

# IMS Version 7 Migration Tips



*The world depends on it*

Rich Lewis  
IBM  
IMS Advanced Technical Support

This document contains information useful in planning a migration to IMS Version 7 from earlier versions of IMS.

This is a revision of the document published on 9/20/2001. It contains additional information about /DISPLAY DATABASE command responses, refers to recently published IMS Redbooks, and makes minor changes to some text. The 9/20/2001 document was a revision of the document published on 01/11/2001. It contained additional information on IMS Online Recovery Service and DBRC Support for Initial Loads (PROCOPT=L and LS).

In this document:

- IMS V7 refers to IMS Version 7 (5655-B01)
- IMS V6 refers to IMS/ESA Version 6 (5655-158)
- IMS V5 refers to IMS/ESA Version 5 (5695-176)
- IMS V4.9 refers to IMS/ESA Year 2000 Local DL/I (5799-GBA)
- IMS TM refers to the Transaction Manager feature of IMS
- IMS DB refers to the Database Manager feature of IMS

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## **Availability and Currency**

IMS V7 became generally available on October 27, 2000. Please consult Announcement Letter 200-290 for more information on availability and ordering.

IMS V5 was withdrawn from service effective September 30, 2001. See Announcement Letter 900-220 for this announcement. IMS V5 was withdrawn from marketing effective December 5, 2000. See Announcement Letter 900-222 for this announcement.

## **What's New in IMS Version 7**

IMS V7 includes enhancements to improve availability, performance, usability, connectivity, application development, and systems management.

A detailed presentation which explains most of the enhancements in IMS V7 is available at:

<http://www.ibm.com/support/techdocs/atmastr.nsf/PubAllNum/PRS160>

It includes explanations of the following:

### **System Enhancements**

- Install/IVP Process
- System Parameters Display
- CPLOG Specification
- Concurrent Upgrade of RECONs
- Online RECON Access Preference
- RECON Loss Notification
- ACBGEN Processing and Limits
- IMS Monitor and IMS PA Enhancements

### **Database Enhancements**

- High Availability Large DB (HALDB)
- Online Recovery Service (ORS)
- Change Accumulation Enhancements
- Image Copy 2 Compression
- DBRC GENMAX and RECOVPD
- DBRC PROCOPT=L|LS support

- I/O Error Handling for DEDBs
- DEDB Scan Segment Expansion
- Open DB Access (ODBA)

## **Transaction Manager Enhancements**

- CQS Enhancements for Shared Queues
- Asynchronous OTMA/APPC
- VTAM Generic Resources enhancements
- Rapid Network Reconnect (RNR)
- TM and MSC Message Routing and Control User Exit
- Queue Space Notification Exit enhancement
- Deferred VTAM ACB Open
- RACF PassTicket Support
- USERID Clarification
- SLUP/Finance Session Cold Termination
- Spool Enhancement
- SLU2 Enhancement
- ETO Enhancements
- Callable Interface to OTMA
- IMS Connect
- Java Application Support

## **Highlights of IMS V7**

Among the highlights of IMS V7 are:

### **Packaging and IVP**

The installation process for IMS has been enhanced to conform more closely with the installation of the other S/390 products. This should make it easier for systems programmers unfamiliar with IMS to successfully install and maintain the product.

### **High Availability Large Databases (HALDB)**

The HALDB function delivers enhancements to capacity, availability, manageability, and usability by enabling partitioning for full function IMS DB databases. HALDB supports as many as 1,001 partitions (each partition having a maximum capacity of 40 gigabytes). This means you can have over 40 terabytes of OSAM or VSAM data sets for a database. A single HALDB partition has the capacity of an entire full function IMS DB database from earlier releases of IMS.

HALDB support also allows a partition to be taken off line, have something done to it, and be independently brought back online. This means each partition can be individually unloaded and reloaded, and while off line, have a batch reorganization done to it. Or the entire database can be taken off line and each partition reorganized in parallel, greatly speeding up the off line reorganization process. Thus, HALDB improves database availability because multiple partitions decrease the amount of data unavailable if a partition fails or is taken off line.

HALDB partitions can be processed in parallel, greatly reducing the total time required for batch workload or utility processing. Reorganized HALDBs are immediately usable after image copies are created because Prefix Resolution or Prefix Update utility processing is no longer required.

HALDB supports secondary indexes and logical relationships.

A presentation on HALDB is available at:

<http://www.ibm.com/support/techdocs/atmastr.nsf/PubAllNum/PRS185>

### **IMS Online Recovery Service (ORS)**

IMS ORS is a new product (5655-E50) which works in conjunction with IMS V7 DB. It provides database recovery processing in an online IMS environment. This facility enables you to recover multiple database data sets by reading log volumes in parallel and applying the database changes to multiple database data sets simultaneously. Recovery related processing occurs only if it is required. In addition, I/O overhead for recovery is reduced. This facility also enables you to recover databases to a point in time which is earlier than the last committed updates. A command initiates database recovery. ORS substantially improves recovery time. Multiple full function database data sets and Fast Path areas can be recovered simultaneously in a single pass of the IMS log data sets.

A presentation on ORS is available at:

<http://www.ibm.com/support/techdocs/atmastr.nsf/PubAllNum/PRS219>

### **IMS Connect**

IMS Connect is a new product (5655-E51). It provides enhanced IMS TCP/IP support over that which was available through the IMS TCP/IP OTMA Connection, also known as IMS TOC or ITOC. Enhancements include SMP installability; dump and trace formatting enhancements for increased serviceability; user exits, command improvement, and asynchronous output support for enhanced usability; and persistent sockets and bottleneck relief for improved performance. Future enhancements to IMS TCP/IP support will only be provided through IMS Connect.

Asynchronous output support is available only when IMS Connect is used with IMS V7. Other enhancements are available when IMS Connect is used with IMS V7, V6, or V5.

Additionally, IMS Connect will provide enhancements for IMS V7 through the service process. This includes Local support, without TCP/IP, when communicating from a Web-serving application to IMS in a S/390 environment. IMS Connect also provides Unicode support for IMS V7 through the service process. This provides the ability to send Unicode application data to an IMS host application capable of dealing with Unicode, such as a Java application running in IMS.

A presentation on IMS Connect is available at:

<http://www.ibm.com/support/techdocs/atsmastr.nsf/PubAllNum/PRS190>

## **Rapid Network Reconnect (RNR)**

RNR utilizes the facilities of VTAM's Persistent Session support to improve IMS system availability. With RNR, IMS TM automatically reconnects terminal sessions following an IMS failure and subsequent restart. RNR includes support for both Single Node Persistent Sessions (SNPS) and Multinode Persistent Sessions (MNPS). SNPS covers IMS failures. MNPS covers IMS, VTAM, and OS/390 failures. MNPS requires a Parallel Sysplex. With MNPS, IMS may be restarted on any OS/390 in the Parallel Sysplex. The value of RNR depends on how quickly IMS is restarted.

## **Java Application Support**

Java application development support enables IMS applications to be written in Java and executed in IMS TM dependent regions. Additionally, Java programs running in CICS, DB2, or Websphere Application Server environments may access IMS databases. VisualAge workstation tools, as well as host tools, can be used for development and testing. IMS Java applications have access to IMS message queues through the use of IMS Java classes. Databases may be accessed either with IMS Java classes or the use of the JDBC interface. The IMS Java support enhances the ability of customers and Business Partners to provide integrated e-business application development with IMS.

Two Redbooks on IMS Java Application support are available. *IMS Version 7 and Java Application Programming*, SG24-6123, explains the application programming requirements. *IMS Version 7 Java Update*, SG24-6536, documents the new IMS TM region types for Java and the deployment of applications in IMS TM, CICS, and DB2.

## **XML Support**



IMS allows the development of application programs which use XML. This may be done through interoperation with the OS/390 XML Parser, Java Edition. The XML parser's application programming interfaces (APIs) can be used with the High Performance Java Compiler, shipped as part of VisualAge for Java, Enterprise Edition for OS/390, to develop a new IMS Java program running in IMS. IMS V7 Java application programmers can thus invoke the APIs (DOM APIs and SAX APIs) of the OS/390 XML Parser, Java Edition, to convert an XML document from its stream form into a "parsed" form for reading, editing, or updating.

## Services

Services are available from IBM for installing IMS V7 and migrating to it from previous releases. Information about these services is available at:

<http://www.ibm.com/software/data/ims/services.html>

## Prerequisite Software

The prerequisite levels of software for IMS V7 are:

- OS/390 V2R6 (5647-A01) or subsequent version, release, or modification level
- DFSMS 1.4 (a base element of OS/390 V2R6)
- IBM High-Level Assembler Release 2 (5696-234) with the High-Level Assembler Toolkit feature

The IMS Transaction Manager feature requires:

- e-Network Communications Server for OS/390 V2R6
- VTAM Version 4 Release 4 (HVT4401)

IMS Java Application Support requires:

- IMS V7 Transaction Manager feature with PQ37547, PQ32371, and PQ37630
- VisualAge Java Enterprise Edition for OS/390 V2 (5655-JAV) with one seat of VisualAge Java for NT V3.5
- OS/390 LE Version 1 Release 7
- For DB2 access, DB2 V5 with PQ19814 or a later release

Rapid Network Reconnect (RNR) requires:

- VTAM Version 4 Release 4.1 (HVT4411) with PTF UW50802
- APPN
- HPR is required for Multinode Persistent Session (MNPS) support

## IMS Related Products

Some IMS related products, such as database tools, require maintenance, new releases, or new versions to operate with IMS V7. Information about these requirements for IBM products is available at:

<http://www-1.ibm.com/support/techdocs/atmastr.nsf/PubAllNum/Flash10062>.

## **Prerequisite APARs**

- IMS Java requires PQ37547, PQ32371, and PQ37630 for IMS V7.
- IMS Connect (5655-E51) requires PQ33929, PQ34229, and PQ34542 for IMS V7.
- IMS Queue Control Facility for OS/390 Version 1 (5697-E99), the replacement for IMS Message Requeuer, requires PQ32932 for IMS V7 to process messages produced on IMS V6 or V5.
- Fast Path MADS I/O Timing support requires OW35775 for Media Manager

## **Supported Connections**

### **DB2**

IMS V7 can be connected via the external subsystem interface to:

- DB2 V4 (5695-DB2)
- DB2 V5 (5655-DB2)
- DB2 V6 (5645-DB2)
- DB2 V7 (5675-DB2)

### **CICS DBCTL**

IMS V7 DBCTL is supported with the following versions of CICS:

- CICS/ESA Version 4 (5655-018)
- CICS Transaction Server for OS/390 V1 (5655-147)

### **ISC**

IMS TM V7 can be connected via Intersystem Communication (ISC) to the following:

- IMS V7, IMS V6, and IMS V5
- CICS Transaction Server for OS/390 V1 (5655-147) and CICS/ESA V4 (5655-018)
- User-written software

### **MSC**

IMS TM V7 can be connected via Multiple Systems Coupling (MSC) with IMS V7, IMS V6, and IMS V5

## **Compatibility**

IMS V7 is upwardly compatible from previous versions and releases, allowing existing applications and data to be used without change. Migration and coexistence support is provided for IMS V5 and V6 with V7.

### **Compatibility Small Programming Enhancements (SPEs) for IMS V7, V6, and V5**

#### **DBRC RECONs**

- IMS V6 requires PQ27643 to use RECONs which have been upgraded to IMS V7.
- IMS V5 requires PQ27640 to use RECONs which have been upgraded to IMS V7.
- IMS V4.9 does not have support for IMS V7 level RECONs.

#### **MSC**

- IMS V7 requires APAR PQ32932 for MSC communications with IMS V6 or V5.
- IMS V6 requires APAR PQ27555 for MSC communications with IMS V7.
- IMS V5 requires APAR PQ27553 for MSC communications with IMS V7. IMS V5 requires APAR PQ04333 for /MSVERIFY to process 2-byte SYSIDs which were introduced in IMS V6.

#### **ACBGEN**

- IMS V6 requires APAR PQ37363 to use PSBs generated by IMS V7 as input to IMS V6 ACBGEN.
- IMS V5 requires APAR PQ37653 to use PSBs generated by IMS V7 as input to IMS V5 ACBGEN.

#### **Shared Queues**

- IMS V6 requires PQ27555 to receive shared queues messages generated by IMS V7.
- IMS V7 requires PQ32932 to receive shared queues messages generated by IMS V6.

#### **Shared Queues support for Asynchronous APPC and OTMA**

- IMS V6 requires APAR PQ29879 to allow a back-end IMS V6 system to process an asynchronous request and send the reply to an IMS V7 front-end system.

## **Exit Routines**

## **RECON I/O Exit Routine (DSPCEXT0)**

If you have a RECON I/O exit routine (DSPCEXT0) special care should be taken when upgrading the RECONS. The exit used by IMS V6 or V5 must be able to read IMS V7 records after the upgrade has been done. If the upgrade is done while an IMS system is executing, the exit routine must be able to read the IMS V6 format records before the update and the IMS V7 format records after the update. An indication of the RECON release level exists in the parameter list that is passed to the exit. When the RECON is upgraded to a new release, the exit routine can use both the old release format and the new release format. During the upgrade process, the release level in the parameter list shows the old release level. A flag in the parameter list indicates that an upgrade is in progress. Prior to IMS Version 7, the release level of the RECON did not change from one Begin Series call to another (within the same job), except during upgrade. All activity to the RECON had to be stopped during this upgrade. With online upgrade in IMS Version 7, the release level of the RECON can change from one Begin Series call to another. Except during the upgrade process, the release level does not change between the Begin Series call and the Terminate Series call.

## **TM and MSC Message Routing and Control User (DFSMSCE0) Exit**

The TM and MSC Message Routing and Control User exit routine is new with IMS V7. It is optional. It includes new message routing capabilities as well as all of the capabilities previously available in the Terminal Routing (DFSCMTR0), Input Message Routing (DFSNPRT0), Link Receive Routing (DFSCMLR0/DFSCMLR1), and Program Routing (DFSCMPR0) exit routines. These routines remain available in IMS V7 but may be eliminated when their functions are moved to DFSMSCE0. The functions of the old routines may be moved to DFSMSCE0 one at a time. When the functions of an old exit routine are moved to DFSMSCE0, it may be eliminated.

IMS V7 is the last release to support the Terminal Routing (DFSCMTR0), Input Message Routing (DFSNPRT0), Link Receive Routing (DFSCMLR0/DFSCMLR1), and Program Routing (DFSCMPR0) exit routines. If you use these exit routines, you should plan on migrating their functions to DFSMSCE0 during the life of IMS V7 at your installation.

## **Exits Routines with Additional Information or Capabilities**

### **Logoff (DFSLGFX0) and Signoff (DFSSGFX0) Exits**

Users of VTAM generic resources with IMS have a new capability. IMS V7 adds the capability for the Logoff (DFSLGFX0) and Signoff (DFSSGFX0) exit routines to reset significant status for terminals in Fast Path response mode. This can affect the VTAM generic resources affinity of these terminals. If you do not want to use this capability, you do not have to modify your exit routine.

## **Logon (DFSLGNX0) and Logoff (DFSLGFX0) Exits**

The Logon and Logoff exit routines are available with the IMS V7 TM feature. In previous releases, the ETO feature was required to use these exits. If you do not want to use the capabilities of these exit routines, you do not have to include them in your system.

## **Queue Space Notification (DFSQSPC0) Exit**

IMS V7 adds access to a flag which indicates if a conversational transaction destination is stopped. The exit routine may choose to reject a message intended for this destination. If you do not want to use this information, you do not have to modify your exit routine.

## **Build Security Environment (DFSBSEX0) Exit**

IMS V7 adds the user ID of the dependent region to the information passed to the Build Security Environment exit. The exit parameter list has been extended to include this data and the USERID indicator. The USERID indicator may be used to determine if the user ID field contains a user ID, an LTERM name, a PSB name, or something else. If you do not want to use this information, you do not have to modify your exit routine.

## **Coexistence of Logs and Utilities**

### **Batch Backout (DFSBBO00), Log Archive (DFSUARC0), and Log Recovery (DFSULTR0)**

IMS V7 Batch Backout (DFSBBO00), Log Archive (DFSUARC0), and Log Recovery (DFSULTR0) utilities accept only logs from IMS V7. The IMS V5 and V6 versions of these utilities do not support the input of logs from IMS V7.

### **Database Recovery (DFSURDB0)**

Inputs to the IMS V7 Database Recovery (DFSURDB0) utility may include:

- Image Copies from IMS V7, V6, and V5
- HISAM Unloads from IMS V7, V6, and V5
- Change Accumulation data sets from IMS V7, V6, and V5
- Logs from IMS V7, V6, and V5

The use of Image Copies, HISAM Unloads, Change Accumulation data sets, and logs produced by IMS V7 is not supported with the IMS V5 and V6 Database Recovery utilities.

### **Database Change Accumulation (DFSUCUM0)**

Inputs to the IMS V7 Database Change Accumulation (DFSUCUM0) utility may include:

- Change Accumulation data sets from the IMS V7, V6, and V5 Change Accumulation utilities
- Logs from IMS V7, V6, and V5.

The use of IMS V7 Change Accumulation data sets from IMS V7 or logs from IMS V7 is not supported with the IMS V6 and V5 Change Accumulation utilities.

## Online Recovery Service

Online Recovery Service executes under the control of an IMS V7 online system. It accepts Image Copies, HISAM Unloads, and logs produced by IMS V7, V6, and V5. It accepts Change Accumulation data sets produced only by IMS V7.

## Migration Tasks

The tasks required to migrate to IMS V7 will vary between installations. You should evaluate the following steps for their applicability to your environment. We have assumed that you will not immediately implement the optional major new functions in IMS V7, such as HALDB and RNR. The implementation of these functions is not included in these migration tasks. Their implementation would be part of a separate plan.

### IMS V7 Familiarization

Familiarize yourself with the functions, features, and enhancements in IMS V7. Resources for this include the following:

- IMS Version 7 Release Planning Guide, GC26-9437
- IMS Version 7 Release Guide, SG24-5753
- IMS Version 7 Presentation available at <http://www.ibm.com/support/techdocs/atsmastr.nsf/PubAllNum/PRS160>
- IMS Version 7 Product Enhancements class, CM70. See [Education](#) on page 28.
- IMS V7 Program Directory, GI10-8334

### Install Prerequisite Software and APARs

Install or upgrade prerequisite software as required. These are explained at [Prerequisite Software](#) on page 9 and [Prerequisite APARs](#) on page 10.

Check the Preventive Service Planning (PSP) bucket for IMS V7. This PSP bucket is found by using Upgrade name: IMS710.

### Update IMS Related Products

Update IMS Tools and related products for IMS V7 compatibility. The products may include those from both IBM and other vendors. These products include those for performance monitoring and reporting, database administration, application control, and other IMS tools. Information on the minimum levels of products which connect with IMS is available at [Supported Connections](#) on page 10. Information on IMS V7 requirements for IBM Tools is available at <http://www-1.ibm.com/support/techdocs/atmastr.nsf/PubAllNum/Flash10062>.

### **Install Coexistence Maintenance on Other IMS Systems**

Apply coexistence maintenance to other IMS systems. This is required for systems using MSC with an IMS V7 system, those that use RECONs upgraded to IMS V7, those using RSR in conjunction with IMS V7 systems, and those using shared queues support in conjunction with IMS V7 systems. These maintenance requirements are explained at [Compatibility Small Programming Enhancements \(SPEs\) for IMS V7, V6, and V5](#) on page 11.

### **Evaluate and Update IMS Exit Routines**

Evaluate the need to update any IMS exit routines. Also, evaluate whether you want to modify any exit routines to take advantage of new capabilities. The changes to exit routines are explained at [Exit Routines](#) on page 11.

### **Evaluate and Forward Fit USERMODs**

If you have any USERMODs to IMS, you should evaluate the continued need for them with IMS V7. If they are still required, they may need to be modified for the forward fit to IMS V7.

### **Update User Programs**

#### **Programs Using IMS Macros or Non-standard Interfaces**

If you have programs which use IMS macros or non-standard interfaces, they may need to be modified to work with IMS V7. You should evaluate all programs which use IMS macros, which read the RECONs directly, or use other non-standard interfaces. They may require reassemblies or other changes.

#### **Programs Which Process IMS Logs**

IMS V7 adds new log records and modifies some old log records. If you have programs which read IMS logs, you should evaluate the need to update them. This is explained under [Log Records](#) on page 21.

#### **Programs Using INQY ENVIRON Call**

If you have IMS application programs which issue the INQY ENVIRON call, they may need to be updated to run successfully under IMS V7. The call returns more data than in previous releases. If your programs cannot handle this condition, they must be updated. This is explained at [INQY ENVIRON Call](#) on page 20.

### **Update Automation**

You should review your IMS related automation procedures and programs. IMS V7 has added some capabilities for improved automation.

IMS V7 adds a new message when an IMS system detects a bad RECON data set. This is explained at [RECON Loss Notification](#) on page 24. You may want to implement automation processes to react to these messages.

IMS V7 allows you to control when messages are issued warning you of large RECON records. This is explained at [Very Large RECON Record Warning Messages](#) on page 25. You may want to use these messages in conjunction with automation to address large RECON record problems.

IMS V7 has added an address space level resource manager for the control region. This service will issue a message if it discovers that the IMS control region has terminated without terminating a subordinate address space. The service also terminates the subordinate address space. The purpose of the message is to alert you to a potential problem, such as a storage shortage, in your MVS system. You may want to update your automation or procedures to react to the new DFS0799E message. The new service and the message are explained in [IMS Control Region Resource Manager](#) on page 20. A new DSP0089I message is issued when a database is registered after it has been loaded. The message states that an Image Copy is recommended. This is explained in [DBRC 'Image Copy Recommended' Flag and Message](#) on page 24.

The Batch Backout utility issues an improved log verification message when it discovers an invalid input log. Information about the expected data set and volume, as well as what was found, may now be in the DFS3294A message. This message has been expanded to report the additional information when appropriate. This should simplify the procedures which address invalid inputs for the Batch Backout utility.

## **Install IMS V7**

IMS installation is documented in the *IMS V7 Installation Volume 1: Installation and Verification* publication, GC26-9429. You should carefully review the Program Directory, GI10-8334, which you receive with IMS V7 before beginning the installation process.

*IMS Installation and Maintenance Processes*, SG24-6574, is a Redbook published in May 2002. It describes the options available for installing and maintaining IMS systems. It is a helpful guide for installations migrating to IMS V7.

Review the information in chapter 4, “IMS Installation Reference Information,” of the *IMS V7 Installation Volume 1: Installation and Verification* publication, GC26-9429, on Installing Multiple Copies of IMS. IMS V7 requires its own Type 2 and Type 4 SVCs. The IMS resource cleanup module (DFSMRCL0) and the dump formatting module (DFSAFMD0) from IMS V7 may be used with earlier supported releases.

## **Upgrade RECONS**

The RECON data sets must be updated to the IMS V7 format before IMS V7 may be executed. IMS V6 and V5 systems may use the upgraded RECONS if they have the necessary coexistence



maintenance applied. This should be done in the Install Coexistence Maintenance on Other IMS Systems migration step. Upgrading the RECONs is explained in [RECON Upgrade](#) on page 17.

### **Execute ACBGEN**

An ACBGEN specifying PSB=ALL and using the IMS V7 level of the utility must be run before an IMS V7 system may be executed. The inputs to ACBGEN may be PSB and DBD libraries generated under previous IMS releases. That is, PSBGENs and DBDGENs do not have to be run under IMS V7. For a technique to speed the execution of ACBGEN, see [Using VIO with ACBGEN](#) on page 22.

### **Execute System Definition**

A system definition must be done. An ALL, ON-LINE, or BATCH gen is required. This is specified as the first subparameter in the SYSTEM parameter of the IMSCTRL macro. ALL is appropriate for almost all users. It generates libraries for both online and batch users. ON-LINE does not generate libraries for batch. BATCH does not generate libraries for IMS Transaction Manager or DBCTL.

The macros used for the system definition may be the same that were used for IMS V6 or V5. This assumes that the databases, applications, static terminal definitions and options have not changed.

## **Migration Tips**

### **RECON Upgrade**

IMS V7 has changed the way that RECONs are upgraded to the new release level. Previous releases used the RECON Upgrade utility (DSPURU00). IMS V7 uses the DBRC utility (DSPURX00) with a new command for upgrades from IMS V6 RECONs. Upgrades from IMS V5 RECONs to IMS V7 still use the RECON Upgrade utility.

When upgrading from IMS V6 level RECONs, **IMS systems do not have to be terminated**. This is a significant advantage over the previous method. The upgrade requires that all IMS systems using the RECONs have the compatibility/coexistence maintenance applied. IMS V6 requires PQ27643. IMS V5 requires PQ27640. Note that this applies to IMS V5 systems which are upgrading their RECONs from the IMS V6 level to the IMS V7 level. This maintenance allows the IMS systems to process the upgraded RECON records. The upgrade process checks to see if there exist any RECON subsystem records for IMS systems which cannot use IMS V7 level RECONs. If there are, the upgrade is not done. This check applies to IMS online and batch systems. Utilities do not create subsystem records in the RECONs. It is the user's responsibility to ensure that no utilities from IMS systems incapable of using IMS V7 level RECONs are running during the upgrade.

While the upgrade is in process, the RECONs are reserved. The time for the upgrade depends primarily on the number of records in the RECONs. Most RECONs take less than two minutes to upgrade. To get an estimate of the time to upgrade your RECONs, you may copy them and upgrade the copies. This should give you an accurate measurement of the time you will require. The RECONs are accessed for online log (OLDS) switches. **You should ensure that your online systems do not**

**need to access the RECONs during this process.** To avoid the need for these accesses while upgrading, you should switch your logs immediately before you upgrade. This may be done with a /SWITCH OLDS command. RECONs are also accessed when databases are authorized, unauthorized, and first updated. To avoid these accesses, you should not issue database commands, such as /DBR DB, during the upgrade process.

The upgrade of the RECONs must be done by a batch execution of the DBRC utility (DSPURX00). The command is:

```
CHANGE .RECON UPGRADE
```

This command cannot be used with an online system. That is, the /RMC IMS command cannot be used to invoke the upgrade.

Check APAR II12095. This informational APAR is used to provide DBRC coexistence and migration information for installations migrating to IMS V7 from earlier releases.

### **RECON Upgrade from IMS V5 or IMS V4.9**

If you are upgrading your RECONs from an IMS V5 or IMS V4.9 to IMS V7, you cannot use the DBRC utility (DSPURX00). You must use the IMS V7 RECON Upgrade utility (DSPURU00). The key size of the RECONs changed with V6. This means that new data sets must be used for the upgrade. RECONs must be at SHARECTL before the upgrade is done. The procedure for upgrading RECONs from IMS V5 or IMS V4.9 to V7 is explained in the RECON Upgrade utility (DSPURU00) chapter of the *IMS Version 7 DBRC Guide and Reference*, SC26-9428.

There is no compatibility support in IMS V4.9 for IMS V7 RECONs. Once the upgrade is done, you can no longer use this release of IMS with the RECONs.

### **System data set names**

IMS V7 has changed the default names for the distribution and target libraries. They now conform to the OS/390 naming standards. Distribution library names begin with ADFS. Target library names begin with SDFS. For example, RESLIB has been replaced with SDFSRESL. Some libraries have been combined. For example, there is one source library for the services, database, and transaction manager components. SVSOURCE, DBSOURCE, and TMSOURCE have been replaced with ADFSSRC. There is one distribution macro library. GENLIB, GENLIBA, and GENLIBB have been replaced with ADFSMAC. There is one target macro library. SMPMTS and MACLIB have been replaced with SDFSMAC. The new names are documented in Chapter 2 of the *IMS V7 Installation Volume 1: Installation and Verification* manual, GC26-9429.

The following table shows the IVP data set name changes.

<b>Dlib-Pre V7</b>	<b>Tlib-Pre V7</b>	<b>Dlib - V7</b>	<b>Tlib - V7</b>
DFSCCLSTA	DFSCCLST	ADFSCLST	SDFSCCLST
DFSEXECA	DFSEXEC	ADFSEXEC	SDFSEXEC
DFSISRCA	DFSISRC	ADFSISRC	SDFSISRC
DFSRTRMA	DFSRTRM	ADFSRTRM	SDFSRTRM
DFSMLIBA	DFSMLIB	ADFSMLIB	SDFSMLIB
DFSPLIBA	DFSPLIB	ADFSPLIB	SDFSPLIB
DFSSLIBA	DFSSLIB	ADFSLIB	SDFSSLIB
DFSTLIBA	DFSTLIB	ADFSLIB	SDFSTLIB

The following table shows the other IMS data set name changes.

<b>Dlib-Pre V7</b>	<b>Tlib-Pre V7</b>	<b>Dlib - V7</b>	<b>Tlib - V7</b>
GENLIB	SMPMTS	ADFSMAC	SDFSMAC
GENLIBA	MACLIB/SMPMTS	ADFSMAC	SDFSMAC
GENLIBB	MACLIB/SMPMTS	ADFSMAC	SDFSMAC
LOAD	-	ADFSLOAD	-
DBSOURCE	-	ADFSRC	-
SVSOURCE	-	ADFSRC	-
TMSOURCE	-	ADFSRC	-
-	RESLIB	-	SDFSRESL
DBOPTSRC	-	ADFSOPSC	-
SVOPTSRC	-	ADFSOPSC	-

## **CPLOG parameter**

The CPLOG parameter on the system definition IMSCTF macro sets the system checkpoint interval. In previous releases, this could not be changed without a system definition. IMS V7 makes four changes to CPLOG. First, the default is changed from 1000 to 500,000. Second, the CPLOG value may be specified as an execution parameter. Third, the CPLOG value may be changed during execution with a /CHANGE CPLOG command. Finally, the CPLOG value may be displayed with a /DISPLAY CPLOG command. If you have found an optimal CPLOG value for your system, you should continue to use it. If you have used the default in the past, we recommend that you use the new default.

## **System Parameters Startup Message**

IMS V7 issues a new message when an online system starts. This new message, DFS1929I, lists the system execution parameter values. The message is written to the system console and the job log. It will be useful for problem determination.

A partial example of this message follows:

```
DFS1929I *****IMS1
DFS1929I * IMS SYSTEM PARAMETERS ACTIVE FOR THIS EXECUTION: *IMS1
DFS1929I *      ALOT      = 1440                               *IMS1
DFS1929I *      AOIP      = 2047M                             *IMS1
DFS1929I *      AOIS      = A                                 *IMS1
DFS1929I *      APPC      = N                                 *IMS1
.
.
.
DFS1929I *****IMS1
```

## IMS Control Region Resource Manager

IMS V7 has added an address space level resource manager for the control region. It uses the MVS RESMGR service for this. This ensures that all subordinate address spaces, such as DBRC and DLISAS, are properly terminated even if the control region terminates before resource clean up can begin or complete. Situations that could cause clean up not to run include storage shortage problems in MVS and MVS FORCE commands. The new service eliminates the possibility of duplicate DLISAS and DBRC address spaces after an IMS emergency restart.

In previous releases, if surviving DLISAS or DBRC address space were not canceled, IMS could experience database open and authorization problems. These could occur due to the databases already being opened and authorized under the surviving DLISAS address space. The new service eliminates this possibility by always terminating any surviving subordinate address spaces when the control region is terminated. If the MVS Resource manager finds a surviving address space, message DFS0799E is issued. The text of the message is:

```
DFS0799E rgntype REGION jobname BEING TERMINATED AT CONTROL REGION END OF
MEMORY
```

If you receive this message, it may indicate other problems. For example, MVS may be short of storage. You may wish to react to this message by alerting your operations staff to the potential problem.

## INQY ENVIRON Call

Applications which issue the INQY ENVIRON call may need to increase the size of the I/O area used for the call. The size of the data returned by the call increases from 140 to 152 bytes with IMS V7.

Current programs could have any size I/O area. If the I/O area is not at least 152 bytes, the call with IMS V7 will return an 'AG' status code in the IO-PCB and partial data in the I/O area. A return code x'100' and reason code x'C' are set in the AIB. The first 140 bytes of the I/O area is unchanged from IMS V6. If the application cannot handle this condition correctly, it must be modified. The simplest solution is to accept these return and reason codes.

## Log Records

Many IMS log records have been modified and some have been added in IMS V7. If you have written programs which process the logs, they may need to be modified. Products which process log records may require maintenance, a new release, or a new version to handle the new or changed records. You should review all of your programs which process IMS log records and ensure that they are updated for IMS V7 as necessary.

The DSECTs for most IMS V7 log records may be generated by assembling the ILOGREC macro specifying RECID=ALL. For guidance on which macros to use for generation of Fast Path (type x'59') log records, see the Log Records section of the SYS-System Service Aids chapter in the *IMS V7 Diagnosis Guide and Reference*, LY37-3738,

IMS V7 archives sync point log records to the RLDS. In previous releases they were archived only to the SLDS. This change was made to support the point-in-time recovery function of Online Recovery Service.

## /DISPLAY DATABASE Command Responses

IMS V7 adds some new information to /DISPLAY DATABASE command responses. This was done for HALDB support. The responses include an identification of the database type. Automation which reads command responses may need to be modified. Similarly, application programs which use ICMD calls to issue /DISPLAY DATABASE commands may need to be modified.

In systems where Fast Path is not defined, a TYPE column has been added to the response. This column contains either DL/I (for non-HALDB databases), PHDAM, PHIDAM, PSINDEX, or PART. This changes the offset to the "ACC" and "CONDITIONS" columns by nine bytes. Programs which use the DISPLAY macro to map response outputs will probably only require reassemblies. The D05, D15, and D70 FIDs in the DISPLAY macro have been modified to account for these changes. Other programs may require changes to account for the movement of data in the responses.

In systems where Fast Path is defined, the existing TYPE column in the response is used for the HALDB information. The offsets to the "ACC" and "CONDITIONS" columns have not changed for these systems.

## Batch Backout Use of READBACK

IMS V7 changes the way the batch backout processes log records for **IMS batch jobs**. Previous releases read to the end of the log, and then read the log backwards. IMS V7 saves records on the forward read, then processes these saved records. This shortens the backout process elapsed time. The log records are saved in the Batch Backout address space. When this space is exhausted, records are saved in data spaces.

Most installations limit the amount of space available in data spaces for an address space. Batch backout could need more space than is available. The READBACK control statement is available for these circumstances. This control statement causes IMS V7 to process like previous releases. It does not save log records in the address space or data spaces. Instead, it reads to the end of the log and then reads backwards. If your batch backout would exceed your space limitations or if you do not wish to use your space for this purpose, you should include a READBACK control statement with your IMS Batch Backout job.

## Enhanced Batch Backout Log Verification Message

The Batch Backout utility issues an improved log verification message when it discovers an invalid input log. Information about the expected data set and volume, as well as what was found, may now be in the DFS3294A message. The new format of the message is:

```
DFS3294A LOG VERIFICATION FAILURE nn - rrrrrrrrrr [DSN= DSNEExamined[,  
          VOL=VOLSERExamined]] EXPECTED= [DSNExpected | VOLSERExpected]
```

This is especially useful with concatenated data sets. Previous releases listed only the DDNAMEs and volumes that were examined.

## Change Accumulation Enhancements

IMS V7 has changed the way that the Database Change Accumulation (DFSUCUM0) utility decides to create "spill records". Spill records can be created when IMS data sharing is used. They increase the size of the Change Accumulation data set. Spill records are created when the utility has processed log records, but there may be other log records from concurrently running IMS systems that are not input to the utility. The change in IMS V7 means two things. First, the size of Change Accumulation data sets for data sharing users may be much smaller with IMS V7. Second, data sharing users no longer need to quiesce the use of a database to get smaller Change Accumulation data sets. Typically, the quiesce was done by issuing /DBR DB commands. If you use IMS data sharing and currently issue /DBR DB commands to limit the size of your Change Accumulation data sets, you should reevaluate this practice.

## Using VIO with ACBGEN

When migrating to IMS V7 you must execute an ACBGEN with PSB=ALL specified. If you have a large number of PSBs, this can be time consuming. IMS Advanced ACBGEN (5655-E05) can be used to significantly shorten the elapsed time of this process. If you do not have IMS Advanced ACBGEN, there is another technique that you can use. Some users have been able to shorten the elapsed time of ACBGEN by using VIO data sets. In the first steps of a job, PSBLIB and DBDLIB are copied to VIO data sets. The next step executes ACBGEN specifying PSB=ALL. The ACBLIB used in this step is a VIO data set. In the final step, the VIO ACBLIB is copied to a permanent ACBLIB data set. By using VIO, many I/Os are eliminated in the ACBGEN step. This can significantly shorten the process. If you have IMS Advanced ACBGEN, we recommend that you use it. It has other advantages as well as shortening the ACBGEN process.

## **ACBGEN Execution Times**

IMS V7 has eliminated some regenerations of PSBs by ACBGEN. In previous releases, any change to a DBD would result in the rebuilding of all of the PSBs that referenced it. This is not true with IMS V7. Many DBD changes, such as changes to HDAM randomizing parameters or changes to exit routine names, do not cause PSBs to be rebuilt. You may notice considerably shorter ACBGEN times with these circumstances. This enhancement does not apply when PSB=ALL is specified. With PSB=ALL, all PSBs are generated.

## **IC2 Compression**

The Image Copy 2 utility has a new option in IMS V7. It can produce a compressed dump of the data set. This produces a smaller image copy data set. Compression is invoked by specifying a 'C' in column 60 of the utility control statement. If DBRC GENJCL.IC is used to generate the job, compression is invoked by specifying COMPRESS with either the SMSCIC or SMSNOCIC parameter.

## **DBRC RECOVPD and GENMAX Changes**

IMS V7 changes the way the DBRC RECOVPD and GENMAX parameters interact. In previous releases IMS would increase the GENMAX value when the RECOVPD setting caused DBRC to retain information about more Image Copies than the GENMAX setting required. IMS V7 does not increment the GENMAX value in these circumstances. Some installations have jobs which reset GENMAX values to their desired levels. These jobs are run periodically. If you have such jobs, you should be able to eliminate them with IMS V7.

## **DBRC Support for Initial Loads (PROCOPT=L and LS)**

IMS V7 adds support for initial loads of databases. When DBRC is used with a job step using either PROCOPT=L or PROCOPT=LS for a database, the Image Copy Needed flag is set for the database.

This was not done in previous IMS releases. The setting of the flag provides additional integrity for the database. The IC Needed flag prevents the database from being updated before an Image Copy has been taken. This avoids the potential situation where a recovery of the database is needed, but no Image Copy exists. Some users have jobs which load "empty" databases. Such a job loads a segment in one step and deletes it in a following step. This is done to initialize the database. An Image Copy is taken later. With IMS V7 the IC Needed flag will be set in the load step. This prevents the delete step from running unless the job is changed. A step which takes an Image Copy should be inserted after the load step.

Initial load jobs which invoke DBRC require an IMS DD statement which references DBDLIB. This was not required for DBB executions in previous releases. Jobs using the DLIBATCH procedure already have this DD statement. Jobs using the DBBBATCH procedure do not have this DD statement. It must be added to DBBBATCH jobs for the initial load to execute. If it is not included, the job will abend and the following messages will be issued.

```
DSP0011I  IMS          DD STATEMENT INVALID OR MISSING
DFS030I DBRC REQUEST FAILED, REASON=53, RC=32
DFS629I IMS BATCH REGION ABEND- IMS 3275
```

The requirement for the IMS DD statement for DBB executions is being addressed by APAR PQ52114. This may eliminate the need for the IMS DD statement. If the resolution for this APAR is not on your system, you should make sure that an IMS DD statement referencing DBDLIB is in your initial load step JCL.

## **DBRC 'Image Copy Recommended' Flag and Message**

IMS V7 has added a new flag for database data sets. The 'Image Copy Recommended' flag is set when a database data set is registered with DBRC. It indicates that an image copy should be taken before the database data set is updated. It is especially useful for databases that are registered after they are loaded. The flag is turned off by an image copy of the data set, a NOTIFY.IC, a NOTIFY.UIC, or a CHANGE.DBDS ICOFF command. If the database is authorized for update with the flag on, message DSP0089I is issued to the MVS console. The text of the message is:

```
DSP0089I AN IMAGE COPY IS RECOMMENDED FOR DBD=dbdname DDN/AREA=ddn or area
name
```

This is only an informational message. For compatibility reasons, updates to the database data set are allowed.

If you register databases after loading them and you do not take image copies, you should be aware of this new message.

## **RECON Loss Notification**



When an IMS system detects a bad RECON data set, it begins a reconfiguration process. IMS V7 issues a new message, DSP0388I, in this circumstance. The message identifies the number of other systems currently using the RECONs and their names.

There are two forms of the message. The first form identifies the number of subsystems using the RECONs. It is:

```
DSP0388I nnnn SSYS RECORD(S) IN THE RECON AT RECONFIGURATION
```

The second form is issued for each batch or online subsystem using the RECONs. It is:

```
DSP0388I SSID=ssidname FOUND
```

You may want your automation to react to these messages by having the other online systems immediately reconfigure their RECONs. This would allow you to more quickly reestablish a spare RECON. This reestablishment is done by deleting and redefining the bad RECON data set. The deletion cannot be done until each system has deallocated the data set as part of the reconfiguration process. A reconfiguration process may be started for an online system by issuing a /RMLIST DBRC='RECON STATUS' command on the system.

## Very Large RECON Record Warning Messages

IMS V7 allows you to specify when you get messages warning that the RECON contains a very large record.

IMS V6 issued message DSP0287W when a PRILOG record had room to hold only 15 more data set entries with 16 volumes each. IMS V7 allows you to specify the number of data set entries and the number of volumes that cause the message to be issued. This is done with the LOGALERT parameter of the CHANGE.RECON and INIT.RECON commands. The defaults are 15 data set entries and 16 volumes. These setting would cause the message to be issued under the same circumstances as for IMS V6.

IMS V7 also adds two new RECON record size messages.

The new DSP0387W message is similar to the DSP0287W message. You may specify different values for the number of data set entries and the number of volumes causing this message to be issued. These are specified on the SIZALERT parameter of the CHANGE.RECON and INIT.RECON commands. You should specify larger values on the SIZALERT parameter than on the LOGALERT parameter. This will cause DSP0387W to be issued before DSP0287W, giving you an earlier warning of the problem. The defaults are 15 data set entries and 16 volumes. Since these are the same values as the defaults for LOGALERT, the values for either LOGALERT or SIZALERT or both should be changed.

The new DSP0007I message is issued when size of any RECON record exceeds a specified percentage of the maximum RECON record size. This percentage is specified on the SIZALERT parameter of the CHANGE.RECON and INIT.RECON commands. The default is 95 percent.

We recommend that you set these parameters such that you have adequate time to react to the potential RECON record size problem.

## **Online RECON Access Preference**

IMS V7 introduces a modification to the scheme used to serialize accesses to the RECONs. This is being done to favor online systems. The intent is to lessen the probability that many concurrently executing batch jobs and utilities will cause I/O bottlenecks to the RECONs which negatively affect online systems. IMS V7 allows only one IMS batch job or utility on an OS/390 system to attempt to RESERVE the RECONs at any time. This is done by having these jobs obtain an exclusive SYSTEM level enqueue on a new resource. Only the holder of the enqueue is allowed to issue the RESERVE. Online systems do not request this enqueue before issuing the RESERVE. This change means that there is less concern about the effect on online systems of running many IMS batch jobs or utilities concurrently.

## **DBRC LIST.HISTORY Output**

The output of the DBRC LIST.HISTORY command has been enhanced in IMS V7. Two things have been done. First, some extraneous records are no longer listed. For example, PRILOG records are listed only once. In previous releases, a PRILOG record would be listed multiple times if there were multiple ALLOC records which referred to it. When a LIST.HISTORY DBD command is used with IMS V7, it does not list the CA group records and the CA execution record entries for other DBDSs in the group. Second, a graphical time line has been added to the listing. This time line interrelates all the events represented by the listed records. It is useful in quickly determining the activities involving the database data sets. Users of this command should be aware of the changes in its outputs.

## **DEDB I/O Error Handling**

IMS V7 introduces a new way of handling write errors for DEDBs. When a write error occurs, a copy of the CI is kept in memory. This copy may be used to satisfy later read requests. This means that the recovery of the area may be delayed until a convenient time. Also, unlike previous releases of IMS, IMS V7 does not stop an area when more than 10 write errors occur for the last area data set of an area. These changes make the handling of DEDB write errors similar to the handling for full function databases. They also improve availability for DEDBs which suffer write errors. You should review your DEDB recovery procedures for I/O errors. It is no longer necessary to immediately recover an area which has suffered write errors.

## **DEDB SDEP SCAN Expansion**

IMS V7 adds the option of expanding compressed DEDB Sequential Dependent (SDEP) segments when they are returned by the DEDB Sequential Dependent Scan Utility (DBFUMSC0). This is specified by including an EXPANDSEG command on a utility control statement. When this is specified, the Segment Edit/Compression exit routine specified in the DBD will be used to expand the segments.

In previous releases some users expanded compressed SDEP segments during Scan processing by specifying a Scan exit routine. Their Scan exit routine invoked the expansion function of the Segment Edit/Compression routine used with the segment. Since each segment might have a different Segment Edit/Compression routine, each invocation of the Scan utility might require a different exit routine. This implementation could be complex. For compatibility reasons, the old technique may be used with IMS V7.

## **DBRC RECON Buffer Defaults Increased**

The default number of VSAM LSR buffers used for the DBRC RECONs has been increased in IMS V7. IMS V6 defaulted to 12 index buffers and 24 data buffers. IMS V7 defaults to 60 index buffers and 120 data buffers. If you have previously found optimal buffer values your system, you should continue to use them. If you have used the defaults in the past, we recommend that you use the new defaults. They should provide better RECON performance. Information on specifying these buffers is available in the "Buffer Size Specification Facility (DSPBUFFS)" chapter of the *IMS Version 7 Customization Guide*, SC26-9427.

## **IMS Dump Formatter**

The IMS Dump Formatter has a new Enhanced Dump Analysis (EDA) option. This provides better serviceability by supporting boolean arguments. For example, a control block may be found quickly by using an offset in conjunction with a specific hex value. It is advantageous for IMS service personnel using remote viewing capability. This support requires APAR PQ34343. We recommend that you apply this maintenance.

## **SLUP/Finance Session Cold Start**

Terminals defined as SLUTYPEP or FINANCE may now have their sessions cold started without cold starting IMS. The enhancement allows IMS to force a cold session initialization without also requiring an IMS cold start after the terminal and IMS experience a non-recoverable attempt to warm start. This occurs when the SNA STSN sequence number mismatch prevents a connection. The /CHANGE NODE command has been enhanced to allow these session cold starts. The new COLDSESS keyword causes the session status to be reset to 'COLD'. The next session request will attempt a cold

start. If you have SLUTYPEP or FINANCE terminals, you should revise your operational procedures to include this capability.

## Suppression of SLU2 Exception Responses

Some installations have terminals defined as SLUTYPE2 which suffer PROG726 errors and keyboard locks when IMS sends SNA exception responses that precede DFS error messages. These terminals may include 3192-G and 3194-F/H devices and some 3270 emulators. These terminals and emulators deviate from standard SNA protocols. Previous IMS releases assumed there were no such deviations. IMS V7 allows you to suppress SNA exception responses prior to sending DFS error messages to SLUTYPE2 devices. This is done with the SLU2=NOEXR execution parameter in the DFSDCxxx member. Specifying this parameter and keyword will eliminate the PROG726 errors and keyboard locks for these terminals. If you have experience these problems in previous releases, you may want to use this capability in IMS V7.

If you specify SLU2=NOEXR, SNA exception responses are not sent to any SLUTYPE2 devices. Some SLU2 emulators use the exception response as the indicator of an error at the host. If you have such emulators, you may need to modify them if you specify SLU2=NOEXR.

## ETO LTERM Assignment Enhancements

IMS V7 has two enhancements for the /ASSIGN command with ETO LTERMs. First, it allows you to assign an ETO LTERM to a nonexistent user. When the /ASSIGN command is issued specifying a nonexistent USER, IMS dynamically creates the user control blocks. Second, the assignment of an LTERM to a USER can persist across session and IMS restarts. The new SAVE keyword on the /ASSIGN command is used to avoid the deletion of the USER and LTERM control blocks in these situations. You can make SAVE the default for these commands by specifying ASSNCHANGE=SAVE in your DFSDCxxx member.

## Education

Course Title	Course Number
IMS V7 Product Enhancements	CM701

IMS V7 Product Enhancements is available from IBM Learning Services. This is a three-day course which describes the new facilities and functions delivered in IMS Version 7. Lectures cover these significant enhancements and their value to IMS installations. Considerations for installing IMS Version 7 and migrating to it from previous releases are explained.

In North America, call IBM Learning Services at 800-IBM-TEACH (426-8322) for schedules and enrollments. In other locations, call your IBM representative for course information. Information is also available at the following Web site.

<http://www.ibm.com/services/learning>

## Publications

### Redbooks

Title	Order Number
IMS Version 7 Release Guide	SG24-5753
IMS Installation and Maintenance Processes	SG24-6574
IMS Version 7 High Availability Database Guide	SG24-5751
IMS Version 7 and Java Application Programming	SG24-6123
IMS Version 7 Java Update	SG24-6536
IMS Version 7 Performance Monitoring and Tuning Update	SG24-6404
IMS e-business Connectors A Guide to IMS Connectivity	SG24-6514
A DBA's View of IMS Online Recovery Service	SG24-6112

Information about Redbooks is available at:

<http://www.redbooks.ibm.com>

### Product Publications

IMS V7 Product Publications are available at

<http://www.ibm.com/software/data/ims/sclicense7ims.html>.

The following product publications are available:

Title	Order Number
Installation Volume 1: Installation and Verification	GC26-9429
Installation Volume 2: System Definition and Tailoring	GC26-9430
Licensed Programming Specifications	GC26-9431
Messages and Codes Volume 1	GC26-9433
Administration Guide: Database Manager	SC26-9419
Administration Guide: System	SC26-9420
Administration Guide: Transaction Manager	SC26-9421
Application Programming: Database Manager	SC26-9422
Application Programming: Design Guide	SC26-9423

Application Programming: EXEC DLI Commands for CICS and IMS	SC26-9424
Application Programming: Transaction Manager	SC26-9425
Command Reference	SC26-9436
Common Queue Server and BPE Guide and Reference	SC26-9426
Customization Guide	SC26-9427
Database Recovery Control (DBRC)	SC26-9428
Master Index and Glossary	SC26-9432
Operations Guide	SC26-9435
Open Transaction Manager Access Guide	SC26-9434
Release Planning Guide	GC26-9437
Summary of Operator Commands	SC26-9439
Utilities Reference: Database and Transaction Manager	SC26-9440
Utilities Reference: System	SC26-9441
Messages and Codes Volume 2	GC27-1120
Diagnosis Guide and Reference	LY37-3738
Failure Analysis Structure Tables for Dump Analysis (FAST)	LY37-3739

The following publications are available in PDF format only:

<b>Title</b>	<b>Order Number</b>
IMS Java User's Guide	SC27-0832
IMS Connect Guide and Reference	SC27-0946

The following information is contained on CD-ROM in product kit LK3T-3526 (no hardcopy):

<b>Title</b>	<b>Order Number</b>
IMS Sample Operating Procedures	SC27-9438