Making your IMS Ready for Year 2000: Migrating to IMS Version 5

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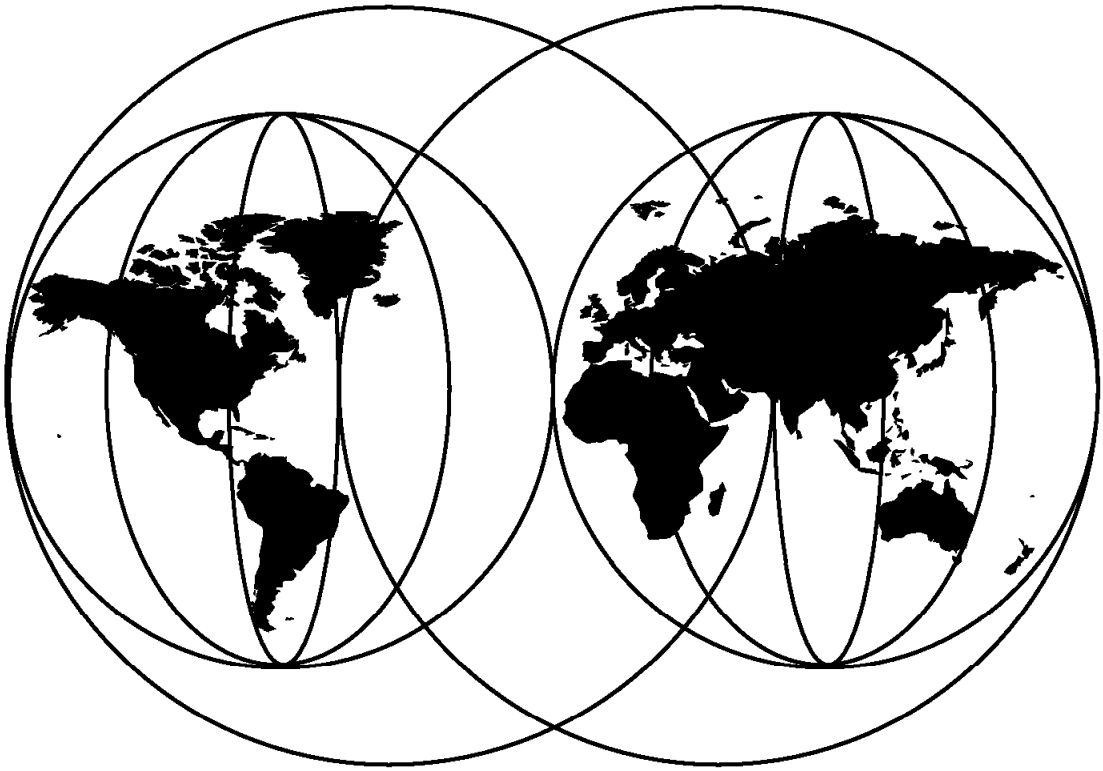

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March 1998

Take Note!

Before using this information and the product it supports, be sure to read the general information in Appendix H, “Special Notices” on page 197.

Second Edition (March 1998)

This edition applies to Version 5 of IMS/ESA Transaction Manager and Database Manager, Program Number 5655-176 and to IMS/ESA Year 2000 Local DL/I, Program Number 5799-GBA, for use with the MVS/ESA and OS/390 Operating Systems.

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Preface

Our goal in writing this redbook is to provide sufficient information to customers running IMS Version 4 or earlier to allow them to migrate their systems to IMS Version 5. IMS Version 5 is the first release of IMS that allows your applications to continue to function after December 31, 1999.

Now that the IMS/ESA Year 2000 Local DL/I Limited Offering is generally available, we also have included information on this option for migration to a Year-2000-ready IMS level.

In this book, we provide

- Advice and guidance on the important issues associated with migration
- Several practical examples to describe what you need to do to perform the upgrade
- A checklist of migration tasks
- A sample project plan.

This redbook does not include information about how to use the new functions IMS has added over the years in its various versions. IMS manuals, especially the Release Planning Guides, already provide this information. Also, we do not discuss the issues associated with the applications themselves. For further information, please refer to the IBM Year 2000 home page on the Internet at *http://www.ibm.com/IBM/year2000*.

This redbook was written for systems programmers and database administrators who need to upgrade their IMS systems to a level that can continue to support their business after the year 2000.

Some knowledge of IMS is assumed, but not a lot. People who are just learning about IMS should not be deterred from migrating their systems.

Audience

This book is intended to be useful for both IMS systems programmers and systems programmers with limited IMS experience. Accordingly, we make as few assumptions as possible about your level of expertise with IMS. As a result, you may need to refer to the IMS product information to get more information about components and features of IMS.

We address the issues associated with:

- IMS Transaction Manager and IMS Database Manager
- Using the IMS Transaction Manager (TM) with other database management systems (an example is IMS TM with DB2)
- IMS Database Manager with other transaction managers (for example CICS with IMS using local DL/I or database control (DBCTL)).

The Team That Wrote This Redbook

This redbook was produced by a team of specialists from around the world working at the International Technical Support Organization San Jose Center.

Geoff Nicholls is an Advisory Systems Engineer at the International Technical Support Organization, San Jose Center. Geoff has a Science degree from the University of Melbourne, Australia, majoring in Computer Science. He worked as an application programmer and database administrator for several Insurance companies before specializing in database and transaction management systems with Unisys and IBM. Since joining IBM in 1989, Geoff has worked extensively with IMS customers in Australia and throughout Asia.

Barbara Frost is an Advisory Technical Marketing Support Specialist for IBM National Technical Support at the Dallas Systems Center in the USA. Barbara has a Bachelor of Arts degree from Slippery Rock University, USA, majoring in Mathematics and is also a Fellow of the Life Management Institute. She had 16 years of experience as an IMS systems programmer and database administrator for a major insurance company, a major telecommunications company, and a major petroleum company prior to joining IBM in 1996. Barbara has assisted many IMS customers in installing IMS and migrating from early releases of IMS to IMS Version 5, in addition to installing, migrating, and optimizing IBM and third party vendor IMS related products.

Niel Kenyon is Services Specialist for IBM Global Services in the UK. Niel has more than 12 years experience working with IMS, in both the transaction and database management areas. Niel′s expertise includes performance and monitoring in the online and batch environments, continuous operations and high availability, remote site recovery, and the integration of IMS with MVS software and hardware. Recently, Niel has been involved in several migrations to prepare customers for the Year 2000 with IMS, as well as projects to convert customers from CICS local DL/I to DBCTL.

Rick Long is an Advisory Systems Programmer for IBM Global Services in Australia. He has many years of experience in the IMS field, specializing in database administration and systems programming. He holds a degree in General Business (Computer Center Administration) from the University of Wisconsin (Whitewater). His areas of expertise include application programming, database design, database recovery control (DBRC) and database administration. He assisted in writing *DBRC Examples and Usage*,GG24-3333.

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- Send us a note at the following address:

  `redbook@vnet.ibm.com`

Chapter 1. How to Use This Book on IMS Migration

This book is a guide to help you migrate your existing IBM Information Management Systems (IMS) and applications to IMS Version 5. The information in this book discusses migrating currently working systems to Version 5 with the minimum of effort. We do not explain how to make use of any of the new features of Version 5. The available IMS/ESA Version 5 design, installation, and customization manuals should be used as the final information source on migration to this IMS/ESA version.

This chapter provides information on how to use this book to plan the migration of an IMS system. If you are an experienced IMS system programmer, this book can be used as a reference to ensure that all the aspects of the migration are considered. If you are less experienced, then a more thorough reading is required.

One place to start is to identify all the IMS components used in your installation by reviewing Section 1.1, “Phase 1: Identifying IMS Components.” If you are familiar with your IMS system, skip to Section 1.2, “Phase 2: Downloading IMS/ESA Version 5” on page 3.

Users of IBM′s Customer Information Control System (CICS) and Database Control subsystem (DBCTL) may want to start with Chapter 12, “IMS/ESA Version 5 Database Control” on page 91 to guide them through the migration. It provides more detail about some of the IMS functions, as many of them are new to first-time DBCTL users.

1.1 Phase 1: Identifying IMS Components

If there is any question as to what components are currently operating in your environment, you will need to identify them. Following is a brief description of some of the components of IMS and identifying characteristics. For more detail, please refer to *IMS/ESA General Information*, GC26-3467.

1.1.1 IMS Transaction Manager

Description: The IMS Transaction Manager (TM) is the communication component of IMS. DCCTL serves the same purpose. Both allow users to log on to IMS *online applications*. An online application thus has transaction components associated with and supporting it.

Identification: IMS TM must run as a started task or job in a MVS system. It has physical terminals associated with it. Terminals log on to IMS via IBM′s Virtual Telecommunications Access Method (VTAM) network. A VTAM application control block (ACB) name is associated with each IMS TM system.

1.1.2 IMS Database Manager

Description: The IMS DB component manages access to the IMS databases from applications and other IMS utilities. Access to IMS databases is through the use of IMS control blocks called *database descriptions* (DBDs). Programs access these databases via the use of IMS program specification blocks (PSBs) and the DL/I call interface.

Identification: In the IMS Stage 1 input source statement files, determine if any DATABASE macros are specified. If these statements are present, then IMS DB is being used. If you are using a CICS local data language interface (DLI) system, then IMS DB is being used. Also, check batch jobs for use of the DFSRRCC0 region control program. If they are found, then IMS DB is being used.

1.1.3 IMS Database Control Subsystem

Description: IMS DBCTL is an IMS system that is connected to CICS transaction management systems. IMS serves as a database access facility for the CICS system.

Identification: The DBCTL system must be running as a started task or job

There is no VTAM ACB associated with a DBCTL system.

1.1.4 CICS Local DLI

Description: CICS Local DLI is an IMS system that is being used by a CICS system to manage IMS hierarchical databases. The IMS component is linked into the CICS system and is running in the CICS address space.

Identification: If the IMS RESLIB library is included in the CICS startup job control language (JCL) then Local DLI is likely being used.

The following parameters might be used in the CICS system initialization table (SIT):

- DLI=YES
- PDIR=
- DDIR=

1.1.5 Fast Path

Description: Fast Path is a feature of IMS that allows specific types of databases to be defined. These are called *data entry databases* (DEDBs) or *main storage databases* (MSDBs). Until Version 3 of IMS, Fast Path was a separately ordered feature. IMS Version 3 included it in the base code. However Fast Path is available to IMS TM and DBCTL systems only.

Identification: In the IMS Stage 1 input file, search for the Fast-Path Control macro (FPCTRL). If this macro is present, then Fast Path support is included.

Note: If the macro is present it will be ignored if the IMSCTRL statement specifies that only a BATCH or MSVERIFY system definition is to be performed.

1.1.6 Database Recovery Control Usage

Description: Database recovery control (DBRC) is an IMS function that can be used in different ways by IMS systems. It is important to understand how it is being used, as use affects migration considerations. Since IMS Version 1.3, DBRC is required if a data communication (DC) system in running. DBRC can also be used for application database recovery control. This is done by registering the application databases with DBRC.

Identification: The easiest way to determine if DBRC is being used for database recovery is to list the RECON for database information. Use the 'LIST.DB ALL' DBRC command as input to the DBRC procedure described in Figure 23 on page 70. If any DB RECON records are found, then DBRC is being used for database recovery. If it is being, used then review Chapter 9, "DBRC and RECON Migration" on page 69 for details on migration considerations.

1.1.7 Internal Resource Lock Manager

Description: The Internal Resource Lock Manager (IRLM) is one of the locking managers that can be used by an IMS system. The IRLM can also be used by DB2 systems.

Identification: The IRLM runs in its own MVS address space. The IMS startup procedure references the IRLM name either:

- In the IMS region startup JCL
- Via the default startup parameter member. See section 6.1.1, "Changes to the EXEC Parameter Statement" on page 55 for details of the startup parameters.

IMS cannot operate without the IRLM being active in the MVS system if IMS makes use of IRLM.

1.1.8 Identifying IMS-Related Products

Description: A wide variety of IMS-related products can be used, whether for online or batch environments. These are some typical ones:

- Database tools (backup, recovery, reorganization)
- Database integrity checking
- Terminal definition tools
- Data communication exits
- Data compression exits
- Data editing tools
- Automation products

Identification: A list of the most common products has been compiled in several tables in Section 14.1, "IBM IMS-Related Products That Support IMS Version 5" on page 137. Refer to those tables to identify all the products being used. If any products being used are shown in the table as unsupported by Version 5, you need to replace them with a supported version or product. Details of how to upgrade some of those products are also included in this chapter.

1.1.9 Third-Party Products

As third-party products are often used in IMS environments, you need to consult with each vendor to determine what levels or replacement products are compatible with IMS/ESA Version 5.

1.2 Phase 2: Downloading IMS/ESA Version 5

The installation of a new IMS version is divided into several steps. First, the product must be downloaded from the distribution media (tape or cartridge) to a direct-access storage device (DASD) in MVS environments. The distribution facility can differ by country, but usually it is one of the following:

- Custom-Built Product Delivery Offering (CBPDO)

- Custom-Built Installation Process Offering (CBIPO)
- IBM Software Distribution (ISD)

Information on how to establish the system modification program extended (SMP/E) environment and how to download the tapes is found in the program directory shipped with the product tapes, or use the Installation Verification Procedure (INSTALL/IVP) supplied with the product. Section 3.3.10, “Perform the IMS Installation” on page 24 contains introductory material on this INSTALL/IVP process.

The following discussion assumes that the downloading is successfully completed and that thereby you have established a working SMP/E environment in your MVS/ESA or OS/390 system for the IMS/ESA Version 5 product.

1.3 Phase 3: IMS Installation

The next step is to install the IMS system. Refer to Chapter 4, “IMS Generation Procedures and Online Change” on page 33 for details on the process and some sample input files that can be used as guidance to generate an IMS/ESA Version 5 system.

We recommend using the INSTALL/IVP dialog to install IMS. IVP tests the newly installed IMS system to verify that the basic facilities of IMS are functioning correctly.

1.4 Phase 4: Customization of the New IMS Environment

After the installation of IMS, it is necessary to customize the product startup, execution, operational, and recovery functions so that IMS can be put to work for your unique business and computing environment. Section 3.3.11, “Customize the IMS Environment” on page 25 is a good index to material in this Redbook associated with the customization of the new system.

1.5 Phase 5: Migrating Existing Systems to the New Level

Each version of IMS from V1 to V6 has introduced new or modified functions compared to its predecessors. We have tried to identify those changes where they directly affect the migration. For a short summary of most of those changes, see Appendix A, “Summary of IMS Function Changes by Release” on page 157. If you are migrating from a version earlier than IMS V3, you need to plan carefully to ensure that a proper fallback scenario is provided when moving to IMS/ESA Version 5.

Other sections of this redbook will be useful during the planning and execution of the migration phase:

- Chapter 3, “General Considerations for Migration to IMS Version 5” on page 11 presents general considerations associated with migrating to IMS/ESA Version 5.
- Chapter 5, “Fallback Considerations” on page 51 is an important chapter to review as a general guide to prepare for the potential of a fallback to your original IMS version.

- It is important to understand the use of DBRC if this environment has not been used yet. Also the DBRC RECON data set will have to undergo an upgrade process to remain compatible functioning with multiple levels of systems (the upgrade process is not available for all levels of IMS when migrating to IMS/ESA Version 5). Chapter 9, “DBRC and RECON Migration” on page 69 contains the necessary information on DBRC and RECON Migration.

Chapter 2. Background to IMS and the Year 2000

When computers and other devices encounter the digits ″00″ to designate the year 2000, the information could be misinterpreted as the year 1900 instead. As a result, except for the most recent software versions and hardware levels, many computing systems may encounter errors or fail to function in some way after December 31, 1999.

Along with all other software developers, IBM has been faced with introducing transition support into its product sets for Year 2000 readiness and then full enablement. IMS has been upgraded to operate successfully into the next millennium. However, as an IMS customer, you must ensure that releases of the product that support this environment are operational in your facilities before the next century is upon us.

2.1 A Short History Lesson

One might question why IMS was not designed with Year 2000 support from the start, which would have eliminated the effort of upgrading to supported levels now. Some of the reasons that the four-digit year was not originally designed into the product as compared to the two-digit value were:

- When IMS was designed in the late sixties and early seventies, DASD space and incore memory were very expensive, and if one could save on those resources by reducing date values by half then this was applauded.
- With the advent of the system 360 technologies, applications and application systems software such as IMS normally did not have to be changed to run on the next level of processor, so constant rewrites were not undertaken as new development was the focus of manpower efforts.

As a result of this design:

- The field used to store the year value was two digits long in both the log and DBRC records and when IMS compared or manipulated the year field, it was performed on two digits.
- The date and local time was used for recovery purposes as part of the recovery token.
- DBRC was designed with the assumption that any date prior to its design (1978) was invalid.
- Since IMS assumed that time always moved forward, users had to shut IMS down momentarily when moving from standard time to daylight savings time. Also, IMS had to be shut down for a hour when moving from daylight savings to standard time as the clock moved back one hour.
- When an input message arrived from the network, IMS placed the two-digit year and local time into the IOPCB as follows:

  0CYYDDDF for the date. The century indicator (shown as C here) is not interpreted consistently in older versions of IMS, and as such cannot reliably be used to indicate the correct century.

  HHMMSSTF for the time stamp.

- Applications could not be tested for year 2000 impacts because IMS versions would not initialize in a Year 2000 test environment before the availability of IMS/ESA Version 5.

This is not a definitive list of the potential problems that could be encountered with older releases of IMS. Section 2.2, “Changes Introduced with IMS/ESA Version 5” summarizes the changes that were made to IMS/ESA Version 5, in order to allow it to function past December 31, 1999.

2.2 Changes Introduced with IMS/ESA Version 5

IMS/ESA Version 5 provides support for the transition past December 31, 1999. Although this version of IMS still uses two-digit years, employs the local date and time as a recovery token, and assumes that the date and time move forward, a major element of support has been introduced. IMS/ESA Version 5 assumes that the two-digit years 00 to 59 are greater than 60 through 99. This has a direct effect on DBRC and IMS recovery utilities.

The change has these results:

- Now that IMS/ESA Version 5 will initialize in a Year 2000 test environment, users can test their applications for Year 2000 impacts.
- The Year 2000 support function of IMS/ESA Version 5 entails no specific date and time stamp changes to log record formats, DBRC RECON data set record formats, to system externals, or to the the IMS application program interface (API).
- Recovery will process logs created over the Year 2000 transition.
- Change accumulation will process logs created over the Year 2000 transition.
- Restart in the Year 2000 can use checkpoint information from 1999.
- Recovery in the 21st century will use Image Copy data sets and Change Accumulation data sets created in the 20th century.
- DBRC will not reject Years between 00 and 77.
- IMS messages containing time stamps will properly display year values having leading zeros.

2.3 Changes Introduced with IMS/ESA Version 6

IMS/ESA Version 6 has been designed to be fully compatible with Year 2000. Some major changes in date and time management increase overall IMS availability. The changes include:

- IMS/ESA Version 6 uses four digits for the year designation.
- Greenwich mean time (GMT or UTC Universal Time Coordinated) is used as the internal date and time recovery token. Local time is no longer used internally, although local time is still displayed in all messages and accepted in time stamp input in IMS commands and utilities. The change to the use of UTC is for internal use only.
- For the purposes of application compatibility, IMS still provides local data and time externally in the API via the same field in the IOPCB. If required, the Version 6 level of the I/O PCB could be assembled into a program with

the new internal time stamp in a 12-byte field at offset 48 into the I/O PCB control block.

- In the log and RECON records, time is measured down to the microsecond level.

The results of these changes include:

- Applications can be tested for Year 2000 compatibility.
- It will not ultimately be necessary to shut down IMS when moving to or from daylight savings, since UTC is used internally for all time stamps.
- There are extensions to the IMS API structures (the IOPCB). There is no requirement to reassemble any application program, unless there is a need to use the new internal time stamp.
- IMS/ESA Version 6 has made extensive changes to log and RECON record formats to provide this support. All the time stamps in DBRC records will be in the new internal format. The time output format for DBRC messages, displays, and listings can be selected by the user; who can choose either local or UTC times, and two- or four-digit years.

With this background, you have an understanding of the changes that have been introduced into IMS in Version 5 and Version 6 to support Year 2000. This publication focuses on the migration to IMS/ESA Version 5 for the goal of Year 2000 readiness support.

We will also provide information on the IMS/ESA Year 2000 Local DL/I Limited Offering in Chapter 13, “The IMS/ESA Year 2000 Local DL/I Product” on page 131. This IMS version is also Year 2000 ready.

Chapter 3. General Considerations for Migration to IMS Version 5

This chapter addresses migration paths and steps. It also covers migration and coexistence considerations.

3.1 Introduction

Migrating an IMS system introduces many considerations beyond those of the mechanics of the migration process. Compatibility and coexistence are of equal importance for many systems.

The migration process consists of many steps, both mandatory and optional. The optimum pace and scope of migration is likely to be different for each customer environment. Because IMS systems are now used by a wide variety of customers for many different applications and in many different environments, the actual migration path and implementation schedule that are best for each customer are highly installation dependent.

3.2 Risk Management and the Migration Process

Migration planning allows you to migrate safely and avoid an unexpected fallback. We recommend that the migration plan itemize what will change in this migration, what must be tested, who is responsible for completing the testing, what risks exist, and the fallback process associated with each risk.

As a general approach, if the system is important, preserving fallback capability is essential. Accordingly, structure the migration process to maintain the fallback capability throughout. A few major activities associated with risk management are discussed below.

3.2.1 Evaluating the Impact of the Migration

Migration from IMS Version 1, 2, or 3 introduces a considerable number of mandatory changes that affect your system. It is important that you evaluate the impact of these changes. Review Section 3.4, “Mandatory Task List Associated with the Migration” on page 27 for details on mandatory migration efforts. For more information on each of the possible migration plans, examine the appendixes in this redbook.

Only two migration paths to IMS/ESA Version 5 are supported through the availability of compatibility migration maintenance:

- IMS/ESA Version 3 to Version 5
- IMS/ESA Version 4 to Version 5

Migration to IMS/ESA Version 5 from other IMS versions is gated by compatibility of IMS logs, RECONs, and MSC links.

The fallback scenario should aim to restore your old system back to where it was, except for updated databases. Partial fallback is not recommended. Also, a fallback could affect the manner that the IMS operational environment functions since operations with IMS/ESA Version 5 may be controlled differently than under your fallback level.

3.2.2 Evaluating the Verification Test Requirements

For users migrating from previous IMS levels, the earlier installation verification procedures (IVPs) are not adequate to verify the correct functioning of applications, utilities, and system processing and output. Other verification test procedures are required to verify such elements as:

- Application programs
- Databases
- Job control steams
- Automation procedures
- Online and offline operating procedures
- Data, application, and systems recovery procedures
- Network operation

Evaluate the testing requirement to ensure that it is representative of your system′s actual workload and criticality. Along with function testing to ensure that your applications work well in the new IMS environment, thorough function, stress, and regression testing are important to assuring the eventual success of your migration effort.

3.2.3 Developing Stress and Regression Tests

When choosing tools for the verification tests, consider using any or all of these:

- The Teleprocessing Network Simulator (TPNS) program 5662-262. This is a terminal and network simulation tool for determining system performance and response times, evaluating teleprocessing network design, doing functional testing, and automating regression test procedures.
- The IMS/ESA Message Requeuer program. This is a program product that supports IMS message queue access. Its primary purpose is to recover IMS message data (transaction input and output) stored in the IMS message queues, allowing the recovery of such data across an IMS cold start. This capability also makes the MRQ an excellent tool for performing stress and regression tests.
- Making sure the number of terminal users is adequate to provide a valid test for systems where response time is critical.
- Running your batch jobs in your test environment using workload volumes comparable to those of your production environment, to make the tests valid for performance evaluation.

As a sample regression test, consider restoring database copies from yesterday morning. You can then rerun part of yesterday′s online transactions and batch streams and compare the result with those of yesterday′s actual production system.

The DL/I Test Program DFSDDLT0 is ideal for regression testing. By using a known database, DFSDDLT0 can issue calls and then compare the results of the call with expected results using COMPARE statements. Information on how to use DFSDDLT0 can be found in Appendix F of *IMS/ESA Application Programming: Transaction Manager*, SC26-8017

3.2.4 Developing and Testing Fallback Processes

The development and testing of a fallback process verifies the ability to restore and operate on the original IMS level after attempting a migration. Also, if the new IMS level is to be guaranteed to be able to function in line with the previous level, tests to check their coexistence must be developed. One result of these tests will be to ensure that all migration compatibility software prerequisite or corequisite APARs are correctly applied on all systems.

3.2.5 Creating the Migration Project Plan

As with any other large business system′s migration, all scheduled activity, target deadlines, facility and personnel requirements, responsibility assignments, estimated costs and required levels of executive management support must be drafted and distributed for input from all involved parties in a project plan. As part of this plan, time and funds must be allocated for the education of operations staff, database administrators, security personnel, automation support, and systems programming on IMS/ESA product enhancements, operational changes, and migration paths.

3.2.6 Implementing New Functions

After you have finished the mandatory task, have migrated your system successfully, and had your new IMS/ESA Version 5 system up and running for a reasonable number of days or weeks, you can consider implementing optional new functions and enhancements. But consider this element of change as worthy of the same risk management process applied to the original IMS/ESA migration. This applies to both test systems and production systems.

The experienced user might consider phasing-in changes in a test system, and including these when migrating production systems.

Depending on where you are migrating from, a considerable number of new functions and enhancements have been introduced. For a summary of these new functions and enhancements, see Appendix A, “Summary of IMS Function Changes by Release” on page 157.

3.3 General Tasks for Migration

Now that we have discussed the importance of risk management for an IMS migration, this section describes the tasks required for the migration. This list below does not represent a complete set of all considerations for migration, nor is the plan derived from this list suitable for every environment.

You are responsible for constructing a suitable migration plan that is valid for your own environment.

A listing of a series of sample tasks follows:

- List hardware and software requirements
- Review IMS Version 5 functions
- Review installation environment
- Determine which migration efforts are needed
- Prepare a migration plan
- Prepare a fallback plan

- Install migration PTFs
- Complete database recoveries on the old IMS system
- Back up the old IMS system
- Install the IMS/ESA Version 5 system
- Customize the IMS/ESA Version 5 system
- Review operations processes
- Review selected user programs
- Back up the IMS/ESA Version 5 system

If you are migrating from IMS/ESA Version 3 or 4 to Version 5, there is a direct migration path supported by IBM. If you are migrating from IMS Version 1 or 2 and do not use DBRC and have no, or just a few Multiple Systems Coupling (MSC) systems, you should experience few problems migrating directly to IMS Version 5. All your databases and applications should work on Version 5.

Additional information to the material offered in this chapter can be found in:

- Appendix B: Migration Considerations in *IMS: Why Migrate?*, GC26-8912
- Chapter 3: Migration to IMS Version 5 in *IMS/ESA Release Planning Guide*, GC26-8031.

When we refer to IMS/VS, the levels are Version 1 and 2. IMS/ESA levels are Versions 3, 4, 5 and 6.

3.3.1 Understand Hardware and Software Requirements

Check the hardware and software environment (prerequisites and corequisites), as follows:

- Collect hardware and software requirement information from the Program Directory (PDIR), which is delivered together with the IMS/ESA installation tapes, and from Chapter 2 of *IMS/ESA Version 5 Release Planning Guide*, GC26-8031.
- Contact your local IBM Support Center to collect the current installation, migration, and problem-resolution information. Get the Preventive Service Planning (PSP) data for your original IMS level and for each level that will be crossed to move up to IMS/ESA Version 5, including IMS/ESA Version 5 itself.
- Pay particular attention to the requirements associated with IBM′s Multiple Virtual Storage (MVS) Data Facility Storage Management Subsystem (DFSMS), the Resource Access Control Facility (RACF), and VTAM software levels. For users migrating from IMS/VS Versions 1 and 2, pay particular attention to the table listing Terminals Supported by IMS/ESA Version 5 in Chapter 2 of *IMS/ESA Release Planning Guide Version 5*, GC26-8031.
- Review the service applied to your current system and the target IMS/ESA Version 5 level. Of special importance are the compatibility service levels that must be applied to these products. The Program Directories and PSP buckets will contain information on this maintenance.

3.3.2 Review IMS/ESA Version 5 Functions

- Review the new functions and enhancements:

  The most complete source of information is in *IMS/ESA Release Planning Guide Version 5*, GC26-8031.

- Look at the IMS home page on the Internet for the latest information about the product.

  The home page is located at *http://www.software.ibm.com/data/ims*.

- Based on the scope of the migration, we also recommend that you review the following manuals:

  – *IMS: Why Migrate?*, GC26-8912

  – *IMS/VS V1.3 Release Guide*, SH20-9207

  – *Guide to Migration from IMS/VS V1 to IMS/ESA V3*, GG24-3445

  – *IMS/VS Version 2.2 Release Guide*, SC26-4185

  – *IMS/ESA Version 3 Release Planning Guide*, GC26-4386

  – *IMS/ESA Version 4 Release Planning Guide*, GC26-4630

  – *IMS/ESA Version 4 Migration Guide*, GG24-4150

  – *IMS/ESA Version 5 Release Planning Guide*, GC26-8031.

  – *IMS/ESA Version 5 Guide*, GG24-4302

  – *IMS/ESA Version 6 Guide*, SG24-2228.

  New functions, enhancements, and other changes introduced in IMS Versions 1, 2, 3, and 4 are not covered in the Version 5 documentation. Appendix A, “Summary of IMS Function Changes by Release” on page 157 contains an abbreviated table of these new functions.

3.3.3 Review the Current Installation Environment

Review the following:

- Which optional functions are currently used at your IMS level.
- What external systems and hardware devices are connected to your IMS level.
- Which user exit routines are currently in place.
- What user modifications to IMS code exist in your installation.
- What programs analyze the IMS log data.
- What IBM and OEM critical productivity, operational, or service aids are being used.
- How the IMS environment is maintained and serviced.
- Whether you have the necessary migration PTFs to your existing system, including the DBRC migration Small Programming Enhancements (SPEs) or PTFs.
- Location of system definition macros and PROCLIB members.
- Operation processes (procedures, automation, data base and system recovery, performance monitoring).

3.3.4 Determine the Scope of the Migration Effort

Identify the necessary migration efforts as follows:

- Review the scope of changes required for your existing installation and what the IMS/ESA Version 5 environment will look like. Here are some items to consider during this determination:
  - System modification programs (SMP) distribution, and system data set location and size.
  - Existing system definition macros.
  - Scope of work associated with log record analysis programs that might have to be rewritten.
  - User exit routines (see Chapter 11, “IMS/ESA Version 5 Database Exits” on page 89 for details) that are being used now and those that might be written for IMS/ESA Version 5 use.
  - User IMS code modification retrofit activity.
  - Amount of activity associated with upgrading IBM and OEM utilities and service aids to function at an IMS/ESA Version 5 level.
  - Cataloged procedure location and state.
  - PROCLIB member location and state.
  - DBRC skeletal member location and state.
  - Operator commands currently in use, either manually or controlled through automation.
  - Messages and codes receiving automation responses.
- Determine the scope, time, and personnel required for the migration effort
- Review operational, performance monitoring, application and database design, automation, system or data recovery processes that might have to be modified.

More detail on migration considerations is contained below, presented under titles associated with major IMS system, component or feature groupings.

3.3.4.1 IMS DB/DC Systems

The following apply to the installation and migration of the entire IMS DB/DC system: (It assumes that you have correctly installed the IMS Version 5 system.)

- For customers migrating from IMS Version 1, we recommend reviewing the Offline Dump Formatter Utility (DFSOFMD0) introduced in IMS/VS Version 2.2. Note that much of the information is to be found in *IMS/ESA Version 5 Diagnosis Guide and Reference*, LY27-9620, which is available only to licensed IMS customers.
- The IMS Version 5 modules Resource Cleanup (DFSMRCL0) and Formatted Dump (DFSAFMD0) are not downward-compatible past Version 1.3.
- The log data sets produced by IMS/ESA Version 5 cannot be used to restart any other IMS system level and the log data sets produced by any other IMS Version cannot be used to restart any IMS/ESA Version 5 system.
- You can use the IMS/ESA Version 3 or 4 system log data set (SLDS), recovery log data set (RLDS), image copy, and change accumulation data sets with the Change Accumulation utility and Database Recovery utility for Version 5
- You cannot use the Version 3 or 4 logs with the Version 5 batch backout, log recovery, or log archive utilities. Likewise, you cannot use the Version 5

logs with the Version 3 or 4 batch backout, log recovery, or log archive utilities.

- In an XRF environment, all systems must be at the same level.
- New IMS/ESA Version 5 log formats could affect user programs using logs for post-processing activity. For example, the length of the log sequence number has been increased from 4 to 8 bytes and any applications that refer to these numbers may need to be modified.
- The LSO options LSO=X and LSO=N are no longer supported as of IMS/ESA Version 3. You also need to review the LSO=S impact on buffer allocation.
- IMS/ESA Version 4 provided enhancements for customizing and expanding control over the execution startup parameters for your IMS system. For more information please refer to:
  - Chapter 27, System Enhancements, in *IMS/ESA Version 4 Release Planning Guide,* GC26-4630
  - *IMS/ESA Installation Guide Volume 2: System Definition and Tailoring*, SC26-8024
  - Chapter 6, “Operational Considerations Migrating to IMS Version 5” on page 55
- The AOEXIT parameter must be removed from the COMM macro in the IMS Stage 1 input stream, since it is no longer supported.

3.3.4.2 IMS DB Component

Take account of these:

- Always build the application control blocks via an ACBGEN and ***never*** use a higher level ACBLIB with a lower level IMS. Depending on your IMS maintenance level, using an older ACBLIB with a newer IMS will either cause IMS to issue a warning message, or fail with a system 0C4 abend. Protect your ACBLIB with RACF, making the ACBLIB impossible to use with the earlier level of IMS.
- Data sharing between IMS Version 5 and systems earlier than IMS Version 3 is not supported. Migration to IRLM 2.1 is required if you plan to do sysplex data sharing. However, such a migration is outside the scope of basic migration to IMS/ESA Version 5. Please see *IMS/ESA Data Sharing in a Parallel Sysplex*, SG24-4303, and *IMS/ESA Sysplex Data Sharing: An Implementation Case Study*, SG24-4831 for information on implementing data sharing with IMS.
- All user exit routines must be converted to AMODE=31 when they reference any IMS TM or DB resources.
- Virtual storage constraint relief in IMS/ESA Version 3 with movement from CSA to Extended CSA (ECSA) residing above the 16-megabyte line makes possible larger pools for PSBs and data management control blocks (DMBs) in IMS/ESA compared with IMS/VS. Reevaluate the corresponding parameters to increase the pools, as long as the increase is backed up by real storage (to ensure that page faulting does not affect performance). For more information, refer to Chapter 4, “Virtual Storage Constraint Relief (VSCR)” in *IMS/ESA Version 3 Release Planning Guide Release 1*, GC26-4386.

Because of withdrawn support, changes are required to procedures that use:

- The DSLOG utility, the DSLOG function, and associated routines. Use the change accumulation utility instead.
- Running utilities under the Utility Control Function (UCF)
- Track Recovery for the index component of a VSAM KSDS.

Index sequential (ISAM) databases must be converted to VSAM. See Chapter 10, “Database and Application Support with IMS Version 5” on page 85 for more information.

3.3.4.3 IMS Transaction Manager Component

Transaction management migration must take account of the following:

- IMS/ESA Version 3 implemented three changes affecting the way in which IMS schedules transactions:
  - LOAD BALANCING: APPLCTN Macro with SCHDTYP=PARALLEL

    PARLIM=0 on the TRANSACT macro means: NO parallel scheduling of the application at the IMS/VS levels of V1 and 2.

    PARLIM=0 and MAXRGN=0 on the TRANSACT macro are required in IMS/ESA Version 3 and later to obtain the same result of no parallel scheduling of a transaction. The specification of PARLIM=0 on the TRANSACT macro with MAXRGN not equal to 0 indicates that any input message can cause a new region to be scheduled (up to the MAXRGN value) because the scheduling condition will always be met (the number of messages will be greater than zero).
  - TRANSACTION RESCHEDULING: PROCLIM=n on the TRANSACT Macro

    When the processing limit count (PLC), set by the PROCLIM parameter on the TRANSACT macro, was reached in IMS/VS Version 1 and 2, the next request for an input message was given a QC status code and the application program had to terminate.

    IMS/ESA Versions 3, 4, 5, and 6 return a QC status code only when the scheduling algorithm requires processing of another transaction code. Otherwise, it writes the usual termination or scheduling log records (X′07′or X′08′) with the accounting information and passes the next transaction to the application without returning the status code QC beforehand. This is referred to as a *Quick Reschedule*.
  - PSEUDO WFI (Wait For Input)

    PWFI=YES is a parameter introduced by IMS/ESA Version 3 into the Message Processing Region startup JCL. It can reduce the termination or scheduling activities in the defined region without dedicating one region to a single transaction type (which would be the case if the WFI parameter was set on in the TRANSACT macro). If PWFI is specified, and there are no messages enqueued for the current transaction, the dependent region becomes idle (Wait-for-Input mode) and waits until another transaction appears. If the next message is for the currently scheduled transaction, the message is returned to the application with a ″blank blank″ status. Otherwise termination and scheduling result. Specifying the PWFI on all MPRs may lock resources for a longer period of time than IMS/VS. The installation should ensure that the required resources are available to avoid negative performance results.

- The VTCB is a control block introduced in IMS Version 2. It changes the arrangement of the terminal control blocks from grouping by control block type to a grouping based on the individual terminal. More information about this can be found in *IMS/ESA Version 5 Customization Guide*, SC26-8020.
- IMS/VS Version 1 users should analyze the use of the following buffer and control block pool resources as a result of IMS Version changes:

  Communication input/output queue pool (CIOP) new in Version 2

  Receive any buffer pool (RECA) new in Version 2

  High input/output pool (HIOP) new in Version 2

  Communication work area pool (CWAP) replaced by SPAP in Version 4

  Message format pool (MFP)

  Message queue pool (MSGQ)

  Data management pool (DMB)

  Data management work pool (DMBW)

  Program specification block pool (PSB)

  Program specification block work pool (PSBW)

  Automated operator interface pool (AOIP) new in Version 5

  Communication external subsystem pool (CESS)

  Expedited message handling buffer pool (EMHB) new in Version 4

  Fast Path work pool (FPWP) new in Version 4

  Logical Unit 6.2 manager buffer pool (LUMP) new in Version 4

  Logical Unit 6.2 manager common pool (LUMC) new in Version 4

- The IMS/ESA Version 4 storage manager was modified to provide dynamic pool support to selected storage pools, enabling them to dynamically expand and contract based on storage requests. This relieves the user of the burden of calculating storage pool sizes, although you may specify an upper expansion limit for these pools. This is not recommended, since IMS will wait for storage to be freed in a pool when the pool limit is reached.

  Default storage pool definitions are generated for IMS.PROCLIB members. DFSSPMxx is not required to initialize IMS, but it allows you to override the default buffer definitions for the following storage pools in Table 1.

Table 1 (Page 1 of 2). Storage Managed by the Dynamic Storage Manager

POOL ID	POOL NAME	STORAGE	Usage
AOIP	Automated Operator Interface Pool	CTL/EPVT	AOI work areas
CESS	Communications External Subsystem	ECSA	External subsystem buffers
CIOP	Communications I/O Pool	CTL/PVT	TP buffers
EMHB	Expedited Message Handler Buffer	ECSA	EMHBs
FPWP	Fast Path Work Pool	CTL/EPVT	Fast Path work buffers

Table 1 (Page 2 of 2). Storage Managed by the Dynamic Storage Manager			
POOL ID	**POOL NAME**	**STORAGE**	**Usage**
HIOP	Communications I/O Pool (High)	CTL/EPVT	TP buffers, MFS work buffers, SPAs, miscellaneous work areas
LUMC	LU6.2 Manager Common Pool	ECSA	LU6.2 work areas
LUMP	LU6.2 Manager Private Pool	CTL/EPVT	LU6.2 TP buffers
SPAP	Scratch Pad Storage Pool (Previously know as CWAP)	CTL/EPVT	SPAs
Note: With IMS/ESA Version 6, the SPA pool no longer exists. The SPA is kept with the input and output messages along with a new conversation message prefix item which identifies it as a SPA segment.			

Use of the IMS.PROCLIB member DFSPBxxx allows you to override the default buffer definitions for some storage pools, as shown in Table 2.

Table 2. Storage Pool Startup Parameter Overrides	
POOL ID	**Parameter Description**
RECA	RECA: The number of receive-any buffers
MFP	FBP: Amount of subpool 0 storage to be allocated to the message format block pool
MSGQ	QBUF: Number of message queue buffers in subpool 0 to be allocated to the queue pool
DBD	DMB: Amount of subpool 231 storage to be allocated to the DMB pool
DMBW	DBWP: Amount of subpool 231 storage to be allocated to the database work area pool
PSB	PSB: Amount of subpool 231 storage to be allocated to the PSB pool
PSBW	PSBW: Amount of subpool 231 storage to be allocated to the PSB work area pool

A new online trace option has been added to support a storage manager trace for each of these pools. See Chapter 2 in *IMS/ESA Operator's Reference*, SC26-8030 for more information on the /TRACE command.

3.3.4.4 Fast Path Component

The following changes to the Fast Path component are relatively minor and can be accommodated without much difficulty in most migrations:

- The /DISPLAY AREA command requires an additional parameter 'IOVF', if the count of the available IOVF CIs is to be displayed. By default, the /DISPLAY AREA command does not calculate the number of free CIs.
- The HSSP image copy no longer exists. It has been replaced by the HSSP asynchronous image copy (ASIC). The image copy produced to tape or DASD is a standard concurrent image copy (CIC).

- HSSP application programs can no longer make backward references using the HSSP PCB. A request for data from a UOW before the current UOW is called a *backward reference*. In IMS/ESA Version 5, an FY status code is received when performing this operation. Programs should be provided an additional non-HSSP PCB to be used for backward references.
- HSSP gains its performance benefits in IMS/ESA Version 5 by exploiting larger amounts of data in private buffers. Rather than using one or two buffer sets fixed in real storage (one buffer set if read-only, two buffer sets if updating), a minimum of three to a maximum of six buffer sets are allocated in real storage. Consideration should be given to the real storage requirements of concurrent HSSP jobs.
- The IMS/ESA Version 5 DEDB high speed reorganization utility uses more real storage than earlier versions, to improve performance. Consequently, you might want to limit the number of reorganization utilities that are run in parallel.

  Also, in previous IMS releases, special processing had to be performed at /START AREA or /ERESTART if a failure had previously occurred while the reorganization utility was copying the reorg UOW back to the source UOW. Now the utility is treated as any other updating job and recovery is standard, based on log records.
- Any user-written programs that process output from the log tape analysis utility must be modified.

3.3.4.5 IMS User Exit Considerations

The following changes to user exits need to be evaluated:

- DFSLULU0 (LU6.2 destination exit) no longer exists. The function of this exit has been moved to DFSCMUX0.
- DFSCMUX0 (message control/error exit) now supports MSC, LU6.2 and OTMA.
- DFSCMPR0 (MSC program routing exit) requires modification since it is now also called for local transactions.
- DFSCMTR0 (MSC terminal routing exit) and DFSAOUE0 (automated operator exit - type 1) are not longer linked with the IMS nucleus.

For more information on database exits, see Chapter 11, “IMS/ESA Version 5 Database Exits” on page 89.

3.3.4.6 DASD Logging Feature

The log data sets created by IMS/VS and IMS/ESA levels are not compatible.

For online log data sets, all OLDS and WADS can be allocated through dynamic allocation in the DFSMDA member. JCL allocation is no longer recommended and is ignored when a DFSMDA member is found. OLDS and WADS attributes (OLDSDEF, WADSDEF) must be defined in the member DFSVSMxx, which resides in the IMS.PROCLIB data set.

3.3.4.7 Time-Controlled Operations

The time-controlled operations (TCO) feature was introduced with IMS/ESA Version 3. TCO is a function that replaces and enhances the time-initiated input facility (TIIF), program 5789-CWF. TCO allows IMS messages to be sent automatically at IMS startup, at specified times of day, and at specified time intervals. TCO can be used to start batch message programs (BMPs) at predetermined times, automate the image copies and reorganization of databases, issue IMS commands to start or stop networks, issue message switches, and issue monitoring commands.

3.3.4.8 Multiple VSAM Pool Support and Hiperspace Buffering

IMS/ESA Version 3 provided the ability to build multiple VSAM shared resource pools. Multiple subpools of different buffer sizes can exist in each of the VSAM shared resource pools. This allows multiple subpools of the same buffer size to exist in the system.

Specify the required subpools in the DFSVSAMP data set for batch environments or in the DFSVSMxx member of the IMS.PROCLIB data set for DB/DC environments. For details, please see Chapter 7 of *IMS/ESA Installation Volume 2: System Definition and Tailoring*, SC26-8024.

With IMS/ESA Version 4, Hiperspace buffers, in multiples of 4 KB, can be defined for unique VSAM subpools in the VSAM shared resource pools.

3.3.5 Prepare a Migration Plan

Prepare a migration plan that is valid for your environment. IMS/VS Version 1 or 2 users should consider performing only those mandatory tasks associated with the migration, described in 3.4, “Mandatory Task List Associated with the Migration” on page 27. You may also find useful information in Appendix B, “IMS Version 1.2 to Version 5 Migration Plan” on page 161.

IMS/ESA Version 3 or 4 users should review the supported migration-path information in these books:

- *IMS/ESA Release Planning Guide Version 5*, GC26-8031
- *IMS/ESA Version 5 Guide*, GG24-4302.

3.3.6 Prepare a Fallback Plan

The purpose of the fallback plan is to have your old system back and working in the situation when the move to IMS/ESA Version 5 has to be temporarily delayed. Users of IMS/VS Version 1 or 2 should make sure to use the contents of all their old libraries. Any update to the old libraries, such as copy, assembly or linkedit, using macros, source code, or modules from IMS/ESA Version 5 libraries should be backed out before restarting the old system. There is no supported migration path or fallback path between IMS/VS Version 1 or Version 2 and IMS/ESA Version 5. Partial fallback is not recommended. See Chapter 5, “Fallback Considerations” on page 51 for more information.

As migration and fallback between IMS/ESA Version 3 or Version 4 and IMS/ESA Version 5 are supported, some libraries are compatible. See 5.5, “Libraries” on page 52 for more information.

Because a fallback may or may not affect the operational environment, an IMS fallback may have to be an integrated part of a larger fallback scenario.

3.3.7 Install Migration PTFs

This applies only to users of IMS/ESA Version 3 or 4 who are migrating to Version 5.

Apply migration program temporary fixes (PTFs), if applicable, to the existing system, including the DBRC migration small programming enhancement (SPE). The purpose of applying migration PTFs is to update your existing system to be able, in case of a fallback, to run with changes introduced by the new system.

Apply applicable coexistence PTFs to partner systems that interface with your IMS systems through MSC, ISC, block-level data sharing (BLDS), and the like. For example, partner systems may have to be updated to tolerate commands introduced by the new system or to comply with other changes introduces by a corrective service PTF. Neglecting to apply coexistence PTFs may cause either system to fail.

Information about PTFs can be found in preventive service planning (PSP) data, and the IMS/ESA Version 5 Program Directory delivered with the product tapes.

3.3.8 Perform Database Recovery If Required

All database recoveries should be performed prior to migration. Because the database recovery utility uses the logs as input, recovery should be performed using the current version rather than the database recovery utility level from IMS/ESA Version 5. The operations are as follows:

- Perform database recovery for any DL/I database data sets for which extended error queue elements (EEQEs) have been recorded in DBRCs recovery control data set (RECON).
- Perform database recovery for any DEDB area data sets for which EQEs have been recorded in the RECON. See Chapter 10, “Database and Application Support with IMS Version 5” on page 85 for more information.

3.3.9 Backup the Existing System

Back up the existing system, including:

- SMP/E, distribution, and target libraries — Keep a copy of your old SMP/E environment in case you need to apply maintenance after a possible fallback.
- Other IMS libraries:
  - PGMLIB
  - PSBLIB
  - DBDLIB
  - REFERAL
  - FORMAT
  - TFORMAT

  Depending on which version of IMS you have to fall back to, updates to these libraries using IMS/ESA Version 5 macros may cause problems after a fallback.

3.3.10 Perform the IMS Installation

IMS Version 5 is a complex product to install and prepare for execution. We recommend that you go through the entire INSTALL/IVP process, documented in *IMS/ESA Installation Volume 1: Installation and Verification*, SC26-8023, before proceeding with the migration and preparation of your own systems.

The INSTALL/IVP process provides materials that you can use as a guide when working with your own IMS/ESA systems. The INSTALL/IVP process includes:

- Data set allocation
- Preinstallation activities on target libraries
- SMP/E processing
- Postinstallation activities on target libraries
- System generation (SYSGEN) activities
- Supervisor call instruction (SVC) considerations
- Authorization considerations
- IMS system preparation activities
- IMS application preparation activities
- IMS system and application execution activities

The INSTALL/IVP dialog is packaged as an interactive system productivity facility (ISPF) dialog. When the INSTALL/IVP dialog is installed, you can call it with the Interactive Systems Productivity Facility/Program Development Facility (ISPF/PDF).

The INSTALL/IVP dialog provides unique installation paths for the following environments:

- database batch (DBB)
- database control (DBC)
- DB/DC (DBT)
- data communications control (DCC)
- extended recovery facility (XRF).

After you choose which type of IMS system you want to install, the INSTALL/IVP continues to present panels to help you install the IMS system, taking you through these steps:

1. Session initialization
2. Variable gathering phase
3. File tailoring phase
4. Execution phase
5. Ending the INSTALL/IVP session

So the process to install the new IMS system proceeds as follows:

- Validate system definition macros. Depending on where you are migrating from, macros may have been added, removed or changed. Macro keyword parameters may also have been added, removed, or changed. When migrating from a release prior to IMS/ESA Version 4, note that changes

introduced by IMS/ESA Version 4 and earlier versions are not pointed out as changes in IMS/ESA Version 5 documentation. The IMS system generation macros, their keyword parameters, and how to use them are described in Chapter 4 of the *IMS/ESA Installation Volume 2: System Definition and Tailoring*, SC26-8024. The IVP SYSGEN can also be helpful when customizing your SYSGEN input. Also, see Section 4.1, "A Sample IMS Generation Procedure" on page 33 for additional information.

- During the installation, ensure that the IMS system generation is using non-IMS macro libraries from the correct software levels (for example, MVS/ESA, DFSMS, RACF, VTAM). The macro libraries used must either be from the same software level as the system on which IMS is to execute or be compatible with that level.
- Install required service that was not included in the pregeneration service.
- Customize the system definition macros and run a FULL IMS SYSGEN. The type of IMS system definition to be performed is part of the SYSTEM parm in the IMSCTRL stage 1 macro.
- Install any required updates to IMS tools and aids.

3.3.11 Customize the IMS Environment

Customize the system as follows:

- Customize execution parameters. See Chapter 6, "Operational Considerations Migrating to IMS Version 5" on page 55 for more information.
- Customize the user SIGNON routine (if applicable). See Chapter 8, "Signon Processing Migration Considerations" on page 67 for more information.
- Customize cataloged procedures. Chapter 5 of *IMS/ESA Installation Volume 2: System Definition and Tailoring*, SC26-8024 shows all the IMS SYSGEN-supplied cataloged procedures, control statements, and jobs. An IMS full SYSGEN creates all procedures in IMS.PROCLIB. Compare these new procedures with the production procedures that may reside in your old IMS.PROCLIB.
- Customize IMS.PROCLIB members, including new members DFSPBxxx, DFSVSMxx, and DFSSPMxx. For information on procedures, see Section 7.2 of *IMS/ESA Installation Volume 2: System Definition and Tailoring*, SC26-8024, which describes IMS PROCLIB members that may or may not be needed, depending on your configuration.
- Define your DBCTL environment (if applicable). See Chapter 12, "IMS/ESA Version 5 Database Control" on page 91 for more information.
- Verify time-controlled operations (TCO) scripts. For users running time-initiated input facility (TIIF) see Section 3.3.4.7, "Time-Controlled Operations" on page 22 for additional information.
- Initialize the MODSTAT data set. Information on a sample job, INITMOD can be found in Section 7.1.1 of *IMS/ESA Installation Volume 2: System Definition and Tailoring*, SC26-8024.
- Customize DBRC skeletal members. See Chapter 9, "DBRC and RECON Migration" on page 69 for details on DBRC.
- Customize IMS security. See Chapter 7, "Migration and Security" on page 59 for more details on security.

- Customize JCL. You can either customize copies of your current JCL to fit the new IMS/ESA Version 5 system or, which is preferable, you can customize the sample JCL provided in IMS.PROCLIB to fit your environment. Information on this can be found in Chapter 7 of *IMS/ESA Installation Volume 2: System Definition and Tailoring*, SC26-8024.
- Customize exits. See Chapter 11, “IMS/ESA Version 5 Database Exits” on page 89 for more information.

3.3.12 Examine Operational Procedures

Verify operational procedures as follows:

- Verify operator commands.

  Many of the operator commands have changed and new commands have been introduced by earlier IMS versions. Review the operator commands in *IMS/ESA Operator's Reference*, SC26-8030. Also review any operations instructions that may be affected by command changes.

- Verify normal operation procedures.

  Verify any changes in normal operations, such as starting, restarting, and stopping the system, as well as starting and stopping the IMS network. See Chapter 1 of *IMS/ESA Sample Operating Procedures*, SC26-8032 for more information.

- Verify recovery procedures.

  Verify procedures for recovery from failures such as an IMS control-region loop or wait state, ACBLIB errors, online log data set (OLDS) read/write errors, or VTAM errors. See Chapter 4 of *IMS/ESA Sample Operating Procedures*, SC26-8032, for more information.

- Verify utility processing.

  Verify possible changes in utility processing such as database image copy, high speed sequential processing (HSSP) image copy, database recovery, log archive, and the like. See Chapter 5 of *IMS/ESA Sample Operating Procedures*, SC26-8032, for more information.

- Verify automated operations.

  IMS/ESA Version 5 introduces changes to the Automated Operator Interface (AOI), of which there are now two types:

  – Type 1, available for the DB/DC and DCCTL environments

  – Type 2, available for the DB/DC, DCCTL, and DBCTL environments

  More information on AOI can be found in Section 6.2, “Migration and Automated Operations” on page 56, in Chapter 1 of *IMS/ESA Operations Guide*, SC26-8029, and Chapter 1 of *IMS/ESA Release Planning Guide Version 5*, GC26-8031.

3.3.13 Review Selected User Programs

Verify user programs as follows:

- Verify user programs that read log and RECON records.
- Verify terminal programs (SLUP terminals) to ensure correct operation with IMS Version 5 terminal message changes.

Do not replace these user programs; old versions may be needed for fallback.

3.3.14 Back Up the New System

Back up the new IMS/ESA Version 5 system, including:

- RECONs
- SMP/E distribution, and target libraries
- Other key data sets

Make sure you have usable backups of your new system. This is also important in case of a fallback; having backups of the new system saves time in the future migration.

3.4 Mandatory Task List Associated with the Migration

The following tasks could be considered mandatory for all migrations but should not be taken as a complete list with the many potential different migration paths that can be taken moving to IMS/ESA Version 5:

- Use the RECON upgrade utility if migrating from IMS/ESA Version 3 or 4. See Chapter 9, “DBRC and RECON Migration” on page 69.
- Perform ACBGEN for all ACBs. The ACBGEN must be executed with IMS Version 5 libraries.
- Assemble and link a new DFSMDA member, or copy the existing ones. We recommend creating dynamic allocation modules for all databases, except for registered DEDBs. Delete dynamic allocation lists for registered DEDBs to avoid duplicate definitions.
- Customize the MVS environment:
  - SVCs. Even though some IMS versions can share SVCs, for fallback reasons it is recommended that the new IMS/ESA Version 5 use separate SVCs.
  - The IMS Version 5 level of the following modules must be installed on the MVS system:
    - Abend formatting module (DFSAFMD0) — Link-edit the abend formatting module DFSAFMD0 into SYS1.LPALIB or an MLPA library as CSECT DFSAFMD0, load module DFSAFMD0. Also add the DFSAFMD0 load module name to IEAVADFM CSECT of module IGC0805A in SYS1.LPALIB.
    - Resource cleanup module (DFSMRCL0) — Link-edit the IMS resource cleanup module DFSMRCL0 into SYS1.LPALIB or an MLPA library. Also add the DFSMRCL0 module name to the IEAVTRML CSECT of module IGC000lC in SYS1.LPALIB.
  - There are MVS functions that can be used for suppressing IMS message output. Review these, if applicable, for possible changes.
  - IMS Version 5 requires that the SYS1.CSSLIB dataset be authorized by APF (authorized program facility).

    For other libraries that need APF authorization, see *IMS/ESA Installation Volume 1: Installation and Verification*, SC26-8023. There are two ways to do this: use the PROGxx member in SYS1.PARMLIB or use the IEAAPFxx member in SYS1.PARMLIB. Be careful when specifying the PROGxx member in SYS1.PARMLIB. For example:

```
APF ADD
    DSNAME(SYS1.CSSLIB)
    SMS
```

means that CSSLIB MUST be managed by system-managed storage (SMS). If this is not true, the authorization fails, even though the library appears to have APF authorization, and even if the data set is displayed as APF authorized by the MVS command to display APF authorization, `D PROG,APF`. Using an invalid APF-authorized library for IMS causes an IMS abend.

- All DEDBs must be cataloged using an integrated catalog facility (ICF) catalog, because IMS Fast Path now uses the Media Manager.

- Perform a cold start (/NRESTART CHECKPOINT 0 FORMAT ALL)

3.5 Summary of the Migration Activities

As the material in 3.3, “General Tasks for Migration” on page 13 and 3.4, “Mandatory Task List Associated with the Migration” on page 27 illustrate, a large number of tasks must be performed before a successful migration is complete. The list is not complete. Depending on the current environment, additional customization may be necessary.

For more information, see the *IMS/ESA Release Planning Guide Version 5*, GC26-8031.

3.6 Coexistence Considerations

The ability to have multiple IMS systems coexist at different levels is quite important. Coexistence can be achieved by using the information provided in this section. See *IMS/ESA Release Planning Guide Version 5*, GC26-8031 for additional information.

3.6.1 Data Sharing

Table 3 shows the status of data sharing support between IMS/ESA Version 5 and previous releases of IMS.

Table 3. Supported Data Sharing between IMS Releases

Releases	DL/I DB		DEDB	
	DB Level Sharing	**Block Level Sharing**	**Area Level Sharing**	**Block Level Sharing**
IMSV5 + IMS1.3	Unsupported	No	Unsupported	No
IMSV5 + IMS2.2	Unsupported	No	Unsupported	No
IMSV5 + IMS3.1	Yes	Yes	Yes	Yes
IMSV5 + IMS4.1	Yes	Yes	Yes	Yes

3.6.2 IRLM

When installing multiple copies of IMS systems at different release levels in the same processor:

- A single IRLM can manage multiple IMS systems regardless of release but must be at the level shipped with IMS Version 5.
- Multiple IRLMs can manage a single IMS system.

The IRLM must be at the level shipped with IMS Version 5 to perform data sharing between IMS Version 5 and the previous release of IMS.

3.6.3 Extended Recovery Facility

The extended recovery facility (XRF) active and alternate systems must be at the same IMS version, release and maintenance level.

3.6.4 APPC/IMS Migration Considerations

In IMS/ESA Version 4 APPC/IMS support replaced the LU 6.1 adapter for LU 6.2 applications that ran locally. For remote LU 6.2 applications, however, the adapter was still needed. In IMS/ESA Version 5, APPC/IMS has been enhanced to process these applications through MSC; therefore, the adapter is no longer needed or supported. Chapter 3 of *IMS/ESA Release Planning Guide Version 5*, GC26-8031 contains introductory information on this topic.

3.6.5 MVS Environmental Considerations

Coexistence considerations for the MVS environment are discussed here.

3.6.5.1 SVC Modules

When installing multiple copies of IMS systems at different release levels in the same processor, even though some SVCs may be shared, we recommend that the Type 2 and Type 4 SVCs be unique for each IMS release.

3.6.5.2 The Resource Cleanup Module

The IMS Version 5 Resource Cleanup module (DFSMRCL0) should be used for all IMS release levels below Version 5.

3.6.5.3 The Abend Formatting Module

The IMS Version 5 Abend Formatting module (DFSAFMD0) should be used for all IMS release levels below Version 5.

3.6.6 DB2 Impact

IMS Version 5 allows access to one or more DB2 systems of identical release. It is not possible to access different levels of DB2 from the same IMS system.

DCCTL allows the IMS Version 5 Transaction Manager to run with DB2 as the only database manager.

IMS Version 5 can be connected to the following DB2 versions:

- DB2 Version 4 Release 1 (5695-DB2)
- DB2 Version 3 Release 1 (5685-DB2)
- DB2 Version 2 Release 3 (5665-DB2)

3.6.7 ISC Connection

IMS Version 5 Transaction Manager can be connected by ISC to the following IMS and CICS levels:

- IMS Version 5 (5695-176)
- IMS Version 4 (5665-013)
- IMS Version 3 (5665-409)
- CICS/ESA Version 4 (5655-018)
- CICS/ESA Version 3 (5685-083)
- CICS/MVS Version 2 (5665-403)
- CICS/VSE Version 2 (5686-026)

3.6.8 MSC Connection

IMS Version 5 Transaction Manager can be connected by MSC to:

- IMS Version 5 (5695-176)
- IMS Version 4 (5665-013)
- IMS Version 3 (5665-409)

3.6.9 CICS Connection

The IMS/ESA Version 5 Database Manager may be connected through DBCTL to the following CICS systems:

- CICS/ESA Version 4 (5665-018)
- CICS/ESA Version 3 (5685-083)

3.7 Compatibility of Resources Required for Recovery

A very important component of your migration is the recovery of systems and databases using logs created at different IMS levels.

3.7.1 Compatibility of IMS Log

The IMS log can be used across an IMS release only as summarized in Table 4.

Table 4 (Page 1 of 2). Compatibility of IMS Logs between Releases

LOG INPUT TO IMS VERSION		LOG CREATED BY IMS VERSION				
		V5.1	**V4.1**	**V3.1**	**V2.2**	**V1.3**
IMS V5.1	IMS Restart	Yes	No	No	No	No
	DB Recovery Utility	Yes	Yes	Yes	No	No
	Change Accumulation Utility	Yes	Yes	Yes	No	No
	Batch Backout Utility	Yes	No	No	No	No
	Log Archive Utility	Yes	No	No	No	No
	Log Recovery Utility	Yes	No	No	No	No

Table 4 (Page 2 of 2). Compatibility of IMS Logs between Releases

LOG INPUT TO IMS VERSION		LOG CREATED BY IMS VERSION				
		V5.1	**V4.1**	**V3.1**	**V2.2**	**V1.3**
IMS V4.1	IMS Restart	No	Yes	No	No	No
	DB Recovery Utility	No	Yes	Yes	Yes	Yes
	Change Accumulation Utility	No	Yes	Yes	Yes	Yes
	Batch Backout Utility	No	Yes	No	No	No
	Log Archive Utility	No	Yes	No	No	No
	Log Recovery Utility	No	Yes	No	No	No
IMS V3.1	IMS Restart	No	No	Yes	No	No
	DB Recovery Utility	No	Yes	Yes	Yes	Yes
	Change Accumulation Utility	No	Yes	Yes	Yes	Yes
	Batch Backout Utility	No	No	Yes	No	No
	Log Archive Utility	No	No	Yes	No	No
	Log Recovery Utility	No	No	Yes	No	No
IMS/VS V2.2	IMS Restart	No	No	No	Yes	No
	DB Recovery Utility	No	No	No	Yes	Yes
	Change Accumulation Utility	No	No	No	Yes	Yes
	Batch Backout Utility	No	No	No	Yes	No
	Log Archive Utility	No	No	No	Yes	No
	Log Recovery Utility	No	No	No	Yes	No
IMS/VS V1.3	IMS Restart	No	No	No	No	Yes
	DB Recovery Utility	No	No	No	Yes	Yes
	Change Accumulation Utility	No	No	No	Yes	Yes
	Batch Backout Utility	No	No	No	No	Yes
	Log Archive Utility	No	No	No	No	Yes
	Log Recovery Utility	No	No	No	No	Yes

Note: Special care is needed if using the DB recovery utility with concurrent image copy data sets after fallback to the previous IMS release.

3.7.2 Compatibility of Image Copy Data Sets

The IMS/ESA Version 5 database recovery utility can use image copy data created by any earlier level of IMS. The reverse is also true. This means that you need not take an image copy of every database immediately after the IMS upgrade. The following input data sets are valid:

- Batch image copy data sets
- Online image copy data sets
- CIC data sets for DEDBs made by previous releases of IMS.

The database recovery utility for previous IMS releases can use the following input:

- Batch image copy data sets
- CIC data sets for DEDB made by IMS/ESA Version 5

CIC data sets for DL/I databases made by IMS/ESA Version 5 cannot be used.

3.7.3 Compatibility of RECON Data Sets

Compatibility of the RECON data sets and records is as follows:

- The RECON data sets used by previous releases of IMS must be upgraded to a Version 5 format using the RECON upgrade utility.
- The DBRC coexistence SPE must be applied to the previous release of IMS system that uses an upgraded RECON.
- Once the RECON has been upgraded, the DSLOG function is no longer supported on any IMS version.

Chapter 4. IMS Generation Procedures and Online Change

This chapter includes several sample IMS procedures associated with the generation of IMS, and the creation of security facilities. Also the online change function is discussed.

These samples are included to provide examples and guidance but do not address every situation that could be encountered. Please refer to the *IMS/ESA Installation Volume 1: Installation and Verification*, SC26-8023 for more details.

4.1 A Sample IMS Generation Procedure

This section provides a sample IMS GEN procedure. It generates an IMS DB/DC system that includes only the IMS IVP application.

It also provides a methodology to implement the GEN into the running IMS system. This process runs the IMS GEN into a staging RESLIB, which is copied to the run-time RESLIB at the time the change is to be implemented. It also runs the online change utility to put the new application and security information into the inactive libraries. A REXX exec modifies the MODSTAT data set to switch the active and inactive libraries, so that when IMS is started, the new libraries are used. The jobs are set up in such a way that they could be scheduled using OPCA or any job scheduling system.

There is also a job that backs out the changes if necessary.

4.1.1 IMS GEN Input Macros

The input to the IMS generation is a series of IMS macros that define the IMS system. The names of the members hold no special significance beyond the process described herein.

4.1.1.1 IMSPCTL Member

IMSPCTL contains the standard IMS macros required to generate an IMS TM system. This member has four types of `IMSCTRL SYSTEM=...` statements with three of them commented out, so only the last one is actually used. This would generate the control block members for resources to be added or changed online. These control blocks are used by the IMS control region, the security maintenance utility (SMU), and the multiple systems coupling verification utility. Details of the other macros are not important but this will define a working IMS system. See Figure 1 on page 34.

```
*
* IMSCTRL MACRO --
*
*        IMSCTRL  SYSTEM=(VS/2,(ALL,DB/DC),5.2),
*        IMSCTRL  SYSTEM=(VS/2,(CTLBLKS,DB/DC),5.2),
*        IMSCTRL  SYSTEM=(VS/2,(NUCLEUS,DB/DC),5.2),
         IMSCTRL  SYSTEM=(VS/2,(MODBLKS,DB/DC),5.2),                    X
               DBRC=(YES,YES),                                          X
               DBRCNM=PAPIDBR,                                          X
               DLINM=PAPIDLI,                                           X
               DCLWA=YES,                                               X
               IMSID=IMSP,                                              X
               NAMECHK=(YES,S1),                                        X
               MAXIO=(,015),                                            X
               MAXREGN=(005,512K,A,A),                                  X
               MCS=(2,7),                                               X
               DESC=7,                                                  X
*              ETOFEAT=(YES,YES,ALL),                                   X
               MAXCLAS=016
*
* IMSCTF  MACRO --
         IMSCTF SVCNO=(,254,255),                                       X
               LOG=SNGL,                                                X
               CPLOG=100000,                                            X
               RDS=(3390,4096),                                         X
               PRDR=PAPIRDR
*
* MSGQUEUE MACRO --
         MSGQUEUE DSETS=(3390,3390,3390),                               X
               MRQPSBN=MRQPSB,                                          X
               RECLNG=(560,6720),                                       X
               BUFFERS=(5,6720),                                        X
               SHUTDWN=100
*
* BUFPOOLS MACRO --
         BUFPOOLS PSB=24000,                                            X
               SASPSB=(4000,20000),                                     X
               PSBW=12000,                                              X
               DMB=24000,                                               X
               FORMAT=(24000,256),                                      X
               FRE=30
*
* SECURITY MACRO --
         SECURITY TYPE=(RACFAGN,RACFTERM),SECLVL=(TRANAUTH,SIGNON),     X
               RCLASS=PIMS,                                             X
               TERMNL=YES,                                              X
               SECCNT=2,                                                X
               PASSWD=YES,                                              X
               TRANCMD=YES
```

Figure 1. Member IMSPCTL: IMS Stage 1 Macros

4.1.1.2 IMSPNET Member

Contains the standard IMS COMM macro and one TERMINAL macro required for the master terminal operator (MTO). This member could contain any other TERMINAL macros to define all required static terminals. The secondary IMS terminal, which can be defined to a printer has been defined to a spool data set. All IMS messages can be routed to a direct-access storage device (DASD) file and made available for viewing by all interested parties.

Please note that this member would not be used for a DBCTL system, as they are not part of the IMS DBCTL system functions. See Figure 2.

```
* COMM    MACRO --
         COMM RECANY=(10,4096),                                        X
               APPLID=QOFIMS,                                          X
               OPTIONS=(PAGING,TIMESTAMP,MFSTEST,NOFMAST,              X
               NOUSEMSG,NOMSLEX,VTAMAUTH,BLKREQD),                     X
               COPYLOG=ALL
*
*  DEFINE ONE 3270 SLU2 TYPE 2 TERMINAL FOR MTO
*
 TYPE    UNITYPE=SLUTYPE2,                                             *
               TYPE=3270-A2,                                           *
               SIZE=(24,80),                                           *
               FEAT=IGNORE,OPTIONS=TRANRESP                            *
*
    TERMINAL  NAME=QAF61DB3
    NAME          (QAF61DB3,MASTER)
*
*  SECONDARY MASTER SPOOL
*
      LINEGRP  DDNAME=(SPL1,SPL2,SPL3),UNITYPE=SPOOL
      LINE     BUFSIZE=10000
      TERMINAL FEAT=AUTOSCH
      NAME     (MTOPRINT,SECONDARY)
      NAME     MTOPRT
      NAME     SECNDARY
```

Figure 2. Member IMSPNET: Network Definition

4.1.1.3 IMSPGEN Member

This member contains the IMSGEN macro (Figure 3 on page 36). It is used to control the Stage 2 JCL created in the Stage 1 GEN. It is customized to provide the right high-level data set names. (See Figure 7 on page 41).

```
* IMSGEN MACRO --
*
         IMSGEN ASM=HLASM,                                              X
               ASMPRT=OFF,                                              X
               LKPRT=(XREF,LIST),LKSIZE=(880K,64K),LKRGN=4096K,         X
               SUFFIX=0,                                                X
               SURVEY=NO,                                               X
               MACLIB=ALL,                                              X
               NODE=(PIMS,                                              X
               CCIMS.PIMS,                                              X
               IMS),                                                    X
               OBJDSET=CCIMS.IMS51C.OBJDSET,                            X
               PROCLIB=NO,                                              X
               USERLIB=PIMS.RANDOM,                                     X
               UMAC0=,                                                  X
               SYSMAC=SYS1.MACLIB,                                      X
               MODGEN=SYS1.MODGEN,                                      X
               UMAC1=,                                                  X
               UMAC2=,                                                  X
               UMAC3=,                                                  X
               MFSDFMT=NO,                                              X
               ONEJOB=(YES,YES),                                        X
               JCL=(PIMSGN,(@IMS,FA33),'IMS5 STAGE2',H,                 X
               (CLASS=Y,MSGLEVEL=(1,1),REGION=32M))
          END
```

Figure 3. IMS System Generation Member IMSPGEN: IMSGEN Macro

4.1.1.4 IMSPSEC Member

IMSPSEC contains the standard IMS macros required as input to the IMS security maintenance utility. See Figure 4 on page 37.

The member naming convention is taken from an IMS system and used only as an example.

```
*-------------------------------------------------------------------*
*    RACF '/SIGN' COMMAND CONTROL                                    *
*-------------------------------------------------------------------*
)( SIGN
 STERM ALL
)( TERMINAL    MASTER
    COMMAND    *
)( PASSWORD IVP         /* GENERATE PASSWORD SECURITY */
   COMMAND  DELETE
)( CTRANS   IVTNO       /* GENERATE TRANSACTION SECURITY */
   TCOMMAND *
)( AGN      PRMPRelease 1      /* GENERATE RESOURCE ACCESS SECURITY */
   AGPSB    ALL
   AGTRAN   ALL
   AGLTERM  ALL
)( AGN      PRBMPBTS    /* GENERATE RESOURCE ACCESS SECURITY */
   AGPSB    ALL
   AGTRAN   ALL
)( AGN      PRBMPCCF    /* GENERATE RESOURCE ACCESS SECURITY */
   AGPSB    CCFO13
   AGTRAN   ALL
```

Figure 4. Member IMSPSEC - IMS Security GEN Sample Input

4.1.1.5 IVP Application Macros in Member IVPAPPL

This discussion is included to provide a sample of what an application might use to define the required resources. Figure 5 shows members copied from the installation library. For details on the of the application see Chapter 11, "INSTALL/IVP Sample Application" in *IMS/ESA Installation Volume 1: Installation and Verification*, SC26-8023.

```
*   IVP DATABASES DEFINITION
         DATABASE DBD=IVPDB1,ACCESS=UP              HIDAM/OSAM
         DATABASE INDEX,DBD=IVPDB1I,ACCESS=UP       HIDAM/VSAM INDEX
         DATABASE DBD=IVPDB2,ACCESS=UP              HDAM/VSAM
         DATABASE DBD=IVPDB3,ACCESS=UP              DEDB
*        DATABASE DBD=IVPDB4                        MSDB
*   IVP BATCH/BMP APPLICATION DEFINITION
         APPLCTN PSB=DFSIVP6,PGMTYPE=BATCH          HIDAM/OSAM-ASSEM
         APPLCTN PSB=DFSIVP61,PGMTYPE=BATCH         HIDAM/OSAM-PASCAL
         APPLCTN PSB=DFSIVP62,PGMTYPE=BATCH         HIDAM/OSAM-C
         APPLCTN PSB=DFSIVP64,PGMTYPE=BATCH         HIDAM/OSAM-COBOL
         APPLCTN PSB=DFSIVP65,PGMTYPE=BATCH         HIDAM/OSAM-REXX
         APPLCTN PSB=DFSIVP7,PGMTYPE=BATCH          HDAM/VSAM
*        APPLCTN PSB=DFSIVP8,PGMTYPE=BATCH          DEDB/VSAM
         APPLCTN PSB=DFSIVP9,PGMTYPE=BATCH          HIDAM/OSAM OLIC
         APPLCTN PSB=DFSIVPA,PGMTYPE=BATCH          HIDAM LOAD
         APPLCTN PSB=DFSIVPB,PGMTYPE=BATCH          HDAM  LOAD
```

Figure 5 (Part 1 of 3). Member IVPAPPL - IVP Application Macro Definitions

```
*        APPLCTN PSB=DFSIVPC,PGMTYPE=BATCH           DEDB (DB LOAD)
*   IVP NON-CONVERSATIONAL APPLICATIONS DEFINITION FOR DB/DC
         APPLCTN PSB=DFSIVP1,PGMTYPE=TP              HIDAM/OSAM
           TRANSACT CODE=IVTNO,MODE=SNGL,                                X
               MSGTYPE=(SNGLSEG,NONRESPONSE,1)
*
         APPLCTN PSB=DFSIVP2,PGMTYPE=TP              HDAM/VSAM
           TRANSACT CODE=IVTNV,MODE=SNGL,                                X
               MSGTYPE=(SNGLSEG,NONRESPONSE,1)
*   IVP CONVERSATIONAL APPLICATION DEFINITION FOR DB/DC
         APPLCTN PSB=DFSIVP3,PGMTYPE=TP              HDAM/VSAM-ASSEM
           TRANSACT CODE=IVTCV,SPA=(80,),MODE=SNGL,                      X
               MSGTYPE=(SNGLSEG,NONRESPONSE,1)
         APPLCTN PSB=DFSIVP31,PGMTYPE=TP             HDAM/VSAM-PASCAL
           TRANSACT CODE=IVTCP,SPA=(80,),MODE=SNGL,                      X
               MSGTYPE=(SNGLSEG,NONRESPONSE,1)
         APPLCTN PSB=DFSIVP32,PGMTYPE=TP             HDAM/VSAM-C
           TRANSACT CODE=IVTCC,SPA=(80,),MODE=SNGL,                      X
               MSGTYPE=(SNGLSEG,NONRESPONSE,1)
         APPLCTN PSB=DFSIVP34,PGMTYPE=TP             HDAM/VSAM-COBOL
           TRANSACT CODE=IVTCB,SPA=(80,),MODE=SNGL,                      X
               MSGTYPE=(SNGLSEG,NONRESPONSE,1)
         APPLCTN PSB=DFSIVP35,PGMTYPE=TP             HDAM/VSAM-REXX
           TRANSACT CODE=IVTCX,SPA=(80,),MODE=SNGL,                      X
               MSGTYPE=(SNGLSEG,NONRESPONSE,1)
*   IVP APPLICATIONS DEFINITION FOR DB/DC, DCCTL
         APPLCTN GPSB=IVPREXX,PGMTYPE=TP,LANG=ASSEM  REXXTDLI SAMPLE
           TRANSACT CODE=IVPREXX,MODE=SNGL,                              X
               MSGTYPE=(SNGLSEG,NONRESPONSE,1)
*   IMS SAMPLE DATABASES DEFINITION
         DATABASE DBD=DI21PART,ACCESS=UP              HISAM/VSAM
*   IMS SAMPLE APPLICATION DEFINITION - CICS IVP
         APPLCTN PSB=DFHSAM04,PGMTYPE=BATCH
         APPLCTN PSB=DFHSAM14,PGMTYPE=BATCH
         APPLCTN PSB=DFHSAM24,PGMTYPE=BATCH
         APPLCTN PSB=DFHSAM05,PGMTYPE=BATCH
         APPLCTN PSB=DFHSAM15,PGMTYPE=BATCH
         APPLCTN PSB=DFHSAM25,PGMTYPE=BATCH
*   IMS SAMPLE APPLICATION DEFINITION
         APPLCTN  PSB=DFSSAM01,PGMTYPE=BATCH
         APPLCTN  PSB=DFSSAM02
         TRANSACT CODE=PART,PRTY=(7,10,2),INQUIRY=YES,MODE=SNGL
         APPLCTN  PSB=DFSSAM03
         TRANSACT CODE=DSPINV,PRTY=(7,10,2),INQUIRY=YES,MODE=SNGL
         APPLCTN  PSB=DFSSAM04
         TRANSACT CODE=ADDPART,PRTY=(7,10,2),INQUIRY=NO,MODE=SNGL
         TRANSACT CODE=ADDINV,PRTY=(7,10,2),INQUIRY=NO,MODE=SNGL
         TRANSACT CODE=DLETPART,PRTY=(7,10,2),INQUIRY=NO,MODE=SNGL
         TRANSACT CODE=DLETINV,PRTY=(7,10,2),INQUIRY=NO,MODE=SNGL
```

Figure 5 (Part 2 of 3). Member IVPAPPL - IVP Application Macro Definitions

```
         APPLCTN  PSB=DFSSAM05
         TRANSACT CODE=CLOSE,PRTY=(7,10,2),INQUIRY=NO,MODE=SNGL
         APPLCTN  PSB=DFSSAM06
         TRANSACT CODE=DISBURSE,PRTY=(7,10,2),INQUIRY=NO,MODE=SNGL
         APPLCTN  PSB=DFSSAM07
         TRANSACT CODE=DSPALLI,PRTY=(7,10,2),INQUIRY=NO,MODE=SNGL
         APPLCTN  PSB=DFSSAM08,PGMTYPE=BATCH
         APPLCTN  PSB=DFSSAM09,PGMTYPE=BATCH           GENERAL PURPOSE
```

Figure 5 (Part 3 of 3). Member IVPAPPL - IVP Application Macro Definitions

4.1.2 IMS GEN Steps

The basic process is to generate the IMS system into the staging libraries. These staging libraries include a RESLIB so the GEN can be run while IMS is running, thus reducing the downtime required to implement the IMS GEN. To implement the generation, a series of jobs can be run to perform the changes. If there is a problem, another job can be run to reverse the changes.

This example is not meant as a complete definition of how to run IMS GEN, but to provide a sample procedure that can be modified to work in individual environments.

4.1.2.1 Modify Member IMSPCTL

This is done to identify what type of generation to be run. See Figure 1 on page 34. The choices are

- ALL — To generate the IMS system for the first time or to apply maintenance
- NUCLEUS — To generate an IMS nucleus for the IMS control program region and control block modules for all IMS control blocks
- CTLBLKS — To generate control block modules of all IMS control blocks for use within an IMS nucleus in the IMS control program region
- MODBLKS — To generate the control blocks members for resources to be added or changed online.

4.1.2.2 Modify the IMSPSTG1 Member

The output of the Stage 1 GEN is a job or series of jobs called the Stage 2 GEN. To keep this output of the Stage 1 as a member of a PDS to be submitted later, modify the SYSLIN DD statement to reflect the type of generation being run. See Figure 6 on page 40 for the example JCL. Please note that a return code of 2 from the Stage 1 job is normal if you have application macros and no transaction macros, as you would for DBCTL applications.

```
//PIMSSTG1 JOB (@IMS,FA33),'PIMS STG1',CLASS=Y,
//        REGION=6M,
//        MSGCLASS=X
//*
//IMSASM1 EXEC PGM=ASMA90,REGION=4096K
//SYSLIB   DD  DSN=IMS.GENLIB,DISP=SHR
//         DD  DSN=IMS.GENLIBA,DISP=SHR
//         DD  DSN=IMS.GENLIBB,DISP=SHR
//         DD  DSN=CCIMS.PIMS.IMSSORS,DISP=SHR
//SYSUT1   DD  DSN=&&SYSUT1,UNIT=SYSDA,SPACE=(CYL,(10,3))
//SYSUT2   DD  DSN=&&SYSUT2,UNIT=SYSDA,SPACE=(CYL,(5,3))
//SYSUT3   DD  DSN=&&SYSUT3,UNIT=SYSDA,SPACE=(CYL,(5,3))
//*
//* CHOOSE THE TYPE OF STAGE2 GEN.
//*
//*SYSLIN   DD  DSN=CCIMS.PIMS.STAGE2(STG2CTL),
//*SYSLIN   DD  DSN=CCIMS.PIMS.STAGE2(STG2ALL),
//*SYSLIN   DD  DSN=CCIMS.PIMS.STAGE2(STG2NUC),
//SYSLIN   DD  DSN=CCIMS.PIMS.STAGE2(STG2MOD),
//         DISP=OLD
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD DSN=CCIMS.PIMS.IMSSORS(IMSPCTL),DISP=SHR
//         DD DSN=CCIMS.PIMS.IMSSORS(IMSPNET),DISP=SHR
//         DD DSN=CCIMS.PIMS.IMSSORS(IVPAPPL),DISP=SHR
//         DD DSN=CCIMS.PIMS.IMSSORS(IMSPGEN),DISP=SHR
//*
```

Figure 6. Member IMSPSTG1 - Run the Stage 1 Gen

4.1.2.3 Verify and Submit the Stage 2 Gen

Edit the Stage 2 member and verify that correct information has been generated. Submit the member when correct (use the SUBMIT command).

4.1.2.4 Check JCL Output

The return codes from the Stage 2 GEN should be zero for all steps. If not, check to see what messages were produced.

4.1.2.5 Submit Member IMSPSEC

This macro set is used to run the IMS security utility. See Figure 7 on page 41 for the JCL to run the security GEN. If you have added terminals, programs, or other IMS resources, the input to this security generation step may also need to be modified. The input member is shown in Figure 4 on page 37. The output is to the staging matrix library.

```
//IMSPSEC JOB (@IMS,FA33),'PIMS SEC',CLASS=Y,
//        MSGCLASS=X,MSGLEVEL=(1,1)
//*
//STEP1    EXEC PGM=DFSISMP0,PARM='UPDATE,0'
//STEPLIB  DD  DSN=CCIMS.PIMS.MODBLKS,DISP=SHR
//         DD  DSN=CCIMS.PIMS.RESLIB,DISP=SHR
//         DD  DSN=PIMS.RESLIB,DISP=SHR
//SYSPRINT DD  SYSOUT=*,DCB=(RECFM=VBA,BLKSIZE=129,LRECL=125)
//SYSPUNCH DD  UNIT=SYSDA,SPACE=(CYL,(2,2)),
//             DCB=(RECFM=FB,LRECL=80,BLKSIZE=400),
//             DISP=(NEW,PASS)
//SYSLIN   DD  UNIT=SYSDA,SPACE=(TRK,(1,1)),
//             DCB=(RECFM=F,BLKSIZE=80),
//             DISP=(NEW,PASS)
//SYSUT1   DD  UNIT=SYSDA,DCB=(BLKSIZE=500,RECFM=FB),
//             SPACE=(CYL,(2,2))
//SYSUT2   DD  UNIT=(SYSDA,SEP=SYSUT1),DCB=*.STEP1.SYSUT1,
//             SPACE=(CYL,(2,2))
//SYSIN    DD  DSN=CCIMS.PIMS.IMSSORS(IMSPSEC),DISP=SHR
//*
//STEP2    EXEC PGM=ASMA90,
//             PARM='OBJECT,NODECK',COND=(12,LT,STEP1),REGION=128K
//SYSLIB   DD  DSN=SYS1.MACLIB,DISP=SHR
//SYSPRINT DD  SYSOUT=*,DCB=BLKSIZE=1089
//SYSLIN   DD  UNIT=(SYSDA,SEP=SYSPRINT),DISP=(,PASS),
//             SPACE=(CYL,(2,2)),
//             DCB=*.STEP1.SYSPUNCH
//SYSUT1   DD  UNIT=SYSDA,SPACE=(CYL,(10,5))
//SYSIN    DD  DSN=*.STEP1.SYSPUNCH,DISP=(OLD,DELETE)
//*
//STEP3    EXEC PGM=IEWL,PARM=(LIST,NE,OL,'RMODE=ANY'),REGION=512K,
//             COND=(4,LT,STEP1)
//SYSPRINT DD  SYSOUT=*,DCB=(RECFM=FBA,LRECL=121,BLKSIZE=605)
//SYSLMOD  DD  DSN=CCIMS.PIMS.MATRIX,DISP=SHR
//INPUT    DD  DSN=*.STEP2.SYSLIN,DISP=(OLD,DELETE)
//SYSUT1   DD  UNIT=(SYSDA,SEP=INPUT),SPACE=(CYL,(5,1))
//SYSLIN   DD  DSN=*.STEP1.SYSLIN,DISP=(OLD,DELETE)
```

Figure 7. Member IMSPSEC - JCL to Run IMS Security GEN

4.1.2.6 Check JCL Output

Check the return code of the security generation to make sure that all steps give return codes of zero. If they do, then the GEN has been processed and is ready to be implemented.

4.1.2.7 Stop the IMS System

At the required time, stop the IMS TM system, ensuring that it shuts down cleanly. Typically, a /CHECKPOINT FREEZE or /CHECKPOINT DUMPQ is used to shut down the IMS system. A DUMPQ will requeue any important messages on the queues after the cold start of IMS.

4.1.2.8 Submit Member GENJOB

This job backs up the run-time libraries before making any changes, thus ensuring that a clean backout is available if required. See Figure 8. Note that this job cannot run while any subsystem has the libraries allocated.

The steps are these:

1. Allocate the data sets with DISP=OLD to ensure exclusive use of the libraries.
2. Copy the RUN TIME libraries to a disk backup dataset to provide a quick fallback point.
3. Compress the RESLIB to avoid space problems.
4. Copy the new GEN from the staging library to the RUN TIME RESLIB library.
5. Copy the MODBLKS staging library to the INACTIVE MODBLKS library.
6. Copy the MATRIX staging library to the INACTIVE MATRIX library
7. Run a REXX exit to edit the MODSTAT data set. It changes the active library to the inactive library by changing the MODBLKSx from A to B (or the reverse). The next time IMS is started, it uses the previously inactive library as the active library, thus bringing in the new GEN. See Figure 9 on page 44 for the EXEC.

```
//PIMSGNJB JOB (@IMS,FA33),'PIMS GENJOB',
//         CLASS=Y,MSGCLASS=X
//*          * JOB TO BACKUP RUN TIME LIBS *
//*          * AND COPY IN NEW IMS GEN     *
//STEP1    EXEC PGM=IEFBR14
//*  ALLOCATES ALL DATASETS BACKED UP WITH DISP=OLD, IF ANY
//*  CONTENTION IS FOUND CHECK OFFENDING JOB
//DD1      DD   DSN=PIMS.RESLIB,DISP=OLD
//DD2      DD   DSN=PIMS.MATRIXA,DISP=OLD
//DD3      DD   DSN=PIMS.MATRIXB,DISP=OLD
//DD4      DD   DSN=PIMS.MODBLKSA,DISP=OLD
//DD5      DD   DSN=PIMS.MODBLKSB,DISP=OLD
//DD6      DD   DSN=PIMS.MODSTAT,DISP=OLD
//DD7      DD   DSN=CCIMS.PIMS.RESLIB,DISP=OLD
//SYSPRINT DD SYSOUT=*
//*
//STEP2    EXEC PGM=ADRDSSU,REGION=4096K,COND=(0,NE)
//*  BACKUP CURRENT RUNTIME DATASETS
//OUT      DD  DSN=CCIMS.PIMS.BACKUP(+1),
//          UNIT=3390,
//          DISP=(,CATLG,DELETE),
//          SPACE=(CYL,(100,50),RLSE)
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
 DUMP -
 DATASET(INC(PIMS.RESLIB,     -
```

Figure 8 (Part 1 of 2). Member GENJOB - JCL to Implement the IMS GEN

```
            PIMS.MATRIXA,    -
            PIMS.MATRIXB,    -
            PIMS.MODBLKSA, -
            PIMS.MODBLKSB, -
            PIMS.MODSTAT)) -
 OUTDD(OUT) COMPRESS  -
 ALLDATA(*)           -
 ALLEXCP              -
 SPHERE
/*
//STEP3    EXEC PGM=IEBCOPY,COND=(0,NE)
//*      COMPRESS BOTH RESLIB
//IN1      DD   DSN=CCIMS.PIMS.RESLIB,DISP=SHR
//IN2      DD   DSN=PIMS.RESLIB,DISP=SHR
//SYSUT3   DD   UNIT=SYSDA,SPACE=(TRK,(5,5))
//SYSUT4   DD   UNIT=SYSDA,SPACE=(TRK,(5,5))
//SYSPRINT DD   SYSOUT=*
//SYSIN DD *
 COPY OUTDD=IN1,INDD=((IN1,R))
 COPY OUTDD=IN2,INDD=((IN2,R))
/*
//STEP4    EXEC PGM=IEBCOPY,COND=(0,NE)
//*      COPY NEW RESLIB OVER RUNTIME RESLIB
//IN       DD   DSN=CCIMS.PIMS.RESLIB,DISP=SHR
//OUT      DD   DSN=PIMS.RESLIB,DISP=SHR
//SYSUT3   DD   UNIT=SYSDA,SPACE=(TRK,(5,5))
//SYSUT4   DD   UNIT=SYSDA,SPACE=(TRK,(5,5))
//SYSPRINT DD   SYSOUT=*
//SYSIN DD *
 COPY OUTDD=OUT,INDD=((IN,R))
/*
//STEP5    EXEC OLCUTL,
//         PARM=(MODBLKS,S,U),COND=(0,NE)
//*  RUNS THE ONLINE COPY UTILITY TO COPY THE MODBLKS
//STEP6    EXEC OLCUTL,
//         PARM=(MATRIX,S,U),COND=(0,NE)
//*  RUNS THE ONLINE COPY UTILITY TO COPY THE MATRIX
//STEP7   EXEC PGM=IKJEFT01,DYNAMNBR=30,
//             REGION=4096K,COND=(0,NE)
//* RUN REXX EXEC IN BACKGROUND TO CHANGE MODSTAT LIB
//SYSEXEC   DD DSN=CCIMS.PIMS.CLIST,DISP=SHR
//SYSTSPRT  DD SYSOUT=*
//MODSTATI DD DSN=PIMS.MODSTAT,DISP=SHR
//MODSTATO DD DSN=PIMS.MODSTAT,DISP=SHR
//SYSTSIN   DD *
 EXECUTIL SEARCHDD(YES)
 %DBGCHGMD 'YES'
/*
```

Figure 8 (Part 2 of 2). Member GENJOB - JCL to Implement the IMS GEN

```
/* REXX */
/*   change the modblks entry in a modstat dataset from     */
/*      modblksa to modblksb or vice versa.                 */
/*      That is - flip the modblks entry                    */
  Parse upper arg debug .
  If debug = 'YES' then
    trace  i
  else
    trace  o ;
/*trace i */
/* assume that the MODSTATi DD has been allocated in the JCL */

tsocode = tso("EXECIO * DISKR MODSTATI (FINIS STEM chg_modstat.")
If chg_modstat.0 <> 1 then
  do
    say 'more than one line in modstat dataset '
    say 'this is a no-no - aborting run        '
    rc = 16
    EXIT  rc
  end
else
  do
    select
      when (pos('MODBLKSA',chg_modstat.1) > 0 ) then
        do
           parse value chg_modstat.1 with chng_num ',' modblks ',',
              therest
           chg_modstat.1 = chng_num || ',' || 'MODBLKSB' || ',',
             || therest
        end
      otherwise
        if (pos('MODBLKSB',chg_modstat.1) > 0 ) then
          do
            parse value chg_modstat.1 with chng_num ',' modblks ',',
               therest
            chg_modstat.1 = chng_num || ',' || 'MODBLKSA' || ',',
             || therest
          end
        else
          do
            say 'no modblksa or modblksb entry '
            rc = 16
            exit rc
          end
     end   /* end select */
     /* assume that the modstato dataset is allocated in the JCL */
  tsocode = tso("EXECIO * DISKW modstato (FINIS STEM chg_modstat.")
 end

Exit 0

tso:
    parse upper arg tsocmd;
    address tso tsocmd;
return rc;
```

Figure 9. Member DBGCHGMD - REXX Exec to Modify MODSTAT Data Set

4.1.2.9 Start IMS

If the GEN run was anything other than a MODBLKS GEN, then a cold start is required for the DC system.

4.1.2.10 Backout (if Required)

The steps are these:

1. Shut down the IMS system.

   Typically a /CHECKPOINT FREEZE or /CHECKPOINT DUMPQ command is used to shut down the IMS system. A DUMPQ requeues any important messages on the queues after the cold start of IMS.

2. Run the GENBACK job.

   This restores the run-time libraries to their status before the change. Thus, GENBACK restores the libraries as they were before GENJOB was run. This ensures that the IMS system has been backed out to a point before the generation was implemented. See Figure 10 for details of the GENBACK job.

3. Start IMS.

   A cold start should be used to refresh all the IMS control blocks.

```
//PIMSGNBK JOB (@TS1,FA33),'PIMS GEN-BACKOUT',CLASS=Y,MSGCLASS=X,
//         TYPRUN=HOLD
//*
//STEP1   EXEC PGM=ADRDSSU,REGION=4096K
//*
//*   JOB TO RESTORE RUN TIME LIBS
//*
//IN       DD  DSN=CCIMS.PIMS.BACKUP(0),DISP=SHR
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
 REST DATAS(INC(             -
                **           -
                  )) -
      INDD(IN)               -
      CATALOG                -
      SPHERE                 -
      TGTGDS(ACTIVE)         -
      REPLACE
/*
```

Figure 10. Member GENBACK - JCL to Run Backout of IMS GEN

4.2 Online Change Processing

The online change utility is used to implement IMS changes into the IMS system. It can be used while IMS is active for some changes. This section gives a brief overview of the utility. To find further information, please refer to the chapter on "Making Online Changes in DB/DC" in the *IMS/ESA Operations Guide*, SC26-8029.

4.2.1 Overview

The online change utility implements changes to IMS control blocks while IMS is active. There are three types of online changes:

- ACB (access control blocks (ACBs), DMBs and PSBs)
- Application control blocks
- FORMAT (MFS screens)

The basic concept is that all changes are made to a staging library. The IMS system uses two additional libraries for processing, one as the active, and the other as the inactive library. The active and inactive libraries are known as A and B; one will be the active library and the other will be the inactive library at one time.

The online change process copies the staging libraries to the inactive libraries. An IMS command is issued to cause IMS to switch between the active and inactive. This implements the change by swapping the active with the inactive.

There are some restrictions on the process. IMS must quiesce the changed resources before it can switch the active and inactive libraries. If any of those resources are busy, IMS cannot complete the change.

For more details on handling problems, see “Making Online Changes” in *IMS/ESA Sample Operating Procedures*, SC26-8032.

Once the online change utility (see Figure 11 on page 47) has been run, a /MODIFY PREPARE command is issued to IMS to begin the change process. IMS tries to quiesce those resources that are to be changed. If successful, a /MODIFY COMMIT command can be issued to complete and commit the change process. If, at any time prior to the commit phase, the change is to be abandoned, a /MODIFY ABORT command can be issued.

If any resources remain not quiesced, a /DISPLAY MODIFY ALL command can be issued to determine what resources are in use, such as what PSBs are being used by what transactions.

4.2.2 Making an Online Change

Running the utility requires three parameters to define what function is being performed:

- Copy_type
- Source library
- Target library

The copy_type is the type of library to be copied. The options are

- ACB
- FORMAT
- MATRIX
- MODBLKS

An S for the source value indicates the staging library. The target library can be:

- A for the A library
- B for the B library

- U for the inactive library. The target library will be determined by the utility, using the MODSTAT data set. The target will be the library not currently in use by the IMS online system.

This allows the on-line change utility to copy to a specific library or to the inactive library without having to know whether that is A or B.

```
//OLCUTL PROC TYPE=,IN=,OUT=,SOUT=A
//S      EXEC PGM=DFSUOCU0,PARM=(&TYPE,&IN,&OUT)
//STEPLIB  DD DSN=PIMS.RESLIB,DISP=SHR
//MODSTAT  DD DSN=PIMS.MODSTAT,DISP=SHR
//MODBLKS  DD DSN=CCIMS.PIMS.MODBLKS,DISP=SHR
//MODBLKSA DD DSN=PIMS.MODBLKSA,DISP=SHR
//MODBLKSB DD DSN=PIMS.MODBLKSB,DISP=SHR
//MATRIX   DD DSN=CCIMS.PIMS.MATRIX,DISP=SHR
//MATRIXA  DD DSN=PIMS.MATRIXA,DISP=SHR
//MATRIXB  DD DSN=PIMS.MATRIXB,DISP=SHR
//IMSACB   DD DSN=PIMS.ACBLIB,DISP=SHR
//IMSACBA  DD DSN=PIMS.ACBLIBA,DISP=SHR
//IMSACBB  DD DSN=PIMS.ACBLIBB,DISP=SHR
//FORMAT   DD DSN=PIMS.FORMAT,DISP=SHR
//FORMATA  DD DSN=PIMS.FORMATA,DISP=SHR
//FORMATB  DD DSN=PIMS.FORMATB,DISP=SHR
//SYSUDUMP DD SYSOUT=&SOUT
//SYSPRINT DD SYSOUT=&SOUT
//SYSUT3   DD UNIT=SYSDA,SPACE=(CYL,(1,1))
//SYSUT4   DD UNIT=SYSDA,SPACE=(CYL,(1,1))
//COPYCTL  DD DSN=&&COPYCTL,DISP=(NEW,DELETE),
//         UNIT=SYSDA,SPACE=(CYL,(1,1))
```

Figure 11. Online Change Utility Procedure OLCUTL

4.2.2.1 IMS Security GEN Changes

Although the IMS security GEN (Figure 12 on page 48) updates only the MATRIX library, both the MATRIX and MODBLKS libraries need to be copied during the online change to make the change effective.

```
//*
//*     SECURITY GEN                                        *
//S        EXEC  PGM=DFSISMP0,PARM='UPDATE,0',
//             TIME=30
//STEPLIB  DD  DSN=PIMS.MODBLKS,DISP=SHR
//         DD  DSN=PIMS.RESLIB,DISP=SHR
//SYSPRINT DD  SYSOUT=*,DCB=(RECFM=VBA,BLKSIZE=129,LRECL=125)
//SYSPUNCH DD  UNIT=SYSDA,SPACE=(CYL,(2,2)),
//             DCB=(RECFM=FB,LRECL=80,BLKSIZE=400),
//             DISP=(NEW,PASS)
//SYSLIN   DD  UNIT=SYSDA,SPACE=(TRK,(1,1)),
//             DCB=(RECFM=F,BLKSIZE=80),
//             DISP=(NEW,PASS)
//SYSUT1   DD  UNIT=SYSDA,DCB=(BLKSIZE=500,RECFM=FB),
//             SPACE=(CYL,(2,2))
//SYSUT2   DD  UNIT=(SYSDA,SEP=SYSUT1),DCB=*.S.SYSUT1,
//             SPACE=(CYL,(2,2))
//SYSIN    DD  DSN=CCIMS.PIMS.IMSSORS(IMSAGN1),DISP=SHR
//         DD  DSN=CCIMS.PIMS.IMSSORS(IMSSEC1),DISP=SHR
//         DD  DSN=CCIMS.PIMS.IMSSORS(IMSTCO1),DISP=SHR
//*
//C    EXEC  PGM=IEV90,PARM='OBJECT,NODECK',COND=(12,LT,S),
//         REGION=4096K
//SYSLIB   DD  DSN=SYS1.MACLIB,DISP=SHR
//SYSPRINT DD  SYSOUT=*,DCB=BLKSIZE=1089
//SYSLIN   DD  UNIT=(SYSDA,SEP=SYSPRINT),DISP=(,PASS),
//             SPACE=(CYL,(2,2)),
//             DCB=*.S.SYSPUNCH
//SYSUT1   DD  UNIT=SYSDA,SPACE=(CYL,(10,5))
//SYSIN    DD  DSN=*.S.SYSPUNCH,DISP=(OLD,DELETE)
//*
//L     EXEC PGM=IEWL,
//  PARM=(LIST,NE,OL,'RMODE=ANY,AMODE=31'),
//            REGION=5M,COND=(4,LT,S)
//SYSPRINT DD  SYSOUT=*,DCB=(RECFM=FBA,LRECL=121,BLKSIZE=605)
//SYSLMOD  DD  DSN=CCIMS.PIMS.MATRIX,DISP=SHR
//INPUT    DD  DSN=*.C.SYSLIN,DISP=(OLD,DELETE)
//SYSUT1  DD  UNIT=(SYSDA,SEP=INPUT),SPACE=(CYL,(5,1))
//SYSLIN  DD  DSN=*.S.SYSLIN,DISP=(OLD,DELETE)
//*
```

Figure 12. JCL to Run an SMU Security Gen

4.2.2.2 IMS GEN Changes

IMS GENs modify both the MODBLKS and MATRIX libraries (see Figure 13 on page 49). To implement a change requires that both be copied to the inactive library to make the change effective. Since the target library is set to U the target will be determined by the utility, using the MODSTAT data set. The target will be the library not currently in use by the IMS online system.

```
//*
//STEP1    EXEC OLCUTL,
//         PARM=(MODBLKS,S,U)
//*
//STEP2    EXEC OLCUTL,
//         PARM=(MATRIX,S,U)
```

Figure 13. JCL to Execute MODBLKS and MATRIX Online Change Utility

4.2.2.3 ACB Changes

The ACBGEN process should put the new load modules in the ACB staging library. The example in Figure 14 shows the required JCL to copy the staging library to the active library.

```
//*
//STEP1    EXEC OLCUTL,
//         PARM=(ACB,S,U)
```

Figure 14. JCL to Execute ACB Online Change Utility

Chapter 5. Fallback Considerations

When planning for fallback, make sure that backups are part of the migration process.

The previous releases of IMS do not support compatibility with any major functions introduced by IMS Version 5. Therefore, when preparing your migration plan, please consider how to make fallback successful.

5.1 Sample Fallback Scenario

Fallback tasks are installation dependent. To cover all of your particular needs, be sure to examine the general considerations presented in this section in terms of your system and its component subsystems. This fallback scenario describes the minimum fallback tasks required:

1. Perform a normal shutdown of the current IMS system level.
2. If normal shutdown is impossible, the following actions are required:
   a. Perform batch backout with IMS Version 5 utilities.
   b. Perform log recovery to close all OLDS with IMS Version 5 utilities.
   c. Run archive for all OLDS with IMS Version 5 utilities.
3. Check RECON record (LIST.RECON ALL) to make sure that
   - All OLDS have been archived and closed.
   - No DBDS record with recovery condition is open.
   - No ADS record with recovery condition is open.
   - No SUBSYS record exists.

   See Chapter 9, “DBRC and RECON Migration” on page 69 for more details.
4. Check databases to see if recovery is needed:

   /DISPLAY DB BKERR command

   If so, then recover databases. For more information, see Chapter 10, “Database and Application Support with IMS Version 5” on page 85.
5. Rebuild MSDBINIT from MSDBCPx or MSDBDUMP with the IMS Version 5 MSDB maintenance utility. (Required before cold start.)
6. Restore all libraries of previous-release IMS, including
   - All system libraries (including ACBLIB). There is no compatibility of ACBLIB. The old ACBLIB should be kept to prepare for fallback. If the old ACBLIB is no longer available, it must be rebuilt as part of the fallback process, using ACBGEN on the old release of IMS.
   - All JCL libraries including ones containing Stage 1 SYSGEN input macros.
   - All application module and user utility libraries.
7. Perform LIST.RECON to verify DBRC coexistence SPE, if applicable.
8. Restart IMS with cold start options (/NRESTART CHECKPOINT 0 FORMAT ALL).

5.2 RECON Data Set Considerations

For more information, see Chapter 9, “DBRC and RECON Migration” on page 69.

5.3 ACBLIB

There is no version-to-version compatibility of ACBLIB. The old ACBLIB should be kept to prepare for fallback. If the old ACBLIB is no longer available, it must be rebuilt as part of the fallback process, using the ACBGEN utility from the old release of IMS.

5.4 Language Interface Module (DFSLI000)

The old application program library should be kept to prepare for fallback. The IMS Version 5 Language Interface Module (DFSLI000) should not be used on previous releases of IMS systems. Any application programs that are link-edited with the IMS Version 5 Language Interface Module should not be executed on the old IMS version.

An S0C4 abnormal termination (abend) can occur in some cases if the IMS Version 5 language interface is accidentally executed on a previous release of IMS. The language interface module was extended by the addition of some new interfaces and functions. As long as the application programs don′t use any new function or any of the new entry points, they *should* be able to run under a previous level of IMS. IMS informational APAR II07766 item 9 documents this.

5.5 Libraries

Some libraries that have been used on the old release of IMS should be kept to prepare for fallback. For more information, see Table 5.

Table 5 (Page 1 of 2). Fallback Compatibility of IMS Execution Libraries

Library	Created by	Compatibility	Fallback Consideration
IMS Module (RESLIB)	IMSGEN	No	
IRLM Module (RLRESLIB)	IMSGEN	No	
Randomizer (system)	IMSGEN	Yes	
Randomizer (user)	User	Yes	
Dynamic allocation list	IMSDALC (user)	Yes	
User Exit	User	Depends on exit type	
Application Module	User	Yes	Programs link-edited with DFSLI000 from IMS/ESA Version 5 cannot fall back

Table 5 (Page 2 of 2). Fallback Compatibility of IMS Execution Libraries

Library	Created by	Compatibility	Fallback Consideration
IMS PROCLIB and JOBS	IMSGEN and CUSTOMIZE	No	
DBRC Skeletal JCL	IMSGEN and CUSTOMIZE	No	
TCFSLIB	User	Yes	
MODBLKSx	IMSGEN	No	
FORMATx (user)	MFSGEN (User)	Yes	
System provides MFS	MFSGEN (IMSGEN)	No	
MATRIXx	SMU	No	
ACBLIBx	ACBGEN	No	Must use libraries at the same IMS release level.
MODSTAT	INITMOD	No	
MSDBINIT	USER	Yes	
MSDBCPx	IMS control region	No	
MSDBDUMP	IMS control region	No	
Scratch Pad Area (SPA)	-	No	IMS/ESA Version 4 and later no longer use the SPA.
SHMSG/1-9	IMS control region	No	Not supported in releases prior to IMS/ESA Version 4.
LGMSG/1-9	IMS control region	No	Not supported in releases prior to IMS/ESA Version 4.
DFSTRAxx	IMS control region	No	Not supported in releases prior to IMS/ESA Version 4.
Other system data sets	IMS control region	No	Format with FMT ALL restart option.

5.6 New Functions

After a fallback, the new functions provided by IMS Version 5 cannot be used until Version 5 is restored. This has been a common fallback inhibitor when moving from IMS levels so it would be wise to introduce new functions in the Version 5 level only after obtaining production-level stability using functions that are compatible with your earlier IMS level.

Chapter 6. Operational Considerations Migrating to IMS Version 5

This chapter discusses changes to initialization, operational, and automated operations parameters introduced by IMS/ESA Versions 4 and 5. We are including Version 4 enhancements because they have important operational ramifications. The release guides for earlier levels of IMS should be reviewed for their associated changes and enhancements.

6.1 IMS Control Region Execution Parameter Changes

IMS/ESA Version 4 introduced enhancements for customizing the execution parameters for your IMS system.

In previous IMS releases, execution parameters were specified in the SYSGEN parameters (DFSPRRGx modules), JCL procedures, or both. There are some limitations to these methods:

- DFSPRRGx modules had a one-character suffix, which limited the number of modules to 36.
- DFSPRRGx modules had to be assembled and link-edited into the RESLIB member after changing parameters.
- JCL EXEC statements contained positional parameters, requiring positional commas.
- MVS has a 100-character limit for the EXEC parameter of the JCL procedure area.

IMS Version 4 addresses these limitations in the following manner:

- The new PROCLIB member DFSPBxxx, rather than the DFSPRRGx modules, provides the initial parameters.
- The DFSPBxxx members have a three-character suffix, which greatly expands the capacity for defining specific execution parameter configurations.

  The default members are

  - DFSPBIMS: DB/DC
  - DFSPBDBC: DBCTL
  - DFSPBDCC: DCCTL
- The execution parameters have been changed to keyword-defined values.

6.1.1 Changes to the EXEC Parameter Statement

Changes introduced with IMS/ESA Version 4 to the specification of the EXEC startup parameters for IMS control regions could cause changes to the MVS start command used at your installation. The format of the EXEC statement on the IMS control region JCL is:

```
//   EXEC ...PARM='ccc,&RGSUF,&PARM1=,&PARM2='
```

- Where ccc is the control region type:
  - 'CTL': DB/DC region
  - 'DBC': DBCTL region

– 'DCC': DCCTL region

- &RGSUF is the DFSPBxxx member suffix
- &PARM1 and &PARM2 parameters are both used to specify character strings that contain IMS keyword values, such as:

  ```
  PARM1= AUTO=Y,PST=70,RES=Y
  ```

  Review operating procedures, automated operator procedures, or any other procedures that contain the start command.

  The old format of the MVS start command resembles

  ```
  /S IMS,AUTO=Y.
  ```

  This has to be changed to the current format:

  ```
  /S IMS,PARM1='AUTO=Y'
  ```

In order to use this facility when migrating from levels of IMS earlier than Version 4, perform the following:

- After the IMS installation is complete copy any generated default DFSPB members into DFSPBxxx.
- Include values for the new required keyword parameters with values used in the earlier DFSPRRGx modules.
- Specify RGSUF=xxx on the EXEC statement (three-character specification required).
- Specify keywords specific to an execution through PARM1= or PARM2=.
- Parameter values are merged in the following sequence:

  1. IMSGEN parameter values, overridden by:
  2. DFSPBxxx parameter values, overridden by:
  3. EXEC parameter (&PARM1=|&PARM2=) values.

An IMS DB/DC system is not the only environment where this startup parameter override process is used. The DFSPBxxx member applies to the DCCTL and DBCTL environment well as to IMS DB/DC.

6.2 Migration and Automated Operations

Traditionally, automated operator functions for IMS were provided by the automated operator exit (DFSAOUE0) and AOI transactions. In IMS/ESA Version 3, time-controlled operations (TCO) became available for DB/DC systems.

In IMS/ESA Version 5, a new facility has been introduced that provides DBCTL users control of the automation of their IMS system operations. For users with IMS TM and DBCTL, this automated operator interface (AOI -Type 2) provides automation capability even if the message queue is not available since the facility uses an incore queue. Two major migration considerations are associated with IMS/ESA Version 5 and automation:

- Introduction of the PARM1/PARM2 parameters into the IMS procedures and startup JCL.

  The details of this change are discussed in Section 6.1, “IMS Control Region Execution Parameter Changes” on page 55. The implication of that change is that the startup of the IMS region is different. All startup commands must be modified to use the PARM1 and PARM2 symbolic names to pass

parameters to the system startup. This affects any programs, operations, planning & control advanced (OPCA) jobs or other scheduled jobs, along with automation execs or any other procedures used to operate the IMS systems. Testing of these procedures should be done to ensure compatibility with the Version 5 systems.

- The introduction of the Type 2 AO exit and automation interface support.

  This feature increases operability for the DBCTL systems. It provides a program interface for using IMS commands. This means that, as with IMS TM systems, programs can be used to automate commands. This can be done by using BMP programs.

  The most common use of this interface is to provide scheduled starting and stopping of applications for required batch processing.

  The automated operations control: IMS (AOC/IMS) automation feature also makes use of this interface. If your installation is using the AOC CICS automation feature, you may want to consider using the IMS automation feature to control the startup of the DBCTL regions.

Chapter 7. Migration and Security

Version 1, 2, and 3 IMS systems are affected by RACF security changes introduced in IMS/ESA Versions 4 and 5. IMS/ESA Version 4 introduced RACF security for IMS commands. IMS/ESA Version 5 saw the introduction of RACF security for the new type of automated operator programs.

The security maintenance utility (SMU) normally works at the terminal level and is still available to some environments. But facilities like ETO are incompatible with SMU, and a migration to user-based security facilities such as offered by RACF is recommended. The only facility left requiring SMU with IMS/ESA Version 5 is security for application group names (AGNs), which is a facility provided jointly by SMU and RACF.

If the extended terminal option (ETO) feature is not going to be used, then the changes are minimal. Programmers for those systems that use non-IBM security packages need to consult with their suppliers for details of required changes for IMS Version 5 support.

Those systems that don't use RACF or other security packages are not affected by IMS Version 5 changes. RACF can be set off on startup by the parameter RCF=N. To find out more details about this parameter, please refer to the IMS Procedures chapter of *IMS/ESA Installation Volume 2: System Definition and Tailoring*, SC26-8024.

7.1 IMS Version 5 Features

IMS Version 5 allows you to control security by user ID rather than by LTERM/NODE name. If you continue to use static (predefined) LTERM names, then security continues to work as before.

7.2 RACF Security

IMS makes use of two RACF classes to control all IMS command security. The class names are Cxxxxxxx and Dxxxxxxx where xxxxxxx is defined by the RCLASS parameter on the SECURITY macro in the IMS generation. If these classes are not defined or not active, then IMS abends if the RCF parameter is used on IMS startup. This is a requirement even if ETO is not used and logical terminal (LTERM) security is to be used. To find more details about defining this RACF elements, consult the section "Establishing IMS Security" in the *IMS/ESA Administration Guide: System*, SC26-8013.

Some commands are for general access and all IMS users should have access to them. Other commands should be restricted to operations or support people only. A typical list of those commands and which groups should have access to them is given in Section 7.2.1, "General User Commands" on page 60.

7.2.1 General User Commands

Typical commands to which all IMS users need access include these:

- DISPLAY
- CANCEL
- END
- EXCLUSIVE
- EXIT
- FORMAT
- HOLD
- IAM
- RCL
- RELEASE
- RESET
- SET
- SIGN
- TEST

7.2.2 Operational and Support User Commands

By default, all other commands should be available only to the support groups. These important commands should be available to operational and support personnel:

- ASSIGN
- CHANGE
- CHECKPOINT
- CLSDST
- DBDUMP
- DBRECOVERY
- DELETE
- DEQUEUE
- ERESTART
- IDLE
- LOCK
- LOG
- MODIFY
- MONITOR
- NRESTART
- RMCHANGE
- RMLIST

7.2.3 RACF Definition Examples

The following describes how to define command security for different classes of users:

7.2.3.1 General User Command Example

Once the RACF classes have been defined, Figure 15 on page 61 and Figure 16 on page 61 show examples of how to define the commands and connect the required users to them.

```
       RDEFINE CIMS (CAN DIS END EXC)
       RDEFINE CIMS (EXI FOR HOL IAM)
       RDEFINE CIMS (RCL RDI REL RES)
       RDEFINE CIMS (SET SIG TES)
       RDEFINE CIMS (ASS CHA CHE CLS COM DBD DBR)
       RDEFINE CIMS (DEL DEQ ERE IDL LOG LOO MON)
       RDEFINE CIMS (MSA MSV NRE OPN PST PUR QUI)
       RDEFINE CIMS (RMI RML RMN RST SET SSR STA STO SWI)
       RDEFINE CIMS (TRA UNL BRO)
/*
```

Figure 15. RACF Commands to Define Commonly Used Commands

```
  RDEFINE DIMS IMSUSR ADDMEM(CAN DIS END EXC EXI FOR HOL IAM)
  RALTER  DIMS IMSUSR ADDMEM(RCL RDI REL RES SET SIG TES)
/*
```

Figure 16. RACF Commands to Define a General User Group

7.2.3.2 Operational Support Commands Examples

Once the RACF classes have been defined, the example jobs shown in Figure 17 and Figure 18 illustrate how to define the commands and connect the required users to them.

```
//* DEFINE DIMS RESOURCE CLASS
   RDEFINE DIMS MTOIMS ADDMEM(ASS CHA CHE CLS COM )
   RALTER  DIMS MTOIMS ADDMEM(DBD DBR DEL DEQ DIS ERE IDL)
   RALTER  DIMS MTOIMS ADDMEM(LOC LOG LOO RCO MOD MON MSA MSV)
   RALTER  DIMS MTOIMS ADDMEM(NRE OPN PST PUR QUI )
   RALTER  DIMS MTOIMS ADDMEM(RMI RMN RST SET SSR )
   RALTER  DIMS MTOIMS ADDMEM(STA STO SWI TRA RML UNL BRO)
```

Figure 17. RACF Commands Defining Classes for Operational Support User Groups

```
 CO IMSYSYP GROUP(MTOIMS)
 CO IMSOPER GROUP(MTOIMS)
 CO APPLPGM GROUP(IMSUSR)
```

Figure 18. RACF Command to Connect Users to the Groups

7.2.4 Security Maintenance Utility

7.2.4.1 Command Security

To give specific LTERMS command authority, those LTERMS must first be defined in the Stage 1 GEN of the IMS system. Once defined, then normal SMU commands can be used to define the required security.

Figure 19 on page 62 gives two examples. The first limits program CCF013 to the DBR command only and the second gives CCF014 access to all IMS

commands. The DBR command would be used to close a database to allow for database recoveries or offline processing.

```
)( CTRANS CCFO13
  TCOMMAND DBR
)( CTRANS CCFO14
  Tcommand *
```

Figure 19. Member IMSSEC1: Sample SMU Input Giving Program Command Authority

7.2.4.2 Application Group Name Security

Application group names (AGN) are used to control the access to run programs to BMPs and other regions (CICS) within an IMS system (Figure 20).

```
*-----------------------------------------------------*
* IMS PROD Message Processing Regions all have the    *
* same AGN name, so that transactions can be assigned *
* to different MPRs without a security gen            *
* CICS systems also share the same AGN                *
*-----------------------------------------------------*
)( AGN PRAGN1
 AGLTERM ALL
 AGPSB   ALL
 AGTRAN  ALL
)( AGN PRBMPCCF
 AGLTERM ALL
  AGPSB   CCFO1O
  AGPSB   CCFO12
  AGPSB   CCFO13
   AGTRAN ALL
```

Figure 20. Member IMSAGN1: Sample Security GEN Input for AGNs

```
)( TERMINAL DFSTCF      /* TCO FACILITY              */
   COMMAND  ASSIGN
   COMMAND  CHANGE
   COMMAND  CHECKPOINT
   COMMAND  CLSDST
   COMMAND  COMPT
   COMMAND  DBDUMP
   COMMAND  DBRECOVERY
   COMMAND  DISPLAY
   COMMAND  IDLE
   COMMAND  OPNDST
   COMMAND  PSTOP
   COMMAND  RMGENJCL
   COMMAND  RSTART
   COMMAND  SMCOPY
   COMMAND  SSR
   COMMAND  START
   COMMAND  STOP
   COMMAND  SWITCH
   COMMAND  TRACE
```

Figure 21. MEMBER IMSTCO1: Sample TCO Terminal Security

7.2.4.3 IMS Security Maintenance Utility Processing

To generate IMS SMU security, a security GEN is required. A sample security generation procedure is provided in Figure 22 on page 64.

Once this security generation has been run, the changes need to be implemented through the online change procedure. The input is shown in Figure 19 on page 62 through Figure 21.

```
//*
//*     SECURITY GEN                                          *
//*
//S        EXEC  PGM=DFSISMP0,PARM='UPDATE,0',
//             TIME=30
//STEPLIB  DD  DSN=PIMS.MODBLKS,DISP=SHR
//         DD  DSN=PIMS.RESLIB,DISP=SHR
//SYSPRINT DD  SYSOUT=*,DCB=(RECFM=VBA,BLKSIZE=129,LRECL=125)
//SYSPUNCH DD  UNIT=SYSDA,SPACE=(CYL,(2,2)),
//             DCB=(RECFM=FB,LRECL=80,BLKSIZE=400),
//             DISP=(NEW,PASS)
//SYSLIN   DD  UNIT=SYSDA,SPACE=(TRK,(1,1)),
//             DCB=(RECFM=F,BLKSIZE=80),
//             DISP=(NEW,PASS)
//SYSUT1   DD  UNIT=SYSDA,DCB=(BLKSIZE=500,RECFM=FB),
//             SPACE=(CYL,(2,2))
//SYSUT2   DD  UNIT=(SYSDA,SEP=SYSUT1),DCB=*.S.SYSUT1,
//             SPACE=(CYL,(2,2))
//SYSIN    DD  DSN=PIMS.IMSSORS(IMSAGN1),DISP=SHR
//         DD  DSN=PIMS.IMSSORS(IMSSEC1),DISP=SHR
//         DD  DSN=PIMS.IMSSORS(IMSTCO1),DISP=SHR
//*
//C    EXEC  PGM=IEV90,PARM='OBJECT,NODECK',COND=(12,LT,S),
//         REGION=4096K
//SYSLIB   DD  DSN=SYS1.MACLIB,DISP=SHR
//SYSPRINT DD  SYSOUT=*,DCB=BLKSIZE=1089
//SYSLIN   DD  UNIT=(SYSDA,SEP=SYSPRINT),DISP=(,PASS),
//             SPACE=(CYL,(2,2)),
//             DCB=*.S.SYSPUNCH
//SYSUT1   DD  UNIT=SYSDA,SPACE=(CYL,(10,5))
//SYSIN    DD  DSN=*.S.SYSPUNCH,DISP=(OLD,DELETE)
//*
//L     EXEC PGM=IEWL,
//  PARM=(LIST,NE,OL,'RMODE=ANY,AMODE=31'),
//            REGION=5M,COND=(4,LT,S)
//SYSPRINT DD  SYSOUT=*,DCB=(RECFM=FBA,LRECL=121,BLKSIZE=605)
//SYSLMOD  DD  DSN=PIMS.MATRIX,DISP=SHR
//INPUT    DD  DSN=*.C.SYSLIN,DISP=(OLD,DELETE)
//SYSUT1  DD  UNIT=(SYSDA,SEP=INPUT),SPACE=(CYL,(5,1))
//SYSLIN  DD  DSN=*.S.SYSLIN,DISP=(OLD,DELETE)
//*
```

Figure 22. JCL to Run an SMU Security GEN

7.2.4.4 Transaction Security

To restrict transactions from running on predefined LTERMS, the LTERMS must be defined in the IMS Stage 1 GEN. These then become known as *static LTERMS*. Once defined, the transactions can be defined to run on these and only these LTERMS. Any terminal not defined (dynamic ETO LTERMS) cannot use those transactions.

7.3 Checklist of Tasks

Use the following checklist to ensure that the correct security environment has been set up:

1. Review the SMU security input to determine what security is based on LTERMs. Only static terminals can have security defined. This is because the dynamic terminals are not known to the IMS system at the time of the IMS gen. Unless specific LTERMs require specific access, all security can now be handled by RACF based on user ID.
2. If the extended terminal option (ETO) is being used, remove all terminal security for those LTERMs that were removed from the generation.
3. Ensure that the Dxxx and Cxxx classes are set up in RACF and activated.

Chapter 8. Signon Processing Migration Considerations

Most IMS installations have their own sign on procedures, presenting customized logon screens for the end user. IMS/ESA Version 4 introduced the possibility of using a customized exit for sign on.

8.1 DFSGMSG0 Exit for User Signon

In IMS/ESA Version 4, the sign-on process changed. First, message DFS2002 is discontinued.

In releases prior to IMS/ESA Version 4, the way to make use of customized sign on was to replace the IBM default in one way or another. One way was to replace default format MFSSM1 (created during SYSGEN) with a user format, another way was to replace the default MOD DFSMO1. With IMS Version 5, the recommended way is by using the sign on exit DFSGMSG0 (a sample exit is supplied in the TMSOURCE data set).

If no sign-on customization is done, then IMS issues message DFS3649A and the default sign on appears. Upon successful sign on, message DFS3650 is issued.

Exit DFSGMSG0 allows you to create your own version of the DFS2467, DFS3649, or DFS3650 message. It also allows a different MFS mod name to be used for these messages when built by this exit. The mod name can be changed even if the message is not changed. Likewise, the message can be changed without changing the mod name. This exit converts the DFS3650 message to a single segment message.

Please refer to the DFSGMSG0 sample exit in the TMSOURCE data set for the following. To use a customized MOD, supply a user MOD name in the GMSGUMOD field before exiting DFSGMSG0. An example of this coding can be seen in the sample exit after label REQ3650D. Also, note the possible return code settings upon exit from DFSGMSG0. The return codes can be seen in the sample exit header.

The exit name must be DFSGMSG0.

Link-edit the exit into a library preceding RESLIB in the concatenation.

See *IMS/ESA Customization Guide*, SC26-8020 for more information.

Chapter 9. DBRC and RECON Migration

The amount of effort associated with the conversion of the DBRC environment depends on the status of the current setup. If the DBRC environment is not used to provide database recovery control, then there are no issues with DBRC. Simply define a new set of RECONs to be used by the IMS/ESA Version 5 system and start afresh. To determine if the DBRC environment is being used for database recovery support, list the RECON to determine whether any databases have been registered. If no database are registered, then DBRC is not being used for database recovery support.

If DBRC is used to provide database recovery support, then a strategy to convert the DBRC environment needs to be decided. We discuss the major elements of that strategy in this chapter.

9.1 Conversion of IMS/ESA Version 3 and 4 Systems

IMS/ESA Versions 3 and 4 have a direct migration path to IMS/ESA Version 5. If DBRC is not being used for database recovery support, the simplest approach is to allocate a new set of RECON data sets and not use the RECON upgrade utility. Thus the rest of the RECON upgrade steps from this chapter can be bypassed. Otherwise, follow the steps in the following section.

9.1.1 Steps to Migrate an IMS/ESA Version 3 or 4 RECON to Version 5

The steps are these:

1. Prepare the RECON for the upgrade utility
2. Run the upgrade utility using RECON1
3. Run a BACKUP.RECON to create RECON2
4. Delete and define the RECON3 dataset.

The RECON is now ready for use by the IMS 5 system. If a fallback is required, the Version 3 and 4 systems need to have the coexistence enhancements applied. Please refer to the ″Coexistence″ chapter in the *IMS/ESA Version 5 Release Planning Guide* for details.

9.1.2 IMS RECON Upgrade Utility

The record size of certain RECON log records has been increased for IMS Version 5. During the upgrade process, certain large RECON log records from earlier releases may cause the new RECON size to be exceeded. If this occurs, increase the RECORDSIZE value for the RECON data sets as described in ″Creating a RECON Data Set″ in *IMS/ESA Installation Volume 1: Installation and Verification*, SC26-8023. The steps to prepare the RECON data sets for the RECON upgrade utility are listed below with the associated assumptions.

9.1.2.1 RECON Upgrade Assumptions

- The RECON datasets are dynamically allocated by DFSMDA members assembled into the RESLIB.
- The output of any GENJCL command should be SUBMITTED to JES.
- The input is supplied by means of a //SYSIN DD override statement.
- The input is in DBRC command format. Refer to the Database Recovery Control Utility (DSPURX00) chapter in *IMS/ESA Utilities Reference: System*, SC26-8035 for detail of the command syntax.

9.1.2.2 RECON Upgrade Steps

1. Stop all running subsystems.

   The RECON upgrade utility terminates if it finds any SUBSYS records in the RECON.

2. Resolve any failed SUBSYS situations.

   To find any SUBSYS records, use the DBRC utility to run a LIST.SUBSYS ALL. The DBRC batch procedure is listed in Figure 23.

```
//DBRC   PROC SOUT='A',IMS=PIMS
//STEP01  EXEC PGM=DSPURX00
//STEPLIB  DD  DSN=&IMS..RESLIB,DISP=SHR
//IMS      DD  DSN=&IMS..DBDLIB,DISP=SHR
//JCLPDS   DD  DSN=&IMS..JCLLIB,DISP=SHR
//JCLOUT   DD  SYSOUT=(*,INTRDR)
//SYSPRINT DD  SYSOUT=&SOUT
```

Figure 23. DBRC Batch Procedure

   The SUBSYSTEM record is retained until a backout has been run or is removed manually after a RECOVERY is run.

3. Resolve any recovery-needed situations.

   Run the required recovery jobs and then manually delete the subsystem record. See Figure 24 for an example of how to delete the SUBSYS record.

```
//DBRC    EXEC PGM=DSPURX00
//STEPLIB  DD  DSN=IMSVS.RESLIB,DISP=SHR
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
CHANGE.SUBSYS SSID(jobname) STARTRCV
CHANGE.SUBSYS SSID(jobname) ENDRECOV
DELETE.SUBSYS SSID(jobname)
/*
```

Figure 24. JCL to Manually Delete SUBSYS Record from RECON

4. Resolve any batch-backout needed situations.

   The IMS/ESA Version 5 batch backout utility does not work with logs from any other version of IMS. For conversion from Version 4 systems, the LIST.BKOUT DBRC command can be issued to list and back out records in the RECON. This command can be entered using the DBRC batch utility. Run a batch backout for the failed job. A successful completion of the batch backout (BBO) job deletes the SUBSYS record.

5. Make sure that all OLDS data sets have been successfully archived.

   The IMS/ESA Version 5 log archive utility does not work with OLDS from any other versions of IMS. See Figure 25 for an example of how to list any unarchived OLDS.

```
//DBRC    EXEC PGM=DSPURX00
//STEPLIB  DD  DSN=IMSVS.RESLIB,DISP=SHR
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
LIST.LOG OLDS UNARCH
/*
```

Figure 25. JCL to List Any Unarchived OLDS

6. Make sure that the last backup for all DEDBs is not an HSSP image copy.

   IMS Version 5 has changed support for HSSP, and all HSSP IC records will be deleted from the RECON. After deleting the HSSP IC, the upgrade utility fails if there is no valid image copy record for every DEDB area. Ensure that an image copy there is a valid image copy for each DEDB Area.

7. Back up the RECON using the BACKUP.RECON command to a new RECON.

8. Run the RECON UPGRADE Utility with the new RECON.

9.2 Conversion of IMS/VS Version 1 and 2 Systems

IMS Version 1 and 2 systems do not have a supported direct migration path to Version 5. If DBRC is not used for database recovery support, then the simple approach is to use a new set of RECONs. If DBRC is used, then a migration strategy needs to be determined. The choice of strategies is based on the current usage of the DBRC environment. These three strategies describe the alternatives:

- Migration where DBRC is not used for database recovery information
- Migration with no database recovery history information
- Migration with limited database recovery history information.

  One easy way to determine if DBRC is used for database recovery support is to list the RECON to see if any databases are registered. This can be done use the DBRC command LIST.DB ALL. Enter this command using the DBRC batch utility.

9.2.1 Migration When DBRC Is Not Used for Database Recovery

Where DBRC is not used for database recovery Information, no database recovery information is registered in the RECON datasets and a new set of RECONs can be used by the new IMS Version 5 system. This can be done in either of two ways:

- Define different RECON dataset names.
- Delete the existing RECON and define a new one.

Either way, the RECONs need to be initialized using the INIT.RECON command issued from the IMS/ESA Version 5 system. Figure 26 on page 72 shows an example of the required parameters.

```
//DBRC    EXEC PGM=DSPURX00,COND=(0,NE)
//STEPLIB  DD  DSN=IMSVS.RESLIB,DISP=SHR
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
INIT.RECON  SSID(imsid) NOFORCER CHECK17
/*
```

Figure 26. JCL to Initialize the RECON

9.2.2 Migration with No Database Recovery History Information

This approach copies limited amounts of recovery information to the new RECON, whether done manually or by means of DBRC commands. Version 1 systems must take the manual approach as the GENJCL.USER command is not available until IMS Version 2.1.

These are the steps to prepare the RECON:

1. Stop all running subsystems.
2. Resolve any failed SUBSYS situations.

   Again, to find any SUBSYS records use the DBRC utility to run a LIST.SUBSYS ALL. The subsystem record is retained until a backout has been run or until it is removed manually after a recovery is run.
3. Resolve any batch-backout needed situations.

   Because the IMS Version 5 batch backout utility does not accept logs from any other version of IMS, run a batch backout for the failed job. A successful completion of the BBO deletes the SUBSYS record.
4. Resolve any recovery-needed situations.

   Run the required recovery jobs and then manually delete any subsystem record present. Version 2 or 3 systems may have the recovery-needed flag set without a failed SUBSYS record in the RECON. Run a LIST.DB ALL command and check the output for any recovery-needed situations. Figure 24 on page 70 shows an example of how to delete the SUBSYS record.
5. Define and Initialize the RECON data sets.

   Figure 26 shows the required JCL to initialize the RECONs.
6. Reregister all databases.

   Refer to Section 9.3, “Migrating RECON Database Information” on page 73, for details on how to extract this information so that it can be used to assist with reregistration of the databases.
7. Run an image copy for all recoverable databases.

9.2.3 Migration with Limited Database Recovery History Information

This approach requires careful planning to ensure that adequate recovery scenarios are available.

These are the steps to prepare the RECON data sets:

1. Stop all running subsystems.
2. Resolve any failed SUBSYS situations.

To find any SUBSYS records, use the DBRC utility to run a LIST.SUBSYS ALL command. The subsystem record is retained until a backout has been run or is removed manually after a recovery is run.

3. Resolve any recovery-needed situations.

   Run the required recovery jobs and then manually delete the subsystem record. See Figure 24 on page 70 for an example of how to delete the SUBSYS record.

4. Resolve any batch-backout needed situations.

   The IMS Version 5 BBO utility does not accept logs from any other version of IMS. Run a batch backout for the failed job. A successful completion of the BBO deletes the SUBSYS record.

5. Define and Initialize the RECON data sets.

   See Figure 26 on page 72 for the required JCL to initialize the RECONs.

6. Extract information from the current RECON for the databases you intend to reregister.

   Refer to Section 9.3, “Migrating RECON Database Information” for details on how to extract this information.

7. Reregister the database information

   This can be done by using the DBRC INIT commands to reestablish the required information in the RECON. (See Figure 28 on page 74 for an example of the INIT commands required.)

9.3 Migrating RECON Database Information

It is possible to extract some of the DB history from a RECON without keeping all of it. For those customers using IMS Versions 3 and 4, it is easier to use the RECON upgrade utility and keep the whole RECON. Version 1 and 2 customers can′t do this. In these examples,

- The RECON datasets are dynamically allocated by means of DFSMDA members assembled into the RESLIB.
- PIMS.RESLIB is from IMS release 2.1 or higher.
- IMS51.RESLIB is the new IMS Version 5 release.

9.3.1 Databases Registration Example

An example of how to exact some information has been provided. See Figure 27 on page 74 for the example to extract the database registration information.

The examples provide a means of loading this information into a new RECON in Version 5 format. This example makes use of a DBRC command first available in IMS Version 2.1, so it does not work for IMS Version 1 systems.

The example in Figure 27 on page 74 shows how to extract the registration information for each database data set group (DBDSGRP) in the RECON. If there are no DBDSGRPs currently defined, one can be defined to include all databases in the RECON. The default member is used to provide static information and needs to be customized for each group. If the information for each database is the same, then one group can be created to handle all the databases. There is one restriction with this example. If any DB records have more than one DBDS

record, the output INIT commands must be edited to remove the duplicate INIT.DB commands.

```
//DBRC    EXEC PGM=DSPURX00,COND=(0,NE)
//STEPLIB  DD  DSN=PIMS.RESLIB,DISP=SHR
//IMS      DD  DSN=SDBR.DBGI.DBDLIB,DISP=SHR
//JCLPDS   DD  DSN=PIMS.JCLLIB,DISP=SHR
//JCLOUT   DD  DSN=SDBR.DBGI.RUN(JCLDBS1),DISP=SHR
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
GENJCL.USER GROUP(DBGGRP1) MEMBER(DBDSREG) LIST JOB(JOBACRD) -
DEFAULTS(DBGGDFLT) ONEJOB
/*
```

Figure 27. JCL to Generate Database Registration

This member selects all the databases in the DBDS group. Figure 28 shows the skeletal JCL used in Figure 27.

```
%DELETE (%STPNO NE '00000')
//JOBCARD  JOB (@TS1,ROOM),'REGISTRATION',MSGCLASS=H
//S%STPNO  EXEC PGM=DSPURX00,COND=(0,NE)
//STEPLIB  DD  DSN=IMS51.RESLIB,DISP=SHR
//IMS      DD  DSN=SDBR.DBGI.DBDLIB,DISP=SHR
//JCLPDS   DD  DSN=IMS51.JCLLIB,DISP=SHR
//JCLOUT   DD  SYSOUT=(*,INTRDR)
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
%ENDDEL
%SELECT DBDS((%DBNAME,%DDNAME))
 INIT.DB DBD(%DBNAME) SHARELVL(1)
 INIT.DBDS DBD(%DBNAME) DDN(%DBDDN) -
  GENMAX(%MAXGEN) DSN(%DBDSN) -
  ICJCL(%JCLIC) RECOVJCL(%JCLRECV) DEFLTJCL(%JCLDFLT)
%ENDSEL
```

Figure 28. DBDSREG Skeletal Member in JCLLIB

Figure 29 is the default member named in the GENJCL command in Figure 27. The main purpose of this default member is to allow different DBDSGRPs to have specific MAXGEN and JCL member defaults.

```
%JCLIC   = 'DBGIC'
%JCLRECV = 'DBGRECOV'
%JCLDFLT = 'DBGDFLT'
%MAXGEN  = '10'
```

Figure 29. DEFAULT Member for Registration GENJCL Command

Figure 30 on page 75 is the generated JCL. The output in the Figure 30 on page 75 example has been edited to remove the duplicate INIT.DB command as the Database DBGAMAP has two DBDS records in the RECON.

```
//JOBCARD  JOB (@TS1,ROOM),'REGISTRATION',MSGCLASS=H
//S1  EXEC PGM=DSPURX00,COND=(0,NE)
//STEPLIB  DD DSN=IMS51.RESLIB,DISP=SHR
//IMS      DD DSN=SDBR.DBGI.DBDLIB,DISP=SHR
/JCLPDS    DD DSN=IMS51.JCLLIB,DISP=SHR
/JCLOUT    DD SYSOUT=(*,INTRDR)
//SYSPRINT DD SYSOUT=*
//SYSIN    DD  *
INIT.DB DBD(DBGAMAP) SHARELVL(1)
INIT.DBDS DBD(DBGAMAP) DDN(DBGAMAP1) -
GENMAX(10) DSN(SDBRIMSS.DBGI.DBGAMAP1) -
ICJCL(DBGIC) RECOVJCL(DBGRECOV) DEFLTJCL(DBGDFLT)
INIT.DBDS DBD(DBGAMAP) DDN(DBGAMAP2) -
GENMAX(10) DSN(SDBRIMSS.DBGI.DBGAMAP2) -
ICJCL(DBGIC) RECOVJCL(DBGRECOV) DEFLTJCL(DBGDFLT)
INIT.DB DBD(DBGAMAY) SHARELVL(1)
INIT.DBDS DBD(DBGAMAY) DDN(DBGAMAY) -
GENMAX(10) DSN(SDBRIMSS.DBGI.DBGAMAY) -
ICJCL(DBGIC) RECOVJCL(DBGRECOV) DEFLTJCL(DBGDFLT)
INIT.DB DBD(DBGAMBP) SHARELVL(1)
INIT.DBDS DBD(DBGAMB8P) DDN(DBGAMBP) -
GENMAX(10) DSN(SDBRIMSS.DBGI.DBGAMBP) -
ICJCL(DBGIC) RECOVJCL(DBGRECOV) DEFLTJCL(DBGDFLT)
INIT.DB DBD(DBGAMBX) SHARELVL(1)
INIT.DBDS DBD(DDBGAMBX) DDN(DBGAMBX) -
GENMAX(10) DSN(SDBRIMSS.DBGI.DBGAMBX) -
ICJCL(DBGIC) RECOVJCL(DBGRECOV) DEFLTJCL(DBGDFLT)
INIT.DB DBD(DBGAMBY) SHARELVL(1)
INIT.DBDS DBD(DBGAMBY) DDN(DBGAMBY) -
GENMAX(10) DSN(SDBRIMSS.DBGI.DBGAMBY) -
ICJCL(DBGIC) RECOVJCL(DBGRECOV) DEFLTJCL(DBGDFLT)
```

Figure 30. Generated JCL to Register the Databases in the New RECON

9.3.2 NOTIFY of Last Image Copy

This example extracts the required information to copy the last image copy into the new RECON, which avoids having to take another image copy. The example in Figure 31 on page 76 is run using the current IMS system. Only the last image copy is selected, as it is more complex to try to extract enough information to make any earlier recovery point usable. The output is sent to a member of a partitioned data set (PDS), but could have been sent directly to the job entry subsystem (JES) to be run.

9.3.2.1 Registering the Last Image Copy for Each Database

This GENJCL command searches the RECON and extracts the last image copy data set information for each database data set in the database dataset group.

```
//DBRC    EXEC PGM=DSPURX00,COND=(0,NE)
//STEPLIB  DD  DSN=IMSVS.RESLIB,DISP=SHR
//IMS      DD  DSN=SDBR.DBGI.DBDLIB,DISP=SHR
//JCLPDS   DD  DSN=IMSVS.JCLLIB,DISP=SHR
//JCLOUT   DD  DSN=SDBR.DBGI.RUN(JCLIC1),DISP=SHR
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
GENJCL.USER GROUP(DBGGRP1) MEMBER(ICCOPY) LIST NOJOB  -
USERKEYS(%WHICHIC,'LAST')
/*
```

Figure 31. JCL to Generate NOTIFY.IC of Last Image Copy

Figure 32 shows the skeletal member to extract the image copy information. If the CATDS option has been specified for the RECON, then the volume and unit information is optional.

```
%DELETE (%STPNO NE '00000')
//JOBCARD  JOB (@TS1,ROOM),'REGISTRATION',MSGCLASS=H
//S%STPNO  EXEC PGM=DSPURX00,COND=(0,NE)
//STEPLIB  DD  DSN=IMS51.RESLIB,DISP=SHR
//IMS      DD  DSN=SDBR.DBGI.DBDLIB,DISP=SHR
//JCLPDS   DD  DSN=IMS51.JCLLIB,DISP=SHR
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
%ENDDEL
%SELECT IC ((%DBNAME,%DDNAME),%WHICHIC)
 NOTIFY.IC DBD(%DBNAME) DDN(%DDNAME) -
  ICDSN(%ICDSN) RUNTIME(%ICTIME)     -
  UNIT(%ICUNIT) VOLLIST(%ICVOLS)
%ENDSEL
```

Figure 32. ICCOPY Skeletal Member to Get the Last Image Copy

Figure 33 on page 77 is the generated output of the GENJCL.USER command. It is ready to be submitted.

```
//JOBCARD  JOB (@TS1,ROOM),'GEN LAST IC',MSGCLASS=H
//S1  EXEC PGM=DSPURX00,COND=(0,NE)
//STEPLIB  DD  DSN=IMS51.RESLIB,DISP=SHR
//IMS      DD  DSN=SDBR.DBGI.DBDLIB,DISP=SHR
//JCLPDS   DD  DSN=IMS51.JCLLIB,DISP=SHR
//SYSPRINT DD  SYSOUT=*
//SYSIN DD *
NOTIFY.IC DBD(DBGAMAP) DDN(DBGAMAP1) -
ICDSN(SDBR.DBGI.DBGAMAP1.BKUP.G0002V00) -
RUNTIME(971281653407)     -
UNIT(3400)VOLLIST(MAP054)
NOTIFY.IC DBD(DBGAMAP) DDN(DBGAMAP2) -
ICDSN(SDBR.DBGI.DBGAMAP2.BKUP.G0002V00) -
RUNTIME(971281653422)     -
UNIT(3400) VOLLIST(MAP054)
NOTIFY.IC DBD(DBGAMAY) DDN(DBGAMAY) -
ICDSN(SDBR.DBGI.DBGAMAY.BKUP.G0002V00) -
RUNTIME(971281653441)     -
UNIT(3400) VOLLIST(MAP054)
NOTIFY.IC DBD(DBGAMBP) DDN(DBGAMBP) -
ICDSN(SDBR.DBGI.DBGAMBP.BKUP.G0002V00) -
RUNTIME(971281653455)    -
UNIT(3400)VOLLIST(MAP054)
NOTIFY.IC DBD(DBGAMBX) DDN(DBGAMBX) -
ICDSN(SDBR.DBGI.DBGAMBX.BKUP.G0002V00) -
RUNTIME(971281653472)  -
UNIT(3400) VOLLIST(MAP054)
NOTIFY.IC DBD(DBGAMBY) DDN(DBGAMBY)-
ICDSN(SDBR.DBBGI.DBGAMBY.BKUP.G0002V00) -
RUNTIME(971281653488)     -
UNIT(3400) VOLLIST(MAP054)
```

Figure 33. Generated Job to NOTIFY New RECON Image Copy

9.3.3 Generating a Recovery Job Using the Last Image Copy

The example in Figure 34 is included for completeness. It demonstrates that the extracted information can be used to recover databases with only this limited information in the RECON.

```
//DBRC    EXEC PGM=DSPURX00
//STEPLIB  DD  DSN=IMS51.RESLIB,DISP=SHR
//IMS      DD  DSN=SDBR.DBGI.DBDLIB,DISP=SHR
//JCLPDS   DD  DSN=IMS51.JCLLIB,DISP=SHR
//JCLOUT   DD  DSN=SDBR.DBGI.RUN(JCLRECOV),DISP=SHR
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
 GENJCL.RECOV GROUP(DBGGRP1) ONEJOB MEMBER(DBGRECOV) -
 JOB(JOBCARD) DEFAULTS(DBGDFLT)
/*
```

Figure 34. JCL to Generate a Database Recovery with Newly NOTIFIED Image Copy

Figure 35 on page 78 shows the skeletal member to delete or define the databases and run the recovery step.

```
//*-------------------------------------------------
//* DELETE/DEFINE DATABASE DATASET
//*-------------------------------------------------
//S%STPNO   EXEC PGM=IDCAMS,
//             COND=(0,LT)
//SYSPRINT DD SYSOUT=*
//SYSIN    DD DSN=%PARMLIB(%DBDDN),DISP=SHR
//*-------------------------------------------------
//* RECOVER %DBNAME DATABASE DATASET
//*-------------------------------------------------
//S%STPNO    EXEC PGM=DFSRRC00,COND=(0,LT),
//             PARM='UDR,DFSURDB0,%DBNAME',REGION=4096K
//STEPLIB   DD DSN=IMS51.RESLIB,DISP=SHR
//SYSPRINT  DD SYSOUT=*
//IMS       DD DSN=%DBDLIB,DISP=SHR
//%DBDDN    DD DSN=%DBDSN,DISP=OLD,
//             AMP=('BUFND=30')
//DFSUDUMP  DD DSN=%ICDSN,DISP=SHR,DCB=BUFNO=20
%DELETE  (%CADSN EQ '')
//DFSUCUM   DD DSN=%CADSN,DISP=SHR
%ENDDEL
%DELETE  (%CADSN NE '')
//DFSUCUM   DD DUMMY
%ENDDEL
%SELECT  RLDS((%DBNAME,%DBDDN),ALL)
//DFSULOG   DD DSN=%LOGDSN,DISP=SHR
%ENDSEL
%DELETE (%LOGSEL EQ 'YES')
//DFSULOG DD DUMMY
%ENDDEL
//DFSVSAMP  DD DSN=%PARMLIB(%VSAMP),DISP=SHR
//SYSIN     DD *
%RCSYSIN
/*
```

Figure 35. DBGRECOV Skeletal Member for GENJCL.RECOV Command

The default member shown in Figure 36 is used to reduce the parameters in the GENJCL command. It allows for differences in information between DBDSGRPs.

```
%DBDLIB  = 'SDBR.DBGI.DBDLIB'
%PARMLIB = 'SDBR.DBGI.UTIL'
%VSAMP   = 'ISSVBUF'
```

Figure 36. Default Member DBGDFLT for GENJCL.RECOV Command

Figure 37 on page 79 shows the generated output of the GENJCL command and could have been submitted to JES to be run.

```
//*-------------------------------------------------
//* DELETE/DEFINE DATABASE DATASET
//*-------------------------------------------------
//S1   EXEC PGM=IDCAMS,
//           COND=(0,LT)
//SYSPRINT  DD SYSOUT=*
//SYSIN     DD DSN=SDBR.DBGI.UTIL(DBGAMAP1),DISP=SHR
//*-------------------------------------------------
//* RECOVER DBGAMAP DATABASE DATASET
//*-------------------------------------------------
//S2    EXEC PGM=DFSRRC00,COND=(0,LT),
//     PARM='UDR,DFSURDB0,DBGAMAP',REGION=4096K
//STEPLIB   DD DSN=IMS51.RESLIB,DISP=SHR
//SYSPRINT  DD SYSOUT=*
//IMS       DD DSN=SDBR.DBGI.DBDLIB,DISP=SHR
//DBGAMAP1  DD DSN=SDBRIMSS.DBGI.DBGAMAP1,DISP=OLD,
//             AMP=('BUFND=30')
//DFSUDUMP  DD DSN=SDBR.DBGI.DBGAMAP1.BKUP.G0002V00,DISP=SHR,
//             DCB=BUFNO=20
//DFSUCUM   DD DUMMY
//DFSULOG   DD DUMMY
//DFSVSAMP  DD DSN=SDBR.DBGI.UTIL(ISSVBUF),DISP=SHR
//SYSIN         DD *
S  DBGAMAP DBGAMAP1
/*
//* DELETE/DEFINE DATABASE DATASET
//*-------------------------------------------------
//S3   EXEC PGM=IDCAMS,
//       COND=(0,LT)
//SYSPRINT  DD SYSOUT
//SYSIN     DD DSN=SDBR.DBGI.UTIL(DBGAMAP2),DISP=SHR
//*-------------------------------------------------
//*
//*-------------------------------------------------
//* RECOVER DBGAMAP DATABASE DATASET
//S4    EXEC PGM=DFSRRC00,COND=(0,LT),
//           PARM='UDR,DFSURDB0,DBGAMAP',REGION=4096K
//STEPLIB   DD DSN=IMS51.RESLIB,DISP=SHR
//SYSPRINT  DD SYSOUT=*
//IMS       DD DSN=SDBR.DBGI.DBDLIB,DISP=SHR
//DBGAMAP2  DD DSN=SDBRIMSS.DBGI.DBGAMAP2,DISP=OLD,
//          AMP=('BUFND=30')
//DFSUDUMP  DD DSN=SDBR.DBGI.DBGAMAP2.BKUP.G0002V00,DISP=SHR,
//             DCB=BUFNO=20
//DFSUCUM   DD DUMMY
//DFSULOG   DD DUMMY
//DFSVSAMP  DD DSN=SDBR.DBGI.UTIL(ISSVBUF),DISP=SHR
//SYSIN     DD *
S  DBGAMAP  DBGAMAP2
/*
```

Figure 37 (Part 1 of 4). Generated JCL from GENJCL.RECOV Command

```
//*-------------------------------------------------
//* DELETE/DEFINE DATABASE DATASET
//*-------------------------------------------------
//S5   EXEC PGM=IDCAMS,
//            COND=(0,LT)
//SYSPRINT  DD SYSOUT=*
//SYSIN     DD DSN=SDBR.DBGI.UTIL(DBGAMAY),DISP=SHR
//*-------------------------------------------------
//* RECOVER DBGAMAY DATABASE DATASET
//*-------------------------------------------------
//S6    EXEC PGM=DFSRRC00,COND=(0,LT),
//            PARM='UDR,DFSURDB0,DBGAMAY',REGION=4096K
//STEPLIB   DD DSN=IMS51.RESLIB,DISP=SHR
//SYSPRINT  DD SYSOUT=*
//IMS       DD DSN=SDBR.DBGI.DBDLIB,DISP=SHR
//DBGAMAY   DD DSN=SDBRIMSS.DBGI.DBGAMAY,DISP=OLD,
//            AMP=('BUFND=30')
//DFSUDUMP  DD DSN=SDBR.DBGI.DBGAMAY.BKUP.G0002V00,DISP=SHR,
//            DCB=BUFNO=20
//DFSUCUM   DD DUMMY
//DFSULOG   DD DUMMY
//DFSVSAMP  DD DSN=SDBR.DBGI.UTIL(ISSVBUF),DISP=SHR
//SYSIN     DD *
S  DBGAMAY  DBGAMAY
/*
//*-------------------------------------------------
//* DELETE/DEFINE DATABASE DATASET
//*-------------------------------------------------
//*
//S7   EXEC PGM=IDCAMS,
//            COND=(0,LT)
//SYSPRINT  DD SYSOUT=*
//SYSIN     DD DSN=SDBR.DBGI.UTIL(DBGAMBP),DISP=SHR
//*-------------------------------------------------
//* RECOVER DBGAMBP DATABASE DATASET
//*-------------------------------------------------
//S8    EXEC PGM=DFSRRC00,COND=(0,LT),
//            PARM='UDR,DFSURDB0,DBGAMBP',REGION=4096K
//STEPLIB   DD DSN=IMS51.RESLIB,DISP=SHR
//SYSPRINT  DD SYSOUT=*
//IMS       DD DSN=SDBR.DBGI.DBDLIB,DISP=SHR
//DBGAMBP   DD DSN=SDBRIMSS.DBGI.DBGAMBP,DISP=OLD,
//            AMP=('BUFND=30')
//DFSUDUMP  DD DSN=SDBR.DBGI.DBGAMBP.BKUP.G0002V00,DISP=SHR,
//            DCB=BUFNO=20
//DFSUCUM   DD DUMMY
//DFSULOG   DD DUMMY
```

Figure 37 (Part 2 of 4). Generated JCL from GENJCL.RECOV Command

```
//DFSVSAMP  DD DSN=SDBR.DBGI.UTIL(ISSVBUF),DISP=SHR
//SYSIN     DD *
S  DBGAMBP  DBGAMBP
/*
//*-------------------------------------------------
//* DELETE/DEFINE DATABASE DATASET
//*-------------------------------------------------
//S9   EXEC PGM=IDCAMS,
//            COND=(0,LT)
//SYSPRINT  DD SYSOUT=*
//SYSIN     DD DSN=SDBR.DBGI.UTIL(DBGAMBX),DISP=SHR
//*-------------------------------------------------
//* RECOVER DBGAMBX DATABASE DATASET
//*-------------------------------------------------
//S10    EXEC PGM=DFSRRC00,COND=(0,LT),
//            PARM='UDR,DFSURDB0,DBGAMBX',REGION=4096K
//STEPLIB   DD DSN=IMS51.RESLIB,DISP=SHR
//SYSPRINT  DD SYSOUT=*
//IMS       DD DSN=SDBR.DBGI.DBDLIB,DISP=SHR
//DBGAMBX   DD DSN=SDBRIMSS.DBGI.DBGAMBX,DISP=OLD,
//            AMP=('BUFND=30')
//DFSUDUMP  DD DSN=SDBR.DBGI.DBGAMBX.BKUP.G0002V00,DISP=SHR,
//            DCB=BUFNO=20
//DFSUCUM   DD DUMMY
//DFSULOG   DD DUMMY
//DFSVSAMP  DD DSN=SDBR.DBGI.UTIL(ISSVBUF),DISP=SHR
//SYSIN     DD *
S  DBGAMBX  DBGAMBX
/*
//*-------------------------------------------------
//* DELETE/DEFINE DATABASE DATASET
//*-------------------------------------------------
//S11   EXEC PGM=IDCAMS,
//            COND=(0,LT)
//SYSPRINT  DD SYSOUT=*
//SYSIN     DD DSN=SDBR.DBGI.UTIL(DBGAMBY),DISP=SHR
//*-------------------------------------------------
//* RECOVER DBGAMBY DATABASE DATASET
//*-------------------------------------------------
//S12    EXEC PGM=DFSRRC00,COND=(0,LT),
//            PARM='UDR,DFSURDB0,DBGAMBY',REGION=4096K
//STEPLIB   DD DSN=IMS51.RESLIB,DISP=SHR
//SYSPRINT  DD SYSOUT=*
//IMS       DD DSN=SDBR.DBGI.DBDLIB,DISP=SHR
```

Figure 37 (Part 3 of 4). Generated JCL from GENJCL.RECOV Command

```
//DBGAMBY   DD DSN=SDBRIMSS.DBGI.DBGAMBY,DISP=OLD,
//             AMP=('BUFND=30')
//DFSUDUMP  DD DSN=SDBR.DBGI.DBGAMBY.BKUP.G0002V00,DISP=SHR,
//             DCB=BUFNO=20
//DFSUCUM   DD DUMMY
//DFSULOG   DD DUMMY
//DFSVSAMP  DD DSN=SDBR.DBGI.UTIL(ISSVBUF),DISP=SHR
//SYSIN     DD *
S  DBGAMBY  DBGAMBY
/*
```

Figure 37 (Part 4 of 4). Generated JCL from GENJCL.RECOV Command

9.4 JCL Changes

Users of DBRC prior to IMS Version 2.1 may have changes to be made to the skeletal JCL members. If any customization of the skeletal members has been done, then customized members need to be compared with the IMS Version 5 members. As a general rule, use the IMS 5 members and make any required changes.

If the names of the RECON data sets have been changed and you are not using the DFSMDA macros to allocate the RECONs, all procedures that make use of the RESLIB may need to be modified with the correct RECON data set names.

9.5 Change Accumulation Group Changes

No changes are required to the skeletal JCL for change accumulation (CA). Versions prior to IMS Version 2.1 have some additional features you can use. The most significant is that the CHANGE.CAGRP command can be used to add or delete members for a CA group without redefining the whole group. See the *IMS/ESA Utilities Reference: System*, SC26-8035 for more details.

9.6 Conversion of DBCTL Systems

There are no special DBRC migration issues for the DBCTL system.

9.7 Compatibility of Log Data Sets

Recovery log data sets (RLDS) have limited compatibility between some versions of IMS. That is, they can be combined into a single RLDS by means of the change accumulation utility or used by the IMS recovery utility as input. However, it would be wise to reduce the mixing of logs as much as possible. One way to ensure that DBRC does not use logs from different IMS versions is by taking an image copy. However, an image copy requires application downtime; if downtime is not a problem, it is the cleanest way to manage the upgrade.

Version 5 logs are not compatible with those from prior versions of the IMS utilities.

9.8 Fallback Requirements

Requirements for fallback to Version 3 and 4 systems differ from those for fallback to Versions 1 and 2.

9.8.1 Fallback for Version 3 and 4 Systems

IMS Version 5 logs are not compatible with any Version 3 or 4 utilities. Thus, if fallback is required, you must:

- Ensure that there are no outstanding recovery-required situations.
- Make image copies of all databases to avoid the use of any log data sets (including CA data sets) by future recoveries.

9.8.2 Fallback for Version 1 and 2 Systems

The RECONs used by the IMS Versions 5 system are not compatible with either the Version 1 or 2 systems. If DBRC is not used for database recovery support, then simply delete or define the RECON for the old IMS system and do a cold start.

IMS Version 5 logs are not compatible with any Version 1 or 2 utilities. Therefore, if fallback is required, you must:

- Ensure that there are no outstanding recovery-required situations
- Make image copies of all databases to avoid the use of any log data sets (including CA data sets) by future recoveries.
- If DBRC is used for database recovery, then extract the last image copy information from the IMS Version 5 RECONs and add it to the current RECON.

  The examples used to extract information can be used again to copy data from the Version 5 RECON to the current RECON to save some work in updating the RECON information.

Chapter 10. Database and Application Support with IMS Version 5

This chapter addresses fast path databases, database compression, migration from IMS Version 2.2 or earlier, and application restart changes.

10.1 Fast Path Databases

Prior to IMS/ESA Version 5, PROCOPT=GO (read without integrity processing option) was allowed for databases that had read-only (RO) access. With other access intents, the processing intent was dynamically modified at scheduling time and set as though you had specified PROCOPT=G. This meant that a read lock was obtained for every retrieve call.

In IMS/ESA Version 5, programs that use PROCOPT=GO when accessing DEDBs are no longer dynamically modified to PROCOPT=G if the DEDB access intent is other than read-only. Thus, these programs can reference data that another program is updating. To be compatible with full-function processing, PROCOPT=GO, PROCOPT=GON, and PROCOPT=GOT are supported.

Note

If your existing programs specify PROCOPT=GO and you want data integrity, you ***must*** change the PROCOPT=GO to PROCOPT=G.

This support enables you to develop application solutions that require more efficient access to DEDB databases, provided locking is not required. Your applications also gain performance benefits because you can run PROCOPT=GO application programs concurrently with updating application programs.

10.2 Database Compression

All compression exits must be relinked with IMS/ESA Version 5 macros. As long as the exits have not changed the compression algorithms, the databases need not be uncompressed and recompressed. It is advisable to test to ensure compatibility of the compression exit with the IMS releases.

10.3 Migration from Version 2.2 or Earlier

Databases from IMS Version 2.2 or earlier need to be reviewed carefully with the following points in mind.

10.3.1 ISAM Databases

The indexed sequential access method (ISAM) is not supported in IMS/ESA.

Use the following steps to convert ISAM data sets to VSAM KSDS data sets:

1. Unload databases from ISAM data sets
2. Modify the DBD to VSAM and regenerate the load module
3. Build VSAM access method services (IDCAMS) control cards to define the VSAM clusters

4. Reload databases to VSAM KSDS data sets.

10.3.2 Withdrawn Support for DSLOGs

Since Version 3, IMS/ESA has not supported this type of logging. All procedures that use it need to be modified. Use the database change accumulation utility to condense your accumulated records in system log datasets (SLDSs) or recovery log data sets (RLDSs).

10.3.3 Utility Control Facility for Database Utilities

Since Version 3, IMS/ESA has not supported the utility control facility (UCF) for the database recovery utilities. All reorganization utilities that make use of UCF need to be modified. Remove the UCF control cards and modify the JCL to execute the standard utilities under the region controller.

10.3.4 Recovery Processing for Version 1 Databases

The recovery procedure for a database write error must be changed because of the EEQE processing feature introduced in Version 2.1.

When a write error occurs on a DL/I database, the error event is logged, the block in error is kept in the IMS buffers, and an EEQE is built. The application can continue to process, accessing the data representing the block in error, even across a system restart. The recovery action to correct the database write error can be deferred until a more convenient time.

If the database is registered to DBRC, the recovery-needed flag is set on. No DLI update job is able to authorize the database while the flag is on. For those databases not registered to DBRC, unpredictable results can occur if the error can be read from the DASD.

10.4 Application Restart Changes in IMS/ESA Version 5

A restart of an IMS BMP or batch job can be requested in a number of ways.

- Specify CKPTID=LAST (BMPs only) as an EXEC parameter or in the XRST IO-area.
- Specify CKPTID=symbol as an EXEC parameter or in the XRST IO-area (where symbol is the 8-character symbolic checkpoint ID created by the application program).
- Specify CKPTID=timestamp as an EXEC parameter or in the XRST IO-area (where timestamp is the time stamp ID from message DFS0540I).

No matter which of the above methods is used to specify the restart, the XRST call used to signify the restart has the 8-character symbolic checkpoint ID moved to the IO-area.

Prior to IMS/ESA Version 5, the time stamp checkpoint ID was a 12-byte string of the form IIDDDHHMMSST where:

- II is the region ID (in hexadecimal)
- DDD is the day of the year
- HHMMSST is the time

Since IMS/ESA Version 5 supports up to 999 regions, the time stamp checkpoint ID increased from 12 to 14 bytes and is of the form IIIIDDDHHMMSST where:

- IIII is the region ID
- DDD is the day of the year
- HHMMSST is the time.

Thus, changes need to be made if restarts are requested by specifying the time stamp checkpoint ID. If the restart is requested by specifying the restart ID as an EXEC parameter, then no application program changes are required (only the EXEC parameter changes). However, if the restart is requested by specifying the restart ID in the XRST call′s IO-area, then application program changes are probably required, since the size requirements of the IO-area have increased from 12 bytes to 14 bytes.

It should be noted that the format and size of the time stamp checkpoint ID increases again in IMS/ESA Version 6.

For further information, see IMS APAR PN83358.

Chapter 11. IMS/ESA Version 5 Database Exits

As a general rule, all IMS user exit routines should be:

- Verified to ensure that they are compatible with correct execution in 31-bit addressing mode.
- Verified to ensure that they are compatible with correct execution in reentrant or reusable mode.
- Also, all user exits should be assembled and link-edited using IMS/ESA Version 5 libraries.

Possible user exits include

- HDAM randomizing routines
- Segment edit and compression routines
- Secondary index entry suppression routines
- Data capture exit

There are some important changes to exit routines for the database manager.

11.1 Data Capture Exit

This exit was added to IMS/ESA Version 3 as an SPE. It is now part of IMS/ESA Version 5.

The exit accesses the updated data for IMS full function and Fast Path databases when an application has made the modification. The access occurs after the modifications are logged and before control is returned to the application.

The synchronous data capture exit works in all IMS environments: IMS Batch, IMS IFP, IMS BMP, and IMS MPP. It does not work in CICS environments, whether with local DLI or DBCTL. To use the exit, specify EXIT=exitname on the SEGM or DBD statements in the database description generation (DBDGEN). For more details, see the *IMS/ESA Utilities Reference: System*, SC26-8035.

The asynchronous data capture exit works in all IMS environments (IMS Batch, IMS IFP, IMS BMP and IMS MPP) as well as in the CICS DBCTL environment. To use the asynchronous data capture exit, specify the logging option of the EXIT= parameter of the DBDGEN utility. The data capture log records use the X′99′ log code with X′04′, X′28′, X′30′, and X′34′ subcodes. For more details, see Chapter 10 in *IMS/ESA Utilities Reference: System*, SC26-8035.

11.2 HDAM Randomizing Routines

The DL/I access method HDAM requires that you supply a randomizing module for storing or retrieving root segments of an HDAM database.

With IMS Version 5, some changes have occurred in the processing of the link-edit attributes for these routines:

REENTRANT IMS does not serialize the database before calling this routine. A single copy is used for all databases.

REUSABLE IMS serializes the database before calling this routine. If the routine is used for multiple databases, it must be written and compiled as a reentrant even if it is not a link-edited reentrant.

NONREUSE IMS serializes the database before calling this routine. Each database has its own copy of the routine.

To ensure that the routines run as they did in previous IMS releases, link-edit them as neither reentrant nor reusable. Do this only if the randomizer routine is not trusted to function correctly as a reentrant or reusable program.

In IMS Version 5, the parameters from DBDGEN (DMBDACS DSECT) contain a new field for the return codes from the randomizer. The return codes can be:

0 Randomizing properly

4 Set FM status code and return to caller

8 U812 abend

11.3 Segment Edit or Compression Exit Routine (DFSCMPX0)

This exit allows compression or expansion of some data segments of any full function database or DEDB. Both the DFSCMPX0 and DFSKMPX0 routines are provided, but DFSCMPX0 is recommended because it uses MVS services and therefore can take advantage of the hardware compression assist available on some ES/9000s when such IMS software support is installed. DFSKMPX0 is still supported for compatibility reasons.

This is the only DB exit routine that can use the IMS callable services facility of IMS/ESA Version 5.

Chapter 12. IMS/ESA Version 5 Database Control

DBCTL is an IMS subsystem that allows access to DL/I full-function databases and data entry databases (DEDBs) from CICS environments. Access from transaction management subsystems (excluding the IMS/ESA Transaction Manager) is provided through the DBCTL coordinator controller (CCTL) interface. The IMS/ESA database manager may be connected through DBCTL to the following:

- CICS/ESA Version 4
- CICS/ESA Version 3

Note

The minimum software level requirements to achieve Year 2000 compatibility across a CICS/DBCTL environment is CICS/ESA Version 4 with IMS/ESA Version 5. It is possible to achieve the same level of Year 2000 compatibility migrating to the IMS/ESA Year 2000 Local DL/I Limited Offering. But since this is a complete migration in its own right, it would be more beneficial to migrate to IMS/ESA Version 5 and prepare to use CICS with DBCTL for the Year 2000.

For the purposes of this document, CICS is considered as the primary transaction management subsystem for DBCTL. DBCTL also supports non-message-driven BMPs.

DBCTL, introduced with IMS/ESA Version 3, is packaged as part of the IMS/ESA database manager product. For users already running DBCTL, there are few issues in migrating to DBCTL at IMS/ESA Version 5. However, users who are running a release of IMS prior to IMS/ESA Version 3 and using CICS local DL/I will find that in IMS/ESA Version 5, CICS local DL/I support has been removed and that CICS DL/I requests must now be serviced by DBCTL. Consequently, migration to Version 5 is a more complex task for the CICS local DL/I user.

Because of the differences in the migration requirements between existing DBCTL users and CICS local DL/I users, the two topics are discussed separately:

- Existing DBCTL users see Section 12.3, “Migrating an Existing DBCTL to IMS/ESA Version 5” on page 92.
- CICS Local DL/I users see Section 12.4, “Migrating CICS Local DL/I to DBCTL for IMS/ESA Version 5” on page 94.

The *CICS/ESA CICS-IMS Database Control Guide*, SC33-1184 will also be helpful as a source of information in the implementation of a DBCTL environment.

12.1 Benefits of the Database Control Subsystem

DBCTL, as an IMS/ESA subsystem, can be attached to CICS but runs in its own address space. The benefits of DBCTL include these:

- It gives one or more CICS systems concurrent online access to full-function DL/I databases and data entry databases (DEDBs).

- Batch jobs can be run as BMPs, application programs that perform batch-type processing online. DBCTL gives you concurrent access to IMS databases from BMPs and one or more CICS.
- DBCTL uses a separate log (the IMS log), so DL/I activity does not appear on the CICS system log. This means that all DL/I information is on a single log processed using IMS logging facilities. IMS logging facilities, which include dual logging, are well integrated with database recovery control (DBRC).
- Virtual storage constraint relief for CICS systems that currently contain DL/I because DL/I code is now outside of the CICS address space.
- Improved throughput on multiprocessors, because DL/I requests run under task control blocks (TCBs) separate from those used by CICS and because CICS and DBCTL reside in separate address spaces.
- Improved failure isolation between CICS and IMS. A DBCTL failure should not cause your CICS system to fail.
- Release independence. You do not need to regenerate the DL/I support in CICS if you change to a new release of CICS or IMS.
- Access to more IMS functions for CICS users.

Remote database support remains for function-shipped DL/I requests. For function shipping in the CICS environment, the local and remote CICS must both use IMS DBCTL but the CICS/DBCTL receiving the function-shipped request can be on the same or an alternate MVS. Where DL/I requests are not function-shipped, CICS and DBCTL must exist on the same MVS image.

12.2 CICS-IMS Year 2000 Compatibility

To achieve Year 2000 compatibility across a CICS/DBCTL environment, the minimum software levels required are CICS/ESA Version 4 with IMS/ESA Version 5.

If the starting point for migration is a version of CICS prior to CICS/ESA Version 4, and the aim of the migration is to achieve Year 2000 compliance, then a separate migration project for CICS is required. However, it is not the purpose of this book to discuss migration issues concerning CICS except insofar as they relate to the implementation of a CICS/DBCTL environment.

Note

See the section on possible migration paths in *CICS/ESA CICS-IMS Database Control Guide*, SC33-1184 for further information on possible migration scenarios.

12.3 Migrating an Existing DBCTL to IMS/ESA Version 5

Existing DBCTL users are those who are migrating IMS from:

- IMS/ESA Version 4 to IMS/ESA Version 5

  or

- IMS/ESA Version 3 to IMS/ESA Version 5

IMS/ESA Version 5 supports migration and coexistence back to IMS/ESA Version 3, with some IMS/ESA Version 5 functions and facilities providing support back to IMS/VS Version 1.3. Full details of migration paths and coexistence between IMS/ESA Version 3 or IMS/ESA Version 4 and IMS/ESA Version 5 are well documented in the IMS release documentation sets and are therefore only summarized here.

12.3.1 Migration Considerations

The objective of migration is to enable an orderly transfer from your current release of IMS to IMS/ESA Version 5. The principal migration tasks for the existing DBCTL user include:

- Applying migration PTFs to your existing system, including the DBRC migration SPE if required.
- Executing the RECON upgrade utility provided with DBRC for IMS/ESA Version 5, to enable the conversion of a recovery control data set (RECON) to the Version 5 format.
- Building application control blocks (ACBGEN).
- Reviewing HSSP image-copy support, which has been completely changed in IMS/ESA Version 5 and is not compatible with earlier releases. Since all HSSP image copy information is deleted from the RECON, the RECON upgrade utility terminates abnormally if an HSSP IC is the latest IC for any Fast Path DEDB area.

12.3.1.1 Migration PTFs and SPE

A migration and coexistence small programming enhancement (SPE) is available to allow DBRC for IMS/ESA Version 5 to coexist with DBRC for IMS/ESA Version 3 or IMS/ESA Version 4.

The DBRC migration and coexistence SPE does not add support for functions that are new in later releases. What it does is to allow an earlier release to run properly with a Version 5 RECON without precluding DBRC at Version 5 from operating properly with the same RECON. Thus, a Version 5 RECON can be used by a Version 3 or 4 IMS/ESA system that is awaiting migration. This is of particular importance if more than one IMS system is sharing the same DBRC RECONs and the IMS systems are to have their migration staggered over time. Likewise, DBRC does not do anything to preclude an earlier release (with the appropriate SPE applied) from operating properly with the same RECON, within constraints imposed by IMS/ESA Version 5.

12.3.1.2 RECON Upgrade Utility

The RECON upgrade utility provided with IMS/ESA Version 5 DBRC changes a RECON data set from either a Version 3 or 4 format to a Version 5 level so that it can be used by IMS/ESA Version 5. Once the RECON has been upgraded, it can be used by IMS/ESA Version 5 or an earlier release with the appropriate SPE applied to the earlier release.

For details of executing the RECON upgrade utility, see Chapter 9, “DBRC and RECON Migration” on page 69.

12.3.1.3 Application Control Block Generation

ACB generation (ACBGEN) must be performed for all PSBs and DBDs allocated to a DBCTL region and for any batch application that executes as a DBBBATCH IMS region. The ACBs must be generated at the IMS level at which they are going to be accessed. Batch applications that execute as a DLIBATCH IMS region perform an ACB build at run time and do not require that ACBs be prebuilt.

12.3.1.4 HSSP Image Copy Support

The HSSP IC support has been changed in IMS/ESA Version 5 and no longer uses HSSP IC records. In earlier versions, DBRC maintained two sets of image copy information, both regular and HSSP. As part of the upgrade process, all HSSP IC information is deleted. HSSP records are deleted, as is HSSP IC information from the area records. Before upgrading the RECON, take image copies for all areas for which HSSP ICs exist. The RECON upgrade utility fails if, after deleting HSSP ICs, there is no usable image copy for an area. Message DSP0033I is issued and the utility terminates with return code 12.

It is possible that the latest IC may not be usable and that an earlier one is needed. In this case, it is also possible that a partial HSSP IC should be used as input to the recovery utility, but DBRC no longer knows about it.

After upgrading the RECON, an area cannot be recovered using an HSSP IC.

Note

When the RECON is upgraded to a Version 5 level, all HSSP IC information is lost. The RECON upgrade utility fails if the latest, usable image copy for any area is an HSSP IC.

12.4 Migrating CICS Local DL/I to DBCTL for IMS/ESA Version 5

Prior to IMS/ESA Version 5, CICS could access DL/I databases with DBCTL, local DL/I, or remote DL/I. With IMS/ESA Version 5, CICS applications can no longer access DL/I databases through local DL/I. Therefore, you must migrate to IMS DBCTL. The role of the IMS/ESA Year 2000 Local DL/I Limited Offering and the options it provides users is described in Chapter 13, “The IMS/ESA Year 2000 Local DL/I Product” on page 131.

This section is for existing users of CICS local DL/I who require a basic understanding of DBCTL and what is involved in installing DBCTL as a product in its own right, and then integrating DBCTL with CICS. It includes:

- A basic overview of CICS/DBCTL and the components that make up the CICS/DBCTL environment
- Connecting CICS to DBCTL
- Migration considerations
- Suggestions on creating a basic CICS/DBCTL installation verification (IVP) environment
- Suggestions on migrating a test or production CICS local DL/I application to CICS/DBCTL.

12.4.1 Components of CICS/DBCTL

A CICS/DBCTL system consists of a CCTL subsystem, CICS in this case, and the DL/I database manager, DBCTL. CICS can also request database services from DB2.

The components of a typical system and their associated address spaces are:

- CCTL subsystem

  The CCTL subsystem is the transaction management subsystem that communicates with the database resource adapter (DRA), which in turn communicates with DBCTL. In a CICS/DBCTL environment, the CCTL is CICS. The term CCTL is used in a number of DBCTL operator commands and in the IMS manuals. CICS users of DBCTL should take the term CCTL to mean a CICS system that is attached to IMS by means of DBCTL.

- DBCTL

  The DBCTL subsystem contains support and features required to process full function DL/I databases and DEDBs. Full function supports HSAM, SHSAM, HISAM, SHISAM, HDAM, and HIDAM databases. A single DBCTL can service multiple CICS systems, but a CICS system can connect to only one DBCTL at a time. A CICS system can connect to one DBCTL, disconnect from it, and then connect to a different DBCTL.

  Note

  Support for ISAM databases was discontinued at IMS/ESA Version 3.

  Each DBCTL subsystem is made up of three address spaces (DBCTL, DLISAS, and DBRC), and optionally one more for IRLM, described as follows:

  – Control (CTL) address space

    The CTL region manages the overall function of the DBCTL subsystem, controlling connectivity, logging, and resource use.

  – DL/I separate address space (DLISAS)

    The DLISAS required with DBCTL is a separate address space that contains DL/I code, control blocks, buffers for DL/I databases, and program isolation (PI), which is the lock manager for DL/I. (Lock management is the process of controlling concurrent requests.) You use PI for lock management unless you need the extra facilities provided by the IRLM, which is described below. For example, you need the IRLM if you are data sharing with another IMS/ESA database manager, which could be another DBCTL subsystem or IMS batch work executing as DLIBATCH or DBBBATCH.

  – DBRC address space

    The DBRC address space is an IMS facility that supports log management, recovery control, and database sharing by providing the necessary information to subsystems, batch programs, and utilities. DBRC is required with DBCTL for log control and can optionally be used for database recovery control and data sharing.

  – IRLM

    The IRLM is a global lock manager that resides in its own address space. In simple configurations, you do not need to use the IRLM; program isolation locking is sufficient. However, you must use the IRLM

to maintain data integrity if you are sharing databases at block level. (For VSAM databases, a block is a control interval, or CI. For any other kind of database, it is a physical block.) You also need the IRLM if you need to process a set of common databases from multiple IMS/ESA or CICS/ESA subsystems.

The IRLM is also the lock manager used by DB2, so you may prefer to use it with DBCTL if you already use, or intend to use, DB2. However for high-throughput systems, it would be preferable not to share the IRLM between DBCTL and DB2.

Figure 38 summarizes how DBCTL integrates with CICS. A single CICS task can use DB2 tables, IMS databases, and CICS-managed local or remote resources (for example, VSAM files).

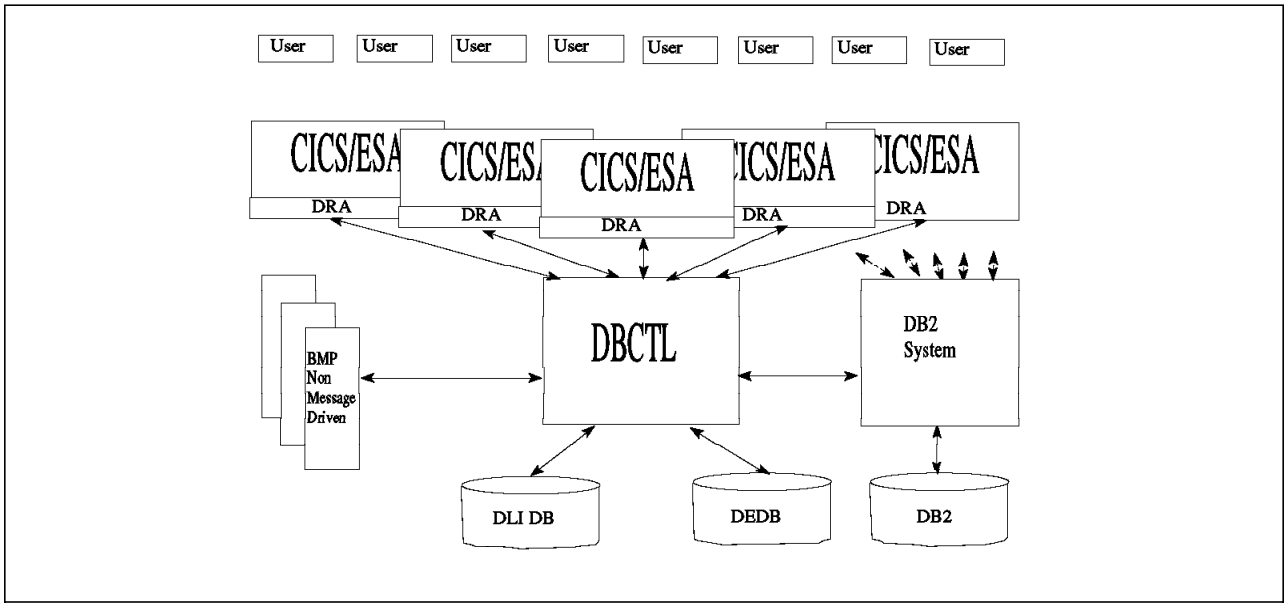

Figure 38. CICS/DBCTL Environment Showing Resources You Can Access from a CICS Environment that Includes DBCTL

The CICS-DB2 and the CICS/DBCTL interfaces are similar in that both use the task-related user exit interface, and have a two-phase commit process.

For users of both IMS/ESA TM and CICS transaction managers, the IMS/ESA TM control region can replace the DBCTL control region, as you can see in Figure 39 on page 97.

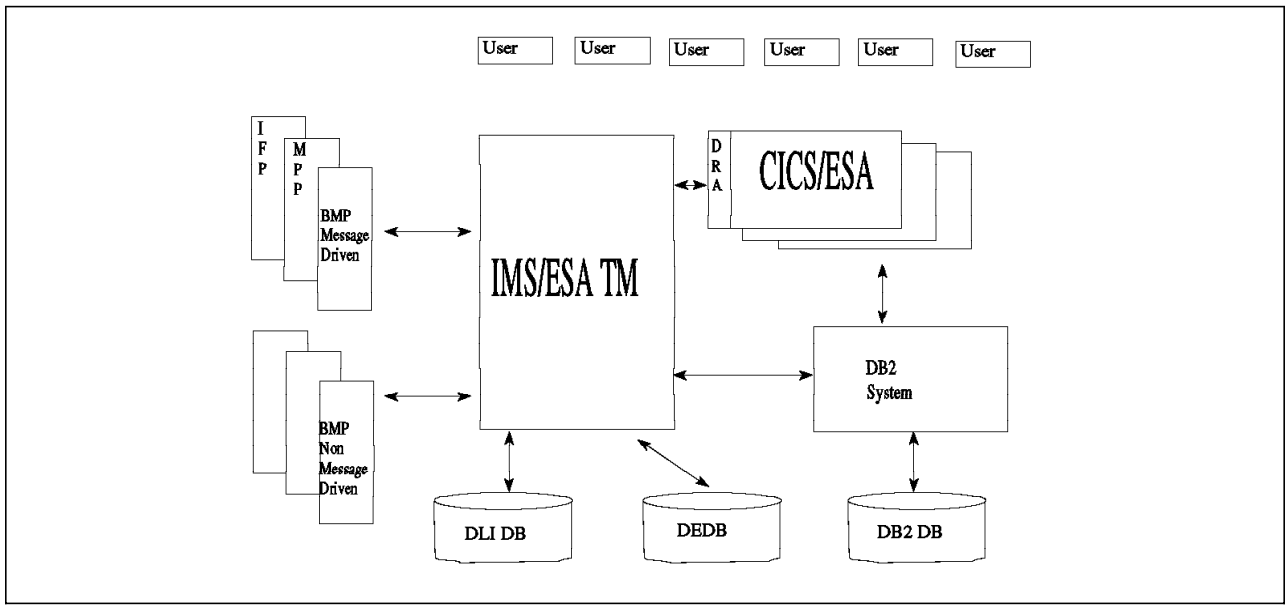

Figure 39. CICS - IMS TM Environment with IMS/ESA TM Replacing DBCTL Control Region

For users of IMS/ESA database manager only, without the transaction manager component, DBCTL is a subset of IMS TM that lacks message queue support. However, it can manage BMP regions and some IMS database utilities.

12.4.1.1 CICS/IMS Software Compatibility

Table 6 shows the software levels supported between CICS and IMS.

Table 6. Supported Software Levels: CICS and IMS

CICS	IMS Local DL/I	IMS DBCTL
CICS/MVS 2.1.2	IMS/VS Version 1.3 IMS/VS Version 2.2 IMS/ESA Version 3 IMS/ESA Version 4	----
CICS/ESA 3.1.1	IMS/VS Version 1.3 IMS/VS Version 2.2 IMS/ESA Version 3	IMS/ESA Version 3
CICS/ESA 3.2.1	IMS/VS Version 2.2 IMS/ESA Version 3 IMS/ESA Version 4	IMS/ESA Version 3 IMS/ESA Version 4
CICS/ESA 3.3	IMS/VS Version 2.2 IMS/ESA Version 3 IMS/ESA Version 4	IMS/ESA Version 3 IMS/ESA Version 4 IMS/ESA Version 5
CICS/ESA 4.1	IMS/ESA Version 3 IMS/ESA Version 4	IMS/ESA Version 3 IMS/ESA Version 4 IMS/ESA Version 5
CICS Transaction Server for OS/390 1.1	----	IMS/ESA Version 3 IMS/ESA Version 4 IMS/ESA Version 5
CICS Transaction Server for OS/390 1.2	----	IMS/ESA Version 3 IMS/ESA Version 4 IMS/ESA Version 5

12.4.2 Connecting to DBCTL

DBCTL implements an interface between CICS and IMS called the *Database Resource Adapter.* The DRA and the TM together are known as the CCTL. At this time, CICS/ESA is the only transaction manager product that supports this interface.

You can connect to DBCTL and disconnect from it using a CICS-supplied transaction CDBC. When you have connected to DBCTL by means of CDBC, you can issue DL/I requests from your application programs. There is another CICS-supplied transaction, CDBI, which you can use to inquire into the status of the connection to DBCTL from CICS. See Figure 40 for a sample CDBI CICS screen.

Additionally, at CICS startup, you can specify that CICS be connected automatically to either the same or different DBCTL systems.

```
CDBI                    CICS-DBCTL INTERFACE INQUIRY




            Status     : DFHDB8293I DBCTL connected and ready.
            CICS APPLID: CICSZ02O
            DBCTL ID   : IMST









PF1 = Help   2 = Refresh   3 = End
```

Figure 40. CDBI CICS Screen

12.4.2.1 Database Resource Adaptor

The functions of the DRA are to:

- Establish contact with the DBCTL address space and load the DRA startup parameter table. The DRA startup parameter table provides the parameters needed to define the interface to a DBCTL subsystem.
- Request connection to, and disconnection from, DBCTL.
- Manage threads. A CICS application thread provides a two-way link between an application and DBCTL. When a CICS transaction issues a DL/I request to DBCTL, the thread represents that CICS transaction in DBCTL. It identifies the transaction′s existence, traces its progress, sets aside the resources it needs, and limits its access to other resources.
- Tell CICS when a shutdown of DBCTL has been requested, or if DBCTL has failed.

The DRA startup/router routine (DFSPRRC0) must be in a CCTL load library. The routine can be copied from the IMS.RESLIB built by the IMS generation process, or the IMS.RESLIB can be concatenated in the CCTL step library.

The DFSPZPxx load module must be in a CCTL load library, which is the DRA startup table. The 'xx' is the startup table name suffix that the CCTL specifies on the DRA initialization request. The source code for DFSPZPxx is DFSPZP00 in the IMS distribution library, DLIB. Once all modifications have been made to DFSPZPxx, it is assembled using IMS DLIBs. A default load module, DFSPZP00, is in the IMS.RESLIB. It has default values for all but two of the required DRA initialization parameters, all of which can be overridden on the initialization (INIT) request itself.

The rest of the DRA code must reside in a load library that is dynamically allocated by DFSPRRC0. The DDNAME and DSNAME of this load library are specified in the DRA startup table or initialization request. The default DSNAME is IMS.RESLIB because all DRA code resides here through the IMS generation process.

12.4.3 Migration Considerations

Implementing DBCTL is straightforward in a CICS environment, although the exception to this may be where a CICS migration must be performed to bring CICS up to a suitable software level. The primary area of impact is operational, with little or no change of application programs required.

12.4.3.1 Application Modifications

Current CICS DL/I application programs do not need to be changed, or even recompiled, to use DBCTL.

Current batch programs may benefit from conversion to BMP in lieu of using data sharing. This conversion is not mandatory but offers operability advantages that may be significant for your installation. More information is located in 12.4.3.4, "Conversion of Batch DL/I to BMP" on page 101.

12.4.3.2 DLI Batch Work

Normal operational procedures for running DLI batch — that is with the CICS service down or the databases off-line from CICS — can continue unchanged with the DBCTL environment. That is, if DBCTL is servicing a dedicated CICS region, then CICS and DBCTL can be shut down at the same time. If DBCTL is servicing multiple CICS regions that have differing service level agreements (SLAs), it is a simple matter to take the required databases off-line for the DLI batch work.

12.4.3.3 Operational Procedures

The migration from CICS local DL/I to CICS-DBCTL requires some important operational changes because DBCTL uses a command interface for operational control of the DBCTL subsystem and uses a subset of the same commands and the same utilities as IMS TM.

Unlike IMS TM, however, DBCTL uses neither the master terminal operator (MTO), nor time-controlled operations (TCO) for control of its operations, but uses the MVS console or equivalent for command entry. At IMS/ESA Version 5, DBCTL does implement an automated operations interface (AOI), of which there are two types:

- Type 1, available for the DB/DC and DCCTL environments

- Type 2, available for the DB/DC, DCCTL, and DBCTL environments

Note

Only command entry from the MVS console, or equivalent, supports the full set of DBCTL commands. Command entry from CICS or DL/I supports only a subset of the commands available to DBCTL.

Issuing DBCTL Commands: There are four methods of communicating IMS operational commands to DBCTL:

- You can define in the DBCTL startup parameters or JCL procedure (DBC by default) a command recognition character (CRC) and use the CRC as a prefix for the IMS command on the MVS consoles or on the SDSF log. The default CRC is a solidus (/) as in IMS TM support.
- With IMS/ESA Version 5, you can specify CMDCHAR=NONE on the IMSCTRL macro. This then enables you to use the four-character IMSID instead of the CRC when routing commands to the DBCTL subsystem. This second method of issuing IMS commands can provide much greater flexibility and ease of recognition of the IMS system being communicated with when several DBCTL regions are present.
- With CICS/ESA Version 4, and IMS/ESA Version 5 or later, you can use a CICS-supplied transaction CDBM to issue many of the IMS operator commands that are valid for DBCTL, across the DRA interface to DBCTL. However, commands like IMS shutdown /CHECKPOINT and others cannot be entered across the DRA interface.
- With IMS/ESA Version 5, DBCTL commands can be issued from a command-level DL/I BMP application program. (This is essentially the same interface that is used by the CICS DBCTL operator transaction CDBM.)

IMS/DBCTL Logging: IMS writes log records to DASD data sets called *online log data sets* (OLDS). The OLDS is made up of multiple data sets written in wraparound form, similar to CICS journaling, with the difference that IMS/DBCTL has the facility to dual log and can have between a minimum of three and a maximum of one hundred pairs of OLDS data sets.

Using more than one OLDS enables IMS to continue logging when the first OLDS is full. Also, if an I/O error occurs while writing to an OLDS, IMS can continue logging by isolating the OLDS where the problem occurred and switching to another one.

IMS can write committed log records to the write-ahead data set (WADS) so that these records are externalized to avoid the need to write partially filled and padded log blocks to the OLDS.

When the OLDS is full, it is archived to the SLDS. The frequency of OLDS archiving depends on how you specified automatic archiving using the ARC= parameter in the DBC JCL. You can specify ARC=1 through ARC=99. Automatic archiving takes place only when the number of OLDS you specified is full. The system reuses the OLDS after they have been archived. An SLDS can be on DASD or on tape. The contents are used as input to the database recovery process.

IMS archives the OLDS using the log archive utility (DFSUARC0). During archiving, IMS can write to the recovery log data sets (RLDS) a subset of the log records it writes to the system log data sets (SLDS). This subset consists only of the log records required to perform a database recovery.

During logging, IMS writes system checkpoint ID information (including OLDS positioning information) to the restart data set (RDS). IMS uses the RDS during the restart process to determine from which checkpoint to begin a restart.

12.4.3.4 Conversion of Batch DL/I to BMP

The benefit of this conversion is in increasing the possibility for concurrent processing in many applications, while reducing processing costs (both direct and indirect costs may be reduced).

The total storage requirements of a large system are reduced because DL/I and DBRC code are loaded once into the DBCTL subsystem rather than being loaded into each batch region.

Any conversion of batch DL/I to BMP requires the following changes to be made:

- An input/output program communication block (IOPCB) as the first program communication block (PCB)

  The IOPCB must be added to the program specification block (PSB) and mapped into any linkage area of the application program as the first IOPCB. Reassembly and link edit of the PSB and application program are required.

- Checkpoints in application programs with update or read-with-integrity intent

  Application programs running as IMS batch programs may not have taken checkpoints. If the same program is run as a BMP, or in a data sharing environment, resources owned by that program need to be released periodically. More specifically, any application program that performs database access requiring integrity causes locking to take place, and so must periodically take a checkpoint to release those locks. This can be done by issuing checkpoints (using the CHKP DL/I call) at appropriate intervals. Any database records and other locks held by the application program are released by the checkpoint process.

  A program that does not issue checkpoints causes any other program that is accessing the same database records to wait, and uses larger amounts of storage within IMS for holding the resources. This is wasteful and undesirable in most cases.

  Any PSB that has a combined PCB access intent no greater than PROCOPT=GO would not be required to checkpoint. However, it could just as easily be scheduled as DLI batch with no application changes involved, provided the databases are available and they are not attached to DBCTL in exclusive status.

- Ensure that the application has no need to have exclusive access to data
- The program isolation enqueue/dequeue pool must be increased

12.4.4 Creating a Basic CICS/DBCTL Environment

It is highly recommended if you are new to IMS/DBCTL that you follow the IMS installation procedure as supplied on the IMS delivery media. IMS/ESA Version 5 is supplied with a set of Install/IVP dialogues which take you, step by step, through installing, building, and performing initial verification of your new IMS system, including setting up a standalone DBCTL system.

As part of the IVP process you will become familiar with the operation and some of the features of the DBCTL environment. Additionally, if you are installing a DBCTL environment for the first time, the install and IVP process provided with IMS/ESA Version 5 create for you much if not all the JCL you need to set up your testing and production environments, with only a little modification.

CICS/ESA Version 4 also supplies a DBCTL installation verification procedure, DFHIVPDB, which integrates with the IMS/DBCTL IVP. For more information about this CICS IVP, see the section on verifying the CICS-DBCTL interface in the *CICS/ESA Installation Guide*, GC33-1163.

If possible, integrate the CICS and IMS IVP process so you can build a working CICS/DBCTL applications environment.

The following subsections guide you through the process of setting up and running a basic CICS/DBCTL environment using the IVP material of both products. While not every detail of the build process is specifically documented here, if you follow the references to other material and the sequence in which the steps are presented, the result should be a working CICS/DBCTL environment.

The IMS Install/IVP process is fully documented in *IMS/ESA Installation Volume 1: Installation and Verification*, SC26-8023

12.4.4.1 Installing DBCTL

This list is an example from which to develop your own procedures for installing DBCTL and is based on the Install/IVP procedure as supplied with the IMS/ESA Version 5 delivery material. When developing your own checklist, refer to *IMS/ESA Installation Volume 1: Installation and Verification*, SC26-8023 and *IMS/ESA Installation Volume 2: System Definition and Tailoring*, SC26-8024 for further guidance on IMS installation and system definition.

Installing IRLM

Note

Unless you intend to use DL/I data sharing, that is sharing DL/I databases concurrently between two or more IMS subsystems, do not install the IRLM. IRLM is required for block-level data sharing only and provides no benefits for the DBCTL user who is not using block-level data sharing. The default for the IMS/ESA Version 5 installation is to install IRLM.

Do not confuse block-level data sharing with database sharing that is available as a matter of course with DBCTL, where numerous CICS and BMP batch regions can share concurrently the databases attached to a single DBCTL.

The installation steps are:

1. Install IMS/DBCTL using the installation procedure supplied as part of the delivery media and perform the supplied IVP tasks for DBCTL. The DBCTL installation supplies and tailors the JCL and data for the IMS/DBCTL IVP process, including a sample IMS DBCTL SYSGEN.

   This process consists of a number of tasks and points of guidance that enable you to create a DLI batch and DBCTL environment and install a supplied mini-DBCTL application to it. In all cases, except IMS integration with MVS, all the material required to run is ready-built and tailored for your new IMS environment. IMS integration with MVS consists of a number of manual tasks, and ready-tailored sample material and detailed guidance on performing the integration are supplied.

   As part of the installation process, read the Program Directory for IMS to check for any PTFs or APARs that you may need. Additionally, check with IBM for any maintenance you may require.

   The following assumes that you have received your IMS order and installed it to DASD from the distribution media according to the delivery method you have chosen.

   Depending upon the product delivery method, the following steps for DLIB build may or may not be required. The delivery installation material indicates whether they are required or not. The steps are these:

   - Steps for System Definition (Stage 1 and Stage 2 SYSDEF)
   - Steps for interface of IMS to MVS
   - Steps to prepare IVP applications and system
   - Steps for IVP execution of a DBB system (batch)
   - Steps for IVP execution of a DBC system (DBCTL)

2. Perform the full set of IVP execution steps for DBC to familiarize yourself with the functions and operation of a DBCTL environment. Include also the steps for DBB (batch). The generated IMS system includes support for DLI batch.

   For further detailed information on the IMS Install and IVP process, see *IMS/ESA Installation Volume 1: Installation and Verification*, SC26-8023.

3. Perform additional tests over and above those supplied with the IVP, to reflect the way you manage your own systems at your location. Try using some of the other DBCTL operator commands.

4. Check and familiarize yourself with the DBCTL log archiving process.

   Note

   It is important to understand the log archiving process and how it integrates with DBRC, including the use of skeletal JCL. If log archiving does not function correctly, then the IMS logs eventually fill and stall the system.

5. If you are new to DBRC, familiarize yourself with DBRC and the contents of the RECON data sets (DBRC's repository of subsystem, logging, and database activity information). It is important to understand how DBRC integrates with DBCTL and how to extract and read reports from the RECON data sets. Use a modified copy of the LIST.RECON IVP job to:

- Perform LIST.RECON for full listings of the contents of the RECON data sets.
- Perform selective listings of the RECON data sets using:
  - LIST.SUBSYS
  - LIST.OLDS
  - LIST.DB while the systems are:
    - Down
    - In-flight
    - Processing an active unit of work.

Using the IVP process “Steps for IVP Execution for a DBC System” and executing it repeatedly provides you with most of these scenarios.

For detailed information on DBRC processing, see the section on DBRC utilities in *IMS/ESA Utilities Reference: System*, SC26-8035.

12.4.4.2 Installing or Modifying CICS

Make available or install a basic CICS/ESA Version 4 to perform the CICS IVP tests.

Note

Using DBCTL instead of local DL/I simplifies installation, because you do not have to perform a partial system generation of CICS in order to use DL/I resources.

If you are going to use an existing CICS region with an existing PDIR and DDIR, specifying DLI=NO in the CICS SIT ensures that CICS routes all DLI requests to DBCTL while leaving your peripheral data set information record (PDIR) and DDIR intact. Alternatively, you can prepare a PDIR and DDIR that do not specify PSBs or DMBs.

As a part of setting up the CICS IVP system, read the program directory for CICS to check for any PTFs or APARs that you may need, and check with IBM for any maintenance that you may require.

When setting up the CICS system, make sure that the following are carried out:

- Set the CICS system initialization parameter DLI to DLI=NO. This causes CICS to send all DLI requests to the DBCTL.
- Include the following CICS-supplied groups within CICS system definition:
  - Program, transaction, and mapset entries for the CICS system definition (CSD) file to provide DBCTL support are supplied in the group DFHDBCTL. This includes the CDBC, DBCTL connection and disconnection transaction; CDBI, the inquiry transaction; and CBDM, the operator transaction. DFHDBCTL is in DFHLIST, which contains the CICS resource definitions needed to run IBM-supplied transactions that must be installed in your system. Also in DFHLIST is the DFHEDP group, which provides the program definition required to run EXEC DLI applications. The group DFHEDP must always be installed in the CICS system. If you need further information on DFHLIST, see *CICS/ESA Resource Definition Guide*, SC33-1166.

Although the operator transaction CDBM has been installed for CICS, it does not function correctly until a corresponding PSB resource is defined in DBCTL. This PSB resource is not defined in DBCTL as part of the IVP process; it is defined later and used to illustrate the function of the IMS MODBLKS generation and online change facility.

You can also add recovery and restart capabilities for DBCTL by installing the CICS resource definition online (RDO) groups DFHJRNL (for CICS journals), and DFHAKP (for CICS activity keypoints used to provide records for CICS journals). You may also want to specify the following options of the transaction definition for transactions using DBCTL:

- RESTART — This option defines whether or not CICS attempts to restart a transaction that has been backed out after a failure.
- SPURGE — We recommend that you specify SPURGE(YES) so that the transaction can be purged using the CICS master terminal transaction (CEMT)

However, at this time, unless you specifically intend to use recovery restart capabilities, keep the IVP system definition simple.

– If you have any of the following DD cards in your CICS JCL, ***remove them***.

  - Database DD cards — These must be available in the DBCTL DLI address space and can be specified in the JCL or in DFSMDA for dynamic allocation. The IVP uses DFSMDA for the sample databases.
  - DFSCTL DD Card — DBCTL owns the OSAM buffer pools. They are specified in DBCTL startup JCL.
  - DFSRESLB DD card — This is replaced by the DRA dynamically allocating IMS.RESLIB.
  - IMSMON DD card — This is now specified in the DBCTL CTL address space.
  - IMSACB DD card — This is specified in the DBCTL CTL address space and the DLI address space as IMSACBA and IMSACBB. One is the active library and the other is the inactive and is available for the IMS online change utility.
  - DFSVSAMP DD card — The information in DFSVSAMP DD card for CICS contains, for example, VSAM buffer parameters and performance and trace options. In DBCTL, this information, and more, is in the DFSVSMxx member of IMS.PROCLIB in the PROCLIB DD statement of the DBCTL startup procedure (DBC). The DFSVSMxx member must be available to DLISAS, which means that you must add a data set with member DFSVSMxx (such as IMS.PROCLIB) to the DLISAS address space. The last two characters of the DFSVSM member are a suffix, which you specify in the VSPEC parameter of the DBCTL startup procedure (DBC).
  - RECON data sets DD cards — RECON data sets are generally specified in DFSMDA IMS dynamic allocation members in the IMS.RESLIB library. For DBCTL, RECON data sets can be specified in the DBRC address space. The IVP uses DFSMDA members in IMS.RESLIB.

- JCLPDS DD card — For DBCTL, JCLPDS is in the DBRC address space.
- JCLOUT DD card — For DBCTL, JCLOUT is in the DBRC address space.

– Include the IMS.RESLIB dataset in the CICS STEPLIB concatenation. IMS.RESLIB must be APF authorized. CICS requires the DRA and startup table and other modules that reside in this library to be authorized.

– Check the DRA start-up table assembly deck that was used by the IMS IVP process, JOB IV2E304J. Check that the following fields contain the correct values as shown in the example in Figure 41. If they do not, then change, reassemble, and link the module into the IMS RESLIB.

  Check to make sure the commented fields are correct.

```
FUNCLV=1,
DDNAME=CCTLDD,          <=This must be 'CCTLDD'
DSNAME=your.ims.reslib, <=Library that contains IMS modules
DBCTLID=IVP3,           <=DBCTL IMSID for CICS to connect to
USERID=,                <=Blank, will get CICS APPLID
MINTHRD=001,
MAXTHRD=005,
TIMER=60,
FPBUF=001,
FPBOF=001,
SOD=I,
TIMEOUT=060,
CNBA=001,
AGN=IVP                 <=IVP security name, see SECURITY macro
```

Figure 41. DRA Parameters for Start-up Table Assembly Deck

12.4.4.3 Connecting the DBCTL and CICS System

Before DBCTL can begin accepting transactions, several things must happen. You can perform the CICS and DBCTL startup from a TSO terminal or an MVS console, following these steps:

1. CICS is started by submitting a job or starting a procedure.
2. DBCTL is started by submitting a job or starting a procedure. DBCTL starts DLISAS and DBRC.
3. After receiving a DBCTL READY message, indicating that startup is complete, the IMS console operator enters a start command, as follows:

   /NRESTART for a warm start

   /ERESTART for an emergency restart after a failure.

   Note

   If you generated DBCTL with no command-recognition character, CRC=NONE in the IMSCTRL macro, then you need to substitute the IMSID for the default CRC used in the examples.

   If starting DBCTL for the first time, use /NRESTART CHECKPOINT 0 FORMAT ALL. This command cold-starts DBCTL and formats the write ahead data set (WADS) and the restart data set (RDS).

When the start has completed, the following message is issued:

```
DFS994I rtype START COMPLETED
```

where rtype is the type of start requested (COLD, WARM, or EMERGENCY).

4. The CICS operator then requests connection to DBCTL using the CDBC transaction.

   Typing CDBC on a 3270-type terminal displays a menu for connecting CICS to, and disconnecting it from, DBCTL. See Figure 42 on page 108 to see an example of the CICS screen.

   To connect to DBCTL, enter Option 1 after:

   ```
   Option Selection ==>
   ```

   in Figure 42 on page 108.

   If you want to specify a DRA start-up table suffix, you can enter it after:

   ```
   Startup Table Suffix ==>
   ```

   in Figure 42 on page 108.

   This is the two-character suffix you gave to the DFSPZPxx DRA start-up parameter table. If you do not specify a suffix, CICS uses the one that was used when it was last connected to DBCTL. If this is the first time you have connected CICS to DBCTL, and you do not specify a suffix, CICS uses the default suffix, which is 00.

   If you want to specify a DBCTL identifier, you can enter it after:

   ```
   DBCTL ID ==>
   ```

   in Figure 42 on page 108.

   If you do not specify a DBCTL identifier, the DRA uses the DBCTL identifier specified on the DBCTLID parameter in the DRA start-up table.

   The CDBC menu screen displays the following additional information:

   - Status of the CICS-DBCTL interface
   - The APPLID of the CICS system
   - The identifier of the DBCTL system
   - The DRA start-up parameter table suffix for this connection.

```
CDBC               CICS-DBCTL CONNECTION/DISCONNECTION


          SELECT ONE OF THE FOLLOWING:

               1 CONNECTION
               2 ORDERLY DISCONNECTION
               3 IMMEDIATE DISCONNECTION


          OPTION SELECTION     ==>
          STARTUP TABLE SUFFIX ==> 00




  STATUS OF THE INTERFACE: DFHDB8290I DBCTL NOT CONNECTED TO CICS.
              CICS APPLID: CICSZ020
                 DBCTL ID:
     STARTUP TABLE SUFFIX:

PF1 = Help   2 = Refresh   3 = End
```

Figure 42. CDBC CICS Screen

The DBCTL identifier and the DRA start-up parameter table suffix are displayed only when CICS has been connected to DBCTL. You can refresh any of the information on the CDBC menu screen by pressing PF2.

You can obtain a help screen for the CDBC menu by pressing PF1.

Note

Step 1 can be done before, during, or after Steps 2 and 3. Steps 2 and 3 must be done in the sequence shown, and all three steps must be completed successfully before Step 4 can begin.

12.4.4.4 Operating CICS and IMS

The operation of CICS systems for IMS Version 5 is now also dependent on the operation of the DBCTL system. CICS systems using DBCTL do not have access to any IMS database until the DBCTL region is also active. If the DBCTL region is active when CICS starts, then an automatic connection can be established. See 12.4.4.5, “Automatically Connecting DBCTL and CICS” for more details. If IMS is not active when CICS starts, then a manual connection is required. See 12.4.4.3, “Connecting the DBCTL and CICS System” on page 106 for the details.

If you use the AOC CICS automation feature to automate CICS system startup, consider using the IMS automation feature to handle the startup of the DBCTL regions.

12.4.4.5 Automatically Connecting DBCTL and CICS

You can specify that CICS automatically connects to DBCTL at CICS startup.

If you want to connect automatically to the DBCTL that was being used when CICS was last shut down, just add an entry for DFHDBCON to the PLTPI so that it is invoked in the second stage of PLTPI processing (that is, the third stage of CICS initialization), as described in the *CICS/ESA Resource Definition Guide*, SC33-1166.

If you want to connect automatically to a specific DBCTL, or to connect CICS to DBCTL when it was not connected at shutdown, use the CICS SIT parameter, INITPARM, in addition to specifying DFHDBCON in the PLTPI. INITPARM enables DFHDBCON to have access to the DRA start-up parameter table suffix you want to use:

```
INITPARM=(DFHDBCON='xx,yyyy')
```

where xx is a 1- to 2-character DRA startup table suffix, which you must enter, and yyyy is an optional 1- to 4-character DBCTL identifier. The DBCTL identifier specified in INITPARM overrides the DRA startup parameter DBCTLID.

Using INITPARM avoids the need to use the CRLP (also known as sequential terminal) as your means of automating connection to a specific DBCTL. If you prefer to use CRLP, code as shown in Figure 43.

```
//DDIN DD *
  CDBC CONNECT SUFFIX(xx) DBCTLID(yyyy)
```

Figure 43. Sample CRLP Member to Automate Connection to a DBCTL

where xx is the 1- to 2-character DRA startup table suffix and yyyy is the 1- to 4-character DBCTL identifier, both of which are optional. Specifying a DBCTL identifier here overrides the one specified in the DRA startup table parameter DBCTLID. Here, \ is the end-of-line character. (See *CICS/ESA Resource Definition Guide*, SC33-1166 and *CICS/ESA Application Programming Guide*, SC33-1169 for guidance on using sequential terminal support.)

12.4.4.6 Activating the CICS/DBCTL Operator Interface

IMS can be operated from an IMS master terminal operator console, which is usually the primary MVS console. Before CICS/ESA Version 4, operator communication with DBCTL was from a MVS console. This can be the primary MVS console, but we recommend that you have a secondary MVS console specifically dedicated to DBCTL. We refer to this as the *DBCTL console*.

From CICS/ESA Version 4 and IMS/ESA Version 5 onward, you can choose to issue operator commands to DBCTL from a CICS terminal, using a CICS-supplied transaction CDBM.

To activate the CICS/DBCTL operator interface, you must ensure that you have installed the program, transaction, and mapset group DFHDBCTL. In addition you must also specify a PSB in DBCTL for the CICS transaction CDBM to use to communicate with the IVP DBCTL.

The following steps are required:

- Generate an IMS PSB called DFHDBMP.
- Perform an IMS ACBGEN for DFHDBMP.
- Perform an IMS MODBLKS generation for your existing IVP DBCTL to include the new PSB in the IVP system.
- Run the online change utility to make the changes available to DBCTL.
- Issue the IMS /MODIFY operator command to activate the changes.

Note

IMS online change assumes that the DBCTL region is started and ready to accept work. For the purposes of this exercise, ensure that the DBCTL region is started. The DBCTL region is not changed, or required, until the IMS operator command /MODIFY is issued. It is also possible to incorporate changes into DBCTL while the region is down.

Generating CDBM PSB DFHDBMP: When generating a PSB named DFHDBMP, remember that DFHDBMP need not have any associated PCBs. Example input for the PSBGEN is shown in Figure 44.

```
PSBGEN LANG=ASSEM,PSBNAME=DFHDBMP,IOASIZE=1000
```

Figure 44. Sample PSB for CDBM Transaction

The IOASIZE parameter must be large enough to cope with the output from the largest AOI command issued. Large AOI commands can result from using wild cards. For example, issuing the command CDBM /START DATABASE D* results in a start command for all database names beginning with D. See the section on the PSBGEN statement in *IMS/ESA Utilities Reference: System*, SC26-8035 for information on defining IOASIZE.

IMS ACBGEN for PSB DFHDBMP: Run an ACBGEN for PSB DFHDBMP to the IMS.ACBLIB. Make sure that the ACBGEN JCL card DD ACBLIB points to the IMS.ACBLIB and not to ACB libraries A or B.

IMS MODBLKS Generation: The IVP process, Stage 1 and Stage 2 IMS generation, was done to create for the first time all the required modules, procedures, and parameters that populate IMS.RESLIB and IMS.PROCLIB. During this process, another library is populated: IMS.MODBLKS. This contains the application definitions for PSBs and DBDs from the APPLCTN macro and the DATABASE macro statements.

When it becomes necessary to make application type changes to IMS, as when adding or removing PSBs or DBDs, IMS provides an IMS generation facility that allows the generation of only the application changes without regenerating all the IMS systems code. This process is called a *MODBLKS generation*.

The source for a MODBLKS generation is your original IMS generation.

Review the IMSCTRL macro SYSTEM keyword. The original IMS generation for DBCTL and batch looks something like Figure 45.

```
IMSCTRL  SYSTEM=(VS/2,(ALL,DBCTL),5)
```

Figure 45. Sample IMSCTRL ALL GEN Macro for DBCTL

For a MODBLKS generation, change the macro to look like Figure 46.

```
IMSCTRL  SYSTEM=(VS/2,(MODBLKS,DBCTL),5)
```

Figure 46. Sample IMSCTRL MODBLKS Gen Macro for DBCTL

Include with the APPLCTN macros statements an additional statement for the CICS CDBM transaction PSB name DFHDBMP and code as in Figure 47 on page 111.

```
APPLCTN  PSB=DFHDBMP,PGMTYPE=BATCH,SCHDTYP=PARALLEL
```

Figure 47. Sample APPLCTN Macro for DFSDBMP

Specifying parallel scheduling for this PSB enables multiple CDBM transactions to be active at the same time.

You can leave the rest of the statements the same. When the Stage 1 and Stage 2 generation are run, all that is generated are the members of IMS.MODBLKS, the application definition blocks.

On-line Change Utility: Execute the on-line change utility. (Sample JCL for your system can be found in the IVP material.) Changes have been made to two IMS libraries, IMS.ACBLIB and IMS.MODBLKS, so you need to run the on-line change utility for IMS.ACBLIB, IMS.MODBLKS, and IMS.MATRIX.

Note

The two control block libraries, IMS.MODBLKS (containing application PSB and DBD entries) and IMS.MATRIX (containing security control blocks) must always be changed together and kept synchronized. When the online change utility is run for either IMS.MODBLKS or IMS.MATRIX it must also be run for the other (unless you do not have security implemented, in which case IMS.MATRIX is empty). Your IVP DBCTL system has security implemented.

For each of the utility executions, make sure that the procedure parameters are passed as shown:

IMS.ACBLIB changes TYPE=ACB,IN=S,OUT=U

TYPE=ACB points the utility to the IMS.ACBLIB libraries. IN=S requests that the input to the utility be the staging library, that is IMS.ACBLIB. OUT=U requests that the utility determine which is the inactive ACBLIB (ACBLIBA or ACBLIBB) that is online to DBCTL and use that inactive library for the utility output.

IMS.MODBLKS changes TYPE=MODBLKS,IN=S,OUT=U

TYPE=MODBLKS points the utility to the IMS.MODBLKS libraries. IN=S requests that the input to the utility be the staging library, that is, IMS.MODBLKS. OUT=U requests that the utility determine which is the inactive MODBLKS (MODBLKSA or MODBLKSB) that is online to DBCTL and use that inactive library for the utility output.

IMS.MATRIX changes TYPE=MATRIX,IN=S,OUT=U

TYPE=MATRIX points the utility to the IMS.MATRIX libraries. IN=S requests that the input to the utility be the staging library, that is IMS.MATRIX. OUT=U requests that the utility determine which is the inactive MATRIX (MATRIXA or MATRIXB) that is online to DBCTL and use that inactive library for the utility output.

To determine which of the libraries is the inactive one, the on-line change utility refers to a data set called IMS.MODSTAT. This contains a single record and

informs the utility, and DBCTL, which of the data sets, A or B, is currently the active one.

Note

There is no entry for MATRIX in IMS.MODSTAT as it is always kept synchronized with MODBLKS. (You may also see an entry for FORMAT, which is applicable only to the IMS Transaction Manager.)

For a further description of the online change utility, see Section 4.2, “Online Change Processing” on page 45.

Once the on-line change utility has been successfully run and the new ACB and application MODBLKS have been loaded into the inactive libraries, DBCTL can be modified online to switch the ACBLIB, MODBLKS, and MATRIX data sets.

Modify DBCTL: To complete the process, DBCTL must be modified to point to the new libraries. On an IMS console, enter the IMS operator commands:

```
/MODIFY PREPARE ACBLIB MODBLKS
```

followed by

```
/MODIFY COMMIT
```

Check that the new PSB is available to DBCTL. On an IMS console, enter the IMS command:

```
/DISPLAY PROG DFHDBMP
```

For a full description of the procedure to MODIFY DBCTL, see the section on making online changes in *IMS/ESA Sample Operating Procedures*, SC26-8032.

Using the CICS/DBCTL Operator Interface CDBM: You can use CDBM to issue, across the DRA interface, most of the IMS operator commands that are valid for DBCTL, to display and change the state of selected resources. However, some commands cannot be issued across this interface; they are

/CHECKPOINT FREEZE and /CHECKPOINT PURGE
/MODIFY
/ERESTART
/NRESTART
/SSR

From a CICS terminal, enter the transaction name CDBM. The CDBM screen presents an area where you can enter IMS commands. For example enter the command:

```
/DISPLAY PROG DFHDBMP
```

When dealing with databases, you can use an asterisk (*) to refer to generic groups; for example, DB21* refers to all databases starting with the characters DB21. You can also use a plus (+) sign in place of a single character; for example, DB+2 displays databases DB12, DB22, DB32, and so on.

12.4.5 Steps to Migrate Your Existing Environment to CICS/DBCTL

When migrating a production or test environment from CICS local DL/I to CICS/DBCTL, there are a number of additional considerations over and above those outlined in Section 12.4.4, “Creating a Basic CICS/DBCTL Environment” on page 102. This section outlines the steps involved in providing a production or test DBCTL environment and migrating a CICS local DL/I application to it.

For this example, we assume:

- A new IMS environment is to be created for a production or testing area.
- SMP/E installation processing for IMS has been completed successfully.
- SMP/E processing is performed according to your environmental standards. (See *IMS/ESA Installation Volume 1: Installation and Verification*, SC26-8023.)
- The IMS environment contains support for batch and DBCTL in the same RESLIB, PROCLIB, and so on.
- You decided upon a naming convention for IMS data sets, started task names, and IMSIDs. (Default IMS names are used here. You can substitute your own standards if necessary.)
- As the model for your setup JCL, you use the JCL generated as part of the IVP installation. This JCL is available in IMS.INSTALIB under the IVP Jobnames. See the appendix on INSTALL/IVP JOBs and TASKs in *IMS/ESA Installation Volume 1: Installation and Verification*, SC26-8023 for a cross-reference to the IVP job names and a description of the tasks they perform.
- The IMS RESLIB, PROCLIB, and other libraries associated with the IVP installation are not used as part of this installation.
- The MVS integration as performed for the IMS/ESA Version 5 installation has been completed successfully.
- For ease of explanation, only one CICS local DL/I environment is to be connected to one DBCTL environment. (It is possible to have more than one DBCTL region running under an MVS image and many CICS systems connected to one DBCTL.)
- You perform verification testing of any application migrations.
- During any migration process, you develop backup and recovery processes for fallback.

The example outlined below is not the only way in which an CICS/DBCTL environment can be set up. Please bear in mind that there are many ways to configure and control a DBCTL environment.

The IMS system generation macros, keywords, and parameters, described below are described only insofar as they relate to a DBCTL environment, and only for the purposes of this example application migration. Many of the macros have additional keywords and many of the keywords have additional values that may relate to the generation of the DBCTL environment. See *IMS/ESA Installation Volume 2: System Definition and Tailoring*, SC26-8024, for a full description of the system generation process and the macros, keywords, and values involved.

12.4.5.1 IMS System Definition

IMS system definition is a two-stage process with an optional preprocessor. The input to Stage 1 consists of JCL statements and the IMS macro statements that you prepare. The Stage 1 output job stream is used as input to Stage 2. Creating an IMS environment for both DBCTL and BATCH can be performed in the same IMS system definition by specifying on the IMSCTRL macro the ALL,DBCTL options for the TYPE and CLASS parameters. (You could also perform separate system definitions for batch and DBCTL to separate IMS RESLIBs and so on, if required).

For a full description of the system generation process and the macros involved, see *IMS/ESA Installation Volume 2: System Definition and Tailoring*, SC26-8024.

Allocate IMS System Data Sets: Allocate the IMS systems data sets required to support your IMS environment. Depending on how you organize your environment, it should only be necessary to allocate these data sets once, although you may consider it advisable to keep the IMS testing and production environments separate.

Allocate the following data sets:

IMS.RESLIB
IMS.MACLIB
IMS.OPTIONS
IMS.PROCLIB
IMS.OBJDSET
IMS.LGENIN
IMS.LGENOUT
IMS.JOBS
IMS.MODBLKS
IMS.MATRIX

Sample data set allocation JCL can be found in the IVP material.

Dataset allocation attributes can be found in the chapter on data sets in *IMS/ESA Installation Volume 1: Installation and Verification*, SC26-8023.

APF-Authorized IMS Libraries: The following data sets must be APF authorized before they can be used by a DBCTL environment:

IMS.RESLIB
IMS.MODBLKSA
IMS.MODBLKSB
IMS.MATRIXA
IMS.MATRIXB

Create Stage 1 System Generation Macros: Using as a base the Stage 1 macro definition from the IVP material, create the system definition for your batch and DBCTL environments:

1. Copy the Stage 1 macros from the IVP material.
2. On the **IMSCTRL** macro:,
   - SYSTEM=

     Ensure that the SYSTEM= keyword parameters values are set to:

     First parameter = VS/2

Second parameter = (ALL,DBCTL)
Third parameter = MVS operating system release or modification level

- CMDCHAR=

  If you are going to use the default CRC for communication from the MVS/IMS console to DBCTL, set CMDCHAR=/ or a suitable alternative CRC.

  If you are going to use the four-character IMSID for communication from the MVS/IMS console to DBCTL, set CMDCHAR=NONE.

- DBRC=

  If you use DBRC for the DBCTL environment only, set DBRC=(YES,NO). If DBRC is used for the DBCTL and batch environments, set DBRC=(YES,YES).

  Note

  If you do not currently register your databases with DBRC, then you probably want to set DBRC=(YES,NO).

- DBCRCNM=

  Set DBCRCNM= to the name of the DBCTL DBRC address space started-task name, such as DBRCNM=IMSADBRC

- DLINM=

  Set DLINM= to the name of the DBCTL DLI address space started-task name, such as DLINM=IMSADLI

- IMSID=

  Set IMSID= to the four-character IMS identifier to be used for this IMS environment, such as IMSID=IMSA.

  Note

  The IMSID specified here is set for the DBCTL and the batch environments; however, it is possible to set the IMSID for DBCTL from the DBCTL startup parameter list. If you require the batch environment to have a specific IMS identifier, then set IMSID= to that value here.

- MAXREGN=

  The first parameter of MAXREGN= specifies the minimum number of control blocks that DBCTL permanently allocates for CICS CCTL threads and BMPs. If DBCTL requires more control blocks, they are dynamically allocated and deallocated.

3. On the **IMSCTF** macro,

   - SVCNO=

     Specify the SVC numbers reserved for use by the generated system. The first parameter specifies the Type 2 SVC number. The second parameter specifies the Type 4 SVC number. For example,

     ```
     Set SVCNO=(,254,255),
     ```

Only one Type 2 SVC and one Type 4 SVC number are required for any number of IMS systems of the same release level.

For reasons of compatibility, the SVC numbers, if specified, must be immediately preceded by a comma and then enclosed in parentheses. Also, the Type 2 and Type 4 SVC number may not be the same.

- LOG=

  If you are to use dual logging for batch processing, specify LOG=DUAL, otherwise specify LOG=SNGL.

- CPLOG=

  CPLOG= specifies the number of system log records between system-generated checkpoints. The permitted values range from 500 to 16,777,215. The default is 1000. A number of factors influence this value:

  – How busy the system is

  – How frequently you want DBCTL to checkpoint. Too frequently and DBCTL spends more time taking system checkpoints than doing work. Too rarely and DBCTL recovery and restart time may be compromised.

  You need to set this value according to how busy your system is. The CPLOG=1000 default is probably too low for any moderately busy system.

- RDS=

  RDS= specifies the device on which the DBCTL restart data set, IMS.RDS, resides and also the buffer size to be used for the data set. Specify LGDK for the first parameter, unless you are using a DASD type other than 3375, 3380 or 3390, in which case consult the chapter on macros in *IMS/ESA Installation Volume 2: System Definition and Tailoring*, SC26-8024. For the second parameter, buffer size, the maximum allowable size is the track size for the device type specified, or 32767, whichever is smaller.

- PRDR=

  Set PRDR= to the default IMSRDR.

4. Unless you specifically intend to use Fast Path, exclude the **FPCTRL** macro. Excluding Fast Path reduces DBCTL CSA requirements.

5. Allow the **BUFPOOLS** macro to default. The BUFPOOLS macro results in parameters being built into the DBCTL startup parameter list in member DFSPBxxx of IMS.PROCLIB, where these values are tailored at a later stage.

6. The **SECURITY** macro statement lets you specify optional security features that are in effect during IMS execution unless they are overridden during system initialization.

   The IMS system may be defined to use the RACF program product, or equivalent.

   If you have no requirement to define security for DBCTL connections, remove the SECURITY macro. If you do have security requirements for DBCTL, see the chapter on security checking with DBCTL in *CICS/ESA CICS-IMS Database Control Guide*, SC33-1184.

7. Using the DDIR specification from the CICS region you are migrating from as a model, specify **DATABASE** macro statements for each DL/I database and

database index to be included in the DBCTL environment. For example, see Figure 48 on page 117.

```
DATABASE DBD=DBDO1,ACCESS=UP
DATABASE INDEX,DBD=DBDO1X1,ACCESS=UP
DATABASE INDEX,DBD=DBDO1X2,ACCESS=UP
DATABASE DBD=DBDO2,ACCESS=UP
DATABASE INDEX,DBD=DBDO2X1,ACCESS=UP
```

Figure 48. IVP DATABASE Macros

The ACCESS parameter indicates how DBCTL controls database access. Possible values for ACCESS= are

ACCESS=EX (exclusive)

ACCESS=UP (update)

ACCESS=RD (read)

ACCESS=RO (read only)

8. Using the PDIR specification from the CICS region you are migrating from as a model, specify **APPLCTN** macro statements for each DL/I PSB to be included in the DBCTL environment. For example, see Figure 49.

```
APPLCTN  PSB=DFHDBMP,PGMTYPE=BATCH,SCHDTYP=PARALLEL
APPLCTN  PSB=PSBO1,PGMTYPE=BATCH,SCHDTYP=PARALLEL
APPLCTN  PSB=PSBO2,PGMTYPE=BATCH,SCHDTYP=PARALLEL
APPLCTN  PSB=PSBO3,PGMTYPE=BATCH,SCHDTYP=PARALLEL
```

Figure 49. IVP APPLCTN Macros

Note

Include the PSB DFHDBMP for the CICS transaction CDBM, CICS/DBCTL Operator Interface.

SCHDTYP=PARALLEL enables parallel scheduling of the same PSB name.

9. On the **IMSGEN** macro,
   - Set the SUFFIX= keyword to SUFFIX=0
   - Set the MACLIB= keyword to MACLIB=ALL
   - Set the NODE= keyword to NODE=(IMS,IMS,IMS)

     If you have used other values for IMS data set names, consult the section on the IMSGEN macro, NODE= in the *IMS/ESA Installation Volume 2: System Definition and Tailoring*, SC26-8024.
   - Set the OBJDSET= keyword to the IMS OBJDSET data set name.
   - Set the PROCLIB= keyword to PROCLIB=YES to generate IMS-supplied JCL procedures.

     After IMS JCL procedures have been generated once, you may want to set this keyword to PROCLIB=NO to avoid regenerating these procedures into IMS.PROCLIB.
   - Set the USERLIB= keyword to a data set name containing any user-furnished routines that are to be included in the generated IMS

nucleus. If this operand is omitted, the library containing the routines is assumed to be the same as that named on the RESLIB DD statement.

- Set the JCL= keyword values to valid JCL job card values for your installation.

10. Run the Stage 1 and Stage 2 IMS system definition.
11. Run SMP/E JCLIN

See "Create Stage 1 System Generation Macros" on page 114 for a sample IMS system definition job stream to generate a DBCTL and batch environment.

Example DBCTL Stage 1 Source: An example of the IMS DBCTL and batch system generation Stage 1 input stream is shown in Figure 50.

```
//STAGE1   EXEC PGM=ASMA90,PARM='DECK',TIME=()
//SYSPRINT DD SYSOUT=*
//SYSLIB   DD DISP=SHR,DSN=IMS.GENLIB
//         DD DISP=SHR,DSN=IMS.GENLIBA
//         DD DISP=SHR,DSN=IMS.GENLIBB
//SYSPUNCH DD DISP=SHR,DSN=user.dataset(STG2OUT)
//SYSUT1   DD UNIT=SYSDA,SPACE=(CYL,(05,05)),DCB=OPTCD=C
//SYSUT2   DD UNIT=SYSDA,SPACE=(CYL,(05,05)),DCB=OPTCD=C
//SYSUT3   DD UNIT=SYSDA,SPACE=(CYL,(05,05)),DCB=OPTCD=C
//SYSIN    DD *
         IMSCTRL  SYSTEM=(VS/2,(ALL,DBCTL),5),                        X
               CMDCHAR=/,                                             X
               DBRC=(YES,NO),                                         X
               DBRCNM=IMSADBRC,                                       X
               DLINM=IMSADLI,                                         X
               IMSID=IMSA,                                            X
               NAMECHK=(YES,S1),                                      X
               MAXIO=(,015),                                          X
               MAXREGN=(015,512K,A,A),                                X
               MCS=(2,7),                                             X
               DESC=7,                                                X
               MAXCLAS=016
*
         IMSCTF SVCNO=(,254,255),                                     X
               LOG=SNGL,                                              X
               CPLOG=10000,                                           X
               RDS=(LGDK,27998),                                      X
               PRDR=IMSRDR
*
         BUFPOOLS PSB=24000,                                          X
               DMB=24000,                                             X
               SASPSB=(4000,20000),                                   X
               PSBW=12000
*
         DATABASE DBD=DBD01,ACCESS=UP
         DATABASE INDEX,DBD=DBD01X1,ACCESS=UP
```

Figure 50 (Part 1 of 3). Sample DBCTL Stage 1 System Generation Input Deck

```
         DATABASE INDEX,DBD=DBDO1X2,ACCESS=UP
         DATABASE DBD=DBDO2,ACCESS=UP
         DATABASE INDEX,DBD=DBDO2X1,ACCESS=UP
*
         APPLCTN  PSB=DFHDBMP,PGMTYPE=BATCH,SCHDTYP=PARALLEL
         APPLCTN  PSB=PSBO1,PGMTYPE=BATCH,SCHDTYP=PARALLEL
         APPLCTN  PSB=PSBO2,PGMTYPE=BATCH,SCHDTYP=PARALLEL
         APPLCTN  PSB=PSBO3,PGMTYPE=BATCH,SCHDTYP=PARALLEL
*
         IMSGEN ASM=(HLASM,SYSLIN),ASMPRT=ON,                          X
               LKPRT=(XREF,LIST),LKSIZE=(880K,64K),LKRGN=1024K,        X
               SUFFIX=0,                                               X
               SURVEY=NO,                                              X
               MACLIB=ALL,                                             X
               NODE=(IMS,                                              X
               IMS,                                                    X
               IMS),                                                   X
               OBJDSET=IMS.OBJDSET,                                    X
               PROCLIB=YES,                                            X
               USERLIB=IMS.RESLIB,                                     X
               UMACO=,                                                 X
               SYSMAC=SYS1.MACLIB,                                     X
               MODGEN=SYS1.MODGEN,                                     X
               UMAC1=,                                                 X
               UMAC2=,                                                 X
               UMAC3=,                                                 X
               ONEJOB=(NO,NO),                                         X
               JCL=(IMSGEN,                                            X
               (TS,F1),                                                X
               'PROGRAMMER NAME',X,                                    X
               (CLASS=A,MSGLEVEL=(1,1),NOTIFY=USERID),                 X
               (TYPRUN=HOLD,REGION=6M)),                               X
               SCL=(255,,(TIME=)),                                     X
               UJCL1=,                                                 X
               UJCL2=,                                                 X
               UJCL3=,                                                 X
               UJCL4=,                                                 X
               UJCL5=
         END ,
```

Figure 50 (Part 2 of 3). Sample DBCTL Stage 1 System Generation Input Deck

12.4.5.2 Create DBCTL Environment

Creating the DBCTL environment involves allocating data sets required to run a DBCTL subsystem, and tailoring JCL and parameter lists to configure DBCTL for your environment.

Allocate DBCTL Data Sets: A number of data sets are required for a DBCTL environment, some of which need special consideration in their allocation. See the chapter on data sets in *IMS/ESA Installation Volume 1: Installation and Verification*, SC26-8023 for full details of IMS data set allocations. Here are some recommendations:

- IMS.MDALIB is an optional data set and would be used to hold dynamic allocation modules for databases and DBCTL system data sets such as the OLDS. IMS.MDALIB can be useful if you are going to be running multiple

DBCTL systems on the same MVS image with a shared RESLIB. Allocate using the same data set control block (DCB) information as IMS.RESLIB.

- IMS.IMSMON is a required data set for the IMS monitor feature. The IMS monitor can generate a large volume of trace output when activated.
- IMS.ACBLIB is the staging library for the IMS ACBGEN-process generated application control blocks. You can model the size of this library on your CICS ACBLIB.

  Warning

  An ACB generation needs to be performed for CICS with local DL/I. However, as it is very likely that you are changing IMS releases with this installation, it is imperative that you do ***not*** use the ACBs from an earlier release of IMS, such as the CICS ACBLIB, and that you perform a new ACBGEN for your applications.

- IMS.ACBLIBA is one of the ACBLIBs that are online to DBCTL. Allocate the same as IMS.ACBLIB.
- IMS.ACBLIBB is one of the ACBLIBs that are online to DBCTL. Allocate the same as IMS.ACBLIB.
- IMS.MODBLKSA is one of the application definition libraries online to DBCTL. Allocate the same as IMS.MODBLKS.
- IMS.MODBLKSB is one of the application definition libraries online to DBCTL. Allocate the same as IMS.MODBLKS.
- IMS.MATRIXA is one of the IMS security libraries online to DBCTL. Allocate the same as IMS.MATRIX.
- IMS.MATRIXB is one of the IMS security libraries online to DBCTL. Allocate the same as IMS.MATRIX.
- IMS.MODSTAT informs DBCTL which of the ACBLIBs (A or B) and which of the MODBLKS and MATRIX (A or B) are active. It contains only one 80 byte record.
- IMS.RDS contains information required for recovery, including the checkpoint ID table required for restarting IMS. However, RDS does not contain any log records. You should allocate at least five contiguous tracks for this data set. IMS sets the DCB information during the DBCTL cold start process.
- IMS.DFSOLP00 through DFSOLP99 and IMS.DFSOLS00 through DFSOLS99 are the DBCTL online log data sets, and perform the same function for DBCTL as the journals do for CICS. How many IMS OLDS you allocate and their size depends on the volume of activity on your DBCTL system and also possibly on your log archive and offsite recovery policy.

  You need to allocate at least three pairs of OLDS for DBCTL to run. We recommend allocating more than the minimum required. If for any reason the OLDS archive process fails, DBCTL will stall when it runs out of OLDS data sets. IMS does not reuse OLDS data sets until they have been archived.

  You can model the size of the OLDS on the size of your existing CICS journal data sets. DBCTL writes approximately the same amount of DL/I logging information as CICS does for a CICS local DL/I environment plus additional DBCTL system information. If you have a CICS environment that only processes DL/I, then the sum of the size of all your DBCTL OLDS datasets

should be approximately the same as or a little more than the sum of the size of your CICS journals.

For OLDS allocation considerations, see the section on “Specifying Your Choices” for the Log Data Sets in the *IMS/ESA Operations Guide*, SC26-8029.

- IMS.DFSWADS0 through DFSWADS9, the write-ahead data sets are small DASD data sets containing a copy of log records reflecting committed operations in the OLDS buffers that have not yet been written to the OLDS. WADS space is continually reused after the records it contains are written to the OLDS. Allocate at least a pair of WADS.

  For WADS allocation considerations, see the section on “Specifying Your Choices for the Log Data Sets” in the *IMS/ESA Operations Guide*, SC26-8029.

- IMS.DFSTRA01 and IMS.DFSTRA02 are table trace data sets.

Allocate DBRC RECON Data Sets: There are a number of important considerations when allocating the DBRC RECON data sets. For optimal performance and integrity of the RECON data sets, these recommendations should be followed wherever possible:

- Place each RECON data set on a different device.
- Place each RECON data set on a different channel.
- Place each RECON data set in a different user catalog.
- To eliminate deadlocks, the RECONs must be the only objects cataloged in their respective catalogs and must be on the same device as their catalogs.
- Allocate each RECON data set with different space allocations. The spare data set must be at least as large as the largest, or preferably a little larger.
- Specify SPANNED so large RECON records can span the control interval.
- Specify the same maximum record size for all RECON data sets.
- Use the same index control interval size and data CI size of all the RECON data sets and make sure that the largest data CI size specified exceeds the smallest index CI size specified by at least 2048 bytes. Failure to do so can seriously degrade the performance of your DBRC.

See the section on “DBRC RECON Data Set” in the *IMS/ESA Installation Volume 1: Installation and Verification*, SC26-8023, for more detailed information on allocating RECON data sets. An example allocation for RECON data sets is shown in Figure 51 on page 122.

```
//ALLOCATE EXEC PGM=IDCAMS,DYNAMNBR=200
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
  DEFINE CLUSTER(NAME(IMS1.RECON1)              -
                 FREESPACE(20 20)               -
                 INDEXED                        -
                 KEYS(24 0)                     -
                 RECORDSIZE(4086 32600)         -
                 SHAREOPTIONS(3 3)              -
                 RECOVERY                       -
                 NOERASE                        -
                 SPANNED                        -
                 NOREUSE                        -
                 UNORDERED                      -
                 UNIQUE                         -
                 VOLUMES(VOLSE1)                -
                 CYL(3 1))                      -
           DATA(NAME(IMS1.RECON1.DATA))         -
          INDEX(NAME(IMS1.RECON1.INDEX))
  DEFINE CLUSTER(NAME(IMS2.RECON2)              -
                 FREESPACE(25 25)               -
                 INDEXED                        -
                 KEYS(24 0)                     -
                 RECORDSIZE(4086 32600)         -
                 SHAREOPTIONS(3 3)              -
                 RECOVERY                       -
                 NOERASE                        -
                 SPANNED                        -
                 NOREUSE                        -
                 UNORDERED                      -
                 UNIQUE                         -
                 VOLUMES(VOLSE2)                -
                 CYL(4 1))                      -
           DATA(NAME(IMS2.RECON2.DATA))         -
          INDEX(NAME(IMS2.RECON2.INDEX))
  DEFINE CLUSTER(NAME(IMS3.RECON3)              -
                 FREESPACE(30 30)               -
                 INDEXED                        -
                 KEYS(24 0)                     -
                 RECORDSIZE(4086 32600)         -
                 SHAREOPTIONS(3 3)              -
                 RECOVERY                       -
                 NOERASE                        -
                 SPANNED                        -
                 NOREUSE                        -
                 UNORDERED                      -
                 UNIQUE                         -
                 VOLUMES(VOLSE3)                -
                 CYL(5 1))                      -
           DATA(NAME(IMS3.RECON3.DATA))         -
          INDEX(NAME(IMS3.RECON3.INDEX))
```

Figure 51. Example Allocation for RECON Data Sets

Dynamic Allocation of RECON Data Sets: To ensure the integrity of your RECON data sets and the data relating to subsystems and applications running under DBRC, use dynamic allocation for all allocations of the RECON data sets. Placing the dynamic allocation modules in the IMS.RESLIB ensures that all tasks

and jobs use the same set of RECON data sets. An example of a dynamic allocation definition for RECON data sets is shown in Figure 52 on page 123.

```
DFSMDA TYPE=INITIAL
DFSMDA TYPE=RECON,DDNAME=RECON1,DSNAME=IMS1.RECON1
DFSMDA TYPE=RECON,DDNAME=RECON2,DSNAME=IMS2.RECON2
DFSMDA TYPE=RECON,DDNAME=RECON3,DSNAME=IMS3.RECON3
DFSMDA TYPE=FINAL
        END
```

Figure 52. Example Dynamic Allocation Definition for RECON Data Sets

Initialize DBRC RECON Data Sets: Before the RECON data sets can be used, they must be initialized. This involves placing a header record in the COPY1 and COPY2 RECON data sets. At this time, the third RECON data set is a spare, which DBRC uses if there are any problems with COPY1 or COPY2. An example of an INIT.RECON command is shown in Figure 53.

```
//STEP01   EXEC PGM=DSPURX00
//STEPLIB  DD DISP=SHR,DSN=IMS.RESLIB
//SYSPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//SYSIN    DD *
  INIT.RECON NOFORCER CHECK44 SHARECTL NONEW  -
             DASDUNIT(SYSDA) TAPEUNIT(3480)  -
             CATDS
```

Figure 53. Sample INIT.RECON Command

GRS Conversion of RECON Reserves: Global resource serialization (GRS) can be used for the RECON reserves. The use of GRS conversion of RECON reserves eliminates any potential DBRC reserve deadlock situations.

If you are having contention situations and deadlocks for the RECON data sets, then consider using GRS, otherwise it is not required.

The major name is DSPURI01. The minor name is the RECON data set name. We recommend using just the major name.

Note

The major and minor names are not documented in the IMS manuals and the IMS manuals say not to use GRS, but they say so because GRS slows performance rather than because of its functional role. GRS can be used for the RECON reserves.

Initializing IMS MODSTAT Data Set: Initialize the IMS.MODSTAT data set with the values for DBCTL startup.

Sample IMS MODSTAT data set initialization values are

```
0,MODBLKSA,IMSACBA,FORMATA
```

Create the DRA: Create a DRA module for use by the CICS systems that connect to this DBCTL.

The DRA module is called DFSPZPxx where xx is a two-member alphanumeric suffix. DFSPZPxx would normally reside in IMS.RESLIB. The default name is DFSPZP00. You can use a suffix that uniquely identifies this DRA with the CICS region that it has been created for.

When specifying the DRA, there are some parameters that you should pay particular attention to:

DDNAME must be equal to CCTLDD

DSNAME must be the name of the IMS RESLIB.

DBCTLID must be set to the IMSID of the DBCTL system.

USERID is set by CICS to the CICS APPLID.

MINTHRD This is the minimum number of CICS/DBCTL threads that are permanently created to avoid dynamic thread creation. Set this to the average number of your concurrent CICS transactions.

MAXTHRD Set this to the maximum number of threads allowed for this CICS/DBCTL connection. Threads from MINTHRD to MAXTHRD are dynamically created as necessary. However, DBCTL reuses some dynamically created threads.

FPBUF Set to zero if you are not using Fast Path.

AGN Set the application group name if you are using IMS security.

A sample DRA assembly is shown in Figure 54.

```
DFSPRP DSECT=NO,                                              X
       FUNCLV=1,          X        CCTL FUNCTION LEVEL        X
       DDNAME=CCTLDD,     XXXXXXXX DDN FOR CCTL RESLIB DYNALOC X
       DSNAME=IMS.RESLIB,                                     X
       DBCTLID=IMSA,      XXXX     NAME OF DBCTL REGION      X
       USERID=,           XXXXXXXX NAME OF USER REGION       X
       MINTHRD=010,       XXX      MINIMUM THREADS           X
       MAXTHRD=030,       XXX      MAXIMUM THREADS           X
       TIMER=60,          XX       IDENTIFY TIMER VALUE - SECS X
       FPBUF=000,         XXX      FP FIXED BFRS PER THREAD  X
       FPBOF=000,         XXX      FP OVFLW BFRS PER THREAD  X
       SOD=X,             X        SNAP DUMP CLASS           X
       TIMEOUT=060,       XXX      DRATERM TIMEOUT IN SECONDS X
       CNBA=000,          XXX      TOTAL FP NBA BFRS FOR CCTL X
       AGN=               XXXXXXXX APPLICATION GROUP NAME
END
```

Figure 54. Sample DRA Member

Tailoring the DBCTL Environment: Each DBCTL can be tailored by a set of startup parameters. These parameters can be specified in either the startup JCL or in a startup parameter list held in a PDS member. For ease of use and maintenance, we recommend that you maintain the DBCTL startup parameter as a PDS member.

The DBCTL startup parameter member is called DFSPBxxx, where xxx is a three-member alphanumeric suffix. DFSPBxxx normally resides in IMS.PROCLIB. You can use a suffix that uniquely identifies this member name with the IMSID of the DBCTL region that it has been created for.

When DBCTL is started, you pass the alphanumeric suffix via the JCL specified value RGSUF=.

When specifying DFSPBxxx, there some parameters that you should pay particular attention to:

ARC sets the OLDS archive frequency. Unless you have a large number of OLDS allocated to DBCTL, set this to ARC=01.

AUTO informs DBCTL to attempt automatic restart. For normal DBCTL restarts, set this to AUTO=Y.

CRC specifies the command recognition character for this DBCTL. If you are not going to use the CRC, then leave this field blank.

CSAPSB specifies the size of the PSB pool in the DBCTL address space. Set CSAPSB to approximately 25% of DLIPSB.

DBRCNM is the name of the DBRC started-task to be started by DBCTL.

DBWP Specify the size as the largest logical record length parameter size of any database you may run.

DLINM is the name of the DLI started-task to be started by DBCTL.

DLIPSB specifies the size of the PSB pool in the DLISAS address space. Set DLIPSB to a size equivalent to the CICS PSBPL.

DMB specifies the size of the database pool. Set DMB pool to a size equivalent to the CICS DMBPL.

FIX specifies the two-character suffix for DFSFIXxx and DFSDRFxx. This specifies the IMS.PROCLIB member to control page-fixing portions of the control program, and loading portions of the control program into DREF storage.

IMSID specifies the IMSID for this DBCTL region.

IRLM Specify IRLM=N unless you are performing block-level data sharing.

ISIS specifies whether resource access security checking is to be performed:

0 specifies that no resource access security is to be performed.

1 specifies that resource access security checking is to be performed using RACF.

2 specifies that resource access security checking is to be performed using the user-written exit routine.

MAXPST specifies the maximum number of dependent regions that can be active. (Use in conjunction with PST=.)

PIMAX specifies the maximum amount of dynamic storage available to the exclusive control of the ENQUEUE/DEQUEUE routine.

PRDR specifies the name of the IMSRDR procedure in IMS.PROCLIB or SYS1.PROCLIB, used in /START REGION commands.

PSBW specifies the PSB work pool. Initially set this to approximately the same size as CSAPSB=.

PST specifies the minimum number of dependent regions that are active and have control blocks prebuilt. (Use in conjunction with MAXPST=.)

SSM specifies a one- to four-character name for building the DB2 connection member name.

SUF specifies the one-character suffix for the control program name. This allows multiple copies of the IMS nucleus to reside on IMS.RESLIB. The DBCTL region suffix is specified in the IMSGEN SUFFIX keyword. For this example, the suffix is SUFFIX=0.

VSPEC specifies the two-character suffix of the DFSVSMxx member in IMS.PROCLIB. DFSVSMxx specifies VSAM buffer pool definitions and OLDS and WADS logging requirements.

WADS specifies whether single (S) or dual (D) logging is to be done on the write-ahead data set. For dual logging, set WADS=D.

WKAP specifies storage for the work area pool.

When tailoring the DBCTL system to suit your own environment, particularly for many of the work pools, define the pools to be larger than initially required and then trim them back as you gauge the performance and workload of your system.

See the section on DBC Procedure in the *IMS/ESA Installation Volume 2: System Definition and Tailoring*, SC26-8024 for more detailed information on DBCTL startup parameters.

A sample DFSPBxxx startup parameter list is shown in Figure 55. (The values specified are sufficient for an initial startup of a moderate testing system.)

```
AOIP=,
AOIS=,
ARC=01,
AUTO=Y,
BSIZ=,
CIOP=,
CRC=,
CSAPSB=12,
DBBF=,
DBFX=,
DBRCNM=IMSADBRC,
DBRSE=,
DBWP=048,
DLINM=IMSADLI,
DLIPSB=48,
DMB=048,
```

```
EPCB=12,
FIX=00,
FMTO=D,
FPWP=,
IMSID=IMSA,
IRLM=N,
IRLMNM=,
ISIS=0,
LGNR=,
MAXPST=,
OTHR=,
PIINCR=64,
PIMAX=1000,
PRDR=IMSRDR,
PREMSG=N,
PRLD=00,
PSBW=24,
PST=5,
RES=Y,
SPM=,
SRCH=0,
SSM=,
SUF=0,
TRACK=,
UHASH=,
USERVAR=,
VSPEC=00,
WADS=D,
WKAP=048
```

Figure 55 (Part 2 of 2). Sample DFSPBxxx Startup Parameter List

Define DBCTL Database Buffer Pools: DBCTL defines the database buffer pools for full-function databases in an IMS.PROCLIB member DFSVSMxx, where xx is a two-character suffix to the member name. The suffix is resolved from the VSPEC= DBCTL startup parameter.

You can take the DFSVSAMP definitions from your CICS environment and transfer them directly into the DFSVSMxx member of IMS.PROCLIB. However, many features are available with DBCTL buffer pool definitions that you may wish to take advantage of. You can also define OSAM database buffer pools in DFSVSMxx.

Define Logging Requirements: Use the OLDSDEF and WADSDEF control statements of DFSVSMxx to specify the log data sets and parameters to be established during DBCTL initialization. These control statements are mandatory. An example of a DFSVSMxx member is shown in Figure 56 on page 128.

```
VSRBF=4096,25
VSRBF=2048,25
VSRBF=1024,25
VSRBF=512,25
IOBF=(4096,25,Y,Y)
IOBF=(2048,25,Y,Y)
SBONLINE,MAXSB=10
OPTIONS,BGWRT=YES,INSERT=SKP,DUMP=YES,DUMPIO=YES
OPTIONS,VSAMFIX=(BFR,IOB),VSAMPLS=LOCL
OLDSDEF OLDS=(00,01,02,03,04),BUFNO=005,MODE=DUAL
WADSDEF WADS=(0,1)
```

Figure 56. Example DFSVSMxx Member

For detailed information on the DFSVSMxx member, see the section on specifying IMS PROCLIB members in the *IMS/ESA Installation Volume 2: System Definition and Tailoring*, SC26-8024.

ACBGEN for DBCTL: Perform an ACBGEN for the PSB and DBD resources defined to DBCTL.

Warning

An ACB generation needs to be performed for CICS with local DL/I. However, as it is very likely that you are changing IMS releases with this installation, it is imperative that you do ***not*** use the ACBs from an earlier release of IMS (don't use the CICS ACBLIB), and that you perform a new ACBGEN for your applications.

The ACB generation should be done to the IMS.ACBLIB staging ACB library and not to the ACBLIBA or ACBLIBB data sets. Once the ACB generation is completed, you can use the online change utility to copy the IMS.ACBLIB staging library to the DBCTL online ACBLIB A or B.

DBCTL JCL: Update system procedure libraries, for example, SYS1.PROCLIB, with the startup procedures for DBCTL, DLISAS, DBRC, and the IRLM (if you are using it). These startup procedures are in the IMS.PROCLIB library.

12.4.5.3 Modifying the CICS System

There are only a few changes to be made to CICS.

- Remove all entries for CICS local DL/I support from the CICS setup.
- Specify DLI=NO in the CICS SIT.
- Remove the DDIR and PDIR.
- Include an entry for DFHDBCON in the PLT.
- Include the CICS-supplied group DFHDBCTL within the CICS definition.
- Include a CDBC entry in the destination control table (DCT) for the CDBC transient data queue.
- Include the IMS.RESLIB in the CICS STEPLIB concatenation.

CICS Autoconnect to DBCTL: If you wish to start the DBCTL interface automatically at CICS startup, you must use the SIT INITPARM parameter. Use INITPARM=DFHDBCON='xx,yyyy' to specify the suffix of the DRA (xx) and the DBCTLid (yyyy) that you wish to connect to.

See the section on connecting DBCTL to CICS automatically in the *CICS/ESA CICS-IMS Database Control Guide*, SC33-1184.

DBCTL MVS Performance Groups: Set up MVS dispatching priority and performance groups for DBCTL so that the DBCTL address spaces are slightly behind those of the CICS address space.

Chapter 13. The IMS/ESA Year 2000 Local DL/I Product

IMS must continue to operate correctly while making the transition into the Year 2000 and for years beyond. In addition, IMS customers must be able to test their own IMS application code for use in the 21st century, and they cannot do that without an IMS system that supports 21st century dates.

13.1 Overview

The IMS/ESA Year 2000 Local DL/I product can be used as an IMS/ESA version to support Local DL/I for the macro-level CICS user with Year 2000 toleration support built in, or it can be used solely as a migration aid to upgrade a Version 1, 2, or 3 system to a level that can subsequently be further upgraded to Version 5 or 6 with a supported migration path.

This product contains all of the function offered in IMS/ESA IMS/ESA Version 4 but none of the functional enhancements added in IMS/ESA Version 5 or IMS/ESA Version 6 except Year 2000 toleration. It also contains all of the maintenance improvements which have been applied to IMS/ESA Version 4 through most of 1997. This includes the maintenance required to coexist with a RECON data set which has been upgraded to the IMS/ESA Version 5 or IMS/ESA Version 6 level. It should be noted that this is a full release of IMS and not just a maintenance upgrade to an existing version or release. It is offered as a programming request for price quotation (an IBM custom-built program product) or PRPQ to a specific subset of IMS customers.

As the name IMS/ESA Year 2000 Local DL/I Product indicates, this product provides a Year-2000-ready release of IMS which will support CICS local DL/I database access. This is release is designed for the CICS customer who cannot fully convert to the DBCTL interface to IMS in the time remaining before the end of the year 1999.

This is the third version of IMS/ESA which is Year 2000 ready, in addition to IMS/ESA Versions 5 and 6. Any IMS customer currently on Version 1, 2, 3, or 4 must install one of these Year-2000-ready releases before the end of 1999, or lose the ability to process subsequent transactions under IMS.

13.2 Summary of the Functional Characteristics

Before discussing the characteristics of the line item changes associated with this product, the term *encoded year* should be explained since it is an important element in this product's Year-2000-ready solution.

The encoding of values is a method of making use of all of the bit configurations in a field (previously constrained by conformance to packed decimal designations), to achieve a larger range of values. In the case of the packed decimal two-digit year, only 100 of the potential 256 (X'FF') values in a byte are being used. By using the encoding scheme, 60 more values which are greater than 99 are used to denote the years from 2000 to 2059. Sixty of the values from X'A0' to X'F9' represent the years 2000 to 2059.

This is a complete IMS release at the same functional level as IMS/ESA Version 4 with the addition of Year 2000 toleration support, equivalent to that

contained in IMS/ESA Version 5. This includes the encoding of dates in the RECON and the replacing of date comparison operations in IMS code with a macro that performs a fixed windowing conversion of dates for comparison purposes. Also changes to the IMS/ESA Version 5 upgrade code are added to allow that IMS version to process encoded dates in the IMS/ESA Year 2000 Local DL/I level RECON data set. Since IMS/ESA Version 5 was shipped, further refinements have been supplied in Program Temporary Fixes (PTFs) applied to Year 2000 support code in IMS/ESA Version 5. These changes are incorporated into the code supplied with this product.

IMS DBRC encodes two-digit year values occurring after 1999 (for example ′00′ or ′01′) by adding X′A0′ to indicate the year so that they can be properly sequenced with pre-2000 dates (′98′, ′99′). For example the year 2011 would be represented by the value X′B1′. These encoded year values are stored in the RECON data set; but in messages and formatted RECON listings, these time stamps are decoded (′00′, ′01′) for display. Also the size and format of the time stamps are not changed by this offering.

This product uses a fixed-window solution usable only until the year 2059. This means that the breakpoint for interpreting the century associated with a two-digit year is fixed at the value of 60. It is expected that the period of use of this limited IMS/ESA offering will not span to the year 2060.

Note.

The support offered by this limited offering manages only the use of those dates that are internal to IMS system operation. The management of dates in the users′ database is left to the user since it could require modification of the application programs that access them.

13.3 Product Structure

The packaging of this product is similar to that of IMS/ESA Version 5 in that all features are under one product number. That product number is 5799-GBA at version/release/modification level of 110. The list of Function Modification Identifiers (FMIDs) associated with this offering is shown in Table 7.

Table 7. FMIDs Allocated for the Offering

Component	FMID	Release Level	Comments
Services	HMK4990	990	Contains Services, IVP, DBRC and Logger features
Database Manager	JMK4991	991	Contains DB and Surveyor features
Transaction Manager	JMK4992	992	Contains TM and APPC features
ETO	JMK4993	993	Contains ETO feature

The date of general availability for this product is March 27, 1998.

13.4 Functional Characteristics Detail

The following sections contain descriptions of the functional extensions for the components targeted by this offering

13.4.1 DBRC

When processing RECON records, this release of DBRC correctly handles internal time stamps for years between 1960 and 2059, without requiring conversion of existing records. Time stamps produced after December 31, 1999 have the two-digit year encoded for all DBRC processing purposes, so that they can be correctly collated with late 20th century dates. For example 1:24:33 AM of January 1, 2001, which would be received as input from IMS in the format X′01001F0124330F′, is encoded as X′A1001F0124330F′.

Time stamps through 1999 are unchanged. In the RECON dataset, all time stamps for Year 2000 and later dates, whether generated within DBRC or received from IMS or user input, contain encoded two-digit year fields. Encoded time stamps are decoded for display or printing or RECON listings; for example, the Year 2001, which is encoded as X′A1′ in the IMS/ESA Year 2000 Local DL/I product RECON data set is displayed as “01” in the LIST.RECON output.

13.4.2 IMS

IMS processing is affected in several ways to maintain integrity of time stamps over and beyond the transition to the year 2000:

- Edit masks used to unpack dates have been modified to assure that the leading zeros in the first ten years of the new century are displayed.
- Time stamp comparison operations are performed with a macro which assures that the years 00 to 59 are greater than the years 60 to 99.
- Century numbers from the MVS TIME macro are suppressed to avoid inconsistencies in their usage which have been corrected in other Year-2000-ready versions of IMS/ESA.

13.5 User Interactions

Here are the interactions that IMS users should be aware when operating at this offering level:

- Time stamps displayed in reports or messages with a two-digit year have the correct low-order digits regardless of the century; that is, the year 1998 is displayed as “98” and the year 2001 is displayed as “01.”
- When entering or coding IMS commands that contain time stamps, users specify the last two digits of the year as they have always done, for example “01” for 2001.
- Encoded time stamps will be seen only by those who have the requirement to read dumps of DBRC storage or RECON records containing time stamps.

13.6 Coexistence and Migration Characteristics

There is no conversion of user data required by the installation of this offering.

13.6.1 Coexistence Prior to the Year 2000

There are no changes in this release over the IMS/ESA Version 4 base which would affect coexistence with prior releases of IMS before the Year 2000.

13.6.2 Coexistence Subsequent to the Year 2000

After the beginning of the year 2000, coexistence for IMS Versions 1, 2, 3, and 4, of IMS with this or any other IMS Year-2000-ready release is not possible. RECON records produced by this release can not be processed by earlier releases. Those releases, if able to function at all, would produce records that could not be processed correctly by any Year-2000-ready version of IMS/ESA.

The IMS/ESA Year 2000 Local DL/I Product has the facility to migrate the RECON data set from earlier releases to its level. There are also coexistence PTFs from the earlier versions to allow sharing the upgraded RECON data set. Coexistence by earlier releases is of interest only until the end of 1999, at which time the earlier versions will cease to operate.

13.6.3 Migration Subsequent to the Year 2000

The upgrade utility for DBRC in the IMS/ESA Year 2000 DL/I Product is not modified to encode the time stamps because no time stamps between 00 and 77 can exist in the RECON data set created by earlier releases, and therefore there is no need for that function. DBRC was not available in any customer environment before 1978.

This product contains the functional coexistence capabilities that allow it to share access to the RECON data set with IMS Versions 5 and 6 after the RECON data set has been upgraded to the level of one of these versions. The upgrade facility that reformats records between Version 4 and 5 levels is not required to make changes in the time stamp format. The procedure which upgrades time stamps from Version 5 format to Version 6 format can be applied to the upgrading of Version 4 time stamps to Version 6 format. This applies to the RECON upgrade process as well as the coexistence record processing.

13.7 Compatible Software Products

The software products listed in Table 8 are the minimum software support levels to interface with this limited offering.

Table 8 (Page 1 of 2). Minimum Support Level

PRODUCT	LEVEL	Year 2000 Ready
MVS/SP	4.3	Special (With PTFs)
CICS	2.1.2	Special (With Accommodations)
CICS	4.1	Yes (With PTF)
VSAM/DFP	3.3	Special (With Accommodations)
ACF/VTAM	3.4.2	Yes
RACF	1.9.2	Special

Table 8 (Page 2 of 2). Minimum Support Level		
PRODUCT	**LEVEL**	**Year 2000 Ready**
IRLM	1.5	Yes
IRLM	2.1	Yes
Note: "Special" indicates that special maintenance will be supplied to make this item Year 2000 ready.		

Chapter 14. IMS-Related Software

When migrating your IMS system to a new release, it is important to identify and review all your IMS-related software products to determine what actions need to be taken to continue their support or replace their function. This should be done as part of your initial IMS migration upgrade planning to allow time to order, install, and customize new versions, releases, or products to meet your project deadlines.

This chapter assists you in this planning process.

14.1 IBM IMS-Related Products That Support IMS Version 5

Table 9 on page 138 shows the IBM IMS related products that support IMS Version 5. Each product is listed with the minimum version, release, and modification level required in order to provide support to IMS Version 5. Year 2000 support availability, whether as part of the base product or as provided by PTFs, is also indicated.

If your IMS system is running one of the products at the exact version, release, and modification level listed in Table 9 on page 138, refer to the “IMS Version 5 Action Required” column to determine if there is any action you must take in order to run your product with IMS Version 5. Year 2000 support availability, whether as part of the base product or as provided by PTFs, is also indicated.

If your IMS system is running an earlier version, release, or modification level of a product in Table 9 on page 138, you need to order and install a supported version, release, and modification level of the product.

If your IMS system is running an IBM IMS-related product that is not listed in Table 9 on page 138, refer to Table 11 on page 152 to identify the IBM-supported replacement product.

Table 9 (Page 1 of 2). IBM IMS Related Software Supporting IMS Version 5				
Product Number	**Product Name**	**IMS V5 Action Required**	**IMS V6 Support Available**	**Year 2000 Support Available**
5655-A14	IMS/ESA Batch Terminal Simulator Version 2	No	Yes	Yes, base
5655-A21	IMS/ESA ADF Tool Pak for MVS Version 1 Release 1	No	Yes	Yes, base
5655-A68	IMS/ESA Recovery Saver for MVS/ESA Version 1	No	Yes	Yes, base
5655-038	IMS/ESA Message Requeuer Version 2	Yes	No	Yes, base
5655-085	IMS Compression - Extended Version 1 Release 2	No	Yes	Yes, base
5655-109	IMS/ESA DEDB Fast Recovery Version 1	Yes	Yes	Yes, base
5655-136	IMS/ESA Message Requeuer Version 3	No	Yes	Yes, base
5665-348	IMSADF II Version 2 Release 2	No	Yes	Yes, with PTFs
5665-366	Screen Definition Facility II Version 1 R4	No	Yes	Yes, with PTFs
5668-948	IMS/VS Batch Terminal Simulator Version 1 Release 2	Yes	No	Yes, with PTFs
5685-093	IMS System Utilities/Data Base Tools Version 2 Release 3	No	Yes	Yes, base
	IMS System Utilities/Data Base Tools Version 2 Release 2		No	Yes, with PTFs
5696-705	DataPropagator NonRelational MVS/ESA Version 2 Release 2	Yes	Yes	Yes, with PTFs
5697-A05	IMS/ESA Ad-Hoc Reporting Tool Version 1 Release 1	No	Yes	Yes, base
5697-A06	IMS/ESA Partition Support Product Version 1 Release 1	Yes	Yes	Yes, base
5697-B87	IMS/ESA Workload Router Version 2	No	Yes	Yes, base
5697-B89	IMS Performance Analyzer Version 1 Release 1	No	Yes	Yes, base
5697-C33	IMS/ESA Index Builder for MVS Version 1	No	Yes	Yes, base
5697-073	Database Integrity Control Facility Version 5	No	No	No (*)
5697-074	IMS/ESA Workload Router Version 1 Release 1	No	No	Yes, base
5740-XXF	OS/VS Data Dictionary Version 1 R6	No	Yes	Yes, base
5798-CHJ	IMS Monitor Summary and System Analysis (IMSASAP) II Version 1 Release 1 M7	No	Yes	Yes, with PTFs

Table 9 (Page 2 of 2). IBM IMS Related Software Supporting IMS Version 5

Product Number	Product Name	IMS V5 Action Required	IMS V6 Support Available	Year 2000 Support Available
5798-CQP	IMS Performance Analysis and Reporting System (IMSPARS) Version 1 Release 1 M9	Yes	Yes	Yes, with PTFs

Note: "Yes, base" indicates support is in the product as released.
(*) DBICF Version 5 supports IMS Version 5, DBICF Version 6 supports IMS Version 6 and Year 2000.

14.1.1 IMS/ESA Batch Terminal Simulator Version 2

IMS/ESA Batch Terminal Simulator (BTS) Version 2 aids in the testing and debugging of applications (using IMS databases or DB2 databases) in a TSO or batch environment. In addition to the original 3270 terminal input capability, IMS/ESA BTS Version 2 has added support for LU6.2/APPC input, MQSeries call tracing, and ETO status codes.

IMS/ESA BTS Version 2 is the first level of BTS to support more than one IMS version in a single BTS load library. Once installed, BTS Version 2 supports IMS Version 4, Version 5, and Version 6 concurrently. Therefore, if you have already installed BTS Version 2 to run with an IMS Version 4 system, you do not need to take any action to obtain IMS Version 5 support.

IMS/ESA BTS Version 2 is recommended rather than IMS/VS BTS Version 1 for the following reasons:

- Includes IMS Version 5 support packaged in the base product.
- Includes Year 2000 support packaged in the base product.
- Provides multiple IMS version support in a single load library.
- Provides new function and positioning for future upgrades (IMS/ESA Version 6 support already included).
- Installation time and effort for IMS/ESA BTS Version 2 is roughly equivalent to the effort and time required to upgrade, reassemble, and relink IMS/VS BTS Version 1 Release 2 for IMS Version 5 support.

14.1.2 IMS/ESA ADF Tool Pak for MVS Version 1 Release 1

IMS/ESA ADF Tool Pak for MVS Version 1 Release 1 is a collection of utilities that are used primarily to identify and regenerate IMSADF applications function after the year 2000. The Tool Pak is not sensitive to the IMS system software level, so there are no actions required to support IMS Version 5. Year 2000 support is already included in the base code.

14.1.3 IMS/ESA Recovery Saver for MVS/ESA Version 1

IMS/ESA Recovery Saver for MVS/ESA (IMS RS) allows IMS databases to be recovered to any date/time stamp whether specified by the user or system-determined. IMS RS utilizes a copy of the IMS RECON data sets and existing IMS logs to create new IMS logs with valid time/date stamp recovery points and update the RECON data set copy with the new valid time/date stamp

recovery information. DBRC can then be used, along with the database recovery utilities of choice, to perform all subsequent database recoveries.

IMS RS also includes a utility that provides efficient, single-step backup and restore functions for RECON data sets, even those with records that exceed 32,760 bytes in size. This utility works in conjunction with the DBRC BACKUP.RECON command.

This product is probably not included in your IMS Version 5 migration effort, since IMS RS does not support an IMS system prior to IMS Version 5. IMS RS should be included during an IMS Version 5 migration only if you are replacing similar functionality (IMS database recovery to any date/time stamp) that exists in your current IMS system.

14.1.4 IMS/ESA Message Requeuer Version 2

IMS/ESA Message Requeuer (MRQ) Version 2 provides customers with the means to select messages from the IMS online log (OLDS) or system log (SLDS) data sets and requeue them to the IMS message queues. It supports IMS Version 3, IMS Version 4, and IMS Version 5.

A newer product, IMS/ESA Message Requeuer (MRQ) Version 3, adds support for IMS Version 6 Shared Message Queues (SMQ) and user exit points in addition to enhanced message selection and reporting. It supports IMS Versions 4, 5, and 6.

If you are currently running IMS Version 3 and you plan to use MRQ in your migration from IMS Version 3 to IMS Version 5 to requeue your Version 3 IMS messages into IMS Version 5, then you must use IMS/ESA Message Requeuer Version 2. If you are not planning to use MRQ function to requeue your messages as part of your IMS migration effort, then we recommend you install IMS/ESA Message Requeuer Version 3.

You should be aware that IBM has announced an end to support for IMS/ESA Message Requeuer Version 2 as of March 1, 1999. Plan to upgrade to IMS/ESA Message Requeuer Version 3 in order to maintain MRQ function support.

If IMS/ESA Message Requeuer Version 2 has already been installed to support IMS Version 3 or 4, maintenance is required to support IMS Version 5. The maintenance adds new load modules to the message requeuer (MRQ) load library which allows you to run MRQ with IMS Versions 3, 4, and 5 concurrently, from a single load library.

The IMS/ESA Message Requeuer Version 2 maintenance requirements for IMS Version 5 support are these:

- PN61530/UN66756 — Initial IMS Version 5 support
- PN65137/UN70556 — IMS Version 5 support for changed log records
- PN65821/UN78418 — Increase time stamp granularity to allow messages to be requeued properly between IMS Version 4 and Version 5. This maintenance also requires these:
  - IMS Version 5 requires IMS Version 5 maintenance PN65138/UN76280 and UN76281
  - IMS Version 4 requires IMS Version 4 maintenance PN67930/UN77470 and PN68552/UN77471

- PN70804/UN78452 — Add support for IMS Version 5 Open Transaction Manager Access (OTMA) messages. This is not actually required for your upgrade; however, future MRQ maintenance may demand this fix as a prerequisite.
- PN79212/UN86622 — Link-edit completion of APAR PN61530.

The VSAM data set that MRQ uses to store intermediate messages also requires a larger RECSZ for IMS Version 5 than for previous releases. If MRQ was initially installed for pre-IMS Version 5 use, you should review all existing MRQ procedures and increase the MRQ intermediate message data set VSAM maximum RECSZ by 4 bytes. This can be done prior to the actual IMS Version 5 migration since the larger size also works with IMS systems prior to Version 5.

The MRQ PSP bucket should also be reviewed for additional information and updates for IMS Version 5 support.

14.1.5 IMS Compression Extended Version 1 Release 2

IMS Compression, Extended Version 1 Release 2 creates IMS database segment compression routines that use MVS hardware data compression for IMS DL/I databases running under IMS Versions 3, 4, and 5, and also for IMS Fast Path DEDB databases running under IMS Versions 4 and 5. Any IMS database segment edit or compression routines (or exits) that have been created under releases of IMS prior to IMS Version 5 continue to function as designed without any new actions under IMS Version 5.

Support for the previous release, IMS Compression Extended Version 1 Release 1, ceased on March 31, 1996. (This level required maintenance to support IMS Version 5 and also to support the DFSMS binder.)

If you are still running Version 1 Release 1, upgrade to IMS Compress Extended Version 1 Release 2, which is upward compatible for all exits created under IMS Compression Extended Version 1 Release 1.

14.1.6 IMS/ESA DEDB Fast Recovery Version 1

IMS/ESA DEDB Fast Recovery Version 1 is a batch program that provides a fast alternative for IMS Emergency Restart (ERE) failure recovery and other situations where DEDBs must be recovered.

IMS/ESA DEDB Fast Recovery Version 1 supports IMS Versions 4, 5, and 6, although there is a different feature for each. If you are running DEDB Fast Recovery with IMS Version 3 (for which support ceased on April 24, 1996), or with IMS Version 4, you need to order IMS/ESA DEDB Fast Recovery Version 1 specifying an IMS Version 5 feature, and install the product with the new feature.

14.1.7 IMS/ESA Message Requeuer Version 3

IMS/ESA Message Requeuer Version 3 provides customers with the means to select messages from the IMS online log data set (OLDS), system log data set (SLDS), and IMS Shared Message Queues (SMQ) and requeue them for processing. Enhanced message selection, reporting, and user exit points are among the other enhancements added in Version 3.

IMS/ESA Message Requeuer Version 3 supports IMS Versions 4, 5, and 6 concurrently from a single load library and the base product is Year 2000 ready.

14.1.8 IMSADF II Version 2 Release 2

IMSADF II Version 2 Release 2 is an application-generation product that also provides an umbrella system in an IMS execution environment. If you are migrating your IMS system from IMS Version 3 or 4, IMSADF II application programs already generated continue to run under IMS Version 5. If you are migrating your IMS system from a version or release of IMS prior to IMS Version 3, you need IMSADF II maintenance.

IMSADF II APAR PL64619/PTF UL79449 adds support for the new IMS DBPCB structure introduced in IMS Version 3. Although documentation in the APAR refers only to IMS Fast Path databases, the fix is also required for IMS DL/I databases. The maintenance is downward compatible since it checks the DBPCB to determine which version of IMS is running to determine where to find information in the IMS DBPCB control block. The maintenance can, therefore, be installed on the current system prior to the actual IMS Version 5 migration.

At the time this document was written, there were no plans to add new capabilities to IMSADF II Version 2 Release 2 to utilize or generate application code to employ new IMS Version 5 functionality. New application programs and changes to existing programs can continue to be coded using existing IMSADF II functionality.

Although no specific IMSADF II maintenance is needed to support IMS Version 5, IMSADF II does require maintenance to support the DFSMS binder that replaces the data facility product (DFP) linkage editor. If you are migrating your MVS system to DFSMS or upgrading DFSMS, you need to check the IMSADF II PSP bucket for up-to-date DFSMS binder compatibility IMSADF II maintenance requirements. This maintenance is ***not*** downward compatible; once it is installed, IMSADF II Rulegens can be run only on an MVS system that uses the DFSMS binder. (This occurs because the rulegen module calls the linkage editor or binder and passes appropriate parameters for the IMSADF module that is generated.)

The IMSADF II PSP bucket also contains information on maintenance requirements for the MVS high-level assembler and LE/370 environments.

Previous versions and releases of IMSADF are unsupported, although application programs that have already been generated may continue to run under IMS Version 5 until the year 2000. However, application program rulegens may not be possible, depending on the DFSMS binder compatibility support that was available at the time that support was discontinued:

- Support for IMSADF II Version 2 Release 1 was discontinued on September 15, 1987.
- Support for IMSADF II Version 1 was discontinued on November 28, 1997.
- Support for IMSADF was discontinued on January 31, 1984.

Year 2000 support is ***not*** provided for any IMSADF version/release prior to IMSADF II Version 2 R2. Year 2000 support for IMSADF II Version 2 Release 2 systems requires maintenance as follows:

- PL34006/UL41177 & UL41181 — Initial 4-digit date support
- PL39153/UL47463 — Follow-up 4-digit date support
- PL39533/UL48882 — Follow-up 4-digit date support

- PL46375/UL67257 — Follow-up 4-digit date support
- PN42764/UN53405 — Correction of link-edit attributes
- PN88540/UN97256 — Follow-up 4-digit date support

The above maintenance provides only IMSADF II systems support for the Year 2000. It does not provide IMSADF II application Year 2000 compliance. Each IMSADF II application still needs to be researched for dependencies and changed if required. The separate product, IMS/ESA ADF Tool Pak for MVS Version 1 Release 1, could be used to identify and regenerate IMSADF II application programs to tolerate the year 2000.

14.1.9 Screen Definition Facility II Version 1 R4

SDF II Version 1 R4 is a product that can be used to generate IMS MFS screen macro definitions that can then be input to the IMS/ESA MFS utility. SDF is not sensitive to the IMS system software level, so no actions are required to support IMS Version 5.

Year 2000 support is available through the maintenance process. APAR PN90598/PTF UN99689 adds Year 2000 support to SDF II Version 1 R4.

14.1.10 IMS/VS Batch Terminal Simulator Version 1 Release 2

IMS/VS BTS Version 1 Release 2 aids in the testing and debugging of applications (using IMS databases, DB2 databases, or both) in a TSO or batch environment.

All functions included in IMS/VS BTS Version 1 Release 2 are included in the newer IMS/ESA BTS Version 2 which also adds support for LU6.2/APPC input, MQSeries call tracing, and ETO status codes.

Both BTS products provide support for IMS Version 5. Installation and migration to IMS/ESA BTS Version 2 for IMS Version 5 support is recommended since it provides greater function and positioning for future upgrades and enhancements. (IBM has announced that IMS/VS BTS Version 1 Release 2 will not be marketed after June 30, 1998.)

If IMS/VS Batch Terminal Simulator Version 1 Release 2 has already been installed to support IMS Versions 3 or 4, action is required in order to support IMS Version 5. This can be accomplished in one of three ways:

1. The functionality of IMS/VS BTS Version 1 Release 2 can be replaced by ordering and installing IMS/ESA BTS Version 2. This approach provides one BTS loadlib that concurrently supports IMS Versions 4, 5, and 6 with Year 2000 support included in the base product. **This is the approach we recommend.**
2. IMS/VS BTS Version 1 Release 2 can be reordered at the current maintenance level and installed into new IMS/VS BTS Version 1 Release 2 datasets and SMP/E zones using the new IMS Version 5 macros during the install. The new BTS loadlib only supports IMS Version 5.
3. IMS/VS BTS Version 1 Release 2 maintenance to support IMS Version 5 must be installed and the entire product reassembled and relinked using IMS Version 5 macros. To accomplish this,
   a. Back up all IMS/VS BTS Version 1 Release 2 datasets and SMP/E zones and datasets.

b. Using SMP/E, apply and accept APAR PN61407/PTF UN66476 for IMS Version 5 support. (IMS/VS BTS Version 1 Release 2 Year 2000 maintenance support can also be SMP/E applied and accepted at this time.)

c. Change your BTS SMP/E JCL procedure or SMP/E DDDEF entries to point to IMS Version 5 macro data sets.

d. Member BTSJCLIN in dataset BTS.BTSJCL contains steps to assemble and link all BTS modules. Edit a copy of this member to use the real data set names of all BTS data sets and the new IMS Version 5 macro data set.

e. Run the edited job and verify that all job-step return codes are zero. When this job completes, the IMS/VS BTS Version 1 Release 2 loadlib supports only IMS Version 5; it will not support the previous IMS.

Since IMS/VS BTS Version 1 Release 2 simulates a terminal and relies on IMS to run transactions, Year 2000 compliance relies on the version of IMS. When IMS/VS BTS Version 1 Release 2 is installed with IMS Version 5, it tolerates the year 2000.

14.1.11 IMS System Utilities and Data Base Tools Version 2 Release 3

IMS System Utilities and Data Base Tools (DBT) Version 2 Release 3 is a collection of database utility products designed to assist in database design, installation, maintenance, performance, and tuning for both IMS full-function DL/I and Fast Path DEDB databases. DBT Version 2 Release 3 enhancements include support for IMS Version 6, Year 2000, OSAM 8-gigabyte databases, and Partition DB in addition to two new components (image copy extensions and fast prefix resolution). The ten separate components in DBT Version 2 Release 3 are:

- Space management utilities (SMU)
- High-speed sequential retrieval (HSSR)
- DBD/PSB/ACB library management utilities (LMU)
- VSAM zapper (VZAP)
- Sequential DAM optimizer (SDO)
- Fast reorganization reload (FRR)
- DEDB pointer checker (DEDBPC)
- DEDB tuning aid (DEDBTA)
- DEDB unload/reload (DEDBUR)
- Fast ACBGEN (FACB)
- Image copy extensions (ICE), new in DBT Version 2 Release 3
- Fast prefix resolution (FRR), new in DBT Version 2 Release 3

IMS System Utilities and Data Base Tools Version 2 Release 3 supports IMS Versions 4, 5, and 6 from a single load library, so no action to obtain support for IMS Version 5 is required if you have already installed DBT Version 2 Release 3 to run with IMS Version 4. Year 2000 support is also included in the base code of DBT Version 2 R3.

The only action that may be required is for the image copy extensions (ICE) feature. If ICE was originally installed in the IMS Version 4 SMP/E zones, it needs to be reinstalled into the IMS Version 5 SMP/E zones.

If you are running IMS System Utilities and Data Base Tools Version 2 Release 1, IMS System Utilities/Data Base Tools Version 1, or a predecessor product, you

need to order and install DBT Version 2 Release 3 to support IMS Version 5. (DBT Version 2 Release 2 new licenses are no longer available.)

14.1.12 IMS System Utilities and Data Base Tools Version 2 Release 2

IMS System Utilities/Data Base Tools (DBT) Version 2 Release 2 is a collection of database utility products that are designed to assist in database design, installation, maintenance, performance, and tuning for both IMS full-function DL/I and Fast Path DEDB databases. DBT Version 2 Release 2 was the first level of DBT to support multiple levels of IMS from a single load library and the first to include the Fast ACBGEN component.

DBT Version 2 Release 2 was originally shipped with support for IMS Versions 3 and 4. Support for IMS Version 5 and Year 2000 must be added through the maintenance process.

Although DBT Version 2 Release 2 can be upgraded to support IMS Version 5 and the Year 2000, you should consider installing DBT Version 2 Release 3 which provides the same support in the base code along with support for IMS V6. IBM has already discontinued sales of DBT Version 2 Release 2 (as of March 14, 1997 when DBT Version 2 Release 3 became available) and announced that DBT Version 2 Release 2 does ***not*** support IMS Version 6.

If you elect to upgrade your current DBT Version 2 Release 2 software to support IMS V5, you need to install APAR PN61005. There are multiple PTFs for this APAR, one for each DBT feature that requires maintenance. All DBT Version 2 Release 2 customers must install both the base PTF and the appropriate PTF for each feature that is running:

- UN66708 - HDBL200 - Base
- UN66709 - JDBL201 - SMU
- UN66710 - JDBL202 - HSSR
- UN66711 - JDBL203 - LMU
- UN66712 - JDBL206 - FRR
- UN66713 - JDBL207 - DEDBPC
- UN66714 - JDBL208 - DEDBTA
- UN66715 - JDBL209 - DEDBUR
- UN66716 - JDBL210 - FACB

Maintenance must also be installed to obtain Year 2000 support and is structured like the IMS Version 5 support maintenance. One APAR, PN67299, has an associated PTF for each DBT feature. All DBT Version 2 Release 2 customers must install the base PTF and the appropriate PTF for each feature that is running:

- UN73341 - HDBL200 - Base
- UN73342 - JDBL201 - SMU
- UN73343 - JDBL202 - HSSR
- UN73344 - JDBL203 - LMU
- UN73345 - JDBL204 - VZAP
- UN73346 - JDBL205 - SDO

- UN73347 - JDBL206 - FRR
- UN73348 - JDBL207 - DEDBPC
- UN73349 - JDBL208 - DEDBTA
- UN73350 - JDBL209 - DEDBUR

The DBT Version 2 Release 2 PSP bucket also contains information on maintenance requirements for the MVS high-level assembler and DFSMS.

14.1.13 DataPropagator NonRelational MVS/ESA Version 2 Release 2

DataPropagator NonRelational MVS/ESA (DPROPNR) Version 2 Release 2 maintains data consistency between IMS databases and DB2 tables by capturing IMS database updates and propagating the incremental changes to DB2. This can be done in asynchronous mode by writing the changes to the IMS log and post-processing the log to update DB2 at a later time or in synchronous mode by completing the DB2 updates within the same unit of work as the IMS updates.

If you have already installed DPROPNR Version 2 Release 2 to support IMS Version 4, you need to install APAR PQ02414/PTF UQ02696 for IMS Version 5 support. You should also make sure that the IMS database exits supplied by DPROPNR are migrated from the IMS Version 4 system to the IMS Version 5 system RESLIB.

If you are currently running DataPropagator NonRelational MVS/ESA Version 2 Release 1 with your IMS Version 3 or IMS Version 4 system, you should be aware that support for DPROPNR Version 1 Release 1 ends on April 24, 1998. In order to obtain IMS Version 5 support, you must either install DPROPNR Version 2 Release 2 or add maintenance to DPROPNR Version 2 Release 1. The recommended approach is to install DPROPNR Version 2 R2, since it provides both IMS Version 5 support and Year 2000 support. DPROPNR Version 2 Release 1 does ***not*** support the Year 2000.

If you elect to upgrade your DPROPNR Version 2 Release 1 system, you need to install the following maintenance:

- PN74467/UN84271,UN84272,UN84273
- PN75866/UN82223
- PQ02414/UQ02695

14.1.14 IMS/ESA Ad-Hoc Reporting Tool Version 1 Release 1

IMS/ESA Ad-Hoc Reporting Tool (ART) Version 1 Release 2 is a quick and easy query, report, and update tool for IMS databases; it runs scripts that you write to perform the queries or updates and format the reports. ART is not sensitive to the level of IMS software, so no action is required for IMS Version 5 support. Year 2000 support is included in the base code for the IMS ART.

14.1.15 IMS/ESA Partition Support Product Version 1 Release 1

IMS/ESA Partition Support Product Version 1 Release 1 extends the data storage capacity of existing HDAM and HIDAM databases to 128 gigabytes. It supports IMS Versions 4, 5, and 6, and tolerates the year 2000. The IMS support is enabled through the installation of an SMP/E USERMOD to the IMS software.

If you have already installed Partitioned DB for IMS Version 4, you need to install the Partitioned DB IMS Version 5 USERMOD into your new IMS Version 5 SMP/E zones. Refer to the Partitioned DB PSP bucket for additional information on the IMS SMP/E prerequisites that are included in the shipped IMS SMP/E USERMODs.

14.1.16 IMS/ESA Workload Router Version 2

IMS/ESA Workload Router (WLR) Version 2 is a product that can be used to balance IMS transaction workloads among multiple IMS online systems that are connected to each other using IMS Multiple System Coupling (MSC) links. WLR Version 2 supports IMS Versions 5 and 6, and tolerates the year 2000.

This product is probably not included in your IMS Version 5 migration effort since both WLR Version 2 and its predecessor, WLR Version 1 Release 1, have never supported an IMS system prior to IMS Version 5. WLR Version 2 should be included during an IMS Version 5 migration only if you are replacing similar functionality (IMS transaction workload routing or balancing) that exists in your current IMS system.

14.1.17 IMS Performance Analyzer Version 1 Release 1

IMS Performance Analyzer (IMS PA) Version 1 Release 1 is a functional replacement for both IMSPARS and IMSASAP providing revised, enhanced, and new reports to analyze your system performance. It adds ease of use with a new ISPF interface to build, maintain, and submit report requests and allows optional use of GDDM for selected graphical reports.

IMS PA supports multiple releases of IMS (Versions 4, 5, and 6) from a single loadlib, and does not require GPAR as a prerequisite product. It is recommended for replacement of IMSPARS and IMSASAP products when you are migrating to IMS Version 5 because it provides greater function than its two predecessor products and will be less effort to install than upgrading or installing higher releases of two products.

14.1.18 IMS/ESA Index Builder for MVS Version 1

IMS/ESA Index Builder for MVS Version 1 (IMS IB) is a product that can be used to build IMS database secondary indices and HIDAM primary indices. IMS IB speeds the IMS database reorganization process by reading the work file (DFSURWF1) created by the base database reload, executing a parallel sort of all index records on the file, and concurrently reloading all secondary indices. This eliminates the need for a serial HISAM unload and HISAM reload of each secondary index. IMS IB can also scan an IMS base database to create secondary indices thus eliminating the need to run IMS Image copies for secondary indices. Finally IMS IB can also build an IMS HIDAM primary index using the HIDAM base and the first record of the HIDAM primary index.

IMS IB supports IMS Version 4 and above and the base code is Year 2000 ready.

14.1.19 IMS/ESA Workload Router Version 1 Release 1

IMS/ESA Workload Router (WLR) Version 1 Release 1 is a product that can be used to distribute an IMS transaction workload among two or more IMS online systems interconnected through MSC communications links. WLR Version 1 Release 1 supports IMS Version 5 only; it had no predecessor product, does not support IMS V6, and can no longer be ordered (marketing ceased September 17, 1997).

Since WLR Version 1 Release 1 was introduced at the IMS Version 5 level, this product is probably not involved in your migration effort. If, however, you are searching for a product to replace similar functionality (IMS transaction workload routing or balancing), you should order IMS/ESA Workload Router Version 2 (5697-B87) which is already available with support for IMS Versions 5 and 6.

14.1.20 Data Base Integrity Control Facility Version 5

Data Base Integrity Control Facility (DBICF) Version 5 allows the use of DBRC under TSO/ISPF, providing both TSO/ISPF and batch facilities to generate jobs and reports under IMS Version 5 only. (DBICF Version 4 supports IMS Version 4, DBICF Version 5 supports IMS Version 5, and DBICF Version 6 supports IMS Version 6.)

If you are running a previous version of DBICF, you need to order and install DBICF Version 5 to run with IMS Version 5. You should be aware that IBM has announced that DBICF Version 5 will not be marketed after June 30, 1998 and plan to order before that date if you need DBICF Version 5.

14.1.21 OS/VS DB/DC Data Dictionary Version 1 Release 6

OS/VS DB/DC Data Dictionary Version 1 Release 6 is an application product that stores data definitions, descriptions and relationships of data in an IMS database and that processes and reports on the data. IMS batch, IMS online, CICS online, and ISPF programs and dialogs are provided to store, change, print, punch, and report on the data (typically, IMS database, program, and system code and macros).

Since this is an application product, it is not sensitive to the IMS system software level nor the century date. If you have OS/VS DB/DC Data Dictionary Version 1 R6 installed and running, it continues to work with IMS Version 5.

If you are running with the CICS online feature and are upgrading your CICS system to a level higher than CICS Version 1.1.7, you need to install APAR PL68850/PTFs UL84858, UL84859, UL90449 for CICS command level program support.

14.1.22 IMS Monitor Summary and System Analysis II Version 1 Release 1 M7

IMS Monitor Summary and System Analysis (IMSASAP) II Version 1 Release 1 M7 is a batch reporting program that processes IMS (batch or online) monitor data and provides summary, system analysis, and program analysis reports that assist in the analysis of an IMS environment.

If you have already installed IMSASAP II Version 1 Release 1 M7 to run with a previous level of IMS, no action is required for IMS Version 5 support. In order to obtain Year 2000 support, however, you need to install maintenance APAR PN83862/PTF UN90558.

Reports available under IMSASAP (and IMSPARS) have been included and enhanced in the new IMS Performance Analyzer (IMS PA) product (product number 5697-B89) along with a new ISPF interface for ease of use. IMS PA is recommended rather than IMSASAP because it has Year 2000 support in the base product, is easier to use, and does not rely on GPAR as a prerequisite base product.

If you are running IMSASAP II Version 1 Release 1 M6 (for which support was discontinued on June 30, 1995) or a previous modification level of IMSASAP II, you need to order and install either IMS PA (the recommended product) or IMSASAP II Version 1 Release 1 M7.

IMSASAP II runs under the System for Generalized Performance Analysis Reporting (GPAR). Although support for GPAR was discontinued on August 17, 1987, the product can still be ordered and installed for use by IMSASAP II and IMSPARS. If any APARs reported for either IMSASAP II or IMSPARS are determined to have occurred in GPAR code, the GPAR code will be corrected.

14.1.23 IMS Performance Analysis and Reporting System V1.1.9

IMS Performance Analysis and Reporting System (IMSPARS) Version 1 Release 1 Modification Level 9 is a batch reporting program that processes IMS logs (SLDS or OLDS) and provides a variety of operational, performance, and analysis reports at both a summary and detailed level that can be used to evaluate, tune, and assist in problem resolution.

If IMSPARS Version 1 Release 1 M9 has been installed to support a pre-IMS Version 5 version or release, action is required in order to support IMS Version 5. Maintenance needs to be installed and the entire product must be reassembled and relinked using IMS Version 5 macros.

Reports available under IMSPARS (and IMSASAP) have been included and enhanced in the new IMS Performance Analyzer (IMS PA, product number 5697-B89) along with a new ISPF interface for ease of use. IMS PA is recommended rather than IMSPARS because it has Year 2000 support in the base product, is easier to use, does not rely on GPAR as a prerequisite base product, includes multiple IMS concurrent support in a single loadlib, and requires equivalent installation effort to that required to upgrade and reassemble and relink the IMSPARS product.

The steps required to upgrade, reassemble, and relink IMSPARS with IMS Version 5 macros are as follows:

1. Back up all IMSPARS Version 1 Release 1 M9 data sets and SMP/E zones and data sets.
2. Using SMP/E, apply and accept the following maintenance items:
   - PN71789/UN79004 - IMS Version 5 ETO fix and fix for incorrect IMSPARS version in report headings
   - PN72167/UN79006 - Support for changed IMS Version 5 X'38' log records
   - PN89895/UN97122 - Support for increased maximum regions in IMS Version 5
3. Change your IMSPARS SMP/E JCL procedure or SMP/E DDDEF entries to point to IMS Version 5 macro data sets.

4. Member BPRALOC in data set IMSPARS.SBPRSAMP contains a job which includes allocation of an object module dataset. (You need this data set only during this process - SMP/E does not know about this data set.) Edit a copy of this member and run the edited job to create a new object module data set.
5. Member BPRASM in data set IMSPARS.SBPRSAMP contains steps to assemble all IMSPARS modules. Edit a copy of this member to use the real data set names of all IMSPARS data sets, GPAR data sets, the new object module data set, and new IMS Version 5 macro data set.
6. Run the edited job and verify that all job-step return codes are zeros. When this job completes, the new object module data set can only be used to link-edit modules for IMS Version 5; it will no longer support the previous IMS.
7. Member BPRLKED in data set IMSPARS.SBPRSAMP contains a link-edit job to relink all IMSPARS modules. Edit a copy of this member to use the real data set names of all IMSPARS data sets, and ensure the link-edit include member used is BPRINCL in dataset IMSPARS.SBPRSAMP which contains link-edit control cards for all IMSPARS modules.
8. Run the edited job and verify that all job-step return codes are zeros. When this job completes, the IMSPARS.SBPRLLIB loadlib supports IMS Version 5 only; it will no longer support the previous IMS.

Maintenance is also required for Year 2000 compliance. You must install APAR PN83308/PTF UQ06220 in order for IMSPARS to use IMS Version 5 logs whose log records have time stamps that include a year greater than 1999.

If you are running IMSPARS Version 1 Release 1 M8 (for which support was discontinued on June 30, 1995) or a previous modification level of IMSPARS, you need to order and install IMSPARS Version 1 Release 1 M9.

IMSPARS runs under the System for Generalized Performance Analysis Reporting (GPAR). Although support for GPAR was discontinued on August 17, 1987, the product can still be ordered and installed for use by IMSPARS and IMSASAP II. If any APARs reported for either IMSPARS or IMSASAP II are determined to have occurred in GPAR code, the GPAR code will be corrected.

14.2 IBM IMS-Related Products PSP Buckets

Table 10 shows preventative service planning buckets (PSP Buckets) for a variety of IMS-related products.

Table 10 (Page 1 of 2). IBM IMS Related Software PSP Buckets

Product Number	Product Name	PSP Bucket Name
5655-A14	IMS/ESA Batch Terminal Simulator Version 2	BTS210 - all subsets
5655-A21	IMS/ESA ADF Tool Pak for MVS Version 1 Release 1	5655A21 - all subsets
5655-A68	IMS/ESA Recovery Saver for MVS/ESA Version 1	5655A68 - all subsets
5655-038	IMS/ESA Message Requeuer Version 2	MRQ310 - all subsets
5655-085	IMS Compression - Extended Version 1 Release 2	5655085 - HDC Version 1 Release 2
5655-109	IMS/ESA DEDB Fast Recovery Version 1	5655109 - all subsets
5655-136	IMS/ESA Message Requeuer Version 3	5655136 - all subsets
5665-348	IMSADF II Version 2 Release 2	IMSADF202 - all subsets
5665-366	Screen Definition Facility II Version 1 Release 4	SDFMVSII - HEF1140, JEF1141, and appropriate JEF114x language subset
5668-948	IMS/VS Batch Terminal Simulator Version 1 Release 2	BTS120 - HBS1200/9504 (most recent shipped base)
5685-093	IMS System Utilities/Data Base Tools Version 2 Release 3	5685093 - HDBL300 and appropriate xDBL3xx feature subsets
	IMS System Utilities/Data Base Tools Version 2 Release 2	5685093 - DBT Version 2 Release 2 (includes all Version 2 Release 2 features)
5696-705	DataPropagator Nonrelational MVS/ESA Version 2 Release 2	DPROP - HQW9220
5697-A05	IMS/ESA Ad-Hoc Reporting Tool Version 1 Release 1	5697A05 - all subsets
5697-A06	IMS/ESA Partition Support Product Version 1 Release 1	5697A06 - all subsets
5697-B87	IMS/ESA Workload Router Version 2	5697B87 - all subsets
5697-B89	IMS Performance Analyzer Version 1 Release 1	5697B89 - all subsets
5697-C33	IMS/ESA Index Builder for MVS Version 1	5697C33 - all subsets
5697-073	Database Integrity Control Facility (DBICF) Version 5	5697073 - all subsets
5697-074	IMS/ESA Workload Router Version 1 Release 1	5697074 - all subsets
5740-XXF	OS/VS DB/DC Data Dictionary Version 1 Release 6	DD160 - all subsets

Table 10 (Page 2 of 2). IBM IMS Related Software PSP Buckets		
Product Number	**Product Name**	**PSP Bucket Name**
5798-CHJ	IMSASAP II Version 1 Release 1 M7	ASAP117 - all subsets
5798-CQP	IMSPARS Version 1 Release 1 M9	PARS119 - all subsets

14.3 IBM IMS-Related Products No Longer Supported

Table 11 presents many of the IBM IMS-related products that are no longer supported for any IMS version, along with products for which 1997 end-of-support dates were announced. Replacement products, when available, are also listed to assist you in identifying new products that are functional replacements.

Table 11 (Page 1 of 4). IBM IMS Related Products That Are No Longer Supported			
Unsupported Product		**Replacement Product for IMS Version 5**	
Product Number	**Product Name**	**Product Number**	**Product Name**
5665-462	Query.DL/I	n/a	No replacement product (Note 1)
5668-856	IMS System Utilities/Data Base Tools Version 1 Release 1	5685-093	IMS System Utilities/Data Base Tools Version 2 Release 3
5668-937	IMSADF II Version 1 Release 1 (Note 2)	5665-348	IMSADF II Version 2 Release 2
5685-124	Data Propagator MVS/ESA Version 1 Release 1	5696-705	Data Propagator NonRelational MVS/ESA Version 2 Release 2
	Data Propagator MVS/ESA Version 1 Release 2		
5695-063	IMS Automation Option/MVS Version 1	5645-005	System Automation for OS/390 Version 1 Release 2 - IMS Automation feature (Note 3)
5740-DC2	DP Accounting for IMS/VS (DPA)	n/a	No replacement product
5740-XY8	Data Base Design Aid	n/a	No replacement product
5740-XYD	Automated Operator Facility Release 1	n/a	No replacement product (Note 4)
5785-CZG	IMS Application Productivity Package	n/a	No replacement product
5785-ECY	Query.DL/I for IMS/VS	n/a	No replacement product (Note 1)
5785-GAJ	IMS Queue Loader	5655-136	IMS/ESA Message Requeuer Version 3
5787-LAA	HSSR Version 1 Release 2	5685-093	IMS System Utilities/Data Base Tools Version 2 Release 3 - HSSR feature

Table 11 (Page 2 of 4). IBM IMS Related Products That Are No Longer Supported

Unsupported Product		Replacement Product for IMS Version 5	
Product Number	**Product Name**	**Product Number**	**Product Name**
5787-LAC	High Speed Sequential Retrieval (HSSR) Version 2	5685-093	IMS System Utilities/Data Base Tools Version 2 Release 3 - HSSR feature
5787-LAR	DBICF Version 4 (Note 5)	5697-073	Data Base Integrity Control Feature (DBICF) Version 5 (Note 5)
5796-AFC	3270 Screen Image Preprocessor-IMS and IMS/VS	n/a	No replacement product (Note 6)
5796-AHL	IMS 3270 Local Copy for Online Printing	n/a	No replacement product
5796-AHT	IMS Logtape Management System	n/a	No replacement product
5796-AJL	IMS HDAM Randomizer Algorithm	5685-093	IMS System Utilities/Data Base Tools Version 2 Release 3 - SDO feature
5796-ARB	IMS/VS Response Time Monitor	n/a	No replacement product
5796-ATN	IMS/VS Emergency Log Terminator	IMS/ESA Version 5 base code	No replacement product
5796-ATP	IMS/VS Message Requeuer Version 1 Release 2	5655-136	IMS/ESA Message Requeuer Version 3
5796-BCP	IMS - Online Monitor	n/a	No replacement product
5796-PBC	IMSMAP	5685-093	IMS System Utilities/Data Base Tools Version 2 Release 3 - LMU feature
5796-PBE	Test IMS Facilities	n/a	No replacement product
5796-PCA	DC Analyzer	n/a	No replacement product
5796-PCY	IMSMAP/VS	5685-093	IMS System Utilities/Data Base Tools Version 2 Release 3 - LMU feature
5796-PDA	Test IMS/VS Utilities	n/a	No replacement product
5796-PGT	Batch Terminal Simulator II (BTS)	5655-A14	IMS/ESA Batch Terminal Simulator (BTS) Version 2
5796-PHX	IMSADF	5665-348	IMSADF II Version 2 Release 2
5796-PJJ	Space Management Utilities II	5685-093	IMS System Utilities/Data Base Tools Version 2 Release 3 - SMU feature
5796-PJK	DB Prototype II	n/a	No replacement product

Table 11 (Page 3 of 4). IBM IMS Related Products That Are No Longer Supported

Unsupported Product		Replacement Product for IMS Version 5	
Product Number	**Product Name**	**Product Number**	**Product Name**
5796-PJQ	VSAMZAP	5685-093	IMS System Utilities/Data Base Tools Version 2 Release 3 - VZAP feature
5798-CLB	IMS History Reporting System	n/a	No replacement product
5798-CLK	IMS Master Terminal Operator Assist Facility	n/a	No replacement product
5798-CLZ	IMS/VS Local Copy II	n/a	No replacement product
5798-CNC	IMS/VS Virtual Storage Analysis (IMSVSAP)	n/a	No replacement product
5798-CNN	IMS Availability Reports	n/a	No replacement product
5798-CPR	System for Generalized Performance Analysis Reporting (GPAR) R2.1	n/a	No replacement product (Note 7)
5798-CRD	IMS/VS Outboard Formatter	n/a	No replacement product
5798-CTP	IMS Fast Scan Utility	5685-093	IMS System Utilities/Data Base Tools Version 2 Release 3 - HSSR feature
5798-CTZ	IMS/VS User Security	n/a	No replacement product
5798-CWF	Time Initiated Input Facility	5695-176	IMS/ESA Version 5 - Time Controlled Operations (TCO) function
5798-CXN	HDAM Sequential Randomizer Generator Extensions	5685-093	IMS System Utilities/Data Base Tools Version 2 Release 3 - SDO feature
5798-CXT	IMS Fast Reorganization Reload	5685-093	IMS System Utilities/Data Base Tools Version 2 Release 3 - FRR feature
5798-DCJ	IMS/VS Data Compression Facility	5655-085	IMS Compression - Extended Version 1 Release 2 (Note 8)
5798-DFN	IMS/VS Fast Scan Utility II	5685-093	IMS System Utilities/Data Base Tools Version 2 Release 3 - HSSR feature
5798-DML	CICS/IMS Data Collection for CPX	n/a	No replacement product
5798-DPR	IMS/VS Fast Reorganization Reload II	5685-093	IMS System Utilities/Data Base Tools Version 2 Release 3 - FRR feature
5798-FBD	IMS LU6.1 Adapter for LU6.2 Applications	5795-176	IMS/ESA Version 5 - APPC/IMS feature (Note 9)

Table 11 (Page 4 of 4). IBM IMS Related Products That Are No Longer Supported			
Unsupported Product		**Replacement Product for IMS Version 5**	
Product Number	**Product Name**	**Product Number**	**Product Name**
5799-CRY	IMS/VS Aid Program Package Version 3 Sequential DAM Optimizer	5685-093	IMS System Utilities/Data Base Tools Version 2 Release 3 - SDO feature (Note 10)

Notes:

1. Query.DL/I and Query.DL/I for IMS/VS have no official replacement products. However, IMS/ESA Ad-Hoc Reporting Tool can provide a similar function. ART is not considered an official replacement product since there is no migration; new ART scripts would have to be coded.
2. Support for IMSADF II Version 1 Release 1 ended November 28, 1997.
3. System Automation for OS/390 Version 1 Release 2 includes the functionality of its predecessor product, Automation Operations Control/MVS, which was the original replacement for IMS Automation Option/MVS. AOC/MVS Version 1 can no longer be ordered (as of December 31, 1996), and support ends April 24, 1998. AOC/MVS Version 1 R4 supports IMS Version 5 with maintenance, but is no longer identified as a replacement product since the end of its support has been announced.
4. Although there is no official replacement product for Automated Operator Facility, much of the function can be replaced by writing scripts under the System Automation for OS/390 - IMS Automation feature. Alternatively, if you still have the source code for AOF, IMS Automated Operator Interface exit DFSAOUE0, and the IMS application programs, you may be able to support AOF on your own even though IBM no longer supports it.
5. DBICF Version 4 supports IMS Version 4; DBICF Version 5 supports IMS Version 5.
6. Although there is no official replacement product for 3270 Screen Image Preprocessor - IMS and IMS/VS, a similar function can be found in SDF II.
7. GPAR was discontinued on August 17, 1987, but the product can still be ordered and installed for use by IMSPARS and IMSASAP II. If any APARs reported for either IMSPARS or IMSASAP II are determined to have occurred in GPAR code, the GPAR code will be corrected. However, standalone support for GPAR commands is not supported.
8. IMS Compression - Extended Version 1 Release 2 is a functional replacement for IMS/VS Data Compression Facility. IMS database compression routines created under IMS/VS Data Compression Facility would have to be recreated under IMS Compression - Extended Version 1 R2.
9. The original IMS LU6.1 Adapter for LU6.2 Applications product was added to the base IMS product via maintenance to IMS Version 2 and continued to be supported through IMS Version 4. IMS Version 4 introduced the APPC/IMS feature as replacement for the LU6.2 Adapter. IMS Version 5 no longer supports the LU6.2 Adapter code but the code is still shipped as part of the IMS Version 5 base code. If you are currently running the IMS LU6.2 Adapter (whether as a separate product or as part of pre-IMS Version 5 code), we recommend you do ***not*** convert your LU6.2 IMS applications from the LU6.2

Adapter to APPC/IMS at the same time you migrate your IMS system to IMS Version 5.

10. A randomizer generated by IMS/VS Aid Program Package Version 3 Sequential DAM Optimizer must be reassembled and relink-edited under IMS System Utilities/Data Base Tools SDO feature in order to execute under IMS Version 3 and higher level IMS software. This is required because the SDO feature uses 31-bit addressing.

14.4 Third-Party IMS-Related Products

If you are running any third-party products that are IMS related, it is important to identify, review, and contact the appropriate vendor to determine what actions need to be taken to continue their support or replace their functionality.

When contacting the vendor, you should remember to ask not only what is required for IMS Version 5 support, but also whether the required maintenance or new product can support your current IMS system. If so, you may be able to install the maintenance or new product before migrating your IMS system. This would reduce the time to shift your IMS production system to IMS Version 5, spread out any product testing, and also reduce the complexity of your fallback planning.

It is also important to tell the vendor whether other changes will be implemented in the IMS environment along with your IMS Version 5 migration. In particular, mention any OS/390 (MVS), DFSMS, RACF, or VTAM upgrades or maintenance that may be bundled with the IMS Version 5 upgrade. These changes can add maintenance requirements or implementation restrictions for your IMS-related product.

Appendix A. Summary of IMS Function Changes by Release

This appendix contains a brief list of the new functions added to various releases of IMS over the years. A more detailed and complete list is available in the book *IMS: Why Migrate?*, GC26-8912.

A.1 New Functions Added in IMS/VS Version 1.3

Table 12 presents the new features available with IMS/VS Version 1.3.

Table 12. New Functions Added in IMS/VS Version 1.3

Function	Required or Optional
DASD Logging for Online System	Required
DASD Logging for Batch System	Optional
DBRC Management of Online Logging	Required
DBRC Management of Databases	Optional, but recommended
DBRC Management of Batch Job Database Access	Optional, but recommended
Online Change for Databases, Programs, Transactions	Required
Enhanced IMS Log Recovery	Required
Enhanced IMS Traces to Support New Function	Optional, but recommended
Reduced Minimum VSAM Buffer Requirements	Optional, but recommended
Support for Assembler H	Optional
Virtual Storage Constraint Relief -Multiple Address Spaces	Required
IMS SYSGEN Preprocessor Utility	Optional
IMS-DB2 Attach/Access	Optional
Multiple, Concatenated MFS Datasets	Optional, but recommended
BMP Utilization of PSBs Defined as TP Programs	Optional
IMS Monitor DASD Support	Optional, but recommended

A.2 New Functions Added in IMS/VS Version 2.2

Table 13 presents the new features available with IMS/VS Version 2.1.

Table 13 (Page 1 of 2). New Functions Added in IMS/VS Version 2.2

Function	Required or Optional
IMS Offline Dump Formatting	Optional, but recommended

Table 13 (Page 2 of 2). New Functions Added in IMS/VS Version 2.2	
Function	**Required or Optional**
IMS OSAM Sequential Buffering	Optional, but recommended
IMS Batch Job Database Dynamic Allocation Support	Optional
Improved Performance for OSAM Database Writes (Chained)	Required
Dynamic Allocation Support for IMS Logs	Optional, but recommended
Extended Restart Facility (XRF)	Optional
Virtual Storage Constraint Relief - Most DC Blocks/Pools >16 MB	Required
Increased Maximum VSAM Buffers per Subpool (32 KB)	Optional
Increased Maximum CWAP Size (999,999 KB)	Optional
Increased Maximum Message Queue Buffers (9,999 buffers)	Optional
MVS/JES SWA Above the Line Support	Optional, but recommended
Enhanced Database I/O Error Processing	Required
Enhanced Transaction Scheduling	Required
MFS Default Format Capability	Required
Enhanced HD Database Locking Protocol	Required
IMS LU6.2 Adapter Support (No longer a separate product)	Optional
IMS VSAM Hiperspace Enhancement	Optional

A.3 New Functions Added in IMS/ESA Version 3

Table 14 presents the new features available with IMS/ESA Version 3.

Table 14 (Page 1 of 2). New Functions Added in IMS/ESA Version 3	
Function	**Required or Optional**
IMS DB Control System (DBCTL)	Optional
Virtual Storage Constraint Relief - DB Blocks/Pools >16 MB	Required
IMS Log I/O Reduction Performance Enhancement	Required
Nonrecoverable Databases	Optional, but recommended
Multiple VSAM Buffer Pool Support	Optional, but recommended
IMS Front-End Switch	Optional
OSAM Database Capacity Increased to 4 GB	Optional
Transaction Quick Reschedule	Optional
Pseudo Wait-for-Input Transactions	Optional
Large Systems Generation (LGEN) Enhancement	Optional
VTAM I/O Timeout Handling	Optional

Table 14 (Page 2 of 2). New Functions Added in IMS/ESA Version 3	
Function	**Required or Optional**
Enhanced IMS System Emergency Restart/Recovery	Optional, but recommended
LLA/VLF Support	Optional, but recommended
Data Propagation Through New Data Capture Exit	Optional
Remote Recovery Data Facility (RRDF) Product Support (Logger Exit)	Optional
Virtual Storage Constraint Relief - Log Buffers >16 MB (DFP Version 3.2+)	Optional
Security Reverification Exit (DFSCTSE0)	Optional
Enhanced Deadlock Processing	Optional
JES Spool Application Interface Support	Optional
OSAM Buffer Model Facility Support	Optional
Time-Controlled Operations (TCO)	Optional
ESCON support	Required

A.4 New Functions Added in IMS/ESA Version 4

Table 15 presents the new features available with IMS/ESA Version 4.

Table 15 (Page 1 of 2). New Functions Added in IMS/ESA Version 4	
Function	**Required or Optional**
Extended Terminal Option (ETO)	Optional
APPC/IMS	Optional
IMS DC Control System (DCCTL)	Optional
Message Control Error Exit (MCEE) (DFSCMUX0)	Optional
Extended Security Support for Commands	Optional
Enhanced Command Authorization Security Exit (DFSCCMD0)	Optional
Customized Logon/Signon Support (Greetings Message Exit, DFSGMSG0)	Optional, but recommended
Concurrent Image Copy Support for Full Function Databases	Optional
Enhanced DB Recovery - DBRC Verification of Batch Backout	Required
Interactive Dump Formatter IPCS Dialog Support	Optional, but recommended
IMS Adapter for REXX Application Support	Optional
DBRC RECON PRILOG Automatic Compression	Required
Performance Enhancements for Database PURGE I/O Processing	Required
External Trace Facility	Optional, but recommended
Enhanced ISPF Dialog Installation Process	Required
Global Physical Terminal Input Edit Exit (DFSGPIX0)	Optional
Enhanced Message Queue Management	Optional

Table 15 (Page 2 of 2). New Functions Added in IMS/ESA Version 4	
Function	**Required or Optional**
Virtual Storage Constraint Relief - DC Blocks/Pools >16 MB	Required
LE/370 Support	Required
Enhanced Storage Manager	Required
Application Interface Block Support	Optional
Enhanced GSAM Database Support	Optional
Hardware Data Compression	Optional
Generic IMS Command Support	Optional, but recommended
IMS Checkpoint Message Suppression	Optional
High-Level Assembler Support	Optional, but recommended

A.5 New Functions Added in IMS/ESA Version 5

Table 16 presents the new features available with IMS/ESA Version 5.

Table 16. New Functions Added in IMS/ESA Version 5	
Function	**Required or Optional**
MVS Sysplex Support, N-Way Data Sharing	Optional
Two-Digit Year Support for Year 2000	Required
MVS Workload Manager Support	Optional
External Security Enhancements for VSAM Databases	Required
Increased Maximum Number of Dependent Regions	Optional
Open Transaction Manager Access	Optional
Enhanced Message Control Error Exit	Optional
Enhanced APPC/IMS	Optional
Enhanced Fast Path (Virtual Storage Option Data Entry DBs)	Optional
Enhanced Automated Operator Interface	Optional
Pseudo Wait-for-Input Support for DB2 Transactions	Optional
OSAM DB Support for Dynamic Cache Management Enhanced	Optional, but recommended
OSAM Database Capacity Increased (8 GB)	Optional
Enhanced Database Time-Stamp Recovery	Required
Enhanced Database Commands	Optional, but recommended
Remote Site Recovery Support	Optional
Enhanced Log Formatting and Select Utility Support (DFSERA10)	Optional, but recommended
MVS ARM Support	Optional, but recommended

Appendix B. IMS Version 1.2 to Version 5 Migration Plan

This plan was devised for a customer for their migration from IMS/VS Version 1.2 to IMS/ESA Version 5. The migration was also intended to include a conversion to DBRC. The steps under each heading should follow the sequence shown. Not all steps will be required for customers in their migration to IMS Version 5. However, you will find this useful in your project planning.

B.1 Identify and Research Current IMS Environment

1. Identify IMS software environment:
   - IMS-related IBM software
   - IMS-related OEM software
   - IMS TM exits
   - IMS DB exits
   - IMS USERMODs
2. Research IMS-related software:
   - Identify obsolete products for deinstallation.
   - Develop plan to deinstall obsolete products.
   - Identify required product-upgrade requirements.
   - Develop plan for RACF security upgrade.
   - Develop plans for other ancillary product upgrades.
3. Identify IMS and MVS dump-handling environment and procedures:
   - Identify current procedures for obtaining IMS system dumps.
   - Identify current procedures for handling MVS dump data set contents (where are they copied before clearing).
4. Examine security environment:
   - Identify current procedures for logon and signon.
   - Find out whether multiple logons from a single user ID are allowed.
   - Identify any terminal security (command password).
   - Identify any transaction security (RACF or IMS SMU).
   - Identify any AGN security.
5. Examine execution environment and configuration:
   - Identify all locations of IMS system modules (no RESLIB in message regions indicates copies elsewhere, such as link pack area (LPA), linklist or LLA, application, or other system data sets)
   - Examine other identified locations for any system or database exits.
   - Find out whether applications or database jobs reference RESLIB or also expect IMS modules in alternative locations.
   - Plan for either removal of modules (jobs reference RESLIB) or replacement of modules in alternative location during migration.
6. Examine JCL and job generation environment:
   - Find any sources of IMS JCL or job generation (TSO CLIST, ISPF dialog, or PC generation with upload to mainframe).
   - Identify functions provided (application, database, or system).
   - Develop plan to upgrade for new IMS software, MVS assembler, and DFSMS binder.

B.2 Examine New IMS Environment

1. Determine the IMS Version 1.2 to Version 5 migration requirements:
   - IMS Version 1.2 to IMS Version 1.3
   - IMS Version 1.3 to IMS Version 2.2
   - IMS Version 2.2 to IMS Version 3
   - IMS Version 3 to IMS Version 4
   - IMS Version 4 to IMS Version 5
2. Identify new required functions.
3. Identify optional function.

B.3 Plan for IMS DASD Logging (Version 1.2 or Prior)

1. Develop naming conventions for logging data sets.
2. Select WADS logging mode.
3. Select OLDS logging mode.
4. Select SLDS logging mode.
5. Select RLDS logging mode.
6. Determine OLDS space allocations and number of OLDS.
7. Determine automatic archive process frequency.
8. Determine number of DASD volumes for OLDS and data set placement.
9. Select SLDS device type.
10. Select RLDS device type.
11. Select OLDS block size.
12. Select SLDS block size.
13. Select RLDS block size.

B.4 Plan for DBRC

1. Identify level of control for initial implementation.
2. Determine if databases are to be registered at initial implementation and, if so, develop plan for registration.
3. Determine whether new jobs should run if only one RECON is available.
4. Determine if batch jobs are to use DBRC by default.
5. Develop naming conventions for RECON data sets.
6. Identify DASD volume for each RECON data set.

B.5 Plan for IMS System Dumping to MVS Dump Data Sets

1. Review various options for IMS system dump processing.
2. Select appropriate option.
3. Determine appropriate size for MVS dump data sets.
4. Identify MVS dump options specifications of storage to be snapped.

B.6 Plan for IMS Online Change

1. Research sizing for online change data sets:
   - Three copies of FORMAT data set.
   - Three copies of ACBLIB data set.
   - Three copies of MATRIX data set.
   - Three copies of MODBLKS data set (new).
2. Determine whether online change is to be regularly scheduled or run on demand.
3. Identify any application DBBBATCH jobs that need to be updated to use suffixed ACBLIBs and MODSTAT data sets.
4. Plan method for running online change:
   - Determine how on-line change utility is to be run (separate job, manual job submission, or part of a regularly scheduled job stream).
   - Determine how IMS commands to switch data sets are entered and who is to enter and monitor the online change process.
5. Review current procedures for MFS and ACB GENs:
   - Scheduling (GEN process can run into staging data sets at any time whether IMS is up or down).
   - Revision of MFS GEN process to eliminate use of MFSBATCH data set.

B.7 Plan for the Multitasking IMS Environment

1. Develop naming conventions for IMS system tasks.
2. Determine relative dispatching priority for new tasks.
3. Determine reporting classes for new tasks.

B.8 Plan for Creation of Parallel Production Testing IMS Database Environment

1. Develop naming conventions for alternative copies of databases.
2. Create new database allocate or delete procedures and control cards.
3. Create special database recovery and restore jobs (using IMS image copies of real databases to restore to alternative databases).
4. Create dynamic allocation source for new databases.

B.9 Examine IMS Database Impact

1. Study IMS database exits:
   - Identify obsolete exits for deinstallation.
   - Identify required exits that could be replaced with standard IBM-provided IMS DB exits.
   - Identify required exits that must be rewritten for 31-bit compatibility.
   - Develop plan to convert databases that can use IBM-provided IMS DB exits prior to IMS software upgrade (under IMS 1.2).
   - Develop plan to rewrite exits that cannot be replaced with IBM-provided IMS database exits (include testing and migration planning).

2. Examine IMS database access methods:
    - Identify any ISAM database indexes.
    - Develop plan to convert ISAM to VSAM prior to IMS software upgrade under IMS 1.2.
3. Identify database recovery procedures:
    - Identify existing IMS DB recovery procedures
    - Review procedures for IMS log data set name, label, and DCB attributes.
    - Develop plan for cutover to SLDS/RLDS cataloged data set names without label or DCB attributes.
    - Review jobs for sufficient region size (additional 512 KB needed for DBRC).

B.10 Identify/Research IMS Data Communications Impact

1. Examine IMS TM exits:
    - Identify obsolete exits for deinstallation.
    - Identify required exits that must be rewritten for 31-bit compatibility.
2. Examine IMS terminal support:
    - Identify current BTAM and VTAM local and remote terminal types.
    - Identify types that are no longer supported.
    - Identify any split LTERMs.
    - Develop plan for LTERM or terminal support conversion.
3. Identify any terminal sensitivity to DFS2002I message.

B.11 Identify IMS Applications Impact

1. Study IMS application checkpointing:
    - Identify any OS checkpointing jobs (CHKPT DD statement in JCL).
    - Develop plan to rewrite application programs to use regular IMS checkpointing.
2. Examine application restart procedures:
    - Review BMP and DLI jobs for IMS log data set name, label, and DCB attributes (IMSLOGR DD statement in JCL).
    - Develop plan for cutover to SLDS cataloged data set names without label or DCB attributes.
3. Identify any application sensitivity to DFS2002I message.
4. Identify DBRC impact on DLI/DBB batch jobs:
    - Identify any jobs with PSB update intent and no logging.
    - Develop plan for adding batch logging.
    - Review jobs for sufficient region size (additional 512 KB needed for DBRC).

B.12 Identify IMS End User Impact

1. Identify signon or status screen impact.
2. Research alternatives to IMS-provided signon or status screens incorporating any identified sensitivity to DFS2002I message.
3. Select appropriate signon or status screen methodology.

B.13 Identify IMS Operational Impact

1. Examine automation:
   - Identify any current automation.
   - Develop plan for converting or migrating automation.
2. Study MVS message suppression of IMS messages:
   - Identify any current (console) MVS message suppression.
   - Develop plan for changing or adding IMS messages.
3. Examine operations procedures and documentation:
   - Identify existing IMS operational procedures and documentation.
   - Develop plan for rewriting affected procedures, adding new procedures, and eliminating obsolete procedures.
4. Examine IMS log tape usage:
   - Identify any jobs or procedures that reference IMS log tapes (such as accounting or performance) and software or programs used.
   - Develop plan for upgrading any software to recognize new and changed IMS log records.
   - Develop plan for rewriting any nonvendor programs to recognize new and changed IMS log records.
   - Develop plan for cutover of affected jobs and procedures to use either SLDS variable cataloged data set names with new DCB attributes or IMS archive exits.
5. Examine IMS control block usage:
   - Identify any programs using or reading IMS control blocks.
   - Develop plan to reassemble and link programs (include testing and migration planning).

B.14 Coordinate IMS Upgrade

1. Order software:
   - IMS Version 5
   - IBM IMS-related software
   - Third-party IMS ancillary software
2. Identify education measures:
   - Identify education requirements for staff.
   - Provide list of recommendations to other areas.
   - Register own staff for appropriate courses.
   - Verify education completion.
3. Obtain manuals:
   - Identify manual requirements for staff.

- Provide list of recommendations to other areas.
- Order manuals for own staff.

B.15 IMS Version 5 Software Installation

1. Verify operating system (OS/390, DFSMS, RACF) installation or maintenance completion.
2. Review PSP buckets:
   - Review IMS Version 5 installation information.
   - Review IMS Version 5 maintenance information.
   - Review OS/390 and DFSMS corequisite maintenance information.
   - Review RACF and IMS corequisite maintenance information.
   - Review IMS-related product installation and maintenance information.
   - Provide list of OS/390, DFSMS, RACF, and IMS-related product corequisites to MVS staff
   - Incorporate list of IMS-related product corequisites into individual product upgrade plans.
3. Create installation jobs:
   - Install IVP dialogs.
   - Gather dialog input (dsnames, DCB, volsers).
   - Run dialog to produce jobs, procedures, and installation task plan.
   - Review dialog tasks and update IMS migration plan if required.
4. SMP/E install IMS
   - Install base IMS.
   - Research and resolve maintenance hold data.
   - Provide list of any additional OS/390, DFSMS, and RACF corequisites to MVS staff.
   - Install resolved maintenance.
5. Install initial target system:
   - Obtain new Type 2 and Type 4 SVC numbers from MVS staff.
   - Obtain appropriate assembler program or level from MVS staff.
   - Obtain new VTAM APPLID from network staff (if no test IMS APPLID is available).
   - Obtain terminal node names and virtual terminal node names from network staff.
   - Obtain RACF resource security class from security staff.
   - Create IMS SYSGEN input source.
   - Run IMS ALL SYSGEN.
   - Run SMP/E JCLIN.
   - Create IMS security generation input source.
   - Verify that IMS security procedure link step has AMODE/RMODE 31 parameter.
   - Run IMS security generation.

B.16 Coordination of IMS/MVS Interfaces

1. Connect IMS to MVS:
   - Provide SVCs, cleanup, and dump formatter modules to MVS staff. Type 2 SVC must either be added to the MVS nucleus, the nucleus module loader, or the NUCLSTxx member. All other modules must be added to the link pack area (LPA).
   - Schedule initial program load of MVS system to pick up new modules.
2. Define IPCS/IMS environment:
   - Create CLIST and dialog data sets.
   - Provide information to MVS staff to customize MVS IPCS dialogs.
   - Obtain IPCS RACF authority for IMS systems programmers TSO IDs.
   - Obtain MVS dump data set and MVS spinoff (offloaded copies of dump data set) RACF authorization for IMS systems programmers TSO IDs.

B.17 Create Systems Testing and IVP Environment

1. Create execution and staging data sets.
2. Provide execution data set names to MVS staff for APF authorization.
3. Create execution procedures and jobs.
4. Create control card parameter members.
5. Obtain RACF STC-started task IDs for IMS system address spaces (all need RACF authority to take MVS SDUMPS and regular dumps):
   - The IMS control region needs multiple user address space authority, update authority for all IMS Fast Path data bases, and update access to the spool data sets.
   - IMS DLI separate address space (needs control authority for all VSAM IMS DL/I data bases, and update access for all OSAM databases).
   - IMS DBRC address space (needs control authority for RECON data sets and authority to submit jobs with alternate RACF user IDs)
   - IMS reader address space (needs job submission/JES internal reader authority and authority to submit jobs with alternate RACF user IDs)
6. Obtain RACF user IDs for IMS system jobs (all need RACF authority to take MVS SDUMPS and regular dumps):
   - IMS message regions
   - DBRC archive job (needs RACF authority to take MVS SDUMPS and regular dumps, control access for RECON data sets, read access for IMS OLDS, and create access for IMS SLDS and RLDS)
   - IMS spool data set print jobs (all need RACF authority to take MVS SDUMPS and regular dumps, update access to the spool data sets, and create access for data set holding spool printout)
7. Request MVS suppression of IMS messages be disabled for the testing environment. You need to provide IMS task ids, IMS system job userids, and IMSIDs to staff responsible for MVS suppression of IMS messages.
8. Populate IMS system data sets:
   - Copy data sets not populated by online change.
   - Initialize MODSTAT data set.

- Run on-line change utility to populate MODBLKS and MATRIX execution data sets.

9. Install IMS IVP and sample applications.
   - Install programs.
   - Install MFS.
   - Run on-line change utility to populate MFS execution data sets.
   - Install PSBs.
   - Install DBDs.
10. Define dynamic allocation modules:
    - Create source and generate modules for logging data sets (OLDS, WADS, SLDS).
    - Create source and generate modules for RECONs.
    - Create source and generate modules for IVP and sample databases.
    - Create source and generate modules for IMS monitor data set.
    - Create source and generate modules for IMS trace data sets.

B.18 Validate Base IMS System

1. Verify IMS SVCs, cleanup, dump formatter are installed.
2. Verify MVS suppression of IMS messages is disabled.
3. Validate resource cleanup module (start and purge an initiator).
4. Verify that APF authorization is defined.
5. Complete base/IVP system installation:
   - Run ACBGEN.
   - Run on-line change utility to populate ACB and MFS execution data sets.
   - Define and initialize RECON data sets.
   - Allocate and load IMS IVP and sample databases.
6. Validate batch IMS and run IMS batch IVP application system.
7. Verify that VTAM ACB is active.
8. Verify that RACF IDs have been defined.
9. Verify that RACF and IMS online security is disabled (RCF=N in DFSPBxxx).
10. Verify that all IMS automation is disabled.
11. Validate online IMS DB/DC system:
    - Start online system (COLDSTART,AUTO=N).
    - Verify that IMS master terminal connects and functions correctly (messages are received and formatted properly).
    - Start message regions.
    - Start data communications (/START DC).
    - Run IMS DB/DC online IVP application.
    - Run IMS sample application.
    - Switch OLDS to force DBRC archive job submission.
    - Verify DBRC archive job.
    - Shut down IMS online system normally.
    - Verify IMS Spool data set print job
12. Validate normal online IMS DB/DC system restart:
    - Start online system (WARMSTART,AUTO=Y).

- Start message regions.
- Start data communications (/START DC).
- Run several IVP or sample transactions.
- Shut down IMS online system normally.

13. Validate normal online IMS DB/DC restart with BUILDQ:

    - Start online system (WARMSTART,AUTO=Y).
    - Start data communications (/START DC).
    - Enter several IVP or sample transactions.
    - Display queued transactions.
    - Shut down IMS online system normally, leaving input transactions.
    - Delete and reallocate a message queue data set.
    - Start online system (WARMSTART,AUTO=Y); restart should abort.
    - Enter manual restart command with FORMAT and BUILDQ.
    - Start data communications (/START DC).
    - Display queued transactions, which should match previous display.
    - Start message regions.
    - Start data communications (/START DC).
    - Run queued transactions.
    - Shut down IMS online system normally.

14. Validate online change process:

    - Start online system (WARMSTART,AUTO=Y).
    - Start message regions.
    - Start data communications (/START DC).
    - Run several IVP or sample transactions.
    - Run MFS generation into staging library.
    - Run ACBGEN into staging library.
    - Run on-line change utility job.
    - Display on-line change library status.
    - Perform on-line change for MFS and ACB.
    - Display on-line change library status.
    - Run several IVP or sample transactions.
    - Shut down IMS online system normally.

15. Validate system cleanup and emergency restart after system abend:

    - Start online system (WARMSTART,AUTO=Y).
    - Start message regions.
    - Start data communications (/START DC).
    - Run several IVP or sample transactions.
    - Abend the IMS system without a dump (F IMS,STOP)
    - Verify cleanup messages.
    - Start online system (ERESTART,AUTO=Y).
    - Start message regions.
    - Run several IVP or sample transactions.
    - Shut down IMS online system normally.

16. Validate emergency online IMS DB/DC restart with BUILDQ:

    - Start online system (WARMSTART,AUTO=Y).
    - Start data communications (/START DC).
    - Enter several IVP or sample transactions.
    - Display queued transactions.
    - Abend the IMS system without a dump (F IMS,STOP)
    - Delete and reallocate a message queue data set.
    - Start online system (ERESTART,AUTO=Y); restart should abort.

- Enter restart command with FORMAT and BUILDQ.
- Display queued transactions, which should match previous display.
- Start message regions.
- Run queued transactions.
- Shut down IMS online system normally.

17. Validate IMS DB/DC system dump capability:

    - Verify that MVS system dump data sets have sufficient DASD space and are clear and available.
    - Verify that MVS system dump options specify required storage areas.
    - Verify that IMS has RACF authority to take system dumps.
    - Verify IMS system specifies offline dumping (FMTO parameter in DFSPBxxx).
    - Start online system (WARMSTART,AUTO=Y).
    - Start message regions.
    - Start data communications (/START DC).
    - Run several IVP or sample transactions.
    - Abend the IMS system with a dump (F IMS,DUMP).
    - Verify that IMS has successfully completed a dump to the MVS system dump data sets (IMS and MVS successful dump completion messages are received and MVS display of dump data sets show IMS dump)
    - Start online system (ERESTART,AUTO=Y).
    - Start message regions.
    - Start data communications (/START DC).
    - Run several IVP or sample transactions.
    - Shut down IMS online system normally.

18. Validate IPCS or IMS environment and IMS dump formatting:

    - Identify IMS control region dump, and restore to DASD if required.
    - Run IPCS dialog selecting various IMS IPCS options to ensure proper IMS formatting.

19. Validate emergency restart after MVS power failure:

    - Schedule assistance and standalone test time with MVS staff.
    - Start online system (WARMSTART,AUTO=Y).
    - Start message regions.
    - Start data communications (/START DC).
    - Run several IVP or sample transactions.
    - IPL MVS while IMS is still up to simulates failure.
    - Run DBRC LIST job to verify that IMS subsystem record is still active.
    - Start online system (ERESTART,AUTO=Y). Restart should abort.
    - Enter manual restart command with OVERRIDE.
    - Start message regions.
    - Start data communications (/START DC).
    - Run several IVP or sample transactions.
    - Shut down IMS online system normally.

B.19 Check Status of Progress on IMS Research, Planning, and Impact Tasks

1. Obtain status of all IMS research, planning, and impact tasks.
2. Notify project members of successful completion of IMS functional verification and freeze of IMS software maintenance level.
3. Enable RACF access to IMS source, macro, and module data sets for project staff to complete impact analysis and begin customization.

4. Notify project staff installing or upgrading other IMS-related software that they may begin any IMS software-dependent tasks.

B.20 Customize IMS Software for SIGNON Process

1. Develop IMS greetings message user exit (DFSGMSG0):
   - Allocate permanent source data set.
   - Verify signon process requirements.
   - Design and code exit.
   - Assemble and link exit into SMP/E RESLIB.
2. Develop corresponding MFS screens:
   - Design and code MFS screens.
   - MFSGEN screens into SMP/E MFS FORMAT data set.

B.21 Customize Systems Testing and IVP Environment for SIGNON Process

1. Repopulate IMS system data sets:
   - Copy data sets not populated by online change.
   - Run online change utility to populate MODBLKS, MATRIX, and FORMAT execution data sets.

B.22 Validate IMS System with Customized SIGNON Process

1. Start online system (COLDSTART).
2. Start message regions.
3. Start data communications (/START DC).
4. Test several signon scenarios (successful signon, invalid password, invalid user ID).
5. Shut down IMS online system normally.

B.23 Customize IMS Software for RACF, Third-Party, or Homegrown Security

1. Verify completion of RACF or third-party security software installation or maintenance
2. Review any security-related USERMODs, retrofit if required, and SMP/E install the USERMODs.
3. If using ACF2/IMS security, install the ACF2/IMS provided IMS SMP/E USERMOD for /ACF Command:
   - Add DDDEF for ACF2/IMS LOADLIB to IMS CSIs.
   - RECEIVE USERMOD from ACF2 data set into IMS CSI.
   - APPLY USERMOD to IMS.
   - Review modules affected and determine whether USERMOD should be accepted to avoid accidental loss through SYSGEN.
4. Allocate IMS USERLIB data set and add SMP/E DDDEF to IMS CSIs.
5. Review any security-related exits, retrofit for 31-bit addressability and any other changes, and assemble and link exits into IMS USERLIB

6. If using ACF2/IMS security, install the ACF2/IMS provided IMS user message exit (DFSCMTU0):
   - Copy ACF2/IMS user message exit source into IMS exit source data set and integrate it into any homegrown user message exit.
   - Assemble and link the exit into the IMS USERLIB.
7. Obtain RACF resource class for IMS from security administrator
8. Update IMS sysgen source with RACF- or other third-party-required security options, any security exit options, and RACF resource classes.
9. Perform IMS sysgen to activate security.
10. Run SMP/E JCLIN of Stage 2.
11. Rerun SMP/E APPLY for any unaccepted USERMODs.
12. Update IMS SMU security source to include signon security.
13. Run IMS security generation.

B.24 Customize Systems Testing and IVP Environment for RACF or IMS Security

1. Repopulate IMS system data sets:
   - Copy data sets that are not populated by online change.
   - Run online change utility to populate MODBLKS and MATRIX execution data sets.
2. Update IMS system execution parameters in DFSPBxxx for active security.
3. If using ACF2/IMS security:
   - Create copy of ACF2/IMS Load library and add data set name to the IMS control region JCL STEPLIB concatenation.
   - Provide ACF2/IMS Load library name to MVS systems person for APF authority.
   - Provide ACF2/IMS Load library name to security administrator for inclusion in ACF2/MVS globals.

B.25 Validate IMS System with RACF or Third-Party Security

1. Verify that the IMS control region user ID has multiple user address space authority.
2. Verify that RACF IMS resource rules are defined.
3. If using ACF2/IMS security:
   a. Verify that ACF2/MVS globals have the ACF2/IMS load data set.
   b. Verify that ACF2/IMS records are defined:
      - EXITS record
      - NETWORK record
      - RESOURCE records
      - OPTS record
      - WTO record
      - SIGNON record
      - STORAGE record

4. Verify RACF online security is defined for IMS online system in DFSPBxxx parameters.
5. Validate online IMS DB/DC system:
   - Start online system (COLDSTART).
   - Start message regions.
   - Start data communications (/START DC).
   - Test several signon scenarios (successful signon, invalid password, invalid user ID).
   - If using ACF2/IMS security, test /ACF command.
   - Run IMS DB/DC online IVP application.
   - Run IMS sample application.
   - Shut down IMS online system normally.
6. Update startup parameters for automatic startup (AUTO=Y in DFSPBxxx).

B.26 Create Basic Operations Procedures for IMS Systems Testing and IVP Environment

1. Develop startup procedures for:
   - IMS COLDSTARTs using manual IMS startup commands.
   - IMS WARMSTARTS using automatic and manual startup.
   - IMS EMERGENCY RESTARTS using automatic and manual startup.
2. Document when each startup type is appropriate.
3. Develop shut-down procedures for:
   - Normal shut downs
   - Emergency shut downs with and without a dump
4. Develop documentation for IMS archive jobs.
5. Obtain RACF read access to documentation for operations staff.

B.27 Second Status Check Progress on IMS Research, Planning, and Impact Tasks

1. Obtain status of all research, planning, and impact IMS tasks.
2. Notify project members of successful completion of IMS security and signon verification and upcoming parallel production environment testing.
3. Notify staff responsible for MVS suppression of messages to begin tracking new DFSxxxxx messages for potential suppression.
4. If using ACF2/IMS security, notify staff responsible for MVS suppression of messages to begin tracking new ACFxxxxx messages for potential suppression.
5. Notify operations staff that they may begin using the systems testing and IVP environment and operational documentation to become familiar with IMS Version 5 systems.

B.28 Finalize IMS TM Impact Planning Tasks

1. Ensure completion of IMS required DC exit identification.
2. Ensure completion of IMS terminal or LTERM support planning.

B.29 Customize IMS Software for Production Environment

1. Create SMP/E environment:
   - Create new SMP/E target environment for production.
   - Re-run SMP/E JCLIN for IMS dialog component.
   - Create new set of IMS data sets for production SMP/E.
   - Add or edit SMP/E DDDEFs for new IMS data sets.
2. Prepare production SYSGEN source:
   - Create copy of current SYSGEN input.
   - Update Type 2 and Type 4 SVC numbers to IMS Version 5 numbers.
   - Update MVS support level.
   - Update MVS assembler level.
   - Use current (IMS Version 1.2) VTAM APPLID, which is overridden in the startup parameters.
   - Add IMS IVP and sample applications (separate copybook)
   - Update terminal macros for current support.
   - Update IMS security keywords (for RACF or IMS).
   - Update IMS data set nodes.
   - Delete SPAREA macro.
   - Delete AOEXIT keyword.
3. Install any required customized DC exits (Automated Operator Exit, Transaction Input or Output Exits, Terminal Input or Output Exits):
   - Copy identified or revised exit source into source data set.
   - If IMS USERLIB has not been allocated yet, allocate one.
   - Assemble and link exits into IMS USERLIB data set.
   - Add DDDEF for USERLIB data set to production IMS SMP/E CSIs.
4. Generate SMP/E copy of production target system:
   - Update SYSGEN source to use new USERLIB data set.
   - Run IMS ALL SYSGEN (make sure that all device definitions are correct).
   - Run SMP/E JCLIN.
   - If using ACF2/IMS security and the IMS SMP/E USERMOD for the /ACF command was not ACCEPTed in the test SMP/E environment, install it in the production SMP/E environment:
     - Add DDDEF for ACF2/IMS LOADLIB to IMS CSIs.
     - RECEIVE USERMOD from ACF2 data set into IMS CSI.
     - APPLY USERMOD to IMS.
   - Reapply any IMS USERMODs that have not been accepted.
   - Save ALLGEN Stage 2 in permanent data set for future SMP/E target zone building.
   - Copy IMS security generation input source.
   - Update source for any security changes.
   - Run IMS security generation.

B.30 Finalize IMS Online System Planning Tasks

1. Ensure consensus and completion of IMS DASD logging planning.
2. Ensure consensus and completion of IMS DBRC planning.
3. Ensure consensus and completion of IMS system dumping to MVS dump data set planning.
4. Ensure consensus and completion of IMS online change planning.

5. Ensure consensus and completion of IMS multitask environment planning.

B.31 Create Systems Portion of Parallel Production Testing Environment

1. Review testing environment with MVS staff:
   - Catalog structure
   - LINKLIST requirements
   - DASD sharing possibilities
   - Installation status of IMS SVCs, cleanup, and dump formatter modules
   - Installation status of IMS IPCS dialog components
2. Create execution and staging data sets.
3. Provide execution data set names to MVS staff for APF authorization.
4. If using ACF2/IMS security:
   - Create copy of ACF2/IMS load library and add data set name to the IMS control region JCL STEPLIB concatenation.
   - Provide ACF2/IMS load library name to MVS systems person for APF authority.
   - Provide ACF2/IMS Load library name to security administrator for inclusion in ACF2/MVS globals.
5. Create execution procedures and jobs.
6. Create control card parameter members.
7. Obtain RACF STC-started task IDs for IMS system address spaces (all need RACF authority to take MVS SDUMPS and regular dumps):
   - IMS control region (needs multiple user address space authority, control authority for all IMS Fast Path data bases, and update access to the spool data sets).
   - IMS DLI separate address space (needs control authority for all VSAM IMS DL/I data bases, and update access for all OSAM databases).
   - IMS DBRC address space (needs control authority for RECON data sets and authority to submit jobs with alternate RACF user IDs)
   - IMS reader address space (needs job submission/JES internal reader authority and authority to submit jobs with alternate RACF user IDs)
8. Obtain RACF user IDs for IMS system jobs (all need RACF authority to take MVS SDUMPS and regular dumps):
   - IMS message regions
   - DBRC archive job (needs RACF authority to take MVS SDUMPS and regular dumps, control access for RECON data sets, read access for IMS OLDS, and create access for IMS SLDS and RLDS)
   - IMS spool data set print jobs (all need RACF authority to take MVS SDUMPS and regular dumps, update access to the spool data sets, and create access for data set holding spool printout)
9. Request MVS suppression of IMS messages be disabled for the testing environment. You need to provide IMS task ids, IMS system job userids, and IMSIDs to staff responsible for MVS suppression of IMS messages.
10. Populate IMS system data sets:
    - Copy data sets not populated by online change.
    - Initialize MODSTAT data set.

- Run on-line change utility to populate MODBLKS and MATRIX execution data sets.

11. Add IMS IVP and sample applications to system:
    - Copy IMS IVP and sample PSBs to production PSBLIB.
    - Copy IMS IVP and sample DBDs to production DBDLIB.
    - Allocate and load IMS IVP and sample databases.
12. Create ACBLIBs:
    - Allocate new ACBLIB data set (cannot be shared with Version 1.2).
    - Run ACBGEN.
    - Allocate new suffixed online change ACBLIB data sets.
    - Run online change utility to populate ACBLIB execution data sets.
13. Create system MFS FORMAT data sets:
    - Allocate new system MFS FORMAT data set.
    - Copy SMP/E MFS FORMAT data set into new system MFS FORMAT data set.
    - Allocate new suffixed online change system MFS FORMAT data sets.
    - Run online change utility to populate system MFS FORMAT execution data sets.
14. Define system dynamic allocation modules:
    - Create source and generate modules for logging data sets (OLDS, WADS, SLDS).
    - Create source and generate modules for RECONs.
    - Create source and generate modules for IMS monitor data set.
    - Create source and generate modules for IMS trace data sets.
    - Create source and generate modules for IVP and sample databases.
15. Define DBRC RECONs:
    - Review DBRC options selected during planning.
    - Allocate DBRC RECONs on identified DASD volumes.
    - Initialize RECONs.
16. Define network accessibility:
    - Obtain new VTAM APPLID from network staff to be used for parallel production testing environment.
    - Update startup parameters with new APPLID (APPLID1 in DFSPBxxx).

B.32 Validate Parallel-Production Testing Environment

1. Verify that APF authorization is defined.
2. Verify MVS suppression of IMS messages is disabled.
3. Validate batch IMS and run IMS batch IVP application system.
4. Verify that VTAM ACB is active.
5. Verify that RACF IDs have been defined.
6. Verify that the IMS control region user ID has multiple user. address space authority
7. Verify that RACF IMS resource rules are defined.
8. Verify that ACF2/MVS IMS resource rules are defined.
9. If using ACF2/IMS security:

a. Verify that ACF2/MVS globals have the ACF2/IMS load data set.

b. Verify that ACF2/IMS records are defined:

   - EXITS record
   - NETWORK record
   - RESOURCE records
   - OPTS record
   - WTO record
   - SIGNON record
   - STORAGE record

10. Verify that RACF online security is defined for IMS online system in DFSPBxxx parameters.
11. Verify MVS suppression of IMS messages is disabled.
12. Validate parallel production testing IMS basic system:
    - Start online system (COLDSTART).
    - Verify that IMS master terminal connects and functions correctly (messages are received and formatted properly).
    - Start message regions.
    - Start data communications (/START DC).
    - Test several signon scenarios (successful signon, invalid password, invalid user ID).
    - If using ACF2/IMS security, test /ACF command.
    - Run IMS DB/DC online IVP application.
    - Run IMS sample application.
    - Switch OLDS to force DBRC archive job submission.
    - Verify DBRC archive job.
    - Shut down IMS online system normally.
    - Verify IMS Spool data set print job.
13. Validate parallel production testing IMS system dump capability:
    - Verify that MVS system dump data sets have sufficient DASD space and are clear and available.
    - Verify that MVS system dump options specify required storage areas.
    - Verify that IMS has RACF authority to take system dumps.
    - Verify that IMS system specifies offline dumping (FMTO parameter in DFSPBxxx).
    - Start online system (WARMSTART,AUTO=Y).
    - Start message regions.
    - Start data communications (/START DC).
    - Run several IVP or sample transactions.
    - Abend the IMS system with a dump (F IMS,DUMP)
    - Verify that IMS has successfully completed a dump to the MVS system dump data sets (IMS and MVS successful dump completion messages are received and MVS display of dump data sets show IMS dump).
    - Start online system (ERESTART,AUTO=Y).
    - Start message regions.
    - Start data communications (/START DC).
    - Run several IVP or sample transactions.
    - Shut down IMS online system normally.
14. Update startup parameters for automatic startup (AUTO=Y in DFSPBxxx).

B.33 Create Application Portion of Parallel Production Testing Environment

1. Create application MFS FORMAT data sets:
   - Create copy of current application MFS FORMAT data set (cannot be shared with Version 1.2 because the Version 5 directory format is different).
   - Create MFS service utility input to delete IMS Version 1.2 system MFS screens (Version 1.2 is not compatible with Version 5).
   - Run MFS service utility and delete screens. (Save this job to rerun during actual production cutover.)
   - Allocate new suffixed application MFS FORMAT data sets.
   - Run online change utility to populate application MFS FORMAT execution data sets.
   - Update IMS control region JCL with new application MFS FORMAT data sets concatenated after the IMS system MFS FORMAT data set.
2. Create application PGMLIB:
   - Create copy of current application PGMLIB (allow for updates).
   - Review contents and delete any IMS sample or IVP programs.
   - Update IMS message regions with new application PGMLIB data set name concatenated ahead of IMS sample or IVP PGMLIB data set.
3. Customize RESLIB for application-dependent non-IMS code:
   - Copy non-IMS application-dependent modules to RESLIB.
   - Review current LNKLST requirements for RESLIB and add RESLIB to LNKLST if necessary.

B.34 Create Parallel Production Testing Environment Online Change Procedures and Documentation

1. Create online change JCL procedures.
2. Create online change operations documentation for performing online change:
   - Standard process (no conflicts).
   - Problem identification and methods of resolving conflicts.

B.35 Validate Parallel Production Testing Environment Online Change

1. Validate online change process without conflicts:
   - Start online system (WARMSTART,AUTO=Y).
   - Start message regions.
   - Start data communications (/START DC).
   - Run several IVP or sample transactions.
   - Run IVP MFS generation into staging library.
   - Run IVP ACBGEN into staging library.
   - Perform MFS and ACB online change following documented procedures.
   - Run several IVP or sample transactions.
2. Validate online change process with conflicts:
   - Change message region classes to exclude IVP transactions.
   - Enter several IVP transactions.
   - Start IVP BMP job that waits.

- Perform MFS and ACB online change following documented procedures to identify and resolve conflicts and complete online change.
- Shut down IMS online system normally.

B.36 Status Check Progress on IMS Database and Operations Tasks

1. Obtain status of database and operations tasks.
2. Notify project members of successful completion of IMS parallel production testing system verification.
3. Notify automation project staff that IMS automation conversion and migration activities may proceed.

B.37 Check Status and Finalize IMS Database Impact Tasks Requiring Completion in Current IMS Version 1.2 Environment

1. Complete database conversions for databases that were identified as being able to convert to standard IBM-provided DB exits.
2. Install any required customized DB exits for databases that are unable to convert to standard IBM-provided DB exits:
   - Copy identified and revised exit source into source data set.
   - Allocate IMS Version 1.2 USERLIB data set.
   - Assemble and link exits into IMS Version 1.2 USERLIB data set.
   - Change JCL to use IMS Version 5 macros and AMODE/RMODE 31.
   - Assemble and link exits into IMS Version 5 USERLIB data set.
3. Complete database conversions for databases that need customized database exits using IMS Version 1.2 exits
4. Complete any identified ISAM-to-VSAM database conversions.
5. Ensure consensus and completion of IMS parallel production testing and database environment planning

B.38 Create Database Portion of Parallel Production Testing Environment

1. Define parallel production testing application databases. Run jobs to restore copies of production databases (jobs must execute on IMS Version 1.2 MVS LPAR if using Version 1.2 image copy input).
2. Allocate dynamic allocation data set and add data set name to the IMS DLI separate address space JCL STEPLIB concatenation for full function databases, and to the IMS control region JCL STEPLIB concatenation for Fast Path databases.
3. Provide dynamic allocation data set name to MVS systems person for APF authority.
4. Define database dynamic allocation source and generate application database modules into parallel production dynamic allocation data set.
5. Rerun ACBGEN to ensure that DBDs used are current (include new converted DBDs).
6. Copy customized database exits from Version 5 USERLIB to Version 5 RESLIB.

B.39 Validate Full Parallel Production Testing Environment

1. Verify APF authorization for dynamic allocation data set.
2. Validate parallel production testing IMS basic system:
   - Start online system (COLDSTART).
   - Start message regions.
   - Start data communications (/START DC).
   - Run several IMS IVP transactions.
3. Validate each application's initial access:
   - Run at least one transaction from each IMS application.
   - Validate database access and data returned.
   - Shut down IMS online system normally.

B.40 Customize Operations Procedures for Parallel Production Testing Environment

1. Verify that operations automation is complete.
2. Customize startup procedures for
   - IMS COLDSTARTs using manual IMS startup commands
   - IMS WARMSTARTS using automatic and manual startup
   - IMS EMERGENCY RESTARTS using automatic and manual startup.
3. Document when each startup type is appropriate.
4. Customize shutdown procedures for
   - Normal shutdowns
   - Emergency shutdowns with and without a dump.
5. Customize documentation for IMS archive jobs.
6. Obtain RACF read-access to documentation for operations staff.

B.41 Perform Operations Testing

1. Operations staff verifies startup procedures.
2. Operations staff verifies shutdown procedures.
3. Operations staff verifies archive procedures.

B.42 Check Status of IMS-Related Products

1. Ensure that new or upgraded product basic validation (IVPs) have been completed.
2. Ensure that obsolete or back-leveled software has been removed from the new MVS/IMS system. If necessary, create copies of data sets for testing or use on new system only.
3. Ensure that complete new and upgraded software is available for application or user testing.

B.43 Check Status of Application Impact Items and Testing Readiness

1. Ensure that application impact items are complete:
   - Make sure that application program OS checkpoints are eliminated or converted to IMS checkpointing.
   - Make sure that application program restarts can be tested with new SLDS.
   - Check that application generation procedures (DBD, PSB, ACB, MFS and program compile) have correct MVS assembler, DFSMS binder and data set names for new MVS and IMS.
2. Verify that applications staff is ready to begin testing.

B.44 Check Status of IMS Control Block (Code), Log Tape Sensitive, and JCL or Job Generation Tasks

1. Ensure that IMS control block and code sensitive programs are upgraded and ready for testing and use.
2. Ensure that IMS log usage software and programs have been upgraded and are ready for testing and use.
3. Ensure that JCL and the job generation environment is ready for testing.

B.45 Finalize Plan for IMS Version 5 Open Testing in IMS Parallel Production Testing Environment

1. Identify application testing requirements:
   - Online system availability
   - Database and batch window availability
   - Other resource requirements
2. Identify database testing requirements:
   - Database availability windows for recovery testing
   - Database availability windows for reorganization testing
3. Identify any additional operations testing requirements and online system availability for startup and shutdown familiarization.
4. Identify systems testing requirements and standalone time windows for testing system recovery.
5. Identify testers and testing requirements for new and upgraded products.
6. Identify testers and testing requirements for IMS control block and code sensitive programs.
7. Identify testers and testing requirements for IMS log usage software and programs.
8. Identify testers and testing requirements for JCL and the job generation environment.
9. Reach consensus on testing schedule.
10. Publish testing schedule.

B.46 Perform Applications Testing

1. Each Applications Group tests online application system.
2. Each Applications Group tests batch/BMP application system.
3. Each Applications Group tests batch/BMP application system with failure and restart using IMS SLDS.

B.47 Perform Database Testing

1. Database Administrators test image copy jobs for their areas.
2. Database Administrators test recovery jobs for their areas.
3. Database Administrators test reorganization jobs for their areas.

B.48 Perform Product, IMS Code Sensitive, IMS Log Usage, and JCL Related Testing

1. Designated testers perform IMS-related product testing.
2. Designated testers perform IMS control block and code-sensitive program testing.
3. Designated testers perform IMS log tape usage testing.
4. Designated testers perform JCL and job generation testing.

B.49 Create Systems-Owned Support Procedures for Parallel Production Testing Environment

1. Create JCL and document procedures for recovery:
   - Close IMS OLDS using WADS.
   - Close IMS OLDS using previous OLDS.
2. Create JCL and document procedures for IMS logging:
   - Generate ARCHIVE jobs through IMS online.
   - Generate ARCHIVE jobs in batch.
   - Print IMS log records.
3. Create JCL and document procedures for RECON maintenance:
   - Back up RECONs (standalone).
   - Recover RECONs.
   - Reorganize or move RECONs (or both).
   - List RECON records.
   - Delete RECON SLDS and RLDS records.
4. Create or customize JCL and document procedures for SYSGENs:
   - Run Stage 1 and Stage 2 SYSGENs.
   - Run Security SYSGENs.
   - Create jobs and procedures to implement MODBLKS SYSGENs.
   - Create jobs and procedures to implement CTLBLKS SYSGENs.
5. Create or customize JCL and document procedures for IMS monitor:
   - Turn IMS Monitor on and off.
   - Create jobs and procedures to back up monitor output and run IMS monitor report.
6. Create or customize JCL and document procedures for IMS traces:
   - Turn various IMS traces on and off.

- Create jobs and procedures to back up trace output and run IMS trace formatting and printing.

7. Create or customize JCL and document procedures for IMS system dumps:
   - Copy IMS dumps to IMS-owned DASD data sets for IPCS debugging.
   - Run IMS IPCS dialog.
   - Copy IMS dumps to tape for mailing to IBM.
8. Create JCL and document procedures for backups:
   - Back up IMS data sets and RECONs for onsite recovery.
   - Back up IMS data sets and RECONs for offsite or disaster recovery.

B.50 Perform Systems Procedures Testing

1. Test procedures for closing IMS OLDS using WADS.
2. Test procedures for closing IMS OLDS using previous OLDS.
3. Test procedures for generating ARCHIVE jobs through IMS online.
4. Test procedures for generating ARCHIVE jobs in batch.
5. Test procedures for printing IMS log records.
6. Test procedures for backing up RECONs (standalone).
7. Test procedures for recovering RECONs.
8. Test procedures for reorganizing RECONs, moving RECONs, and reorganizing RECONs while moving them
9. Test procedures for list RECON records.
10. Test procedures for deleting RECON SLDS and RLDS records.
11. Test procedures for running Stage 1 and Stage 2 SYSGENs
12. Test procedures for running Security SYSGENs
13. Test procedures for implementing MODBLKS SYSGENs.
14. Test procedures for implementing CTLBLKS SYSGENs.
15. Test procedures for turning IMS Monitor on and off.
16. Test procedures for backing up IMS monitor output and running IMS monitor report.
17. Test procedures for turning various IMS traces on and off.
18. Test procedures for backing up trace output and running IMS trace formatting and printing.
19. Test procedures for copying IMS dumps to IMS-owned DASD data sets for IPCS debugging.
20. Test procedures for running the IMS IPCS dialog.
21. Test procedures for copying IMS dumps to tape for mailing to IBM.
22. Test procedures for backing up IMS data sets and RECONs for onsite recovery.
23. Test procedures for backing up IMS data sets and RECONs for offsite or disaster recovery.

B.51 Plan for End-User Parallel Testing

1. Identify IMS and MVS testing requirements.
2. Reach consensus on criteria for successful test.
3. Reach consensus on whether IMS messages will be suppressed during end-user parallel testing.
4. Develop JCL or jobs and procedures to synchronize environments for
   - IMS databases or DBDs
   - IMS application programs, MFS, PSBs (ACBs)
   - IMS system and security definitions (SYSGENS/SMU)
   - Other identified resource items, such as job scheduling, printing, and tape drive access
5. Develop time-line task checklist for overnight and weekend synchronization.
6. Schedule personnel for parallel system synchronization and parallel testing window coverage.
7. Designate end-user status checking focal point contact.
8. Schedule parallel testing.
9. Publish end-user parallel testing schedule and end-user status checking focal point contact.
10. Dry-run synchronization process if possible.

B.52 Perform Parallel System Synchronization

1. Follow synchronization plan for
   - IMS databases or DBDs
   - IMS application programs, MFS, PSBs (ACBs)
   - IMS system and security definitions (SYSGENS/SMU)
   - Other identified resource items, such as job scheduling, printing, and tape drive access
2. Update end-user status checking focal point contact as each task is completed.

B.53 Perform End-User Parallel Testing

1. Each end-user area notifies end-user focal point contact when beginning testing.
2. Each end-user area performs appropriate testing.
3. Each end-user area notifies end-user focal point contact when testing is complete.

B.54 Plan for Cutover to New IMS/MVS System and Machine

1. Meet with MVS and DBA staff to develop cutover plan.
2. Develop timeline task checklist and plan for cutover. Include the following tasks in the plan:
   - Allow normal batch work to complete.

- Run full set of IMS system data set backups.
- Schedule and run full set of IMS Version 1.2 database image copies.
- Ensure that other subsystem backup requirements are complete.
- Ensure that MVS backup requirements are complete.
- Shut down system.
- IPL new machine if required.
- Rename RECON data sets used during testing.
- Define and initialize new set of RECON data sets.
- Schedule and run full set of IMS Version 5 database image copies.
- Update IMS VTAM APPLID with real production name (APPLID1 in DFSPBxxx).
- If changes have occurred since parallel testing, run full ACBGEN and online change utility to implement.
- Validate MVS suppression of IMS messages.
- Update message region JCL to use production PGMLIB.
- Rename application MFS FORMAT staging data set used during testing, update on-line change utility JCL to use production FORMAT data set as staging data set, run MFS service utility to delete old IMS system MFS screens, and run online change utility to implement.
- Startup of IMS V5.1 system.
- End-user testing timeframe.

3. Develop fallback plan.
4. Reach consensus on fallback criteria:
   - What types of failures trigger an immediate fallback?
   - Will all systems fall back or only failing system?
   - What types of repetitive failures trigger a fallback (for example, if it restarts okay but fails again)?
   - What is the fallback period? That is, at what point is fallback not possible and problem resolution the only recourse?
5. Schedule personnel for cutover coverage.
6. Designate end-user status checking focal point contact.
7. Publish scheduled cutover dates, fallback criteria, and end-user status checking focal point contact.
8. Dry-run cutover process if at all possible.

B.55 Perform Cutover to New IMS/MVS System and Machine

1. Follow developed plan to change to IMS/MVS system and machine.
2. Notify end-user focal point contact as each major task is completed.
3. Monitor systems and machine status during fallback period.
4. Publish end of fallback period.

B.56 Followup Tasks

1. Meet with MVS, database, and applications staff for project review:
   - Identify tasks that went well.
   - Identify tasks that could be improved for the next upgrade.
   - Document results of the review and save them.

2. Identify obsolete data sets and members containing:
    - Source
    - Object modules
    - Load modules
    - JCL
    - Control cards
    - Documentation
3. Publish dates for deletion of obsolete items.
4. Provide Help Desk with list of data sets and members that will be deleted and new corresponding data sets and members that should be used.
5. Delete obsolete items as scheduled.
6. Publish accomplishment of deletion with instructions to contact Help Desk if problems are encountered.

Appendix C. Migration Considerations: IMS Version 1.2 to Version 1.3

1. ACBGEN PSB=ALL is required.
2. DBRC Type 4 SVC (new)
3. Separate nonsharable IMS Type 2 SVC.
4. DASD logs—need a minimum of three for startup
5. RECON data sets and DASD hardware reserves
6. OS CHKPT support discontinued.
7. MFS FORMAT data set directory changes (14=>24 bytes) ***not*** compatible.
8. APF Authorization for new online change MODBLKSx/MATRIXx data sets.
9. Multiple address space JCL and procedures.
10. Increased REGION required for batch DBRC.
11. Dynamic log (DBLLOG DD statement in the control region) was discontinued.
12. VSAM buffer pool minimum size is now 3 buffers; IMS used to override any number too low and force (2 X #PSTs) + 1; check pools.
13. New MFS DDnames
    - IMSDILIB now FORMATA/B
    - IMSFMT now IMSFMTA/B
14. Standalone dump no longer required for LOG recovery.
15. DFS194W message at each PSB schedule for unregistered DBs.
16. DFS994 startup completed message text change
17. Restart data set now records only checkpoint information; if DISKLOG=YES was coded, can reduce IMSRDS DD data set size.
18. Work area pool WKAP size now required in startup parameters—can no longer be specified in SYSGEN.
19. Online change uses MVS enqueues to manage online change data sets:
    - SYSTEMS scope QNAME DFSOC001 RNAME data set name and volser
    - ACBGEN/MFSGEN request EXCL for staging data set
    - Online change utility requests EXCL for staging and inactive data sets.
    - IMS control region requests SHR for active data set; during online change process, requests SHR for both active and inactive.
20. PSB pool is split between CSA and PVT when running LSO=S.
21. PROCLIB DD FREE=CLOSE causes error/default buffers at startup.
22. DASD IMS monitor data set must be a single extent (IMS uses only the first extent).
23. Online logs (OLDS) must be single extent (IMS uses only the first extent)
24. DUAL online logs (OLDS) must be same size (IMS uses the smallest size).
25. Write ahead data sets (WADS) must be on the same DASD device type.
26. DFSFIXxx POOLS DLMP fixes only the CSA portion of PSP pool when running LSO=S; POOLS DPSB fixes PVT portion of pool.

Appendix D. Migration Considerations: IMS Version 1.3 to Version 2.2

1. ACBGEN PSB=ALL is required.
2. IMS Version 2.2 resource cleanup module is ***not*** compatible with previous IMS release levels without maintenance being installed on prior IMS level systems and prior MVS systems. (See APARs PP46838 and II02461.)
3. *IMS/ESA Installation Volume 2: System Definition and Tailoring* has dump option recommendations.
4. VTAM node names are now in IMS log records instead of relative terminal number.
5. Number of RECANY buffers can now be specified in startup parameters.
6. New DFSVSMxx keyword VSRBF can be used to define VSAM buffers.
7. All DC exits must be capable of 31-bit addressing.
8. SECURITY procedure should have RMODE=ANY in link step.
9. All SPAs are now in core; DASD is used only if conversation is held.
10. CWAP pool size should be increased to accommodate SPAs.
11. Command processing now in communications I/O pool (CIOP); increase pool size if network is large.
12. All VTAM output messages are now in the new high I/O pool (HIOP). The pool is automatically created during SYSGEN (size cannot be specified).
13. VTAM control blocks are now combined in VTCB.
14. Security exits must be AMODE31.
15. New DB I/O error control blocks EEQE are created if a DB I/O error occurs. The command /DISPLAY DB BKERR displays any EEQEs.
16. Transactions can schedule without all DBs available:
    - New U3303 application abends occur if transactions attempt to access an unavailable database.
    - A new transaction status, USTOPPED, occurs after ten U3303 abends.
    - New SYSGEN TRANSACT SERIAL=YES can be used to cause transactions to be USTOPPED after the first U3303 abend.
    - New application INIT call can be used to return status code instead of abend U3303.
17. OSAM sequential buffering (SB) usage requires SBONLINE control statement in DFSVSMxx for online IMS systems.
18. DFSSTAT DD SYSOUT=x statement in BMPs and batch jobs provide statistics on how OSAM sequential buffering would help or did help the job.
19. IMS DLIBATCH jobs using OSAM SB should also specify the new execution parameter IOB=xx (max OSAM concurrent I/O); default 7.
20. OLDSDEF/WADSDEF statements are required in DFSVSMxx.
21. IMS primer application is no longer supported; it is replaced by the new IMS IVP application.
22. Batch backout (BBO) requires a control card specifying COLDSTART or DATABASE; the old control card IGNORE is invalid.

23. BBO now requires the last X'07' (backout failure) log record. If the failure occurs during an emergency IMS system restart, the first log from the startup is required as input to batch backout.
24. Expedited receive any buffer handling default startup parameter RECH=N is recommended. RECH=Y should be used only if you are exhausting your VTAM RECANY buffers.
25. A new startup message DFS3804I, last valid restart checkpoint, follows the (old) DFS994I and DFS3499I.
26. New HD locking protocol locks only the root anchor point (RAP) of an HDAM DB instead of RAP and root; one root per RAP is now highly recommended.
27. The new TRANSACT MAXREGN keyword restricts the maximum number of message regions that can run a parallel transaction.

Appendix E. Migration Considerations: IMS Version 2.2 to Version 3

1. ACBGEN PSB=ALL is required.
2. ISAM is no longer supported.
3. Utility Control Facility (UCF) is no longer supported for DB recovery utilities, but still is supported for reorganization utilities.
4. MVS/370 is no longer supported (must run under MVS/SP Version 3 or later).
5. Track recovery for VSAM KSDS is no longer supported.
6. IMS logs the changed database segment data only; no more before or after images of database segments.
7. VSAM multiple subpools and dedicated subpools support has been added.
8. VSAM separate subpools can be specified for data and index components — the default (no specification) is both components.
9. DFSDDLT0 is now object-code only. If you have modified it or want the source, save it from the previous release.
10. LSO=X|N are no longer supported.
11. IMS database exits must be 31-bit addressable. Please see *MVS/XA Conversion Notebook for System Product Version 2*, GC28-1567, Chapter 3 for 31-bit address considerations.
12. MVS/ESA conversion notebook for systems product (Version 2 or 3).
13. Transactions do not get QC status codes returned when they reach PROCLIM if there is another same transaction on the input queue and the TRANSACT PLC is greater than 1 (quick reschedule). To disable this code, use PLC=1 on the TRANSACT SYSGEN macro.
14. RECON data sets must all be allocated the same way (all three dynamic or all three in JCL). Dynamic is recommended.
15. IMS OLDS/WADS dynamic allocation modules are used even if DD statements are in JCL (JCL is ignored).
16. VSAM strings can now be specified separately. The default is still (maximum PSTs + 1). This can be specified in one of two ways:
    - In DFSVSMxx/DFSVSAMP OPTIONS statement: STRINGMX=x sets VSAM strings for all VSAM databases.
    - On the POOLID statement: STRINGMX=x sets VSAM strings for all VSAM databases in this pool.
17. Enhanced emergency restart:
    - /ERESTART COLDCOMM to recover DBs and delete messages.
    - /ERESTART COLDBASE to recover messages without any DB backout.
    - /ERESTART COLDSYS (close logs), then /NRESTART CHECKPOINT 0 to delete messages without database backout.
18. All exits allow RMODE31 (not required).
19. IMS log recovery utility (DFSULTR0) no longer accepts PSBLIST=YES. Use PSB MODE control statement.
20. Log buffers move from CSA <16M to CSA >16M only if running with LSO=S (they remain in private with LSO=Y).

21. Security reverification exit is called only if the transaction authorization exit (DFSCTRN0) is used.
22. Enhanced deadlock processing is provided through a new application call, INIT STATUS GROUPB, which causes the application to get a new status code of BC instead of abending with U0777.
23. Use of the OSAM buffer model facility is through GTF tracing, which can degrade performance if not properly set up.
24. PARLIM=0 was used in previous IMS releases to turn off parallel scheduling; now it turns it on (delete the keyword to turn it off).
25. IMSGEN NODE keyword now supports a 26-character high-level qualifier.
26. OSAM database writes now fix only the buffers being written, not the entire pool.

Appendix F. Migration Considerations: IMS Version 3 to Version 4

1. ACBGEN PSB=ALL is required.
2. DASD SPAs are no longer supported. You must change SYSGEN TRANSACT SPA keyword DASD to CORE.
3. SPAs are now created dynamically; remove the SYSGEN SPAREA macro.
4. Conversational work area pool (CWAP) has been renamed to scratch pad area pool (SPAP).
5. Terminal device Types 3767 and Finance are no longer supported.
6. Split (terminal) I/O LTERMs are no longer supported.
7. DFS2002 connect message is discontinued.
8. New logon and signon messages, DFS3649 and DFS3650, are introduced with IBM-provided MFS:
   - Screens can be replaced by writing a greetings message exit.
   - Use DFSGMSG0 to send your own screens or messages, or both.
9. Database PURGE processing now drives all OSAM DB writes concurrently to all packs. OSAM databases should be spread out over as many packs as possible to take advantage of the simultaneous I/Os (VSAM writes are still serialized).
10. Scheduling, termination, DC calls and syncpoint processing, which used to be serialized in the IMS control region, have now moved to the dependent region for better performance and throughput. CPU time has shifted from the IMS control region overhead to transactions; transaction CPU time will be approximately 30 percent higher (and IMS control region CPU will drop correspondingly).
11. Startup parameters are now specified in control cards (module DFSPRRGx is no longer supported):
    - Control cards are in member DFSPBxxx in PROCLIB.
    - DFSPBxxx suffix is specified in IMS control region parameter RGSUF=xxx.
    - Startup overrides are entered PARM1='AAA=aaa'.
    - IMS control region JCL has changed - parameters have been removed from the EXEC statement. Customize new JCL (created by IMS system), or retrofit changes into the current control region JCL.
12. Installation dialog does not allocate an SMPLOG. You must allocate one and update the IMS SMP procedure to use it for tracking.
13. Enhanced message queue handling includes
    - Queue space notification exit DFSQSPC0
    - Multiple message queue data sets. These allow you to spread the MSGQ over multiple packs; any error still causes U0768.
14. The language interface module DFSLI000 may not be downward compatible. An application program linked with the IMS Version 4 version should not be run under a previous version of IMS if it uses the new interfaces or function.
15. External trace data sets can optionally be used to hold trace data output, rather than writing the trace information to the IMS log. These data sets are used in a flip-flop manner. No archive job is provided, and IMS writes over

whatever is there. You must create your own archive, copy, or backup job and run it before IMS switches back to the first trace data set.

16. Utilization of the GSAM concatenated data set and/or system-determined block size should be examined carefully before implementation. Application JCL, DBD, and operational changes are required.
17. The message-region BLDL parameter maximum is increased to 9999.
18. Callable services should be used for storage and control block access in all DC exits. DB exits must continue to use IMODULE for storage and DFSCBTS for control block access.
19. Generic command support is for NODE, USER, LTERM, MSNAME, and TRAN keywords. All others still require specific names.
20. If a database randomizer exit is linked as RENT, IMS no longer serializes DB access. The IBM-provided randomizer exits DFSHDC10, DFSHDC20, DFSHDC30, and DFSHDC40 are linked RENT.
21. IMS does ***not*** support PDSEs.
22. The new command /CHECKPOINT STATISTICS generates IMS log records X′450E′ pool statistics for the new storage manager.

Appendix G. Migration Considerations: IMS Version 4 to Version 5

1. ACBGEN PSB=ALL is required.
2. CICS Local DL/I is not supported by IMS Version 5 (use DBCTL).
3. IMS LU6.2 adapter is no longer supported (code is shipped, but APPC/IMS is the only supported LU6.2 access).
4. The automated operator exit DFSAOUE0 is no longer hard-linked in the IMS nucleus. It must be separately linked into the IMS RESLIB. If IMS finds a DFSAOEU0 module in RESLIB, it will load and use it. Make sure there is no obsolete module in RESLIB.
5. The terminal routing exit, DFSCMTR0, is no longer hard-linked into the IMS nucleus. It must now be separately linked into RESLIB. If IMS finds a DFSCMTR0 module in RESLIB and does not find a DFSNPRT0 module, IMS loads and uses DFSCMTR0. Make sure you do not have an obsolete DFSCMTR0 module in RESLIB.
6. COMM macro AOEXIT keyword must be deleted; MSTEXIT/NOMSTEXT should also be removed.
7. IMS control region and DL/I separate address space region security user IDs must have control access to the VSAM databases (VSAM DB data set external security access is now verified).
8. Message control error exit DFSCMUX0 is now also called for LU6.2 and OTMA (DFSLULU0 LU6.2 exit is no longer supported).
9. APPC/IMS transactions can use MSC.
10. New automated operator interface (Type 2) DFSAOE00 sees more input than the Type 1 DFSAOUE0 and uses new AOI Callable Services to enqueue, dequeue, or cancel a message. (Type 2 functions in all environments; Type 1 does not work in DBCTL.) If both exits are present in the RESLIB, the Type 2 exit is called; however, the Type 2 exit can be written to call the Type 1 exit. Conversion or migration to the new exit is ***not*** required.
11. OSAM DB support for dynamic cache management—extended (DCME) is enabled only if the OSAM DB is on a DASD connected to a cache controller.
12. Enhanced time-stamp recovery allows recovery to any valid time stamp when a database was not allocated to an online system or batch job, instead of requiring end-of-volume, as in previous releases. Procedures using the command /DBRECOVERY (automated and manual) should be reviewed and the addition of an NOFEOV keyword should be considered to reduce the number of log switches and archive jobs.
13. Log formatting and select utility DFSERA10 enhanced print format is activated by adding parameter PARM=(XFMT=YES) to the OPTIONS control card with the EXITR=DFSERA70 parameter. All log records associated with a database recovery token can be selected and printed with parameter PARM=(TOKEN=X′aaaa′); these can be combined (PARM=(XFMT=Y,TOKEN=X′aaaa′)). If the PARM keyword is not specified, the utility prints as it did in previous releases.
14. Databases can be defined to DBRC in DATAGROUPs, which allows one command to be used for /START, /STOP, /DBRECOVERY, /DBDUMP. Databases do not have to be registered to DBRC in order to use this facility. This could be used to streamline manual or automated procedures.

15. New keywords DBALLOC/NODBALLOC on the /START DB command allow a DB to be started but not allocated to IMS. Default for /START DB ALL is NODBALLOC; all other /START DB commands are DBALLOC (including the new /START DATAGROUP command). If you want /START DB ALL to allocate all databases to the online IMS system, you need to change automated and manual procedures to /START DB ALL DBALLOC.

16. When using the ALL keyword or the new DATAGROUP keyword for database commands, IMS no longer issues reply messages DFS2500I and DFS0488I for each successful database command execution. IMS now replies with a new format of the DFS0488I message after all databases have been processed. Any failures continue to be reported. If there is message suppression or automation that searches for these messages or is sensitive to the text, change is needed to your automation.

17. Support was added for the MVS/ESA automatic restart manager (ARM) by APAR PN71392, which contains a detailed explanation of the support in the APAR text. The default is for ARM to be active. To disable it for testing and when MVS ARM is not available, change the PFSPBxxx keyword to ARMRST=N.

18. Application programs may be affected by the increase in maximum allowable dependent regions, which has increased the length of the IMS time stamp checkpoint ID from 12 to 14 bytes. Application programs that restart by specifying the checkpoint ID in the XRST call's IOAREA may require change to accommodate the larger IOAREA to hold the larger checkpoint ID. Please see APAR PN83358 for more details.

Appendix H. Special Notices

This publication is intended to help systems programmers, database administrators, and application specialists migrate their existing IBM Information Management Systems (IMS) and applications to IMS Version 5. The information in this book discusses migrating currently working systems to Version 5 with the minimum of effort. The information in this publication is not intended as the specification of any programming interfaces that are provided by IMS/ESA Version 5. See the PUBLICATIONS section of the IBM Programming Announcement for IMS/ESA Version 5 for more information about what publications are considered to be product documentation.

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Appendix I. Related Publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

I.1 International Technical Support Organization Publications

For information on ordering these ITSO publications see “How to Get ITSO Redbooks” on page 201.

- *IMS/ESA Version 4 Migration Guide*, GG24-4150
- *IMS/ESA Version 5 Guide*, GG24-4302
- *IMS/ESA Version 6 Guide*, SG24-2228
- *Guide to IMS with MVS/ESA*, GG24-3325
- *IMS/ESA Data Sharing in a Parallel Sysplex*, SG24-4303
- *IMS/ESA Sysplex Data Sharing: An Implementation Case Study*, SG24-4831
- *CICS/ESA and IMS/ESA: DBCTL Migration for CICS Users*, GG24-3484

I.2 Redbooks on CD-ROMs

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I.3 Other Publications

These publications are also relevant as further information sources:

- *IMS: Why Migrate?*, GC26-8912
- *IMS/VS Version 2 Release Guide*, SC26-4185
- *IMS/ESA Version 3 Release Planning Guide*, GC26-4386
- *IMS/ESA Version 3 Release Planning Notebook*, GG66-3165
- *IMS/ESA Version 4 Release Planning Guide*, GC26-4630
- *IMS/ESA Release Planning Guide Version 5*, GC26-8031
- *IMS/ESA Application Programming: Transaction Manager*, SC26-8017
- *IMS/ESA Administration Guide: System*, SC26-8013
- *IMS/ESA Customization Guide*, SC26-8020
- *IMS/ESA Diagnosis Guide and Reference*, LY27-9620, available only to licenced users of IMS.

- *IMS/ESA General Information*, GC26-3467
- *IMS/ESA Installation Volume 1: Installation and Verification*, SC26-8023
- *IMS/ESA Installation Volume 2: System Definition and Tailoring*, SC26-8024
- *IMS/ESA Operations Guide.*, SC26-8029
- *IMS/ESA Operator's Reference*, SC26-8030
- *IMS/ESA Sample Operating Procedures*, SC26-8032
- *IMS/ESA Utilities Reference: System*, SC26-8035
- *IMS/ESA V6 DBRC Guide and Reference*, SC26-8733
- *CICS/ESA Application Programming Guide*, SC33-1169
- *CICS/ESA CICS-IMS Database Control Guide*, SC33-1184
- *CICS/ESA Installation Guide*, GC33-1163
- *CICS/ESA Resource Definition Guide*, SC33-1166
- *MVS/XA Conversion Notebook for System Product Version 2*, GC28-1567

How to Get ITSO Redbooks

This section explains how both customers and IBM employees can find out about ITSO redbooks, CD-ROMs, workshops, and residencies. A form for ordering books and CD-ROMs is also provided.

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- **Redbooks Web Site on the World Wide Web**

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List of Abbreviations

ACB	access control block
ACB	application control block
ACBGEN	application control block generation
ADF	application development facility
AGN	application group name
AOC/MVS	automated operations control/multiple virtual storage (IBM)
AOF	automated operator facility
AOI	automatic operator interface
APAR	authorized program analysis report
APF	authorized program facility (MVS)
APPLCTN	application
APPLID	application identifier
ARM	MVS/ESA Automatic Restart Manager
ART	ad hoc reporting tool (IMS/ESA)
BATCH	background computer run
BBO	batch backout
BMP	batch message processing, region (IMS)
BTS	batch terminal simulator
CA	change accumulation
CBIPO	custom built installation process offering (MVS)
CBPDO	custom built product delivery offering (MVS)
CD-ROM	(optically read) compact disk - read only memory
CEMT	Master Terminal Transaction (CICS)
CHKPT	checkpoint
CI	control interval
CICS	customer information control system (IBM)
CICS/ESA	customer information control system/enterprise systems architecture (IBM)
CICS/MVS	customer information control system/multiple virtual storage (IBM)
CICS/VSE	customer information control system/virtual storage extended (IBM)
CIOP	communications I/O pool (IMS control block)
CPU	central processing unit
CRC	command recognition character
CRLP	card reader/line printer
CSD	CICS system definition
CSECT	control section
CTL	control
CWAP	communications work area pool
DASD	direct access storage device
DB	data base
DB/DC	data base and data communications
DBCTL	Data Base ControL Subsystem
DBD	data base description
DBDGEN	data base description generation
DBRC	data base recovery control (IMS)
DBT	data base tools (software aids for IMS/VS DB)
DC	data communication
DCB	data control block
DCME	Dynamic Cache Management Enhanced
DD	data definition
DEDB	data entry data base
DFP	data facility product (MVS)
DFSMS	Data Facility Storage Management Subsystem (MVS and VM)
DL/I	data language 1
DLI	data language interface
DMB	data management block
DP	data processing
DPROP	data propagator (IBM program product, note - case should be DProp)
DRA	data base resource adapter

EEQE	extended error queue element
EQ	equal
ESCON	enterprise systems connection (architecture, IBM System/390)
ETO	Extended Terminal Option
EXCL	exclusive
EXEC	execute/execution
GOPHER	A menu-based search scheme, used to find information on the Internet. Originally developed at the University of Minnesota it lets you reach a destination on the Internet by selecting items from a series of text menus.
GPAR	general performance analysis reporting
GRS	global resource serialization (MVS)
HDAM	hierarchic direct access method
HIDAM	hierarchic indexed direct access method
HSSP	high-speed sequential processing
I/O	input/output
IBM	International Business Machines Corporation
IC	image copy
ICE	image copy extenstions (IMS Tools)
ID	identification/identifier
IMS	information management system
IMS/ESA	information management system/enterprise systems architecture
IMS/VS	information management system/virtual storage
IMSADF	IMS application development facility
IMSASAP	IMS monitor summary and systems analysis program
IMSGEN	IMS system generation
IMSPARS	IMS performance analysis and reporting system
INIT	initialize/initial/initiate
IOPCB	input/output program communication block
IPL	initial program load
IRLM	integrated resource lock manager
IRLM	IMS/VS resource lock manager
ISAM	indexed sequential access method
ISC	inter-system communications
ISD	IBM Software Distribution (replaced by ISMD)
ISPF/PDF	interactive system productivity facility/program development facility
ITSO	International Technical Support Organization
IVP	installation verification procedure/program
JCL	job control language (MVS and VSE)
JES	job entry subsystem (MVS counterpart to VM′s RSCS)
KSDS	key-sequenced data set
LINE	an SNA resource related to a link
LNKLST	link library concatenation
LPA	link pack area
LSO	local storage option
LTERM	logical terminal
LU	logical unit
MFP	message processing facility
MFS	message formatting services
MOD	message output descriptor
MPR	message processing region
MRQ	IMS Message Requeuer
MSC	multiple systems coupling feature
MTO	master terminal operator
MVS	multiple virtual storage (IBM System 370 & 390)
MVS/ESA	multiple virtual storage/enterprise systems architecture (IBM)
OLC	on-line change
OLDS	on-line log data sets
OS/VS	operating system/virtual storage

OSAM	overflow sequential access method
OTMA	Open Transaction Manager Access
PARMLIB	MVS initialization parameter library
PC	personal computer
PC	program check
PCB	program communication block
PDIR	peripheral data set information record
PDS	partitioned data set
PI	program isolation
PLC	primary license charge
PROC	command procedure
PROCLIB	procedure library (IBM System/360)
PROG	program
PSB	program specification block
PSBGEN	program specification block generation
PSP	preventive service planning
PST	partition specification table
PTF	physical twin forward (IMS)
PTF	program temporary fix
R/O	read-only
RACF	resource access control facility
RAP	root anchor point (HDAM)
RDO	resource definition on-line (CICS)
RDS	restart data set
RECA	receive any buffers (IMS)
RECON	recovery control (data set)
REXX	restructured extended executor language
RLDS	recovery log data set
RO	read only
SB	sequential buffering
SHR	sharable
SIT	system initialization table
SLDS	system log data set
SMP	system modification program (MVS)
SMP/E	system modification program/extended (MVS)
SMS	system managed storage (MVS and VM)
SMU	security maintenance utility
SPE	small programming enhancement
SPOOL	simultaneous peripheral operation on-line
SUBSYS	subsystem
SVC	supervisor call instruction (IBM System/360)
SWAT	special weapons and tactics
SYSGEN	system generation
TCB	task control block
TCO	time controlled operations
TM	transaction manager
TSO	time sharing option
UCF	utility control facility
UNIX	an operating system developed at Bell Laboratories (trademark of UNIX System Laboratories, licensed exclusively by X/Open Company, Ltd.)
URL	Universal Resource Locator
VERSION	a major software release
VSAM	virtual storage access method (IBM)
VTAM	virtual telecommunications access method (IBM) (runs under MVS, VM, & DOS/VSE)
WADS	write ahead data sets
WLR	Workload Router
WTO	write to operator
XRF	extended recovery facility
ZDISK	an extension of the CMS system disk

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Special Characters

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