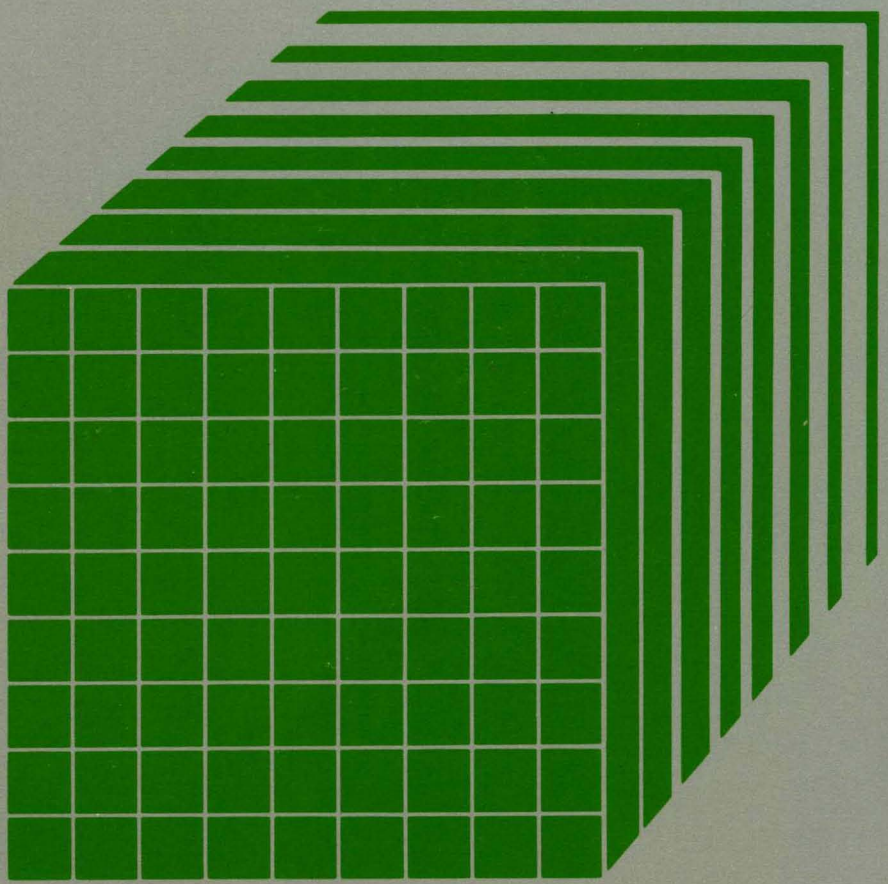
IBM

Virtual Machine/ System Product High Performance Option

Release 5 Guide

SC23-0189-3



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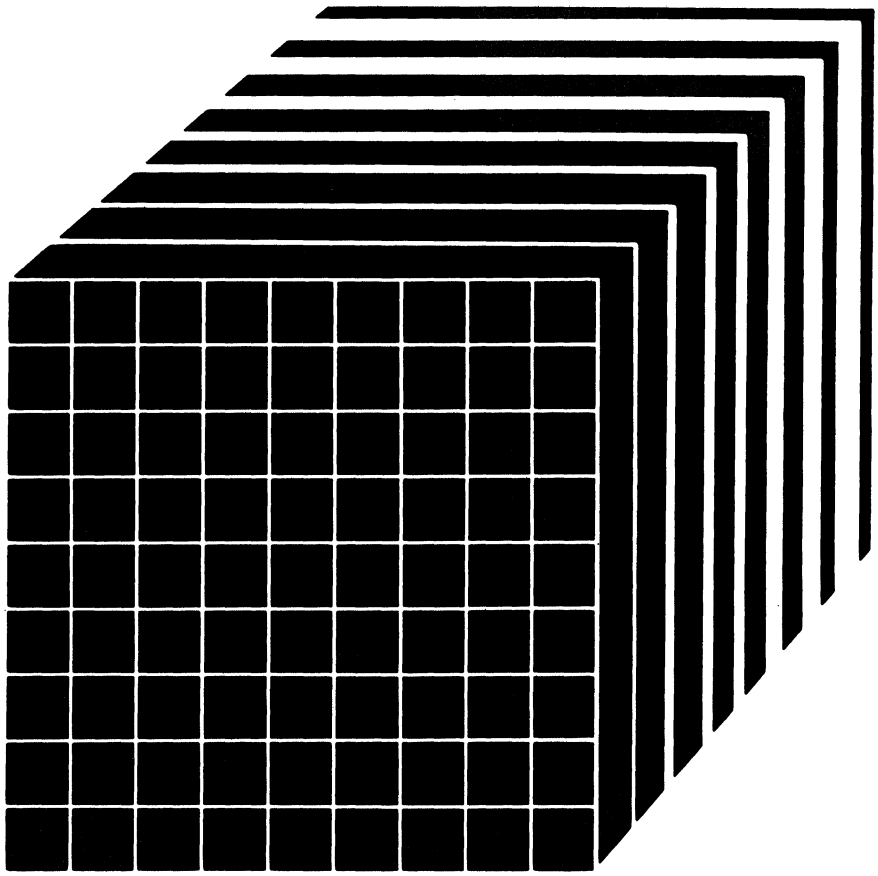

The term "VM/SP High Performance Option" applies to VM/SP High Performance Option Licensed Program when used in conjunction with the VM/System Product Licensed Program.

Fourth Edition (July 1987)

This is a major revision of SC23-0189-2. See "Summary of Changes" on page iii for the changes made to this manual. Technical changes or additions made to the text and illustrations for this release are indicated by a vertical line to the left of the change.

The fourth (current) edition applies to Release 5 of IBM Virtual Machine/System Product High Performance Option (Program Number 5664-173), and to later releases and modifications until otherwise indicated in new editions or Technical Newsletters.

To order the previous edition of this book that still applies to Release 4.2, use the temporary order number ST00-1903. Changes are made periodically to the information herein; before using this publication to operate IBM systems, consult the latest *IBM System/370, 30xx, and 4300 Processors Bibliography*, GC20-0001, for the editions that are applicable and current.

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Summary of Changes

Summary of Changes
for SC23-0189-3
as updated July 1987
for VM/SP HPO Release 5

IMPROVED STORAGE MANAGEMENT AND SIMPLIFIED TUNING

Changed: Programming Support

The new support that selects pages on a systemwide "least recently used" basis aims at improving performance in several ways:

- Improving the memory management of large working sets, shared pages, and the <16 Mb area. Core table scan becomes the primary method for free list replenishment. In addition, the disposable page collector is eliminated.
- Streamlining the QDROP and QADD processes. When a virtual machine drops from queue, its pages will no longer be logically swapped and trimmed.
- Making Expanded Storage (called *Paging Storage* in this manual) more attractive as a swapping device.

ABILITY TO CREATE UP TO 9900 SPOOL FILES PER USER

Changed: Programming Support

The former limit of 9900 spool files on a system has been removed. With this change, there may exist up to 9900 spool files *for each user.*

Spool files will now have a user-unique spool ID. Reader spool file blocks (SFBLOKs) will now be kept in the virtual storage of a special userid, SYSSPOOL. Printer and punch SFBLOKs will remain in FREE storage.

In conjunction with these enhancements, the checkpoint/force start process has been improved to reconstruct the spool files more rapidly.

SCHEDULER ENHANCEMENT

Changed: Programming Support

With this enhancement, virtual machines are moved from the eligible list to the run list only if processor time and sufficient main storage are available. This will help eliminate storage overcommitment and reduce response times.

NEW 'NOQ2' OPTION ON THE 'SET QDROP OFF' COMMAND

New: Programming Support

Specify the SET QDROP OFF NOQ2 command for service virtual machines (like GCS/VSCS) that use system resources in small, frequent bursts. This command will keep that virtual machine in Q1, improving performance for the users of that service.

EXPANDED STORAGE (PAGING STORAGE) ENHANCEMENTS

New: Programming Support

A new macro, SYSXSTOR, is added. This macro controls the allocation of Paging Storage. You may continue to use SYSPAG to allocate Paging Storage, but SYSXSTOR offers these advantages:

- It is easier to use than SYSPAG
- For the 3090 Model 400, it allows you to generate Paging Storage greater than 64 increments.

IMPROVED PAGING ALLOCATION ORDER

New: Programming Support

A new parameter is added to the SYSPAG macro, ORDER=SYSTEM/USER. If ORDER=SYSTEM (the default) is coded, HPO will automatically order the devices allocated on the SYSPAG macro to distribute I/O activity over the available channels and control units. This will decrease the I/O contention by evenly distributing the I/O activity over the available I/O paths. If you specify ORDER=USER, you will preserve the order you specified.

IMPROVED SYSTEM LOCK UTILIZATION

Changed: Programming Support

There is less usage of the system lock in Release 5 and, therefore, less contention. This should improve system performance.

LESS THAN 16 MEGABYTE CONSTRAINT RELIEF

Changed: Programming Support

CP will now reference certain pages above the 16 megabyte line. This relieves constraint below the 16 megabyte line since CP no longer needs to copy these pages below 16 Mb to reference them.

ERROR RECORDING ENHANCEMENTS

New: Programming Support

For a 3090 Processor, the channel check handler and machine check handler will now provide more information in the error records. Specifically, these records will now tell you whether or not the hardware error actually affected system performance.

NEW 'NOVF' PARAMETER ON THE 'OPTION' DIRECTORY ENTRY

New: Programming Support

Specifying the NOVF parameter on a user's OPTION control statement in the directory will deny that user access to the Vector Facility.

4381 PROCESSOR COMPLEX MODELS 11, 12, 13, AND 14

Changed: Hardware Support

The 4381 Processor Complex Models 1, 2, and 3 are replaced and extended by the Models 11, 12, 13, and 14.

NEW MODELS OF THE 3090 PROCESSOR COMPLEX

Changed: Hardware Support

In addition to supporting the 3090 Processor Complex Model 200, VM/SP HPO now supports the 3090 Processor Complex Models 150, 150E, 180, 180E, 200E, 400, and 400E (the 400 and 400E are supported in partitioned processing mode only). VM/SP HPO does **not** support the 300E and 600E.

LOGICAL DEVICE HOST LIMIT RELIEF

Changed: Programming Support

This support removes the restriction that no more than 8 virtual machines can create and use logical devices concurrently. Now, any number of virtual machines can create up to 512 logical devices as long as the number of logical devices in the system does not exceed 4096.

3480 VOLUME SERIAL ERROR RECORDING

Changed: Programming Support

Users can now keep track of the error frequency for 3480 tapes by examining the volume serial in 3480 outboard records (OBR) or miscellaneous data records (MDR).

3422 MAGNETIC TAPE SUBSYSTEM

Changed: Programming Support

VM/SP HPO provides programming support for the 3422 Magnetic Tape Subsystem.

TRANSPARENT SERVICES ACCESS FACILITY (TSAF)

New: Programming Support

The transparent services access facility lets users connect to and communicate with local or remote virtual machines within a group of systems. This facility consists of the TSAF virtual machine component, APPC/VM, and two CP system services. APPC/VM is a modified subset of IUCV. With the TSAF virtual machine, it provides services within a single system and throughout a group of systems, unlike IUCV, which provides services only within a single system. The TSAF virtual machine component handles communication between systems by letting APPC/VM paths span more than one system.

QUERY CPTRAP Command

New: Programming Support

A new command, QUERY CPTRAP, is added.

NATIONAL LANGUAGE SUPPORT

New: Programming Support

VM/SP HPO now supports a variety of national languages. Updates have been made to modules and data areas providing this support, specifically, those handling CP messages.

ALTERNATE NUCLEUS SUPPORT

New: Programming Support

Alternate nucleus support makes it easier to create and IPL backup copies of the CP nucleus when the primary nucleus is damaged or unavailable.

PRINTER SUPPORT ENHANCEMENTS

Changed: Programming Support

The printer support enhancements include the addition of a SPOOL system service facility which provides support for a printer subsystem. The DESTination option allows you to select a specific printer or punch to process your print, punch, or console file. Two new DIAGNOSE codes allow a user to specify additional information about a print file. The CMS PRINT command has been enhanced to support an OVersize option and a special carriage control character to allow a longer data line.

LOGON/LOGOFF ENHANCEMENTS

Changed: Programming Support

The LOGON/LOGOFF enhancements improve system availability to users and resolve the problem of conflicting messages during LOGOFF processing.

ERROR LOGGING SYSTEM SERVICE

Changed: Programming Support

The error logging system service, a new CP system service, allows a virtual machine to receive a copy of all records currently written to the CP error recording area.

SPOOL FILE COMPRESSION SUPPORT ENHANCEMENT

Changed: Programming Support

An enhancement to SPOOL File Compression Support improves the reliability of transmitting spooled data between systems.

ASCII ENHANCEMENTS

Changed: Programming Support

Various enhancements have been made to the support of ASCII devices.

DOCUMENTATION CHANGES

Minor editorial and technical changes have been made throughout this publication.

Summary of Changes
for SC23-0189-2
as updated December 17, 1985
for VM/SP HPO Release 4.2

VECTOR FACILITY

New: Hardware Support

Support is provided for the Vector Facility in System/370 mode configured to a 3090 processor. The Vector Facility is a synchronous vector/scalar instruction processor that can manipulate values (usually floating-point) at a high speed. Compiled engineering and scientific FORTRAN applications can use the array processing capability of the Vector Facility. VM/HPO supports multiple virtual machines' use of this facility.

VM/SP HPO provides user commands to display and change the various sets of registers in the Vector Facility. Commands are changed to provide monitoring and control over Vector Facility functions.

PAGE MIGRATION

Changed: Programming support

Page migration is changed to select pages (rather than segments) for migration on a reference basis instead of by time-stamp (age basis). Also, pages are migrated down the demand page hierarchy, instead of being migrated directly to the pre-allocated migration area. This improves the time required to retrieve those pages that become active in the near future.

Because migration of swap tables is sometimes necessary even when page migration is not actively moving pages, swap table migration is now invoked independently of page migration (rather than after page migration). Swap table migration is further improved by migrating swap tables regardless of whether all the pages in the segment have been migrated.

Because of this change, the installation should retune its free storage requirement.

Commands and monitor are enhanced to support the changed migration algorithms.

AUTO-DEACTIVATION OF RESTRICTED PASSWORDS AND DIRECTORY ENHANCEMENTS

New: Programming Support

This support enhances system integrity by minimizing the exposure of unauthorized system access through the use of restricted passwords. The directory enhancements remove the restriction on the number of USER entries that can be defined in the directory. Also, directory PROFILE support provides a means by which installations can optimize the number of commonly repeated control statements in USER entries in the source directory.

SECURITY ENHANCEMENT

New: Programming Support

The Resource Access Control Facility (RACF) is now called to authorize the STCP and LINK commands. If the user is not authorized to issue the STCP command, an error message is generated. Otherwise, the command is completed and processing continues as normal. If an unauthorized user tries to link to a disk using the LINK command, RACF denies access, the request fails, and an error message is issued. If your installation does not have the RACF feature, normal authorization checking is done.

If the JOURNAL operand of the SYSJRL macro is YES, you can set the maximum number of invalid password attempts and the delay time until next logon, or accept the default of 10 attempts and 60 minutes.

Accounting cards are generated for all CP directory links as well as other links currently recorded

ACCESS VERIFICATION ROUTINES

New: Programming Support

While VM/SP HPO provides many security functions, added support for access verification routines provides a standard interface to the RACF/VM Support PRPQ or user-written routines that can provide a higher level of security. Although the access verification routines support does not by itself provide security functions, it allows you to install software that does.

For example, to increase security of minidisk accesses, logon passwords, and movement of spool files, you can install access verification routines with the Resource Access Control Facility (RACF) (Program Number 5740-XXH) and RACF/VM Support PRPQ (Program Number 5767-002).

IX/370 HANDSHAKING SUPPORT

New: Programming Support

Support is added to improve the performance of authorized IX/370 virtual machines by accelerating supervisor call instructions (SVC) 9, 10, and 11.

3380 DIRECT ACCESS STORAGE DEVICE MODELS AE4/BE4

New: Hardware support

VM/SP HPO now supports the 3380 DASD Models AE4/BE4. The 3380 Models AE4/BE4 are count-key-data (CKD) devices that attach to high-speed channels only, via the 3880 Control Unit. The 3880 can attach up to 16 physical spindles (32 logical devices) of 3380 Models AE4 and BE4 directly to data streaming channels. Strings of different 3380 device models may be intermixed at the control unit level.

MONITOR DEVICE SUPPORT

New: Software support

You can now monitor as many DASD and tape devices as you can put on your system.

Summary of Changes
for SC23-0189-1
as updated December 17, 1985
for VM/SP HPO Release 4

SCHEDULER CHANGES

Changed: Programming support

Changes have been made to the scheduler to improve general performance.

SCHEDULER MONITOR SUPPORT

Changed: Programming support

The scheduler monitor support has been enhanced to collect data on a system-wide basis for Q1 and Q2 users.

3880 MODELS 13 AND 23 SUPPORT

New: Hardware support

VM/SP HPO now supports the 3880 Storage Subsystem Models 13 and 23.

The 3880 Models 13 and 23 are high-performance cached DASD subsystems designed especially for nonpaging applications (application data that resides on DASD that is not defined as a paging, swapping, spooling, or dump area). This support is designed to improve performance for MVS or CMS guest virtual machines running with 3380 DASDs. The performance improvement is obtained principally by maximizing the number of read accesses that can be resolved accessing the cache copy rather than by accessing the DASD itself.

GROUP CONTROL SYSTEM (VM/SP HPO GCS)

New: Programming Support

This new component of VM/SP HPO is a virtual machine supervisor that provides simulated MVS services and supports a multitasking environment. For more information on the group control system (GCS), refer to the *VM/SP Group Control System Guide*. GCS supports VM/VTAM and VSCS, which replaces VCNA.

SIGNAL SYSTEM SERVICE

New: Programming Support

This new CP system service allows virtual machines in a virtual machine group to signal each other. The signal system service can only be used by virtual machines in a virtual machine group.

SAVED SYSTEM 8MB LIMIT REMOVAL

Changed: Programming Support

With the addition of this support, the SAVESYS, VMSAVE, and IPL functions have been enhanced to allow a page image copy of up to a 16 Mb virtual machine to be saved and restored.

CP FRET TRAP

New: Programming Support

The CP FRET trap can be used as an aid in solving problems caused by improper use of CP storage and to solve many storage overlay problems.

VMDUMP ENHANCEMENTS

Changed: Programming Support

DIAGNOSE Code X'94' is available to allow a virtual machine to request dumping of its virtual storage. Also, the three address range restriction has been removed from the VMDUMP command.

DIAGNOSE CODE X'98'

New: Programming Support

Using DIAGNOSE Code X'98', a virtual machine can lock and unlock virtual pages, and execute its own real channel programs.

THE PROGRAMMABLE OPERATOR FACILITY

Changed: Programming Support

The programmable operator facility has been enhanced to support distributed operations in an SNA network through an interface, the Programmable Operator/NCCF Message Exchange (PMX) with the Network Communications Control Facility (NCCF).

CPTRAP ENHANCEMENTS

Changed: Programming Support

CPTRAP is a service aid used in problem determination. Enhancements to the CPTRAP command provide two additional functions, GROUPID and WRAP, and one additional entry type, X'3D'.

Enhancements to TRAPRED makes reviewing the trap data easier by providing more selectivity for X'3D', X'3E', and X'3F' entries and by providing a way to display formatted output of the trapped data.

INTERACTIVE PROBLEM CONTROL SYSTEM (VM/SP IPCS)

New: Programming Support

VM/SP HPO Release 4 has been enhanced to include IPCS as a component of VM/SP. VM/SP IPCS is equivalent to the VM/Interactive Problem Control System Extension (VM/IPCS/E) Licensed Program (5748-SA1).

EXPANSION OF USER CLASSES

Changed: Programming Support

The DIRECT command has been enhanced and the OVERRIDE command has been added to provide the user with more than the seven IBM- defined user classes. You can now choose from 32 user classes, A - Z and 1 - 6.

REMOTE SPOOLING COMMUNICATIONS SUBSYSTEM NETWORKING VERSION 2

Changed: Programming Support

With the release of the Remote Spooling Communications Subsystem Networking Version 2 Licensed Program (5664-188), any reference to RSCS in this manual applies to RSCS Version 2. Information about RSCS can be found in the *VM/SP Remote Spooling Communications Subsystem Version 2 General Information.*

VM/SP HPO 3800 MODEL 3 COMPATIBILITY SUPPORT

New: Hardware Support

Compatibility support allows VM/SP users to access the 3800 Model 3 Printing Subsystem. Existing programs designed to produce 3800 Model 1 printer output may produce output for the 3800 Model 3 printer with little or no program change. Use of this support provides improved print quality (240 x 240 pel resolution) and the addition of a 10 lines-per-inch (LPI) vertical space option.

DIAGNOSE CODE X'8C'

Changed: Programming Support

DIAGNOSE code X'8C' has been enhanced to allow a user to access all the data returned by CP's write structured field query.

ATTACHMENT OF MORE THAN 410 DEVICES

New: Programming Support

This support provides a means of allowing selected virtual machines to attach more than 410 devices.

VM/SP HPO AS A VIRTUAL MULTIPROCESSOR GUEST ON VM/XA

New: Programming Support

Changes were made to VM/SP HPO to allow it to be a viable MP guest on the VM/XA System Facility.

DOCUMENTATION CHANGES

Minor technical and editorial changes have been made throughout this publication.

Preface

This publication contains overview and planning information for the IBM Virtual Machine/System Product High Performance Option (VM/SP HPO), program number 5664-173.

Who Should Use This Manual?

This manual is intended for users of VM/SP HPO Release 4.2 who plan to migrate to Release 5. It provides installation managers, system programmers, and IBM service personnel with the initial planning information needed for this migration. Application programmers might also find this manual helpful.

The body of this book assumes that you already have an understanding of VM/SP HPO and that you are reading this book mainly to understand the changes implemented for Release 5. If you are not familiar with VM/SP HPO and the enhancements that it offers to VM/SP, refer to Appendix A at the back of this book. It provides an overview of the functions in VM/SP HPO prior to this release.

How Is This Manual Organized?

- Part 1 — provides an overview of VM/SP Release 5 and VM/SP HPO Release 5.
- Part 2 — summarizes the system requirements and planning information, describes the changes in the VM/SP HPO library, and discusses program distribution.
- Part 3 — discusses environmental, migration, and performance considerations for Release 5.
- Part 4 — discusses changes to the internal design of Release 5.
- Appendix A — provides an overview of VM/SP HPO prior to this release.
- Glossary — defines terms used in this publication.
- VM/SP HPO Library — diagrams the publications in the VM/SP HPO library (Figure 17).

Contents

Figures

Part 1. Overview of Release 5

This part of the manual introduces you to VM/SP HPO Release 5. It discusses:

- The base VM/SP Release 5 (Chapter 1)
- What VM/SP HPO Release 5 adds to VM/SP Release 5 (Chapter 2)
- The PTFs from Release 4.2 that have been merged into the base (Chapter 3).

Chapter 1. What's in VM/SP Release 5?

VM/SP HPO Release 5 requires installation of VM/SP Release 5 or an equivalent licensed program. When you merge VM/SP HPO with the prerequisite VM/SP release, you obtain a system that incorporates all features from VM/SP and additional features from VM/SP HPO. This chapter provides an overview of the base VM/SP HPO Release 5.

VM/SP Release 5 supports the following:

- Transparent services access facility
- Central message facility
- Parsing facility
- National language support
- CMS session services
- System profile, SYSPROF EXEC
- Error logging system service
- SPOOL system service
- Alternate userid support
- Enhanced reliability, availability, and serviceability
- Improved usability
- Enhanced HELP facility
- Improved installation and service procedures
- Enhanced PRINT command
- Enhanced system product interpreter
- Enhanced control program (CP)
- Enhanced conversational monitor system (CMS)
- Enhanced group control system (GCS).

Transparent Services Access Facility (TSAF)

The **transparent services access facility (TSAF)** is a VM component that lets you communicate with local or remote virtual machines within a collection of VM systems.

TSAF provides Advanced Program-to-Program Communication/VM (APPC/VM) services as a means of communication between two virtual machines. The APPC/VM interface provides a limited set of the SNA LU 6.2 base communication functions. TSAF also provides the TSAF virtual machine component to handle communication between systems by letting APPC/VM paths span more than one VM system.

TSAF lets you connect to and communicate with local or remote virtual machines within a collection of VM systems. With TSAF, you connect to a program by specifying a name the program has made known, instead of specifying a virtual machine userid and nodeid.

The TSAF support consists of three major areas:

- Advanced Program-to-Program Communication/VM (APPC/VM)
- The TSAF virtual machine
- The CP system services, collection resource management and identify.

TSAF Program Communication Services

Programs communicate by using two TSAF program communication services:

- The APPC/VM program interface for VM-program-to-VM program communication (provided by the APPCVM macro)
- IUCV functions used as a VM-program-to-CP interface (provided by the IUCV macro).

The APPC/VM Program Interface

TSAF provides an APPC/VM program interface as a means of communication between programs in two virtual machines. This APPC/VM interface provides a limited set of the SNA LU 6.2 base communication functions and provides the following services within a single VM system and throughout a collection of VM systems:

- Establish and sever communication paths
- Send and receive data
- Send and receive error and control information.

APPC/VM lets you pass any amount of information between virtual machines in a collection of VM systems that are all using TSAF.

The IUCV Functions for Use with APPC/VM

Applications that use APPC/VM must also use a set of IUCV functions in order to establish and control the APPC/VM environment. These IUCV functions are unique to VM and are not part of the SNA LU 6.2 (APPC architecture) verb interface. The IUCV functions provide information between a VM program and CP about the following:

- APPC/VM communication paths. IUCV provides functions to accept an APPC/VM path connection and establish and release an interrupt buffer for an APPC/VM path.
- APPC/VM and IUCV interrupts. IUCV provides functions to enable, disable, interrogate, and process interrupts.

TSAF Virtual Machine

The TSAF virtual machine is a separate component in VM that runs on CMS and is controlled using its own TSAF commands. The TSAF virtual machine keeps track of all the resources within the group of systems, or collection. A resource is an entity (such as a program, a data file, a set of files, or a device) necessary to perform a computation. Resources can be shared throughout the collection. Each system in a TSAF collection must have the TSAF virtual machine running.

The TSAF virtual machine is easy to set up and nearly operates itself. The TSAF virtual machines in a collection:

- Dynamically set up their own collection without the need for an operator
- Reconfigure the collection and choose new routes for communications to follow, if a system enters or leaves the collection.

Multiple users can have access to a resource at the same time. With proper authorization, you can connect to a resource anywhere within the collection, yet it seems like the resource is on your own system.

Collection Resource Management and Identify System Services

The collection resource management system service gives a TSAF virtual machine the ability to be a TSAF virtual machine and to query and change the local VM resource table.

The identify system service lets authorized virtual machines connect to it to be a resource manager and to own or revoke resources.

Reference

Refer to *VM/SP Transparent Services Access Facility Reference* for more information.

The Central Message Facility

Instead of coding message texts directly in a program, you can store all your message texts in a file or "repository." When you want to display a message, access the repository file and retrieve the message text you want.

Having all message text in a central file has the following advantages:

- Message text does not clutter your program.
- You can access the same message from many programs without specifying the message text each time.

New Commands and New Macro

A new command, GENMSG, compiles the message repository. You can then use the SET LANGUAGE command to make your message repository available.

Once the message file is available, you can access messages from REXX (Restructured Extended Executor language) programs, EXEC 2 execs, and CMS with the new XMITMSG command, or from assembler programs with the new APPLMSG macro.

National Language Support

If your installation has national language capabilities and you want your system messages to be available in a language other than American English, your message repository can be translated.

Reference

Refer to *VM/SP CMS for System Programming* for more information about making a message repository, to the *VM/SP CMS Command Reference* for more information about the new commands, and to *VM/SP CMS Macros and Functions* for more information about the APPLMSG macro.

The Parsing Facility

The parsing facility parses and translates command arguments. For a list of CMS commands that use the parsing facility, see *VM/SP CMS for System Programming.*

Just a few of the facility's advantages are:

- You keep syntax definitions in a separate file.
- Definition language for command syntax (DLCS) keeps command syntax consistent.
- You can do parsing for EXEC 2 execs, REXX programs, and BAL programs.

Two new CMS commands added for parsing are:

CONVERT COMMANDS takes an editable syntax definition table (DLCS file) and verifies its correctness or creates an "internal" form of the table (that is, a text deck) for the parsing facility to use.

PARSECMD parses a command from a REXX program or EXEC 2 exec.

The new PARSECMD macro parses a command from an assembler program.

Defining Command Syntax

To use the parsing facility for your own commands, you have to define command syntax in a special language, the definition language for command syntax (DLCS).

You keep DLCS definitions for the command syntax in CMS files. A file can contain more than one DLCS definition. The parsing facility parses a specified command by checking to see if all operands, options, keywords, and so on, are specified according to the DLCS definition for that command. Therefore, you do not have to check syntax in your program.

National Language Support

If your installation has national language capabilities and you want to be able to invoke your program in another language, you must simply modify your DLCS file.

Reference

Refer to *VM/SP CMS for System Programming* for more information about using the parsing facility and DLCS, to *VM/SP CMS Command Reference* for more information about the new commands, and to *VM/SP CMS Macros and Functions Reference* for more information about the PARSECMD macro.

National Language Support

National Language Support allows you to receive most messages in languages other than American English.

The VM system is shipped with American English as the system language: you have to enter commands in American English, the panels you see are in American English, and the messages you receive are in American English.

However, you can order and install other languages on your system. This lets you interact with the system— see panels and and receive messages— in another language

Note: Most CP messages are translated, but CP responses are not.

Making Other Languages Available

For you to interact with VM in a language other than the supplied language, American English, the system administrator must load appropriate language files from tape and then store them in the system.

The administrator must decide whether to use the new language as the system language instead of American English or just make the language available as an option to users.

To install a new system language, the administrator must load the appropriate language files into the CP, CMS, and GCS nuclei. The procedure for doing this is similar to the one used for adding a local update.

However, to make another language available as just an option to users, the administrator must use:

- The NAMELANG macro to reserve DASD space for the CP message file
- The NAMESYS macro to create a DCSS for CMS language files
- The LANGMERG command to combine all CMS language files into one file
- The LANGGEN command to save the CP and CMS language files.

VM allows multiple languages on one system. The administrator must apply the above process for each language.

Note: Make sure your terminals and printing equipment can properly display the character set of any language you order.

Once the files for a language are saved, you can issue the SET LANGUAGE command to set your virtual machine to a language available on your system.

You can automatically set your virtual machine to a specified language when you log on using the new LANG directory option.

Using Other Languages

You can change the current language of your CMS session and any applications running on CMS with the SET LANGUAGE command. SET LANGUAGE makes all the necessary language files available to your virtual machine.

You can also check the language status of your virtual machine by using these commands:

QUERY CPLANG displays the current language set for issuing CP messages

QUERY LANGUAGE displays the current language set for issuing CMS messages

QUERY LANGLIST displays a list of valid languages you can set for CMS.

Creating Your Own Message Repository

You can create your own message repository for storing all your message texts. In this way, just your single message file has to be translated if you want your messages to be available in a language other than American English.

Checking Command Syntax

The parsing facility parses and translates command arguments. It also lets non-English users communicate with CMS in their own national language.

You can set and query translations by using these commands:

SET TRANSLATE sets user translation synonyms, user translations, system translation synonyms, and system translations on or off.

QUERY TRANSLATE displays the translations and translation synonyms in effect.

Reference

Refer to *VM/SP CMS for System Programming* for more information about making other languages available, using other languages, making a message repository, and using the parsing facility and DLCS; to *VM/SP HPO Installation Guide* for how to install a new system language; to *VM/SP CMS Command Reference* for information about the new commands; and to *VM/SP CMS Macros and Functions Reference* for information about the new macros.

Enhanced CMS Session Services

CMS session services includes:

- Window functions for the end user
- A full-screen environment for CMS
- The CONSOLE macro for applications doing 3270 I/O
- Updates to the System Product Editor (XEDIT).

The addition of CMS session services improves the usability of VM on 3270-type terminals. New functions let you work with data through windows. A full-screen environment for CMS lets you use the entire screen to enter input and to display output. The CONSOLE macro provides a higher-level interface for applications doing 3270 I/O. In addition, windowing functions are used to display the XEDIT session.

Window Functions and Virtual Screens

You can now manage several pieces of information on the physical screen at the same time. Through windows, you can manipulate information as you might rearrange pieces of paper on your desk top.

A **window** is an area on your physical screen that lets you display and manipulate data. Data is maintained in virtual screens. A virtual screen is a "presentation space" or a functional simulation of a physical screen. When you enter input or view output through a window, you are really looking into the virtual screen data.

Because a window reflects a virtual screen, you can do several operations against a virtual screen and view the results in a window. The characteristics of virtual screens that you can manipulate include:

- Reserved areas for information such as titles and PF key descriptions
- Color and highlighting
- Options to log data into a file.

Figure 1 shows the relationship between the physical screen, a window, and a virtual screen.

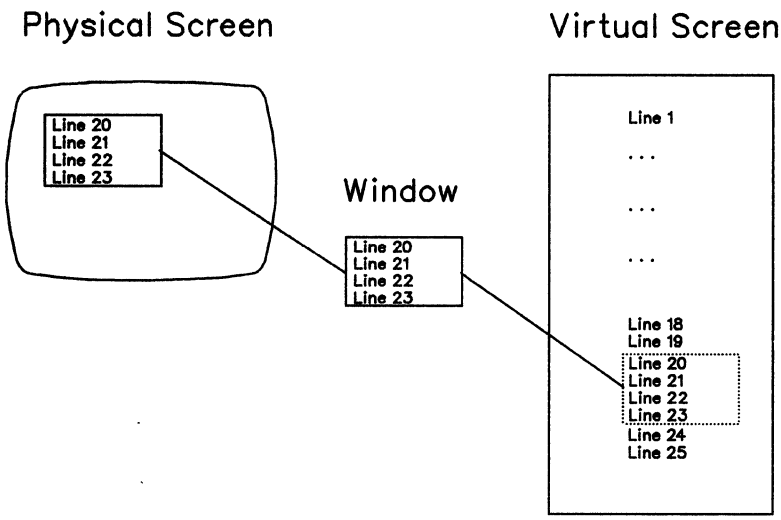

Figure 1. A Window into a Virtual Screen

When you work with windows, you do not have to consider the internal interactions between windows and virtual screens. However, as you become more familiar with how they work, you might find it useful to change or manipulate the system's default settings. You can make changes by using the new CMS commands for windows and virtual screens. (The following sections discuss some of these commands.)

What Is in a Window?

You can position a window almost anywhere on the physical screen. You can have many windows on the screen at once. You can display windows on top of each other and overlap them.

When you work with data in a window, you are actually working with the data in a virtual screen. You can view the data and scroll forward, backward, right, or left through it.

Windows are maintained in an ordered list. You can shuffle the order by "popping" and "dropping" windows. The new CMS commands that let you do this are POP WINDOW and DROP WINDOW.

Full-Screen CMS

Full-screen capability for CMS is optional for 3270-type terminals. You might be familiar with full-screen mode if you use a VM editor such as XEDIT.

With full-screen CMS, you can enter a command from anywhere on the screen, not just from the command line. You can scroll forward and backward through your CMS session to see commands you entered before and CMS responses to these commands. You can reissue a command from your screen by placing the cursor on the command, typing over one character, and pressing the ENTER key.

You request to run in full-screen mode by entering SET FULLSCREEN ON or by putting this command in your PROFILE EXEC.

Note: When you enter full-screen CMS, the TERMINAL BRKKEY is set to the new option NONE. You cannot drop into CP by pressing your PA1 key. This means that it is impossible to interrupt a program or EXEC that is in an infinite loop unless you explicitly specified a BRKKEY before you started the command or EXEC.

Full-screen mode defines default virtual screens and windows, and it routes VM output and messages into windows. You can control the display of a message via the ROUTE and SET WINDOW commands. With these commands, you can sound the alarm when the message arrives, display the message, or issue a notice that a message is pending.

Other features of full-screen mode let you:

- Specify extended attributes for output such as extended highlighting, color, and programmable symbol sets.
- Define program function (PF) keys.

Interactive routines continue to issue output one line at a time and process input much as they used to. Full-screen CMS also captures and displays CP command responses and asynchronous messages formerly displayed on the CP screen. The current machine "states," such as RUNNING and HOLDING, have been replaced by more meaningful status indications.

Border Commands

Border commands make working with windows even easier. You can type the single-character commands in any corner of a window border to execute a command on that window. For example, you can scroll left by entering the letter "L" in a corner of a window border.

Macro Support

CONSOLE Macro

The CONSOLE macro instruction is used to access 3270 full-screen console services. CONSOLE does the following:

- Performs 3270 I/O operations
- Builds the channel command word (CCW) or, for the CONSOLE EXCP function, executes the CCW built by the application
- Issues the DIAGNOSE code X'58' or SIO instruction
- Waits for the I/O to complete processing
- Checks any error status from the device.

The CONSOLE macro lets programs open "paths" (unique names that distinguish one application from another) to a display device. It coordinates use of the screen by indicating to an application writing to the device that another path has updated the screen last and that the screen

must be reformatted. Thus, full-screen applications do not have to rewrite the entire screen each time a write occurs.

One CONSOLE path name, $WM, is reserved for system use.

LINERD and LINEWRT Macros

The LINERD and LINEWRT macros provide increased flexibility for doing line mode I/O. The LINERD macro instruction reads a line of input from the terminal. It supports all the functions of RDTERM; in addition, it provides enhanced input data editing and lets you specify a virtual screen name.

The LINEWRT macro instruction displays a line of output at the terminal. It supports all the functions of WRTERM; in addition, it lets you specify features such as virtual screen name, color, and extended highlighting.

You can use these macros when full-screen CMS is not active (SET FULLSCREEN OFF/SUSPEND) without being incompatible with the line mode environment.

The System Product Editor

The System Product Editor (XEDIT) uses windowing support. You have the option of specifying what window XEDIT should use to display a file. If you do not choose a window name, the window defaults to "XEDIT."

New CMS Windowing Commands

New CMS commands let you manipulate windows and virtual screens. Some of these new commands are POP WINDOW, DROP WINDOW, DEFINE VSCREEN, GET VSCREEN, SCROLL FORWARD, and SCROLL RIGHT.

Enhancement of the QUERY Command

Added or updated functions for the QUERY command include QUERY APL, QUERY CMSPF, and QUERY WINDOW.

Enhancement of the SET Command

Added or updated functions for the SET command include SET APL, SET FULLSCREEN, and SET VSCREEN.

Reference

Refer to the *VM/SP CMS User's Guide* for more information about full-screen CMS, to *VM/SP CMS Command Reference* for more information about new and enhanced commands, and to *VM/SP CMS Macros and Functions Reference* for more information about the LINERD and LINEWRT macros.

System Profile, SYSPROF EXEC

The system profile is a new exec, SYSPROF EXEC, that contains part of the CMS initialization function previously done in a module. It can be invoked by default at CMS initialization, before any user disks are accessed. Therefore, your installation can use it to tailor the CMS environment.

In tailoring an environment, your installation can do such things as accessing additional system disks and bringing up application programs automatically. Make tailoring decisions based on userid, responses to prompting, CMS parameters on the IPL command, or other conditions defined by your installation.

By having this initialization function in an exec rather than in a module, your installation can easily change the default CMS environment for its users without having to modify a CMS module and rebuild CMS. In addition, you do not have to modify user PROFILE EXECs and depend on users not to tamper with the execs you provide.

You can bypass the system profile by using the NOSPROF parameter provided on the IPL command. See "Bypassing the System Profile" on page 15 for more information.

The CMS initialization module calls the SYSPROF EXEC, before any user disks are accessed, and executes it from a DCSS (discontiguous saved segment), or from the S disk or its extension. The SYSPROF EXEC executes by default when you enter the IPL CMS command, unless you specify the NOSPROF parameter on the command line, the IPL is of a non-DASD device, or no SYSPROF EXEC is found.

Default Functions

The following are default functions in the supplied SYSPROF EXEC:

- Process the parameters passed on the IPL command
- Display the CMS system identification (system ID) defined when the CMS system was built
- Issue the initial console read
- Handle the first command entered at this read
- Access the 191 disk as the A-disk
- Access the 192 disk as the D-disk
- Issue the S-STAT/Y-STAT messages
- Issue other initialization-related messages
- Execute the PROFILE EXEC if found.

CP provides restart information when it re-IPLs for a protected user who has dropped into CP. (See "Protected Application Environment" on page 20.) This information shows the nature of the problem and is available to the system profile. The system profile issues a message when this condition is detected. Your installation can choose a different action by modifying the exec.

You can place the IPL CMS command in your directory entry or issue the command after you log on.

Use with the IPL Command

The IPL command has a PARM keyword marking the start of any CMS parameters. These parameters can be up to 64 bytes of data (excluding all leading blank characters after the keyword, PARM, but including all other embedded and trailing blanks). All parameters are passed to the system profile, but CMS initialization ignores unrecognized parameters.

Note: If you are IPLing a non-DASD device, such as a reader, all CMS parameters are ignored and the system profile is bypassed.

Saving a Named System

To save a named system, do one of the following:

- Give a positive response to message 729R
- Modify the DEFNUC macro to include a positive response to the SAVESYS parameter
- Issue the IPL command with the "SAVESYS systemname" parameter.

Note: You can no longer enter the SAVESYS command at the initial VM READ.

Bypassing the System Profile

To bypass the system profile, specify the NOSPROF parameter in the PARM field of the IPL command. If no system profile exists, CMS modules do initialization. If you do not specify the NOSPROF parameter, and no SYSPROF EXEC exists, a warning message is displayed to inform you of this condition.

Building a Protected Application Environment

If your only interest is using application programs, you can build a protected application environment. In this way, you are automatically placed in an application environment at logon and cannot inadvertently drop into CP.

Examples of Functions That Can Be Done at Initialization

Examples of functions the SYSPROF EXEC can do at initialization are:

- Recognition of new parameters in the PARM field of the IPL command. For example, your installation can add the following IPL statement in a user's directory:

  ```
  IPL CMS PARM PROFS
  ```

  Your installation can then recognize this parameter and set up a PROFS environment for the user.

- Access of additional system disks or changing provided defaults. The default user disks (191 A-disk and 192 D-disk) can be changed or eliminated, or additional user disks can be accessed.
- Recognition of specific users or groups of users for placement in an application or other environment.
- Suppression of the initial console read or changing the default to AUTOCR.
- Prompting of novice users for information.
- Modification or suppression of certain system messages, such as the CMS system ID, to hide complexity of the system.
- Handling of conditions when protected users enter CP and are re-IPLed. For example, a message can be sent to the system administrator.

Reference

Refer to *VM/SP CMS for System Programming* for more information about the system profile.

Error Logging System Service

The error logging system service is a new IUCV system service that lets a virtual machine receive a copy of all records currently written to the CP error recording area. The virtual machine can record this information, act on it, or report it to other programming support.

Support for the NetView Program

The hardware monitor component of the NetView[1] program uses this support to record local communication device errors for problem determination.

Reference

Refer to *Virtual Machine System Facilities for Programming* for more information about the error logging system service.

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1 NetView is a trademark of the International Business Machines Corporation.

SPOOL System Service for Advanced Function Printers

The SPOOL system service is a new IUCV system service that gives authorized users an interface for communication between CP and a "printer subsystem." The SPOOL system service provides a way for VM to support a printer subsystem. To a VM operator, printers driven by this subsystem appear very similar to existing system printers (1403, 3211, 3800, etc.). These subsystem printers are called logical printers to differentiate them from system printers supported directly by CP. For example, the Print Services Facility/Virtual Machine (PSF/VM) uses this support.

This interface is a general interface that lets a virtual machine:

- Select a spool file from the print chain for processing
- Close a SELECTed file
- Send messages or command responses to the operator or other users
- Read the spool records (SFBLOKs and SPLINKs) for a selected file
- Read an external attribute buffer (XAB)[2] for a selected file
- Send printer commands to a logical printer
- Notify logical printers when a print file is available for processing
- Purge a print file being processed by a logical printer.

Addition of the DESTINATION Option for Spool Files

The DESTINATION option lets you select a specific printer or punch to process your print, punch, or console file. For example:

```
     SPool   Printer   DEST   dest1
or
     SPool   CONsole   DEST   dest1
```

prints your file at a printer handling output for a certain destination. A destination name (dest1) is a one-to-eight-character alphanumeric name your installation assigns to specific printers.

Addition of DIAGNOSE Code X'B4'

DIAGNOSE code X'B4' lets you associate an external attribute buffer (XAB) an application provides with a virtual printer device.

With the new diagnose code, you can:

- Read the existing XAB into the storage of your virtual machine
- Write or rewrite an XAB
- Determine the size of an existing XAB
- Determine if an XAB has been defined
- Erase the XAB.

---

2 The external attribute buffer (XAB) is a control block that contains data you create to specify additional information about a print file. Each print file has its own XAB, and CP has the facilities to maintain the XABs.

Addition of DIAGNOSE Code X'B8'

DIAGNOSE code X'B8' lets an application virtual machine read, write, or erase an external attribute buffer (XAB) associated with a spool print file.

With the new DIAGNOSE code, you can:

- Read the existing XAB associated with the file
- Write or rewrite an XAB
- Determine the size of an existing XAB
- Determine if an XAB has been defined
- Prevent a file from being used while the XAB is being changed
- Erase the XAB.

Reference

Refer to *VM/SP HPO CP Command Reference* for more information about the DESTination option and to *Virtual Machine System Facilities for Programming* for more information about DIAGNOSE codes X'B8' and X'B4'.

Alternate Userid Support

DIAGNOSE Code X'D4'

A new DIAGNOSE code, X'D4' lets a "master" virtual machine tell CP the userid of a worker machine doing required work and the userid of the end-user it is authorized to work for. The end-user's userid is considered to be the "alternate userid." If this alternate userid exists, CP automatically uses it as the userid to be placed in the APPC/VM connection pending interrupt data. The CP spooling subsystem also uses the alternate userid. If an alternate userid exists, it replaces the actual ID as the spool file origin ID.

The master machine that issues the DIAGNOSE must be on the same system as the worker machine, but they do not have to be on the same system as the end-user.

The master machine must guarantee the identity of a remote user. It must also provide the userid of the end-user. CP cannot verify the end-user's ID.

The master virtual machine must use the new DIAGNOSE to set and reset the identity of the end-user for whom the worker machine is performing. When the worker machine is finished, the master machine can reset the alternate userid by issuing DIAGNOSE code X'D4' with the alternate userid set to zero.

VMBATCH and RACF Support

VMBATCH issues an alternate userid so BATCH jobs can be executed under that userid. RACF does authorizations based on alternate userid support.

Reference

Refer to *Virtual Machine System Facilities for Programming* for more information about DIAGNOSE code X'D4' and to *TSAF Reference* for more information about APPC/VM.

Improved Usability Features

Enhancements that improve usability include:

- Logon from the Logo Screen
- Enhancements for Remote and VM/VTAM Terminals
- Protected Application Environment
- Addition of DIAGNOSE Code X'B0'
- New Option on the NAMESYS Macro
- Expanded DIAGNOSE Code X'08' Support
- Enhancement of the Inter-User Communications Vehicle (IUCV).

Logon from the Logo Screen

- The VM logo message at the top of the screen is now "VIRTUAL MACHINE/SYSTEM PRODUCT" instead of "VM/370 ONLINE". (This change applies to start/stop terminals also.) The VM logo is now "VM/SP" instead of "VM/370".
- VM lets you log on from the VM logo screen of a 3270-type terminal. You do not have to clear the screen before you issue the LOGON command. This support applies only to 3270-type terminals with screen sizes of 20 x 80 or larger.
- A prompting screen advises you how to proceed if you enter an invalid userid or password.
- If you enter a USERID with one or more embedded blanks or if you only enter the PASSWORD in the input area, you receive a new error message.

Note: This function uses nine lines on the Logo screen. As a result, the installation-defined logo (DMKBOX) cannot exceed the size of the smallest physical screen in the installation – 9 lines.

Enhancements for Remote and VM/VTAM Terminals

CP now provides the CONMODE 3270 option on the TERMINAL command for VM/VTAM and remote terminals. If you are a VM/VTAM or remote terminal user, you can issue "TERMINAL CONMODE 3270" for virtual machine start I/Os to be handled as 3270 start I/Os. CONMODE 3270 places the console in full-screen mode with the application program controlling the screen. The application program is responsible for providing 3270 control information in the data stream.

Note: The SCRNSAVE and BREAKIN options on the TERMINAL command are not provided for remote and VM/VTAM terminals as part of this support.

A new command, SET REMOTE, is provided that allows you to control the display of data transmissions for CMS and the System Product Editor. When five or more of the same characters occur consecutively in a data stream and the REMOTE option is set to ON, the data is compressed. This minimizes the amount of data transmitted and shortens the buffer, thus speeding transmission. For remote displays, the initial setting is REMOTE ON. For local displays, the initial setting is REMOTE OFF.

Protected Application Environment

A protected application environment is provided to prevent an interactive user from accidentally entering the CP environment.

You are placed in a protected application when you issue SET CONCEAL ON or at logon if your directory contains the new option CONCEAL.

When you are operating in a protected application:

- Multiple attentions do not cause you to enter CP mode.
- TERMINAL BRKKEY is set to the new option NONE.
- CP initiates an automatic re-IPL when it finds errors such as virtual machine disabled wait, paging error, invalid PSW, external interrupt loop, program interrupt loop, and translation exception.
- If a shared page is altered, CP attempts to resume execution in the virtual machine before initiating an automatic re-IPL.
- The error diagnostic information, provided by DIAGNOSE code X'B0', is not displayed on the screen.

Addition of DIAGNOSE Code X'B0'

DIAGNOSE code X'B0' lets a virtual machine access diagnostic information saved for a user running in a protected application environment, for whom a re-IPL has been attempted. This information consists of the information normally displayed for one of the following errors: shared page altered, virtual machine disabled wait, paging error, invalid PSW, external interrupt loop, program interrupt loop, or translation exception.

New Option on the NAMESYS Macro

PARMRGS has been added as a new parameter on the NAMESYS macro to let specification of the virtual machine general-purpose registers be used to pass the IPL parameters. The specified registers are filled with binary 0's before the IPL parameters are moved in. The format for the new parameter on the NAMESYS macro entry is:

```
PARMRGS=(m,n)
```

where:

m and n are decimal numbers from 0 to 15 and m < = n

If specified, CP fills registers m through n of the virtual machine with binary zeros before moving in the IPL parameters. Parameters that do not fit in the specified registers are ignored. If this parameter is not specified, IPL parameters are moved into the virtual machine's general-purpose registers for the length of the IPL parameters as is currently done. If only one register is to be used for IPL parameters, n can be omitted from the PARMRGS invocation.

Expanded DIAGNOSE Code X'08' Support

DIAGNOSE code X'08' enhancements include:

- To provide a virtual machine with the capability of managing a full-screen environment by letting it prompt for the LINK or AUTOLOG password instead of CP.
- The 8K response buffer limit on the DIAGNOSE code X'08' instruction is eliminated.

Enhancement of the Inter-User Communication Vehicle

The new CONTROL= parameter on the DECLARE BUFFER and CONNECT functions of IUCV enable CP to manage paths in the virtual machine. The new message all system service is an IUCV system service that is an extension to the existing message system service. The message all system service lets a virtual machine receive most terminal output regardless of the current settings established via the SET command. Any output designated for the message system service has priority. Otherwise, console output is sent over the message all system service path except for the following:

- SMSGs
- Asynchronous CPCONIO
- EMSGs not generated as part of a DIAGNOSE X'08' operation
- CPCONIO not generated as part of a DIAGNOSE X'08' operation
- Output generated by the CP ECHO or CP SET LOGMSG commands.

Reference

Refer to the *CMS User's Guide* for more information about the logo screen and the protected application environment; to *Virtual Machine System Facilities for Programming* for more information about enhancements for remote and VM/VTAM terminals, DIAGNOSE codes X'B0' and X'08', and IUCV; and to *VM/SP HPO Planning Guide and Reference* for more information about the NAMESYS macro.

Improved HELP Facility

Enhancements to the HELP facility include:

- HELP Command Options
  - BRIEF HELP
  - DETAIL HELP
  - RELATED HELP
  - Other Options
- Toggling (Switching) Ability
- Windowing of BRIEF HELP
- MOREHELP Command
- Control Section Keywords
- DEFAULTS Command Enhancement
- Improved Search Algorithm
- National Language Support.

HELP Command Options

Three new options to the HELP facility let you select the type of information displayed. The options are BRIEF, DETAIL, and RELATED.

BRIEF HELP

BRIEF HELP has been added for frequently used commands. The BRIEF layer is a short summary of the command. It includes a short description of the command, the basic syntax, an example, and a message instructing how to get more information (if it is available) for the requested command.

DETAIL HELP

DETAIL HELP can contain a description of the command, information about its format, parameters and options, notes on using the command, and information about the error messages it issues. The options DESCRIPT, FORMAT, PARMS, OPTIONS, NOTES, ERRORS, and ALL can be used in any combination to control the information included in the detail layer. DETAIL HELP is especially useful when you use the DEFAULTS command to customize HELP default options.

RELATED HELP

RELATED HELP gives you a task menu of related commands. Although few HELP files contain this section in this release, the ability to add and to display this information is available.

The SET and QUERY task menus are a form of RELATED information. These RELATED task menus help you find HELP information about SET and QUERY operands faster and more easily. Each RELATED task menu gives a brief description of the SET or QUERY operands available for a specified component. You can ask for HELP information about an operand by selecting an entry from the menu.

Other Options

The new EXTEND option extends the search order to include the full default HELP search order. This option is especially useful when you request HELP from the editing environment and you are not sure of the component.

The NOTYPE option suppresses error message 254E

> HELP cannot find the information you requested. If not misspelled, please enter HELP for menu assistance or HELP HELP for the HELP command

so full-screen applications can handle the display of the message in whatever manner is suitable. In other words, NOTYPE lets you change the message text and its placement.

Toggling Ability

When in display mode, you can display BRIEF, DETAIL, ALL, and RELATED help, and you can toggle (switch) between these sections with PF keys. During each display, the PF1, PF10, and PF11 settings are updated to reflect the additional information you can display by pressing the key.

Windowing of BRIEF HELP

When full-screen CMS is active, BRIEF help is displayed in a window rather than on a full screen.

MOREHELP Command

The MOREHELP command assists you (especially if you are a line mode user, do not have PF keys, or choose the NOSCREEN option) to get additional HELP information. HELP saves information when you issue a valid HELP command. The MOREHELP command retrieves this information and uses it to redisplay the HELP file. You can use the MOREHELP options to display a different section of the HELP file.

VM/SP Enhancements

Control Section Keywords

You can use new keywords to specify control sections in HELP files. These keywords are easier to remember and are more meaningful than using numbers to specify control sections. You can use these keywords to build or update your own HELP files.

DEFAULTS Command Enhancement

You can use two new DEFAULTS command options (BRIEF and DETAIL) to customize the HELP default options. The BRIEF option lets the BRIEF layer of help be displayed first for each help request. The DETAIL option lets the DETAIL layer be displayed first.

Improved Search Algorithm

An improved search algorithm for HELP reduces the number of directory blocks read. In a multiuser environment, the overall effect of this search algorithm on the system depends on the level of I/O contention.

National Language Support

All VM/SP associated HELP modules, HELP macros, and HELPCONV modules have been changed to provide National Language Support. VM/SP HPO-unique HELP files have not been changed to provide National Language Support.

As a result, if your installation has another language installed, you will get all CMS HELP files and some CP HELP files in the new language. The central message facility displays the messages.

Reference

Refer to the *VM/SP CMS User's Guide* for more information about using the HELP facility.

Enhanced Installation and Service Procedures

Enhancements to installation and service include:

- Addition of Installation Tools and Profiles
- Addition of Service Exec Procedures
- Enhancement of DASD Volume Labels
- Addition of the NOLOG option
- Enhancement of the INCLUDE, LOAD, and GENMOD Commands
- Enhancement of the VMFMERGE EXEC
- Enhancement of the VMFLOAD EXEC
- Addition of the Installation Discontiguous Shared Segment
- Addition of the HELP Discontiguous Shared Segment

Installation Tools and Profiles

Note: The ITASK, SPGEN, SPLOAD, and UTILITY EXECs replace the PREP and GENERATE EXECs.

ITASK EXEC

ITASK invokes other execs and commands to do most of the steps in the installation procedure.

SPGEN EXEC

This exec does various system generation and maintenance functions, using the information contained in SPGEN PROFILE.

These functions include:

- Creating, verifying, and displaying system profile parameters
- Assembling system files
- Generating CP, CMS, and GCS nuclei
- Receiving and verifying load maps.

SPGEN PROFILE

This file provides information, such as loadlists, control files, minidisk structure, and access order, that the SPGEN EXEC uses to build CP, CMS, and GCS nuclei.

SPLOAD EXEC

This exec loads files from the product tape to disk using information contained in SPLOAD PROFILE.

SPLOAD PROFILE

This file specifies the location of files on the product tape, feature tape, and national language tape. It also tells where the SPLOAD EXEC loads each file.

UTILITY EXEC

You can invoke this exec to do occasionally used utility functions such as:

- Printing system definition files
- Creating a stand-alone service utility tape containing one or more of the following files:

  Device Support Facilities program

  DIR – CP Directory program

  FMT – CP Format/Allocate program

  DDR – DASD Dump Restore program

- Creating the stand-alone service programs (DIR, FMT, DDR, or any combination of them) on disk from their associated object modules (text decks)
- Writing a backup IPLable copy of the CP nucleus to tape.

Service Exec Procedures

The service execs below need certain files and tables to process correctly.

VMFTXT EXEC

The VMFTXT EXEC procedure creates text libraries. VMFTXT rebuilds a named TXTLIB file using a member list in an exec file with the same name. VMFTXT works much like the VMFMAC EXEC procedure.

VMFREMOV EXEC

Note: You can use this exec to service Systems Network Architecture (SNA) products. However, you cannot use this exec to service base components for VM.

The VMFREMOV EXEC removes PTFs that were applied with VMFMERGE. Previously, the only way to remove PTFs that were applied with VMFMERGE was to restore the product to the previous service level, then reapply the wanted PTFs. VMFREMOV is an easier way to remove a PTF.

VMFREMOV removes only PTFs that have a status of MERGED in the Merge Log. To make sure no PTFs are merged without having all requisite PTFs merged, VMFREMOV removes all dependent PTFs when needed. VMFREMOV also handles all PTFs that were superseded by the removal of

the PTF. After VMFREMOV removes a PTF, the exec puts a comment in the Merge Log indicating the PTF has been removed.

You can use this exec when servicing VTAM, the NetView program, EP, SSP, NTO, and NCP.

VMFNLS EXEC

The VMFNLS EXEC automatically applies updates to the three kinds of national-language-related files:

- Message repository files
- Uppercase translate files
- Definition language for command syntax (DLCS) files.

VMFNLS then compiles the updated source files and appropriately names them for loading into the system.

Enhancement of DASD Volume Labels

The volume labels on DASD used for installation have been renamed as follows:

Old Label	New Label
VMSRES	VMSRES
VMPK01	VMPK01
VMSTGE	VMPK04

In addition, the uses of volumes have changed in some cases.

Addition of the NOLOG Option

For system integrity, all virtual machines listed in the base directory, except the MAINT and OPERATOR userids, are shipped with the NOLOG option. You cannot log on a virtual machine that has the NOLOG option specified.

Enhancement of the INCLUDE, LOAD, and GENMOD Commands

The INCLUDE, LOAD, and GENMOD commands let you include comments from TEXT files in MODULE files, using the HIST option on the LOAD or INCLUDE commands. (NOHIST is the default.) These comments can document the service level of the module.

Enhancement of the VMFMERGE EXEC

Note: You can use this exec to service SNA products. However, you cannot use this exec to service base components for VM.

The VMFMERGE EXEC places service history information in the TEXT files being serviced. This history includes the APAR/PTF number, a service time and date stamp, and any information on the :APARTEXT entry in the Service Control File (SCF).

In addition, the limitation of being able to handle only 10 nested PTFs has been removed. VMFMERGE also maintains the REQBY log for merged PTFs. VMFREMOV uses this log for its processing.

Enhancement of the VMFLOAD EXEC

The VMFLOAD EXEC has a new LANGID operand that lets you specify the national language of files you want to load into the nucleus.

Addition of the CMS Nucleus Generation Profile

DMSNGP ASSEMBLE, the CMS Nucleus Generation Profile, contains predefined responses to prompts generated when you build a CMS nucleus.

Addition of the Installation Discontiguous Shared Segment

An optional installation discontiguous shared segment (DCSS), CMSINST, is a segment into which you can load execs and editor macros. The DCSSGEN procedure loads, builds, and saves the DCSS by processing a file containing a list of execs and editor macros. Frequently used execs reside in the DCSS, and all users can access it and share the same executing copy of the execs.

Addition of the HELP Discontiguous Shared Segment

The system name table (DMKSNT) defines a discontiguous shared segment (DCSS) named HELP. After you load the HELP files from the product tape, you can issue the SAVEFD command to load and save the HELP file directory information in the HELP segment. If you use the ITASK EXEC to load the HELP files, ITASK automatically issues the SAVEFD command.

Reference

Refer to the *VM/SP HPO Installation Guide* for more information about installation and service procedures.

Enhanced PRINT Command

The PRINT command has a new option, OVERSIZE, that lets you print files with records larger than the virtual printer's carriage size. It also supports the use of X'5A' as a special carriage control character. This special character lets a data line of up to 32K-1 characters (32767) be written to a spool print file.

Print Services Facility Support

The Print Services Facility (PSF) takes advantage of these enhancements.

Reference

Refer to the *VM/SP CMS Command Reference* for more information about the PRINT command.

Enhanced Reliability, Availability, and Serviceability

Enhancements made to improve system reliability, availability, and serviceability (RAS) include:

- Alternate Nucleus Support
- LOGON/LOGOFF Enhancements
- SPOOL File Compression Support
- CPTRAP, TRAPRED, and QUERY Function Enhancements
- Interactive Problem Control Facility (IPCS) Enhancements.

Alternate Nucleus Support

Alternate nucleus support improves system availability by making it easier to IPL backup copies of the CP nucleus that can access spool files of the primary nucleus.

Alternate nucleus support also improves the IPL procedure in other ways:

- Two or more different copies of CP can share WARM start data, checkpoint data, and error recording data.
- Backup copies of the CP directory and override files are used if the primary directory fails during initialization.
- The SHUTDOWN command lets system operators re-IPL a different DASD volume. This makes switching to an alternate nucleus easier.
- A new length field on the SYSNUC operand can be used to protect the SYSRES volume from nucleus area overflow.

- An asterisk can be specified on the SYSVOL operand of the SYSRES macro to assist in maintaining two copies of CP with the same DMKSYS ASSEMBLE file.

LOGON/LOGOFF Enhancements

LOGON/LOGOFF enhancements improve system availability by detecting and handling known conditions that prevent you from logging on to virtual machines because CP thinks you are already logged on. (This occurs when, because of an I/O problem, LOGOFF/FORCE processing fails to log you off, causing your virtual machine to "hang up" indefinitely.)

LOGON/LOGOFF enhancements also resolve conflicting messages issued in response to the LOGON, AUTOLOG, FORCE, and QUERY commands when the virtual machine in question is in the process of logging off.

SPOOL File Compression Support

SPOOL file compression support improves the reliability of spooled data transmitted through a VM system. With this support, the following information is now included in spooled data:

- The original record length.

  The original length is the length of the record before CP truncates trailing blanks. Programmers can use this length to reconstruct the original image of each record. If the original length exceeds the maximum length for data on the specified output device, the maximum data length for that device is saved.

- The original sequence of carriage control commands.

  Multiple carriage control commands are no longer replaced with a single equivalent command.

Before Release 5, the original record length and the original sequence of carriage control commands were not available to application programs that read spooled data.

Note: SPOOL file compression support affects only application programs that use the DIAGNOSE code X'14' interface to read virtual SPOOL files.

CPTRAP, TRAPRED, and QUERY Function Enhancements

CPTRAP supports monitor codes of 0, 1, and 2. Monitor code 2 identifies general virtual machine data. For monitor code 2 initiated entries, CPTRAP puts the machine type value passed from the virtual machine in the CPTRAP header record. The header record is present on every CPTRAP record.

The TRAPRED command provides access to the CPTRAP file. TRAPRED includes selectivity for the machine types. The types are:

- "TSAF" for TSAF records
- "FE" for records created by Field Engineering
- "USER1" for records created by a user installation.

The CP privilege-class C QUERY command includes a CPTRAP subcommand to return either:

- The current status of CPTRAP
- The current selectivity for a specific CPTRAP record type or for each type of CPTRAP record.

Interactive Problem Control System (IPCS) Enhancement

Diagnosing a TSAF Dump

A new DUMPSCAN subcommand, FDISPLAY, displays information about the TSAF virtual machine. It can display information about the service table, the collection control block, the resource table, links, paths, and routes.

The TRACE subcommand of DUMPSCAN lets you display TSAF trace table entries in a hexadecimal or formatted display.

DUMPSCAN Scroll Support

CP and TSAF provide a command to display their internal trace table. With this support, you can use the scroll functions to display trace table entries.

New parameters have been added to the DUMPSCAN SCROLL and DUMPSCAN TRACE commands to let you scroll through screen displays of trace entries and control the dump formats.

Enhancement to the IPCS MAP Command

The MAP command recognizes "TSAF" as a valid map type. You invoke the MAP command to compress a TSAF load map.

Reference

For more information about SPOOL file compression support, refer to *VM/SP HPO CP for System Programming*. For details concerning alternate nucleus support, refer to *VM/SP HPO CP for System Programming* and *VM/SP HPO Planning Guide and Reference*. For information on TSAF serviceability, refer to the *TSAF Reference*. For details on TRAPRED function, refer to the *VM/SP HPO CP Command Reference*. For information about the CPTRAP and QUERY functions and the MAP command, refer to the *Distributed Data Processing Guide*.

Enhancement of the System Product Interpreter

Enhancements to the System Product Interpreter include:

- Enhancement of the DATE Function
- Addition of New Function Calls for DIAGNOSE Codes X'C8' and X'CC'.

DATE Function

A new option, Basedate, has been added to the DATE function. Basedate returns the number of days since the base date January 1, 0001.

Also, the Century option (C) has been updated to return the number of days since January 1 of the last year which is a multiple of 100 in the format: ddddd.

Addition of New Function Calls for DIAGNOSE Codes X'C8' and X'CC'

Four new functions, DIAG(C8), DIAGRC(C8), DIAG(CC), and DIAGRC(CC), have been added to the external function package. These are the REXX function calls for DIAGNOSE codes X'C8' and X'CC'

Reference

Refer to the *VM/SP System Product Interpreter Reference* for more information about the DATE function and the DIAG(C8), DIAGRC(C8), DIAG(CC), and DIAGRC(CC) functions.

Enhancement of the Control Program (CP)

Enhancements to CP include:

- Addition of DIAGNOSE Code X'BC'
- Enhancement of the DETACH Command
- Enhancement of the VM Message Identifier.

Addition of DIAGNOSE Code X'BC'

DIAGNOSE code X'BC' opens a spool file for a spooled reader device and returns spool file identification into a user buffer. If a file is already open on the device, DIAGNOSE code X'BC' returns spool file identification.

DIAGNOSE code X'BC' lets a program running in virtual machine open a file with the appropriate class for a spooled reader device. The appropriate class is the current class of the spooled reader device. The program receives the same information received from issuing the following commands:

- QUERY READER spoolid
- QUERY READER spoolid ALL
- QUERY READER spoolid TBL.

Refer to *Virtual Machine System Facilities for Programming* for more information about DIAGNOSE code X'BC'.

Enhancement of the DETACH Command

There are two new options for the privilege class B CP DETACH command: UNLOAD and LEAVE. These two options apply only to the detachment of a tape device.

The UNLOAD option detaches the tape device and rewinds and unloads it. If you do not specify UNLOAD or LEAVE, UNLOAD is the default.

The LEAVE option detaches the tape device without rewinding and unloading it. The tape remains positioned as it was before the DETACH command was issued. The LEAVE option lets the system operator or any other Class B user control access to tape devices and the tapes mounted on those devices.

Refer to the *VM/SP HPO CP Command Reference* for more information about the DETACH command.

Enhancement of VM Message Identifier

In the past, the identifier for system messages has been 11 characters (10 alphamerics and a blank) in the following format:

```
xxxmmm###s
```

where "xxxmmm" designates the component and module issuing the message, "###" is the 3-digit message number, and "s" is the severity code.

Now, the message identifier supports a 4-digit message number. Existing messages have not changed, but new messages over the number 999 have a 4-digit message number. Also, you can now edit messages with a user-specified message number length according to your virtual machine's EMSG setting.

Enhancements to DIAGNOSE code X'5C' let you edit error messages with a 10-character message identifier length or a new user-specified message identifier length.

The first byte in Ry contains a subcode identifying whether you want to use the default message length of 10 (subcode X'00') or a message identifier length you specify (subcode X'40'). If subcode X'40' is used, the message identifier length is contained in Rx+1.

Refer to the *VM/SP HPO System Messages and Codes* for more information about the message identifier. Refer to *Virtual Machine System Facilities for Programming* for more information about DIAGNOSE code X'5C'.

Enhancement of the Conversational Monitor System (CMS)

Enhancements to CMS include:

- Addition of alternate tape drive support
- Addition of the VALIDATE Command
- Addition of the CMSDEV Macro
- Enhancement to the processing of reader files
- Enhancement of shared storage access
- Enhancement of the PRINTL Macro
- Enhancement of the RDCARD Macro
- Enhancement of the TXTLIB Command
- Enhancement of the GLOBAL Command
- Enhancement of the RDRLIST Command
- Enhancement of the EXECIO Command
- Enhancement of the FORMAT command
- Enhancement of CMS IUCV Support
- Enhancements for Execs in Storage
- Migration of CMS Commands and Modules to the CMS Nucleus.

Addition of Alternate Tape Drive Support

Alternate tape drive support lets you switch to a second tape drive when the data set you are reading from or writing to is greater than one tape volume. Two tape volumes can be mounted at one time so you do not have to wait for the next tape volume to be mounted. If the data set continues past the end of the second volume on the alternate drive, processing switches back to the primary drive.

You can specify an alternate tape drive with an option of the FILEDEF command. This support only applies to OS simulation support for standard label tapes, a CMS service that provides multivolume tape support.

Refer to the *VM/SP CMS Command Reference* for more information about the FILEDEF command.

Addition of the VALIDATE Command

The VALIDATE command verifies the syntax of a file identifier (filename filetype filemode). In addition, if the file mode is specified (and is not *), VALIDATE verifies by return code whether the disk is accessed, even if the disk is empty. For example, within an exec,

```
validate shopping list e
```

verifies the syntax of the file identifier, SHOPPING LIST E, and determines if disk E is accessed. You should determine if existing calls to STATE can be replaced with a call to VALIDATE.

Refer to the *VM/SP CMS Command Reference* for more information about the VALIDATE command.

Addition of the CMSDEV Macro

The new CMSDEV macro lets you determine the characteristics of a VM device. It provides identifying information and status of a specified virtual device, which is returned to the caller in a user-specified storage area. With CMSDEV, programs running in problem state can obtain information available only through a DIAGNOSE code X'24' instruction. To use the CMSDEV macro, you need not be familiar with a DIAGNOSE code X'24' or the standard addresses for virtual devices (00C, 00D, 00E, and so on).

Use CMSDEV with the new CMSDEV= parameter on the PRINTL macro to provide printer characteristics and status when printing.

Refer to the *VM/SP CMS Macros and Functions Reference* for more information about the CMSDEV macro.

Enhancement to the Processing of Reader Files

New options have been added to the CMS DISK LOAD, READCARD, and RECEIVE commands that:

- Tell you when more than one file is in a spool file
- Give you control over whether or not existing files are overlaid
- Issue a message for each file you receive.

The new options are:

- FULLPROMPT
- MINPROMPT
- NOPROMPT
- NOREPLACE.

In addition, you can set the CMS DEFAULTS command to use the FULLPROMPT, MINPROMPT, and NOPROMPT options for the RECEIVE command.

In "Chapter 10. Design Changes by Function," this enhancement is referred to as *composite reader file support.*

Refer to the *VM/SP CMS User's Guide* and the *VM/SP CMS Command Reference* for more information.

Enhancement of Shared Storage Access

The SAVEFD command and two new options on the ACCESS command have been added to reduce nonshared storage use.

Addition of the SAVEFD Command

The SAVEFD command lets you save the file directory information of a read/only CMS Extended Data Format (EDF) disk in shared storage. This copy of the file directory information is then available to CMS users who access the disk as read/only.

For heavily shared disks, the SAVEFD command reduces the overall paging requirements of the system. It keeps the disk's directory information in a single shared storage copy rather than as multiple copies in the nonshared storage of each CMS user who accesses the disk.

Refer to the *VM/SP CMS for System Programming* for more information about the SAVEFD command.

Enhancement of the ACCESS Command

You can now use shared storage copies of file directory information for large read/only CMS EDF disks when you issue the ACCESS command. If you issue ACCESS with the new SAVEONLY option, only a saved copy of the file directory is used for the access. Read/only accesses of the entire disk use the saved copy by default whenever possible if you do not specify SAVEONLY or NOSAVE. The new NOSAVE option prevents the use of the saved file directory information for the access.

Note: If you access part of a disk (for example, all files with the filetype of SCRIPT), the shared storage copy is not used.

Refer to the *VM/SP CMS Command Reference* for more information about the ACCESS command.

Enhancement of the PRINTL Macro

Three new, optional parameters added to the PRINTL macro are:

- CMSDEV=
- FORM=
- CC=

The CMSDEV= parameter lets you specify the type of printer in use so CMS does not have to ask CP for this information each time a line is printed. CMSDEV= reduces the number of DIAGNOSE code X'24' executions when printing. If the device type is not specified or if the contents of the 12-byte area filled by the CMSDEV macro are zero, a DIAGNOSE code X'24' is executed to determine the device type.

Use the FORM= parameter to print multiple lines with the execution of a single PRINTL macro rather than printing one line per execution.

Use the CC= parameter to specify whether the data to be printed contains a carriage control character in the first byte of the record. To print records without a carriage control character (CC=NO), the system spaces one line before printing. If CC=c is specified (where c is the carriage control character to be used), it is used for all records.

Refer to the *VM/SP CMS Macros and Functions Reference* for more information about the PRINTL macro.

Enhancement of the RDCARD Macro

The RDCARD macro has a new operand that lets you reduce the number of START I/O instructions needed to read a file from the virtual reader:

```
[,RDAHEAD=YES|NO|CANCEL]
```

When you specify RDAHEAD=YES, the system reads as many lines as possible into a system buffer with a single START I/O instruction. Then, one line is read into the user-specified buffer with each RDCARD instruction.

When RDAHEAD=NO, the default, one line is read with each START I/O instruction. RDAHEAD=CANCEL releases the internal I/O buffer used for RDAHEAD=YES. Any lines still in the buffer are deleted.

The RECEIVE and EXECIO commands have been changed to use this support.

Refer to the *VM/SP CMS Macros and Functions Reference* for more information about the RDCARD macro.

Enhancement of the TXTLIB Command

The TXTLIB command has a new option that enhances usability by letting you reference a file in a TXTLIB by its name rather than the first CSECT name. You can enter a file into a TXTLIB with the member name as the file's name by specifying the FILENAME option on the GEN or ADD versions of the TXTLIB command. This option lets you name TXTLIB entries uniquely by their given file names. In this way, you can delete a specific file from the TXTLIB.

Refer to *VM/SP CMS for System Programming* and the *VM/SP CMS Command Reference* for more information about the TXTLIB command.

Enhancement of the GLOBAL Command

Listing MACLIBs, TXTLIBs, DOSLIBs, and LOADLIBs

The GLOBAL command lets you list up to 63 MACLIBs, TXTLIBs, DOSLIBs, or LOADLIBs (subject to other system limits, such as command line length) to be searched when processing subsequent CMS commands.

When issued by the VMFASM EXEC, the enhanced GLOBAL command accepts as its library list up to 29 MACLIBs specified in the MACS record of the control file identified by the UPDATE command (subject to the character limit of the MACS record line).

The QUERY Command

If you list more than eight libraries with the GLOBAL command, the MACLIB, TXTLIB, LOADLIB, DOSLIB, and LIBRARY functions of the QUERY command return multiple output lines (eight libraries per line) to the terminal or, if the function is used in an exec, to the program stack.

Refer to the *VM/SP CMS Command Reference* for more information about the GLOBAL command and the output format of the QUERY command.

Enhancement of the RDRLIST Command

The limit of 100 reader files has been removed from RDRLIST.

Refer to the *VM/SP CMS Command Reference* for more information about the RDRLIST command.

Enhancement of the EXECIO Command

The EXECIO command (CP option) has a new option, BUFFER, that lets you specify how many characters of CP command response data you want returned.

Refer to the *VM/SP CMS Command Reference* for more information about the EXECIO command.

Enhancement of the FORMAT Command

The default block sizes of temporary and permanent CMS minidisks on Count Key Data (CKD) Direct Access Storage Devices have been enhanced.

The new default block sizes are:

DASD	Default Block Size
3330	2K
3350	2K
3375	4K
3380	4K

Note: CMS minidisks on FBA devices continue to default to 1024 (1K) bytes.

Enhancement of CMS IUCV Support

The CMS IUCV macros, HNDIUCV and CMSIUCV, support the Advanced Program-to-Program Communication/VM (APPC/VM) facility, new with TSAF. APPC/VM is a means of communication between two virtual machines. The APPC/VM interface provides a limited set of the Systems Network Architecture Logical Unit (SNA LU) type 6.2 base communication functions. HNDIUCV and CMSIUCV continue to support IUCV.

Refer to *Virtual Machine System Facilities for Programming* for more information about CMS IUCV support.

Enhancements for Execs in Storage

This support lets you share frequently used execs and editor macros that have been loaded into an installation discontiguous shared segment (DCSS). You can access the shared segment and use execs that execute in the DCSS.

This support includes the enhancement of six commands:

SET A new INSTSEG option lets you specify whether the system should search the DCSS when locating a command. You can also specify the location where the segment is searched in the command search order.

QUERY A new INSTSEG option lets you determine if you are using the Installation DCSS and where it is searched in the command search order.

EXECDROP A new SHARED option lets you discontinue use of a specific exec or all execs contained in the segment.

EXECMAP A new SHARED option lets you list the execs contained in the DCSS.

IPL A new parameter for the IPL (Initial Program Load) command loads the Installation DCSS for use by your virtual machine.

EXECUPDT Use the new NOCOMMENTS option to remove all comments and leading blanks from the source file. One comment line containing the name of the file is inserted at the beginning of the file. The new ETMODE option should be specified with NOCOMMENTS when the source file contains DBCS characters and shift-in and shift-out characters.

Refer to the *VM/SP CMS Command Reference*, the *VM/SP CMS User's Guide*, and the *VM/SP HPO CP Command Reference* for more information about these commands.

Refer to the *VM/SP HPO Installation Guide* for information about building and saving the Installation Discontiguous Shared Segment.

Migration of CMS Commands and Modules to the CMS Nucleus

The following CMS commands and modules reside in the nucleus and are no longer loaded into the transient or user area for execution:

Command	Modules
COPYFILE	DMSCPY
GLOBALV	DMSGLO
IDENTIFY	DMSIDE
PRINT	DMSPRT

Invocation of these commands has not changed. Programs that rely on these commands residing in the transient or user area must be modified.

The COPYFILE command can be issued from programs running in the user area and does not overlay the program.

The IDENTIFY, GLOBALV, and PRINT commands can be issued from programs running in the transient area and do not overlay the program.

In addition, module DMSRSF that contains the System Product Interpreter VM Functions now resides in the CMS nucleus.

Enhancement of the Group Control System

Enhancements to the Group Control System include:

- Enhancement of IUCV Support
- Enhancement of Serviceability
- Enhancement of the GLOBAL Command.

Enhancement of IUCV Support

The GCS IUCV macros, IUCVCOM and IUCVINI, support the Advanced Program-to-Program Communication/VM (APPC/VM) facility, new with TSAF. APPC/VM is a means of communication between two virtual machines. The APPC/VM interface provides a limited set of the Systems Network Architecture Logical Unit (SNA LU) type 6.2 base communication functions. IUCVCOM and IUCVINI continue to support IUCV.

Enhancement of Serviceability

Enhancement of the GCS QUERY Command

The GCS Query command supports two additional subcommands, LOADALL and LOADCMD.

Use Query LOADALL to provide the names, addresses, and type of all the entry points residing in the virtual machine's storage.

Use Query LOADCMD to provide the module names, command names, and addresses of all the entry points loaded by the LOADCMD subcommand.

Enhancement of the GCS TRACE Command

GCS Trace can now trace branch entries to GETMAIN and FREEMAIN in addition to the SVC calls.

Enhancement of GCS TRACE Support for APPC/VM

The enhancement of GCS TRACE support includes:

- New TRACE support for the APPC/VM Synchronous function
- Changes to the TRACE support for the External Interrupts for APPC/VM
- Tracing the support of the APPC/VM for IUCVCOM and IUCVINI, new with TSAF.

Enhancement of GCS Dump Services

The enhancement of GCS dump services allows the option of printing formatted VSCS control blocks. Any dump generated by GCS dump services or through VMDUMP command with the dump type of GCS or RSCS2 has this capability.

Enhancement of GCS Recursive DUMP/ABEND

The enhancement of GCS recursive DUMP/ABEND allows the processing of a second dump if another abend occurs during abend processing. The second dump can be supported if ABTERM requests the dump, or if the DUMP parameter is specified on the ABEND.

Enhancement of the GLOBAL Command

Listing CMS Load Libraries

The GLOBAL command lets you list up to 63 (formerly 8) CMS load libraries (library type LOADLIB) to be searched when you invoke a program.

Depending on how you execute the command (such as from the command line or from an exec), there might be other system limits on the number of libraries accepted (command line length, for example).

The QUERY LOADLIB Command

If you list more that eight LOADLIBs with the GLOBAL command, the QUERY LOADLIB command returns multiple output lines (eight LOADLIBs per line) to the terminal.

Reference

Refer to the *VM/SP Group Control System Command and Macro Reference* for more information about GCS support.

Chapter 2. What's in VM/SP HPO Release 5?

In addition to supporting the VM/SP Release 5 enhancements, VM/SP HPO Release 5 has:

- Ability to create up to 9900 spool files per user instead of per system
- Improved storage management and simplified tuning
- More predictable system behavior and performance in a storage constrained environment
- Improved paging allocation order
- Improved system lock utilization
- Less than 16 megabyte constraint relief.

This chapter provides an overview of the new support. For migration considerations with respect to this support, refer to Chapter 7. For performance migrations, refer to Chapter 9. For module, macro, and control block changes, refer to Chapter 10.

Ability to Create up to 9900 Spool Files per User

Now an installation may support up to 9900 spool files per user with spool file numbers ranging from 1 to 9900. The maximum number of spool files that can be in the system at one time depends on the size of the checkpoint area or SYSSPOOL virtual storage size. For VM/SP HPO Release 5, the maximum number of spool files is approximately 100,000. This maximum may change, depending on the size of the SFBLOK.

The optional SYSSPL parameter on the SYSRES macro, which is used during system generation, allows you to specify the maximum number of spool files that may be in the system. Primarily, it should be used to allow easy migration from VM/SP HPO Release 5 or later to an earlier release. Its usual value will be 9900. However, you can specify any value from 1000 to 100,000.

The recovery of spool files during checkpoint and force starts is redesigned by starting multiple tasks that overlap both processing and I/O activity.

This support also modifies the storage structure. Reader spool file blocks are placed in a virtual address space of a pseudo userid (SYSSPOOL). SYSSPOOL'S VMBLOK is located at DMKSYSSP, not in the VMBLOK chain. SYSSPOOL is a reserved userid similar to SYSTEM. Changes are made to LOGON and directory processing to prevent an installation from logging on or defining a user with the userid of SYSSPOOL. A spool file bit map is used to manage the checkpoint area.

With this support, the SYSTEM option is invalid when used with the spoolid option on existing CP commands. In addition, Class D command responses display 6-digit numbers when referring to systemwide number of files changed, ordered, purged, queried, or transferred.

SPTAPE DUMP support is enhanced. If not all the spool files being dumped fit on a single tape, CP requests the issuer to mount another tape.

Addition of DIAGNOSE Code X'D8'

DIAGNOSE code X'D8' is a new diagnose code that allows the spooling operator to access SFBLOKs regardless of which system queue they are on— reader, printer, or punch.

Reference

For migration considerations, refer to "Migrating Spool Files to VM/SP HPO Release 5" on page 112 and to the *VM/SP HPO Installation Guide*. For planning and administrative information, refer to the *VM/SP HPO Planning Guide and Reference* and *VM/SP HPO CP for System Programming*. For documentation of the new DIAGNOSE code, refer to *Virtual Machine System Facilities for Programming*.

Improved Storage Management and Simplified Tuning

This support addresses performance for users in constrained storage environments. The objectives of this support are:

- Improve the storage management of large working sets, shared pages, and the less-than-16Mb area. Core table scan becomes the primary method for free list replenishment. In addition, the disposable page collector is eliminated.
- Change the balance between swapping and paging so that swapping will predominate.
- Reduce overhead at queue drop and queue add. When a virtual machine drops from queue, its pages will no longer be logically swapped and trimmed.
- Simplify tuning.

New NOQ2 Option on the SET QDROP OFF Command

Your installation may now specify SET QDROP OFF NOQ2 command for service virtual machines (like GCS/VSCS) that use system resources in small, frequent bursts. This command will keep that virtual machine in Q1, improving performance for the users of that service.

Deleted CP Commands

Because the logical swap queues have been eliminated, the system programmer no longer needs to specify the length of time that a user stays on a queue. As a result, the class E SET SRM SWPQTIME and QUERY SRM SWPQTIME commands are deleted.

Reference

Refer to "General Performance Indicators That Are Likely to Change" on page 126 for information on performance variables that are likely to change. Also, see *VM/SP HPO CP for System Programming* for more details.

More Predictable System Behavior and Performance

Changes to the scheduler provide more predictable system behavior and more predictable performance in a storage-constrained environment.

Before moving a virtual machine from the eligible list to the run list, the scheduler tests for sufficient processor time as well as sufficient main storage. If processor time is not available, a virtual machine is promoted from the eligible list to the run list only if it has an earlier deadline (higher priority) than the last virtual machine already on the run list.

Reference

For more information, refer to *VM/SP HPO CP for System Programming.*

Improved Paging Allocation Order

A new parameter, ORDER=, is added to the SYSPAG macro to improve the distribution of I/O activity over available channels and control units. The default is ORDER=SYSTEM. If you accept the default, you can add devices or reorganize your I/O configuration without reoptimizing your SYSPAG macros. The system verifies that you distributed I/O activity in a reasonable order and attempts to improve the order.

However, you may specify ORDER=USER if you want to preserve the order you specified.

Reference

For more information, refer to *VM/SP HPO Planning Guide and Reference.*

Improved System Lock Utilization

In Release 5, there is less use of the system lock and, therefore, less contention. This should improve system performance.

Examples of some of the functions that are now executed without the system lock are:

- Part of Diagnose X'18'
- Part of the external interrupt handler
- Most scheduler calls
- System modules that call DMKPTRAN and do not hold the system lock.

In addition, several functions now use less of the system lock when executed. Probably the most notable of these is the command logic that builds multiple-line command responses. As a result of this, the VMSTKO or "VM Stacked Output" problem has been fixed.

Refer to "General Performance Indicators That Are Likely to Change" on page 126 for more information on how this performance change may affect VMMAP variables.

Less than 16 Megabyte Constraint Relief

CP will now reference certain pages above the 16 megabyte line. This relieves constraint below the 16 megabyte line since CP no longer needs to copy these pages below 16 Mb to reference them.

Privileged-operation simulation has been changed to reduce the number of times a page must be moved below the 16 megabyte line. When a privileged-operation exception occurs, the system now copies the privileged instruction to the VMBLOK (from wherever it was). It no longer needs to move the page containing the instruction below the line before it does the copy. Likewise, the new PSW that is the operand of the LPSW instruction can be directly obtained from above the line.

Pseudo-pages used by SWPTABLE migration may be located and referenced above the 16 megabyte line. The system no longer moves them below the 16 megabyte line before referencing them.

In addition, certain pages that could not move above the 16 megabyte line in previous releases are now moved above the line before being paged out. These include virtual page zeros and pageable system modules.

Chapter 3. What PTFs Have Been Merged into the Base?

The following support was issued as new function PTFs to VM/SP Release 4 or VM/SP HPO Release 4.2 and distributed via the PUT process. These PTFs are now included in Release 5. Separate publications were issued for each PTF; however, since the information is included in the Release 5 manuals, you no longer need these separate publications. The PTFs are:

- Enhanced Connectivity Facilities on VM
- 3480 Volume Serial Error Recording
- OS Simulation Standard Label Tape Processing Exits
- Support for IBM 3422 Magnetic Tape Subsystem
- Addition of the CONSOLE Macro
- Logical Device Host Limit Relief
- Support of ASCII
- Enhancements to Paging Storage
- Error Recording Enhancements
- Directory Option for Restricting Vector Use
- Support for 3380 under DOS Simulation
- Reduced Trace Table Size.

Enhanced Connectivity Facilities on VM

Enhanced Connectivity Facilities on VM is a part of IBM System/370 to IBM Personal Computer Enhanced Connectivity Facilities. Enhanced Connectivity Facilities on VM provides:

- A way for VM to communicate with work stations (for example, IBM Personal Computers).

  A new CMS command, CMSSERV, coupled with a communication program on the work station, lets work station users set up communication between VM and their work stations. With this, users have access to the services of IBM System/370 to IBM Personal Computer Enhanced Connectivity Facilities.

- The Server-Requester Programming Interface (SRPI).

  An application programmer can write server programs for VM/SP HPO that use the SRPI. A companion requester program, typically on the work station, can then ask the server to perform functions on VM and pass the results back to the requester.

Refer to the *VM/SP Introduction* or the *Introduction to IBM System/370 to IBM Personal Computer Enhanced Connectivity Facilities*, GC23-0957, for more information about these services. Refer to the *VM/SP Programmer's Guide to the Server-Requester Programming Interface for VM/SP* for more information about Enhanced Connectivity Facilities on VM.

3480 Volume Serial Error Recording

The purpose of 3480 Volume Serial Error Recording support is to provide the 3480 tape volume serial (VOLSER) in any Miscellaneous Data Records (MDR) or 3480 Outboard Records (OBR) when a virtual machine successfully executes the DIAGNOSE code X'D0' for the tape volume.

A X'90' type MDR is logged during shutdown and detach processing to indicate the tape has been rewound and unloaded.

CP logs the 3480 X'90' MDR when a virtual machine issues an SVC 76.

CMS provides CP with the VOLSER by issuing the new DIAGNOSE code as part of its volume label checking for standard labeled tape volumes. The specific CMS operations that support this new function are:

- OS simulation
- CMS DOS
- TAPEMAC, TAPPDS, MOVEFILE commands
- TAPESL macro.

This support improves serviceability because you can keep track of the error frequency for each tape by examining the VOLSER in the OBR and MDR.

A new DIAGNOSE code, X'D0', lets any virtual machine provide CP with the virtual device address and the volume serial of a 3480 tape volume. The VOLSER is then recorded in the OBR or MDR when an OBR or MDR is logged for the tape device.

OS Simulation Standard Label Tape Processing Exits

This support applies to OS simulation QSAM support for standard labeled tapes, a CMS service that provides multivolume tape support.

OS simulation tape processing provides user exits to let your installation do one of the following:

- Replace the current VM tape multivolume support with another installation-provided switching routine
- Interface to a tape management system.

If your installation wants to use a tape multivolume switching routine not supplied by VM, or a tape management system, an interface routine (DMSTVI) that gives control to the selected switching routine or system must be provided. If this interface routine exists, it gets control instead of the VM volume switching routine (DMSTVS).

FILEDEF Command

The SYSPARM option has been added to the FILEDEF command to let users supply non-VM parameters to an installation-provided interface routine during QSAM tape processing.

LABELDEF Command

The maximum number of characters that can be specified with the FID ? operand of the LABELDEF command has increased from 17 to 44 so a full 44-character file ID can be passed to the interface routine.

IBM 3422 Magnetic Tape Subsystem

VM/SP HPO provides programming support for the IBM 3422 Magnetic Tape Subsystem.

The 3422 can write or read data at 6250 BPI or 1600 BPI and has a tape speed of 125 inches per second. This allows a nominal data rate of 780Kb per second at 6250 BPI or 200 Kb per second at 1600 BPI.

The 3422 consists of a Model A01 with a tape control and one tape drive housed in the same frame and a Model B01 with one tape drive only. A maximum of seven Model B01s can be attached to a Model A01 for a total of eight drives per string.

CMS Support

The 3422 is supported in CMS as a 9-track tape device with 1600 or 6250 BPI. CMS support includes:

- CMS Tape Commands
- CMS Tape Macros
- OS Simulation Commands
- DOS Simulation Support
- CMS Tape Utility.

CP Support

CP provides IBM 3422 support for:

- Subsystem Definition
- Spool-to-Tape
- Monitor Recording
- System Dump Recording
- Stand-Alone Dump Facility
- DASD Dump Restore.

The VM/SP HPO Release 5 publications contain this support. However, if you would like a separate booklet that discusses this, order *VM/SP and VM/SP HPO Support of IBM 3422 Magnetic Tape Subsystem*, GC24-5336.

PVM (VM/Pass-Through Facility) Extended Data Stream Support

This support lets you install and run VM/Pass-Through Facility Release 3.

Enhancement of DIAGNOSE Code X'7C'

DIAGNOSE Code X'7C' enhanced to:

- Support 3270 extended data streams that let logical devices use full color, programmed symbol sets, and extended highlighting capabilities
- Support 3284, 3286, 3287, 3288, and 3289 logical printer devices that allow presentation of status from a logical device printer and let an application create logical 328x printers in addition to logical 327x display devices
- Let the addresses of logical devices be kept in a table and accessed through an indexing algorithm
- Return status to CP after an ACCEPT function is performed.

Logical devices are permitted to DIAL or ATTACH to nonowning host virtual machines.

Enhanced CP Commands

The Laddr option has been added to the ATTACH, DETACH, DISABLE, ENABLE, and SET PFnn COPY commands to let CP accept a logical device address. In addition, the HOLD parameter is supported for logical devices on the DISCONN and LOGOFF commands.

Enhancement of DIAGNOSE Code X'8C'

DIAGNOSE code X'8C' detects storage protection exceptions such as if a user attempts to store into a protected area such as a CMS module or the nucleus area.

The VM/SP HPO Release 5 publications contain this support. However, if you would like a separate booklet that discusses this, order *VM/SP and VM/SP HPO CP Extended Data Stream Support for VM/Pass-Through Facility Release 3*, GC24-5354.

CONSOLE Macro

The CONSOLE macro instruction has been added to access 3270 full-screen console service. CONSOLE does the following:

- Performs 3270 I/O operations
- Builds the channel command word (CCW) or, for the CONSOLE EXCP function, executes the CCW built by the application
- Issues the DIAGNOSE code X'58' or SIO instruction
- Waits for the I/O to complete processing
- Checks any error status from the device.

The CONSOLE macro lets programs open "paths" (unique names that distinguish one application from another) to a display device. It coordinates use of the screen by indicating to an application writing to the device that another path has updated the screen last and that the screen must be reformatted. Thus, full-screen applications do not have to rewrite the entire screen each time a write occurs.

One CONSOLE path name, $WM, is reserved for system use.

Logical Device Host Limit Relief

The logical device host limit relief removes the restriction of letting only 8 virtual machines create 512 logical devices. With this support, any number of virtual machines can create up to 512 logical devices as long as the number of logical devices in the system does not exceed 4096.

For example:

Number of Virtual Machines	Number of Logical Devices Created
8	512
16	256
64	64
128	32
4096	1

You can use any combination, as long as **each** virtual machine does not create more than 512 logical devices and no more than 4096 logical devices are defined on the system.

Support of ASCII

7171 Support

The 7171 is a protocol converter that allows emulation of ASCII devices as 327x. Enhancements to support of ASCII in connection with the 7171 include:

Line Drop at Logoff, Disconnect, or Force. When you log off, disconnect from, or are forced off an ASCII terminal connected to a 7171 port, the port is released for possible reuse by another terminal (unless you log off or disconnect with the HOLD option or specify the E3270HLD feature). As a result, you will find ASCII devices more readily available.

Recognition of an Emulated 3270. Your application can detect an emulated 3270 if your device's DMKRIO entry contains the EMUL3270 feature. This support lets you distinguish between a 327x and an emulated 327x. An emulated 327x is indicated by a ;hex.02' in the flag byte returned by DIAGNOSE code X'8C'. This emulation can be done by a 7171 control unit. Once your application detects a 7171, your application can use the special features of the 7171.

Line Mode Support

CP supports ASCII devices via 37 × 5 communication control units. Enhancements to support of ASCII in connection with line mode support include:

Provision of Translate Tables. If you find translate table discrepancies because your application uses STD ANSI X3.26 1980 translate tables, you can select these translate tables via the VM2 option of the TERMINAL command's new operand, ASCIITBL. If not, you can continue to use the STD TTY ANSI X3.4 1977 translate tables as the default or by selecting the VM1 option. (VM1 is the default.)

No Line Control Characters to Line Mode ASCII Devices. By selecting the USR option of the TERMINAL command's new operand, CNTL, you can handle the insertion of line control characters into the data stream. With the SYS option, CP will insert these characters. (SYS is the default.)

3270 Security Enhancement

A PF key no longer causes a "read inhibit" to change to a noninhibited read for local, remote, or VM/VTAM 3270 terminals. Therefore, when you are prompted for your password at logon and press a PF key before you enter your password, the password is not visible on the screen as you type it in.

Enhancements to Paging Storage

This enhancement extends the support of Paging Storage, also called Expanded Storage, so that increments above 64 are usable. It also introduces a new macro, SYSXSTOR, which makes Paging Storage easier to allocate.

The SYSXSTOR macro is similar to the SYSPAG macro. The biggest difference is that you specify the number of **megabytes** to be allocated to the swap type instead of the number of **increments**. This is particularly helpful when you are allocating Paging Storage on the 3090 Model 400. Using the SYSXSTOR macro, you can do a single generation on either side without having to know which hardware increments belong to each side.

The VM/SP HPO Release 5 publications contain this support. However, if you would like a separate booklet that discusses this, order *VM/SP HPO Enhancements to Paging Storage*, GC23-0382.

Error-Recording Enhancements

This PTF changes the way **machine checks** and **channel checks** are recorded.

In the past, the machine check and channel check handlers recorded processor and channel-related errors but did not record the results of the error recovery procedure. Thus, system programmers and IBM CEs had an accurate count of the **number** of errors that occurred but did not have enough information on the **effects** that the errors had on the system. This support changes the error-recording procedure to provide information on the effects of errors.

With this support, certain machine checks and channel checks are now recorded in one of the following categories:

- **Hard** errors may result in the loss of resources, such as a virtual machine or a device. These errors could not be recovered.
- **Degrade** errors may result in the loss of resources, such as a storage frame or a path to a device. Except for a possible degradation in performance, these errors do not have a large effect on the system. Degrade errors are always recovered.
- **Soft** errors cause no loss of resources. They are always recovered.

For channel checks, there is a fourth category in which errors may be recorded:

- **Passed** errors are reflected to a virtual machine. In these cases, the channel check handler either did not attempt error recovery or was not successful.

Directory Option for Restricting Vector Use

This support adds an NOVF parameter to the OPTION directory control statement, which allows an installation to restrict use of the Vector Facility.

There are no commands that override this restriction. If a user has the NOVF parameter assigned in his directory, he may not access the Vector Facility.

Note: This is true unless the user has access to a batch machine that may use the Vector Facility. In this case, the virtual machine can access the Vector Facility through the batch machine. So, if you restrict virtual machines from using the Vector Facility, you should also restrict one or more batch machines from using the Vector Facility.

What Happens If a Restricted Virtual Machine Tries to Access the Vector Facility?

If a user is not authorized to use the Vector Facility and attempts to perform a vector-related command, such as DISPLAY VECTOR or STORE VECTOR REGISTER, the user will receive the following command response: "VECTOR FACILITY NOT AVAILABLE."

If a user is not authorized to use the Vector Facility and tries to execute a vector instruction within a program, the user will get a program interruption for an operation exception (PRG1).

If a restricted V=R virtual machine issues a READ SCP INFORMATION service call, the V=R machine **will** get information about the Vector Facility, even though it is unable actually to access the Vector Facility. The restricted V=V virtual machine, on the other hand, **will not** get any information concerning vectors when issuing the READ SCP INFORMATION service call.

Support for 3380 under DOS Simulation

DOS simulation of CMS now supports all models of 3380 DASD that are supported by CMS.

Reduced Trace Table Size

This support allows an installation to specify and use a trace table that is smaller than the default.

Part 2. System Requirements, Library Changes, and Program Distribution

This part of the manual discusses:

- System requirements and planning information (Chapter 4)
- The VM/SP HPO library (Chapter 5)
- Program distribution (Chapter 6).

Chapter 4. System Requirements and Planning Information

This chapter briefly describes the following system requirements for VM/SP HPO:

- Storage requirements
- Processors supported
- Processor requirements
- Devices supported
- Configuration information
- Program requirements.

Storage Requirements

VM/SP HPO requires a minimum of 2 megabytes of available processor storage. Mixed-mode environments – for example, CMS running concurrently with another virtual machine operating system — require an additional 512K bytes of available processor storage. The resident nucleus size for VM/SP HPO Release 5 is 370K (an additional 40K of real storage is allocated in AP or MP mode).

Note: The nucleus size approximation for VM/SP HPO is for planning purposes only and may vary depending upon your installation's configuration.

Processors Supported by VM/SP HPO

VM/SP High Performance Option operates on the following processors:

Processor	Model No.	Configuration
303x	3031 3032 3033	UP/AP UP UP/AP/MP
3042	3042-2	AP
308x	3081 3083 3084	Dyadic UP Partitioned Processing
3090	150 180 200 400	UP UP Dyadic Partitioned Processing
43xx	4341 (All models) 4381-1 4381-2 4381-3 4381-11 4381-12 4381-13 4381-14	UP UP UP Dual UP UP UP Dual

Notes:

1. *See* VM/SP HPO Planning Guide and Reference *for descriptions of UP (uniprocessor), AP (attached processor), MP (multiprocessor), dyadic, dual, and partitioned processing modes.*

2. *The references to the 3081, 3083, and 3084 include all models of these processors. The references to the 3090 Models 150, 180, 200, and 400 include the E series.*

Processor Requirements

Certain processors require additional hardware in order to support specific VM/SP HPO functions.

1. On the 3031 UP/AP processors, the EC level for shadow table bypass assist (a feature of the shadow table maintenance facility) is 388860 and later.
2. For the IBM 3033 processor:
   - Preferred machine assist requires the following:
     - Preferred Machine Assist RPQ (#8P0913).
     - Virtual Machine Assist RPQ (#EJ1156).
     - 3033 Extension feature (#6850) with Extended Control Storage (#3868) on each channel group.
     - Extended Addressing feature (#3832).

     Note: These features are required for the IPL processor of an AP or MP configured system.
   - Extended storage support requires the Extended Addressing feature (#3832). Also, the virtual machine assist feature must be at EC level 209811 or later.
   - MVS/SP microcode assist cross memory services requires the following:
     - Virtual Machine Assist RPQ (#EJ1156)
     - 3033 Extension feature (#6850) with Extended Control Storage (#3868) on each channel group.
   - 3033 Extension Feature Enhancement to Virtual Machine Assist RPQ (#EJ1156) requires the 3033 Extension feature (#6850). Note that these features are required for the IPL processor of an AP or MP configured system.
   - The EC level for shadow table bypass assist is 212205.
3. For the IBM 308x, the control switch assist for preferred machine assist requires the following engineering change (EC) levels:

Processor	EC Level
3081D	209917
3081K	207224
3081KX	209956C
3081G	212012
3081GX	209996B
3083B	212046
3083BX	209986A
3083E	214336
3083EX	209966A
3083J	208301
3083JX	209976B
3084Q	216745
3084QX	207231A/B

Devices Supported by VM/SP HPO

VM/SP HPO supports most of the currently available direct access storage devices, magnetic tapes, unit record devices, terminals, and transmission control units. The following sections list the devices supported by VM/SP HPO. The devices are listed by device type:

- Direct access storage devices
- Magnetic tapes
- Unit record devices (printers, readers, and punches)
- Terminals
- Transmission control units and communication controllers
- Multisystem communication units

Warning: Certain devices no longer supported are still mentioned elsewhere in the VM/SP HPO library because the code still refers to them. Use any devices not listed here or in Chapter 2 of the *VM/SP HPO Planning Guide and Reference* at your own risk.

Direct Access Storage Devices

The direct access storage devices supported by VM/SP HPO are:

Storage Device	Model No.
2305 Fixed Head	1 and 2
3310 Direct Access	–
3330 Disk	1, 2, and 11
3333 Disk and Control	1 and 11
3340 Direct Access[3]	A2, B1, and B2
3350 Direct Access	A2 and B2
3370 Direct Access	A1, A2, B1, and B2
3375 Direct Access	–
3380 Direct Access	AA4, AD4, AE4, B4, and BE4
3880 Storage Subsystem	11, 13, 21, and 23

All of these direct access devices are supported as dedicated devices. The 2305 is not supported by CMS or on a 3090. All except the 3310, 3330, and 3880 are supported as paging, swapping, and spooling devices and as virtual devices for use by virtual machines. The 3330, 3350, 3375, 3380, and 3880 Model 13 or 23 Storage Subsystem are also supported as system residence devices. The 3880 Model 11 or 21 Storage Subsystem is supported as a paging or swapping device.

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[3] 3348 Data Modules Models 35, 70, and 70F; and the 3344 Direct Access Storage Model B2.

Direct Access Storage Control Units

The following direct access control units are supported by VM/SP HPO:

Control Unit	Model No.	Storage Device	Model No.
2835	1 and 2	2305	1 and 2
3830	1	3330	1 and 2
3830	2	3333 3340 3350	1 and 11 A2 A2
3830	3	3330 3333 3350	1 and 11 1 and 11 A2 and B2
3880	1	3330 3333 3340 3350 3370 3375	1, 2, and 11 1 and 11 A2 A2 and A2F A1, A2, B1, and B2 —
3880	2	3330 3333 3340 3350 3370 3375 3380[4]	1, 2, and 11 1 and 11 A2 A2 and A2F A1, A2, B1, and B2 — —
3880	3	3380[4]	—

Magnetic Tapes

VM/SP HPO supports the following magnetic tape devices:

Device	Model No.
3410/3411	1, 2, and 3
3411 Tape Unit and Control	1, 2, and 3
3420	3, 4, 5, 6, 7, and 8
3422 Tape Unit and Control	–
3430	–
3430 Tape Unit and Control	–
3480	–

[4] For the 303x processor, you must have the Data Streaming Feature (No. 4850).

Magnetic Tape Control Units

The magnetic tape control units supported by VM/SP HPO are:

Tape Control Unit
3411 Unit and Control
3422 Unit and Control
3430 Unit and Control
3480
3803

Unit Record Devices (Printers, Readers, and Punches)

VM/SP HPO supports the following printers, readers, punches, and unit record control units as system spool devices.

Printers

VM/SP HPO supports the following printers:

Printer	Model No.
1403	2, 3, 7, and N1
1443	N1 (with 144 print positions)
3203	5
3211	(Right indexing only)
3213	(in 3215 emulator mode)
3287	1, 1C, 2, and 2C
3289	4
3800	1, 3, and 8
4245	—
4248	1
4250	(dedicated only)

Card Readers and Card Punches

VM/SP HPO supports the following readers and punches:

Device	Model No.
2501 Card Reader	B1 and B2
2520 Card Punch	B2 and B3
2540 Card Read Punch	1
3505 Card Reader	B1 and B2
3525 Card Punch	P1, P2, and P3

Unit Record Control Units

VM/SP HPO supports the following unit record control units:

- IBM 2821 Control Unit
- IBM 3811 Printer Control Unit

High-Function Graphic Devices

VM/SP HPO supports the following high-function graphic devices:

- IBM 3250 Models 1 and 2

Terminals and Display Stations

VM/SP HPO supports the following system consoles and terminals:

Device	Model
2150	—
3066	2
3215	— (except on the 3090)
7412	—
3036	—
3278	2A
2741	—
3275	2
3276	2, 3, and 4
3277	2
3278	2, 3, 4, and 5
3279	2A, 2B, 2C, 3A, 3B, S2A, S2B, 2X, S3G, and 3X
3290	—
3767	1 and 2
3101	10, 12, 13, 20, 22, and 23
TTY 33/35	—

Transmission Control Units

VM/SP HPO supports the following transmission control units:

Device	Unit Type or Model
2701	Data type
2702	Transmission control
2703	Transmission control
Integrated Communications Attachment (ICA)	No. 4060
3704, 3705-I, 3705-II, 3725	Communication controllers

Multisystem Communication Units

VM/SP HPO supports all models of the 3088 Multisystem Communications Unit. The 3088 Model 1 interconnects up to four systems; the 3088 Model 2 interconnects up to eight systems.

Minimum Configuration

VM/SP HPO requires:

- One of the processors previously listed with at least 2 megabytes of available processor storage.
- One system control device.
- One printer
- One card reader. [5]
- One card punch. [5]
- Two disk drive units.
- One 9-track magnetic tape unit.
- One transmission control unit. The 3272 or 3274 control units are required only when a local 3277, 3278, or 3279 display station is used as a terminal.
- One multiplexer channel.
- One selector or block multiplexer channel.
- One communication terminal.

The requirement for at least one transmission control unit, line, and remote terminal can be eliminated if you are operating only two virtual machines using the primary and alternate system consoles. The requirement is also eliminated if the only terminals used are the 3277, 3278, or 3279 attached to a 3272 or 3274 control unit.

Note: The configuration shown is an absolute minimum. Support of large numbers of CMS users requires larger configurations. Consult your marketing team for the appropriate configuration for your environment.

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[5] This device is not required for a cardless system.

Configurations Supported by CMS

VM/SP HPO does not extend the capabilities of the CMS component of VM/SP. The following CMS configurations apply only to the CMS component of VM/SP.

- The minimum virtual storage size for CMS is 320K bytes. Virtual storage can be as large as 16 megabytes added in multiples of 4K bytes.
- CMS can use as a virtual operator's console any terminal supported by VM/SP HPO.
- CMS can use as a spooling device any virtual (nondedicated) card reader, card punch (except the 2520), and printer supported by VM/SP HPO.
- CMS supports up to 26 virtual 3310, 3330, 3333, 3340, 3344, 3350, 3370, 3375, and 3380 direct access storage devices; as well as 3850 Mass Storage System 3330V volumes, as 3330 devices. The minimum size of each virtual disk is one cylinder or 12 FB-512 blocks. The CMS system disk is required and reduces to 25, the number of user disks that can be accessed at any given time.
- CMS supports up to 16 2400, 2415, 3410 (9-track only), or 3420 (7- or 9-track) magnetic tape units.

Program Requirements

VM/SP HPO executes with VM/SP. VM/SP HPO Release 5 requires installation of VM/SP Release 5. When you merge the prerequisite VM/SP licensed program with the appropriate VM/SP HPO program, you obtain a functional operating system that integrates the functions of the VM/SP base product and the added features of the VM/SP HPO.

Your VM/SP system must be at a certain service level prior to your installing VM/SP HPO. Refer to the Program Directory for information describing the required VM/SP service level.

Language

VM/SP HPO source code is written in basic assembler language.

Licensed Programs That Operate with VM/SP HPO Release 5

The following are licensed programs that you may require or find useful for your VM/SP HPO system. Contact your IBM marketing representative for the specific release levels of these and other programs from which your installation may benefit.

- To operate VM/SP HPO Release 5, you must have:
  - VM/System Product (VM/SP) Release 5, Program No. 5664-167
- For Vector Facility, you may require:
  - Engineering and Scientific Subroutine Library (ESSL), Program No. 5668-863
  - VS FORTRAN Version 2 Compiler, Library and Interactive Debug, Program No. 5668-806
  - Assembler H Vector Facility Enhancement, Program No. 5668-962 Vector Facility Enhancement
- To use the new transparent services access facility component of VM, you may need:
  - SQL/DS Release 3.5 with Remote Relational Access Support, Program No. 5748-XXJ
- For a VM/SNA network, you need:
  - Advanced Communications Function/ Virtual Telecommunications Access Method (ACF/VTAM), Program No. 5664-280 Virtual Telecommunications Access Method
  - Advanced Communications Function/ Network Control Program (ACF/NCP), Program No. 5668-854 Network Control Program
  - Advanced Communications Function/ System Support Programs (ACF/SSP), Program No. 5664-289 System Support Programs
- In addition, the following products are recommended for a communication network:
  - NetView, Program No. 5664-204 (this requires ACF/VTAM Version 3 Release 1.1)
  - Remote Spooling and Communication Subsystem (RSCS) Networking Version 1, Program No. 5748-XP1 or RSCS Networking Version 2, Program No. 5664-188
  - VM/Pass-Through Facility (PVM), Program No. 5748-RC1

- For system support, you may find the following helpful:
  - VMBACKUP Management System, Program No. 5664-291
  - VMTAPE Management System, Program No. 5664-292
  - Resource Access Control Facility/VM (RACF/VM), Program No. 5740-XXH
  - Virtual Machine/Directory Maintenance Program Product (VM/DMPP), Program No. 5748-XE4
  - VM Batch Facility, Program No. 5664-364
  - VM/Interactive Productivity Facility (VM/IPF), Program No. 5664-318
  - Environmental Recording, Editing, and Printing (EREP), Program No. 5654-260
- To aid in evaluating performance, you may use:
  - Virtual Machine Monitor Analysis Program (VMMAP), Program No. 5664-191
  - Virtual Machine Real Time Monitor (VM/RTM), Program No. 5796-PNA
  - Virtual Machine Performance Planning Facility (VMPPF), Program No. 5664-179
- For business and text office support, you might consider:
  - Professional Office System (PROFS), Program No. 5664-309
  - Document Composition Facility, Program No. 5748-XX9
  - Display Write/370, Program No. 5664-370
- For printer support, you may use:
  - Print Services Facility/Virtual Machine (PSF/VM), Program No. 5664-198
  - Print Services Access Facility/Virtual Machine (PSAF/VM), Program No. 5664-312.

Compatibility

Application programs that currently execute using VM/SP that do not depend on internal CP structure and/or control blocks should continue to execute using VM/SP HPO.

Chapter 5. VM/SP HPO Publications

This chapter:

- Diagrams the changes to the library for Release 5
- Lists the books that you receive with the product tape
- Gives instructions for ordering additional copies of publications
- Discusses documentation for between-release support
- Provides abstracts of the manuals.

What Are Some of the Changes in the Release 5 Library?

The structure of the VM Library is changed for VM/SP Release 5 and VM/SP HPO Release 5. The information is reorganized so that each book relates more closely to a specific task. Some publications have been eliminated, and the information is provided in new or reorganized publications. In addition, information is added for the new support in Release 5.

What Publications Are Eliminated?

The following publications are eliminated from the VM/SP and VM/SP HPO Release 5 Libraries:

- *System Programmer's Guide* (split into four new publications)
- *Group Control System Guide*
- *Interactive Problem Control System Guide*
- *System Definition Files*
- *OLTSEP and Error Recording Guide.*

What Publications Are Reorganized?

The following publications are reorganized:

- *Operator's Guide*
- *CMS User's Guide*
- *CMS Command and Macro Reference.*

What Publications Are New?

In the restructuring of the library, the *System Programmer's Guide* was split into four new publications, other publications were reorganized, and several new publications were added. Some new titles that you will notice in this release are:

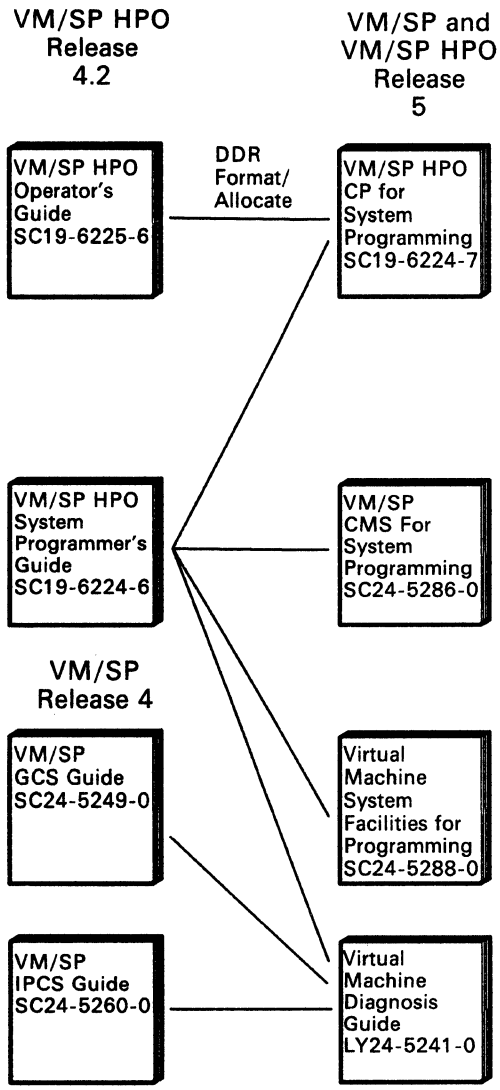
- *CP for System Programming*
- *CMS for System Programming*
- *System Facilities for Programming*
- *Diagnosis Guide*
- *GCS Macro Reference*
- *CP Command Reference*
- *CMS Macros and Functions Reference*
- *TSAF Reference*
- *Programmer's Guide to the Server-Requester Programming Interface for VM/SP.*

Refer to the following pages to find out how these publications fit into the structure of the library and to the "Abstracts of Manuals" on page 87 for descriptions of their contents.

The numbers shown in the following illustrations are the publication numbers, which are not, in all cases, the order numbers. When ordering, use the numbers that appear in Figure 4 on page 84 and in Figure 5 on page 85.

System Programmer's Guide Is Split

You can now find the information that was in the *System Programmer's Guide* in the following publications:



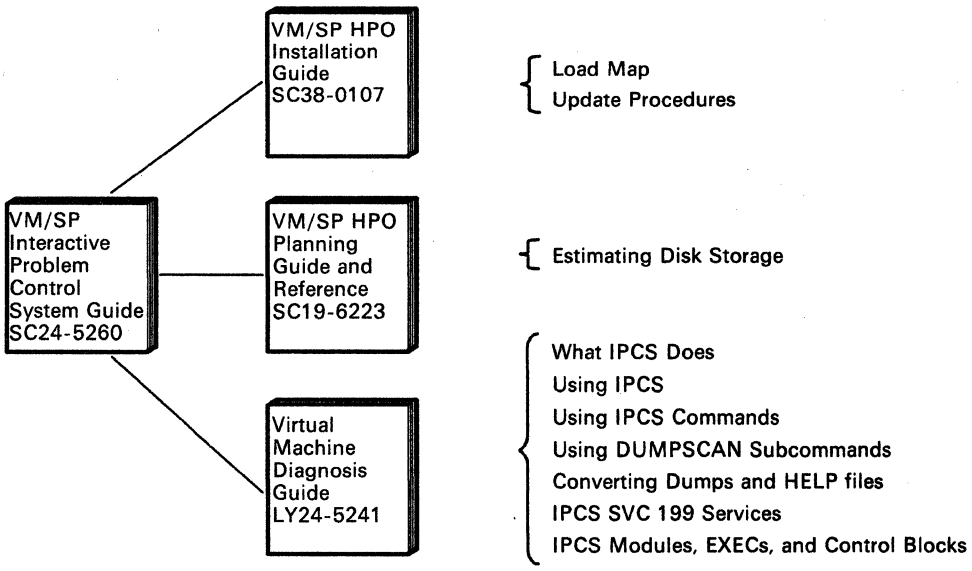
- Introduction to CP
- Storage Protection
- Virtual Storage Preservation
- Alternate Nucleus Support
- Changing Commands and Privilege Classes
- Interrupt Handling
- Accounting Records
- Saved System, DCSSs, Shared Segs
- Security Measures
- Directory, Time, and Storage Management
- Performance Observation and Guidelines
- 3880-11, 21, 13, 23
- CP in AP/MP Mode
- Print Buffers and Forms Control
- 3800 Printing Subsystem
- I/O Management
- CP Conventions
- Paging Storage
- DASD Operations
- Vector Facility
- 3850 MSS
- Timers
- 3088 MCU

- Introduction to CMS
- Interrupt Handling in CMS
- Developing Programs
- Updating Source Programs
- Developing Commands and Message Files
- Assembler Virtual Storage Requirements
- Developing OS and VSE Programs
- Using AMS and VSAM
- Auxiliary Directories
- CMS Batch Facility
- CMS Macro Library
- Tailoring CMS
- Using Storage
- Abend Processing

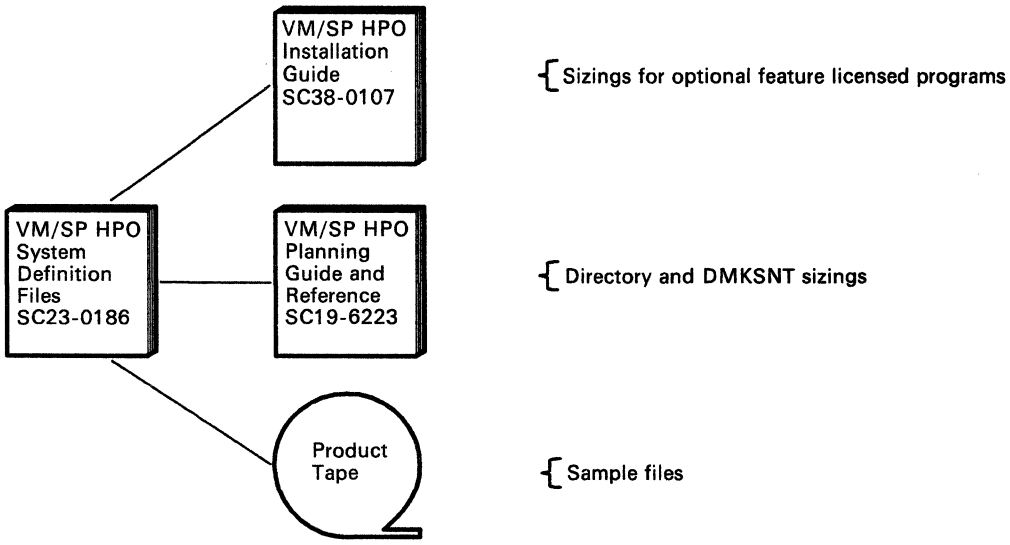
- DIAGNOSE Instruction
- Error Logging
- Special Message Facility
- Single Console Image Facility
- Logical Device Support Facility
- Programmable Operator
- IUCV
- CMS IUCV
- SNA CCS
- VMCF
- NLS
- *MSG
- *MSG ALL
- *BLOCKIO
- *SIGNAL
- *SPOOL

- Introduction to Debugging
- Debugging with VM
- Debugging Using CP, CMS, GCS, IPCS

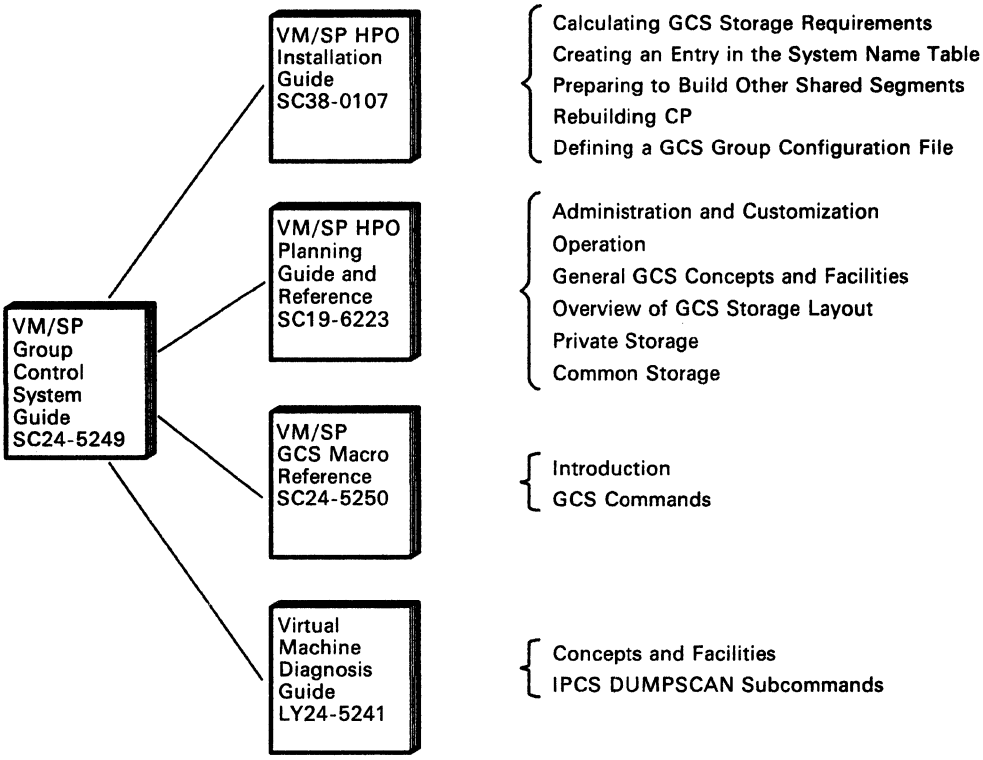
Interactive Problem Control System Guide Is Eliminated



System Definition Files Is Eliminated



Group Control System Guide Is Eliminated

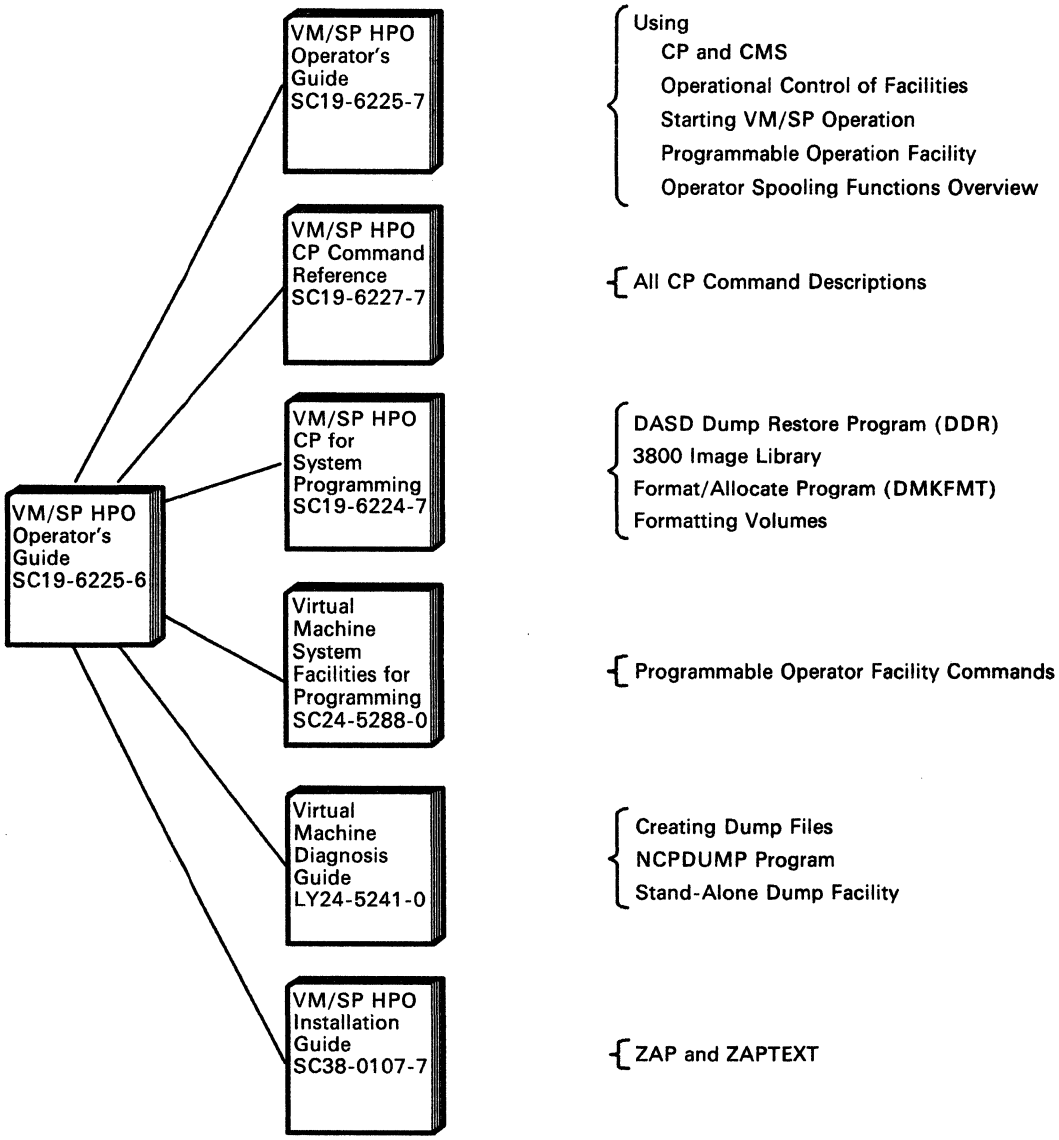


OLTSEP and Error Recording Guide Is Eliminated

Order the *VM/SP HPO Release 4.2 OLTSEP and Error Recording Guide*, ST00-1901.

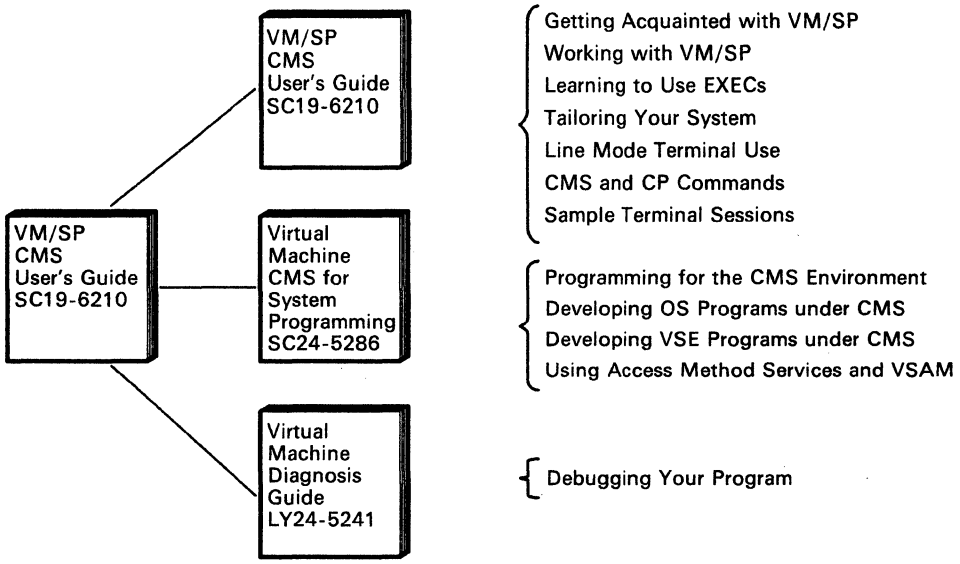
Operator's Guide Is Reorganized

You can now find the information that was in the *Operator's Guide* in the following publications:



CMS User's Guide Is Reorganized

You can now find the information that was in the *CMS User's Guide* in the following publications:



CMS Command and Macro Reference Is Renamed

You can now find the information that was in the *CMS Command and Macro Reference* in the *CMS Macros and Functions Reference.*

What Publications Will I Receive with the Product Tape?

For VM/SP HPO Release 5, you will receive the following publications with the product tape:

VM/SP HPO Licensed Program Specifications

VM/SP HPO Release 5 Guide

VM/SP HPO Library Guide, Glossary, and Master Index

VM/SP HPO Planning Guide and Reference

VM/SP HPO Installation Guide

VM/SP HPO CP for System Programming

VM/SP HPO Operator's Guide

VM/SP HPO CP Command Reference

VM/SP HPO System Messages and Codes

VM/SP HPO Service Routines Program Logic

VM/SP HPO System Logic and Problem Determination Guide

VM/SP HPO Data Areas and Control Block Logic – CP

You will not receive the binders or labels. You must order them separately.

Using SLSS to Order Additional Copies of Manuals

You may order additional copies of VM/SP HPO manuals individually using the individual order numbers. Or, you may use bill of form numbers (BOFs) to order kits of additional copies. Three BOFs exist so you can easily order:

- The VM/SP HPO library as a set
- The combined VM/SP HPO and VM/SP libraries as a set
- The VM/SP library as a set.

Note: For Release 5, the VM/SP HPO BOFs do not include binders. You must order them separately.

Ordering the VM/SP HPO Library as a Set

To order the VM/SP HPO library as a set, use bill of form number SBOF-0003. You receive labels and 9 publications:

VM/SP HPO Library Guide, Glossary, and Master Index

VM/SP HPO Release 5 Guide

VM/SP HPO Planning Guide and Reference

VM/SP HPO CP Command Reference

VM/SP HPO Installation Guide

VM/SP HPO CP for System Programming

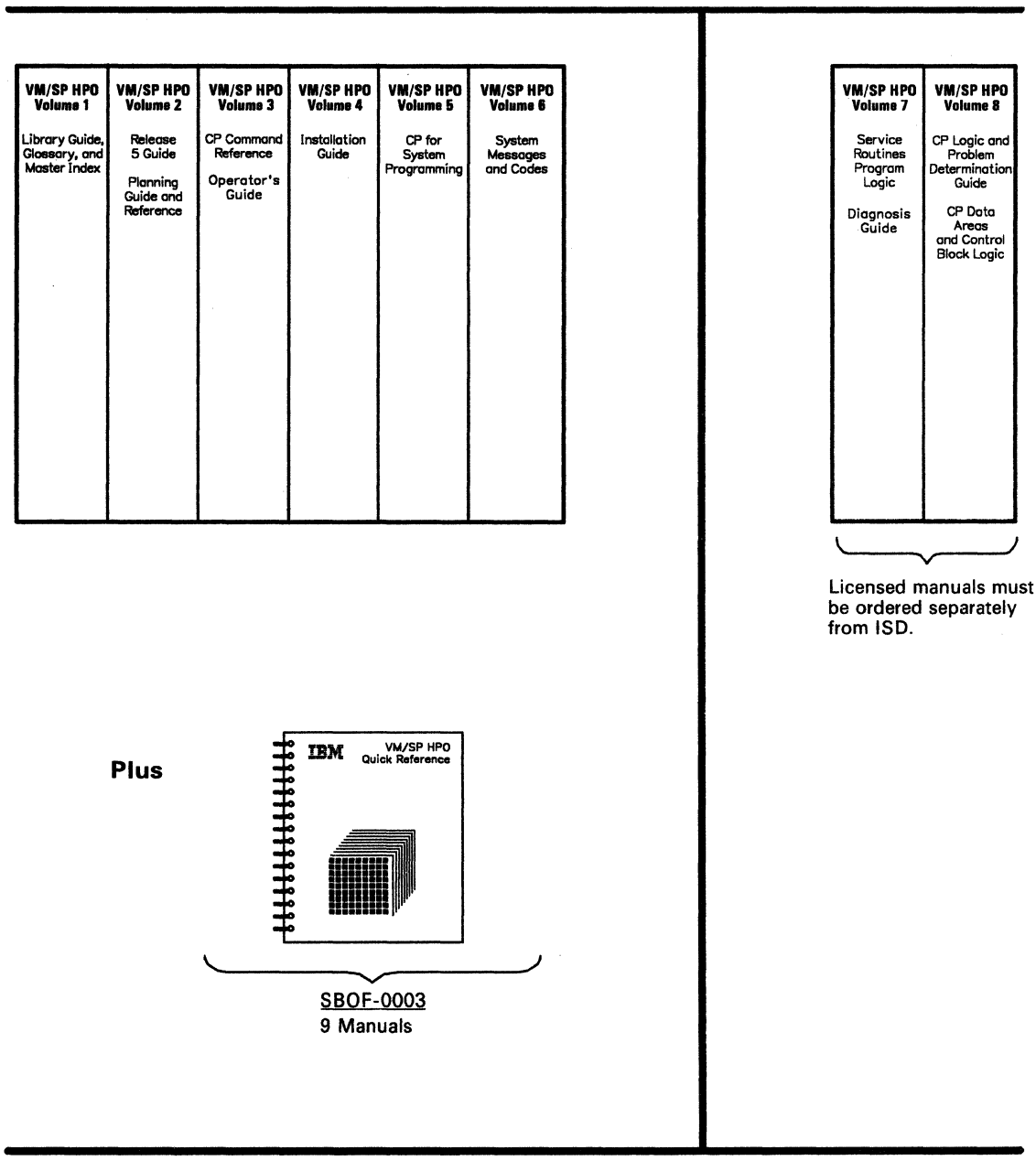
VM/SP HPO Operator's Guide

VM/SP HPO System Messages and Codes

VM/SP HPO Quick Reference.

Binders do not come with SBOF-0003. You must order them separately. The order number for one binder is SX24-5129. Order six binders for the unlicensed publications and an additional two binders for the licensed publications. In addition, you may want to order an extra binder to hold manuals that IBM issues between releases.

Figure 2 on page 80 shows the arrangement of the VM/SP HPO manuals in binders with labels.



Note: The Bill of Form for Release 5 does not include binders. You must order them separately. Order six binders for the unlicensed publications and two binders for the licensed publications. The order number for one binder is SX24-5129.

Figure 2. Ordering and Organizing the VM/SP HPO Library

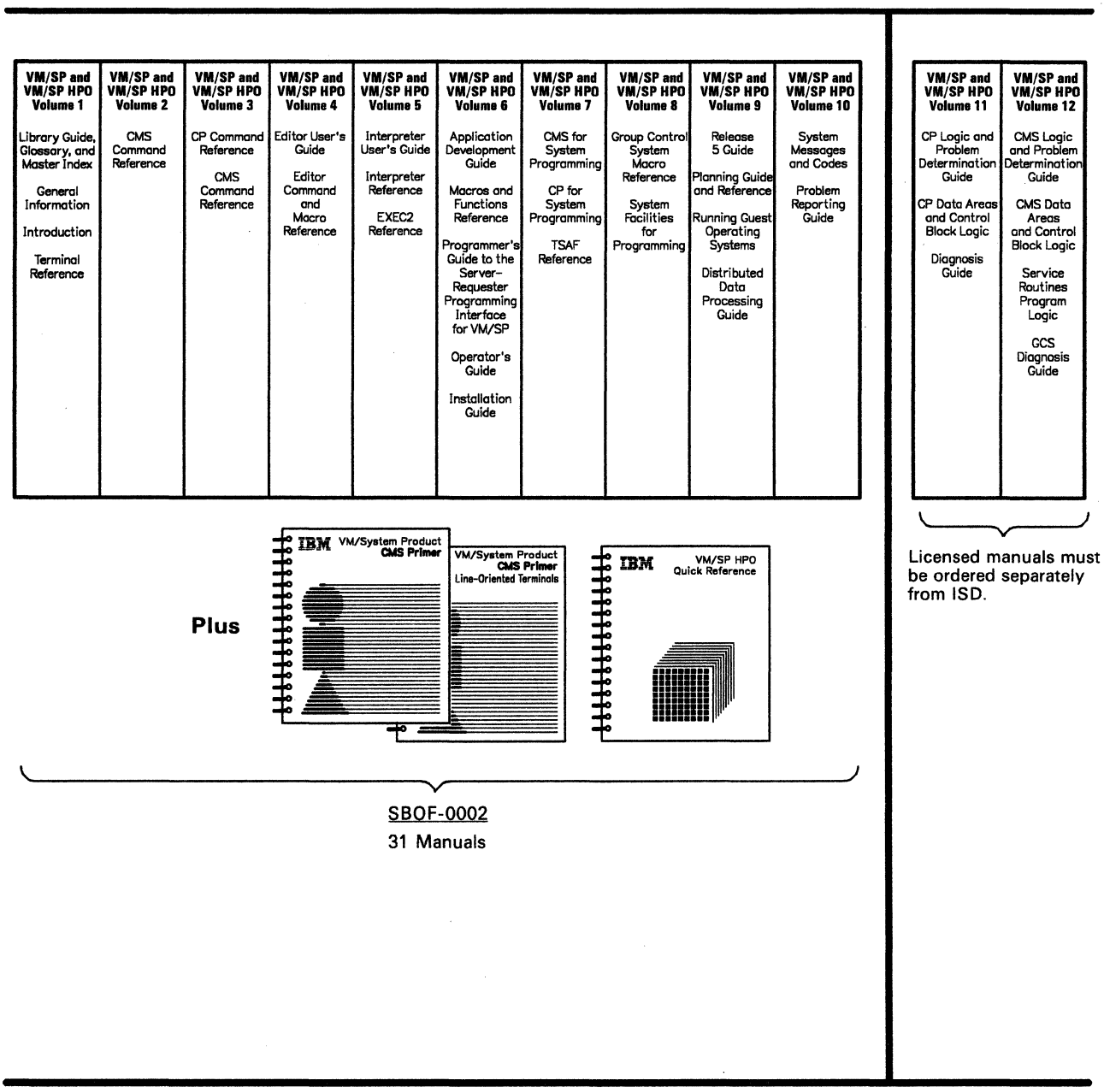
Ordering the Combined VM/SP HPO and VM/SP Libraries as a Set

To order the combined VM/SP HPO and VM/SP libraries as a set, use bill of form number SBOF-0002. You receive the labels and 31 publications:

VM/SP HPO Library Guide, Glossary, and Master Index
VM/SP General Information
VM/SP Introduction
VM/SP Terminal Reference
VM/SP CMS Command Reference
VM/SP CMS User's Guide
VM/SP HPO CP Command Reference
VM/SP System Product Editor Command and Macro Reference
VM/SP System Product Editor User's Guide
VM/SP System Product Interpreter Reference
VM/SP System Product Interpreter User's Guide
VM/SP EXEC 2 Reference
VM/SP Application Development Guide
VM/SP CMS Macros and Functions Reference
Programmer's Guide to the Server-Requester Programming Interface for VM/SP
VM/SP HPO Operator's Guide
VM/SP HPO Installation Guide
VM/SP CMS for System Programming
VM/SP HPO CP for System Programming
VM/SP TSAF Reference
VM/SP Group Control System Macro Reference
Virtual Machine System Facilities for Programming
VM/SP HPO Release 5 Guide
VM/SP HPO Planning Guide and Reference
Virtual Machine Running Guest Operating Systems
VM/SP Distributed Data Processing Guide
VM/SP HPO System Messages and Codes
VM/SP Problem Solving and Reporting Guide
VM/SP HPO Quick Reference
VM/SP CMS Primer
VM/SP CMS Primer for Line-Oriented Terminals.

Binders do not come with SBOF-0002. You must order them separately. The order number for one binder is SX24-5129. Order 10 binders for the unlicensed publications and an additional two binders for the licensed publications. In addition, you may want to order an extra binder to hold manuals that IBM issues between releases.

Figure 3 on page 82 shows the arrangement of the VM/SP HPO and VM/SP manuals in binders with labels.



Note: The Bill of Form for Release 5 does not include binders. You must order them separately. Order 10 binders for the unlicensed publications and two for the licensed publications. The order number for one binder is SX24-5129.

Figure 3. Ordering and Organizing the Combined VM/SP HPO and VM/SP Libraries

Ordering the VM/SP Library

You can order the VM/SP library as a set using SBOF-3241 (this includes binders, labels, and manuals) or order the binders, labels, and VM/SP manuals separately. For this ordering information, refer to *VM/SP Release 5 Library Guide, Glossary, and Master Index*, GC19-6207.

Ordering Individual VM/SP or VM/SP HPO Publications

You can order individual VM/SP or VM/SP HPO publications. The order numbers (for the latest release) and pseudonumbers (for previous but still current releases) appear in Figure 4 on page 84 and Figure 5 on page 85.

Ordering Publications for VM/SP HPO Releases 4.2 and 5

Figure 4 lists the VM/SP HPO publications and order numbers.

VM/SP HPO Publication	Release 4.2 Pseudonumber	Release 5 Order Number
Labels for VM/SP HPO Library	ST00-1909	SX23-0289
Labels for Combined VM/SP HPO and VM/SP Libraries	ST00-1908	SX23-0282
Announcement Brochure	GT00-1895	GC19-6221
What's In VM/SP HPO Release 5?	NA	GC23-0384
Release Guide	ST00-1903	SC23-0189
Library Guide, Glossary, and Master Index	ST00-1914	GC23-0187
Licensed Program Specifications	ST00-1902	GC20-1844
Planning Guide and Reference	ST00-1896	SC19-6223
Installation Guide	ST00-1904	SC38-0107
System Definition Files	SC23-0186	NA
Service Routines Program Logic	LT00-1913	LY20-0898
System Programmer's Guide (see Note below)	ST00-1897	NA
CP for System Programming	NA	SC19-6224
Problem Determination Reference Information	LT00-1910	LX23-0347
Operator's Guide	ST00-1898	SC19-6225
System Messages and Codes	ST00-1899	SC19-6226
System Messages Cross-Reference	SQ23-0190	SC23-0190
CP Command Reference	ST00-1900	SC19-6227
Virtual Machine Running Guest Operating Systems	GT00-1894	GC19-6212
OLTSEP and Error Recording Guide	ST00-1901	NA
Data Areas and Control Block Logic – CP	LT00-1911	LY20-0896
System Logic and Problem Determination Guide – CP	LT00-1912	LY20-0897
Command Summary (General Users)	ST00-1905	SX22-0003
Command Summary (Other than General Users)	ST00-1906	SX22-0004
Quick Reference	ST00-1907	SX22-0005
Note: System Programmer's Guide *was split into four publications for Release 5. Order* VM/SP HPO CP for System Programming *(in this chart),* VM/SP CMS for System Programming, Virtual Machine System Facilities for Programming, *and* Virtual Machine Diagnosis Guide *(in Figure 5 on the following page).*		

Figure 4. Pseudonumbers and Order Numbers for VM/SP HPO Manuals

Ordering Publications for VM/SP Releases 4 and 5

VM/SP HPO Release 4.2 operates in conjunction with VM/SP Release 4. VM/SP HPO Release 5 operates in conjunction with VM/SP Release 5. Figure 5 lists pseudonumbers for applicable VM/SP Release 4 and 5 publications.

VM/SP Publication	Release 4 Pseudonumber	Release 5 Pseudonumber
Introduction	GT00-1575	GT00-1977
Terminal Reference	GT00-1581	GT00-1979
CMS Command Reference	ST00-1583	ST00-1981
CMS User's Guide	ST00-1584	ST00-1980
System Product Editor User's Guide	ST00-1589	ST00-1985
System Product Editor Command and Macro Reference	ST00-1590	ST00-1986
System Product Interpreter User's Guide	ST00-1593	ST00-1987
System Product Interpreter Reference	SQ24-5239	ST00-1988
EXEC 2 Reference	ST00-1368	ST00-1984
Application Development Guide	SQ24-5247	SQ24-5247
CMS Macros and Functions Reference	NA	ST24-5284
Programmer's Guide to the Server-Requester Programming Interface for VM/SP	NA	ST24-5291
CMS for System Programming	NA	ST24-5286
TSAF Reference	NA	ST24-5287
Group Control System Command and Macro Reference	ST24-5250	SQ24-5250
Virtual Machine System Facilities for Programming	NA	ST24-5288
Distributed Data Processing Guide	ST24-5241	ST24-5241
System Logic and Problem Determination Guide Volume 2 (CMS)	LT00-1820	LT00-2007
Data Areas and Control Block Logic–CMS	LQ64-5221	LT00-2009
Virtual Machine Diagnosis Guide	NA	LT00-2010
Group Control System Diagnosis Guide	LT24-5249	LT00-2012
CMS Primer	ST00-1591	ST00-1992
CMS Primer for Line-Oriented Terminals	SQ24-5242	ST00-1993

Figure 5. Pseudonumbers for VM/SP Manuals

Supplementary Publications

The publications listed in Figure 6 apply to VM/SP HPO and, therefore, may be helpful to you.

Supplementary Publications	Order Number
Device Support Facilities User's Guide and Reference	GC35-0033
Input/Output Configuration Program User's Guide and Reference	GC28-1027
Input/Output Configuration Program User's Guide and Reference—3090 Processor Complex	SC38-0038
VM/Directory Maintenance General Information Manual	GC20-1836
VM/Directory Maintenance Program Logic Manual	LY20-0889
VM/Directory Maintenance Guide for General Users	SC20-1839
VM/Directory Maintenance Installation and System Administrator's Guide	SC20-1840
VM/SNA Problem Source Identification (PSI) Guide: Methods and Components	GG24-3059
VM/SNA Problem Source Identification (PSI) Guide: Use of Tools	GG24-3060

Figure 6. Order Numbers for Supplementary Publications

System Center Bulletins

From time to time, the IBM System Centers issue bulletins that apply to VM systems. To automatically receive these bulletins, include GBOF-2201 on your SLSS form.

Between-Release Publications for PTFs

From time to time, IBM provides new VM/SP HPO support that is announced between releases. Such support is available as program temporary fixes (PTFs) on a Program Update Tape (PUT) and is documented by a separate publication.

These publications describe the new support, hardware device, new or changed commands and messages, system generation considerations, and new and changed modules. The publication contains only new information, so you should use it along with the regular library.

We suggest that you order a binder, SX24-5139, to hold the publications. We are providing a label that you can use to keep track of the books in the binder.

The booklets listed in Figure 7 have been issued for PTFs on Release 4.2. Because the information is included in the Release 5 manuals, these booklets are no longer necessary.

Title	Order Number
Directory Maintenance Enhancements	SC23-0339
CMS Vector Processing Support and TXTLIB Enhancement	SC24-5332
Logical Device Host Limit Relief	SC24-5327
3480 Volume Serial Error Recording	SC24-5329
CMS Console Facility	SC24-5333
Enhancements to Paging Storage	GC23-0382
Support of ASCII	GC24-5328
3422 Magnetic Tape Subsystem	GC24-5336
Error Recording Enhancements	GC23-0395
Directory Option for Restricting Vector Use and Monitor Enhancements	GC23-0396

Figure 7. Temporary Booklets That Are Now Obsolete

Abstracts of Manuals

The following *abstracts* present a description of each manual and, consequently, a better idea about which manual is best suited for your task. The VM/SP HPO manuals are listed first, followed by the VM/SP manuals and applicable supplementary manuals.

VM/SP HPO Publications

Announcing VM/SP HPO Release 5

This brochure, *Announcing VM/SP HPO Release 5*, introduces the new release for people who are unfamiliar with VM/SP HPO.

What's in VM/SP HPO Release 5?

This brochure, entitled *What's in VM/SP HPO Release 5: A System Programmer's Perspective*, discusses the technical enhancements to release 5 from a system programmer's perspective. It includes an overview of the new support, the migration and coexistence requirements, and planning information.

Release 5 Guide

This manual provides **current** users of VM/SP HPO Release 4.2 with a synopsis of the functional enhancements offered by the new release. It will improve the installation time of Release 5 and improve customer productivity by describing new functional enhancements, defining the related user interfaces, and giving examples of their use. It includes details for migrating from VM/SP HPO Release 4.2 to VM/SP HPO Release 5 and identifies new and changed modules.

Library Guide, Glossary, and Master Index

This manual describes the documentation available for VM/SP HPO, defines terms used throughout the manuals, and includes a compilation of all the index entries for the library. The master index section is particularly helpful if you are not familiar with the VM/SP HPO library as it directs you to the correct manual for a particular topic.

Planning Guide and Reference

This book is a reference manual for all VM/SP HPO Release 5 users. It describes the enhanced functions and capabilities that improve VM/SP HPO's performance and make it a more versatile product for a wide range of applications.

This publication includes information about:

- Planning for system generation
- Defining your operating system
- Generating a 3704/3705/3725 control program that runs with VM/SP HPO
- Updating VM/SP HPO.

The intended audience is system programmers and anyone responsible for the planning, installation, and updating of a VM/SP HPO system. The reader is expected to have a general understanding of data processing and teleprocessing techniques.

Installation Guide

This book is for system programmers and administrators who install or apply service changes. It contains step-by-step procedures for installing VM/SP HPO. In addition, there are procedures for applying preventive and corrective service.

CP for System Programming

This manual is a reference for system programmers, system analysts, and others who implement and extend the functions of the Control Program (CP) of VM/SP HPO. It assumes some experience with programming concepts and techniques and consists mostly of material extracted from the Release 4.2 *System Programmer's Guide*, in addition to material transferred from the *VM/SP Operator's Guide* for Release 4.2. The book has three parts:

- Part 1 describes the functions of CP and provides guidance in using some CP features.
- Part 2 describes options available in VM to analyze and improve the performance of virtual machines and operating systems.
- Part 3 is a reference for dealing with processor features and real peripheral devices.

CP Command Reference

This publication is a reference manual for all privilege classes of users that are running systems such as OS, OS/VS, DOS, DOS/VS, VSE, CMS, and networking systems in a virtual machine under VM/SP HPO. Control Program (CP) commands available to all privilege classes are listed alphabetically. Each command description contains general usage information, the command line format, descriptions of all allowable operands, and default values for operands. Also included are tables showing the relationship of the general class of CP commands to the complete set of VM/SP HPO CP commands.

Operator's Guide

This book is for those responsible for the operation and administration of a VM/SP HPO system. This book describes the recovery features and how to initialize and terminate the system. It briefly introduces the various commands, CP and CMS, that an operator may find useful. It also includes some information about hardware considerations and spooling and Batch commands.

System Messages and Codes

This manual contains messages and codes, as well as restrictions, that the user may encounter when using CMS, CP, IPCS, GCS, and TSAF. Conditions that generate these messages and codes are explained, the resulting action is described, and appropriate responses are suggested.

Running Guest Operating Systems

This manual was previously titled *Operating Systems in a Virtual Machine.* It has been restructured to include updated and practical examples. This publication is for people who are interested in running their operating system (VSE, MVS, and VM) under the VM host system. The book presents the basic processes so that the working system can be set up quickly. Experienced persons can improve the efficiency of their installation, running a guest system under VM, with the included recommendations. The book assumes the audience is knowledgeable about their own system but new to VM.

VM/SP Publications

Application Development Guide

The *Application Development Guide* tells FORTRAN and COBOL application programmers how to compile, link, load, run, test, and debug programs using CMS. It also contains information on using the Interactive System Productivity Facility (ISPF) for dialog management and the Structured Query Language/Data System (SQL/DS) for data base management.

CMS Command Reference

This publication provides users of the CMS component of VM with detailed reference information about command syntax and usage for CMS commands; EDIT subcommands; HELP format words; DEBUG commands; and EXEC control statements, special variables, and built-in functions.

CMS Macros and Functions Reference

For Release 5, the information pertaining to CMS macros and functions from the *CMS Command and Macro Reference* and the *CMS User's Guide* has been removed to create a separate manual. New CMS macros and functions are also incorporated.

This manual provides application programmers, system programmers, and IBM system support personnel with detailed reference information about CMS assembler language macro instructions and CMS functions.

CMS for System Programming

The *VM/SP CMS for System Programming* provides a system programmer with information about CMS. This information includes details on interrupt handling, CMS storage maps, updating source programs, assembling and executing programs, creating commands and message files, CMS external macros, programming support for OS and VSE, access method support, CMS support of OS and DOS VSAM functions, and the CMS Batch Facility.

CMS Primer

This manual teaches you, as a new user, how to do your work using VM and a video display terminal. The primer presents only a subset of all the functions and commands available. The material is presented in an interesting manner with suggested exercises included in the text.

CMS Primer for Line-Oriented Terminals

This manual is an interactive tutorial for VM users of line-oriented (line mode) video display terminals. The manual, which is similar in scope and content to the *CMS Primer*, is designed to quickly give the reader a working knowledge of VM. Topics include logging on; editing, managing, and printing files; using the Document Composition Facility (SCRIPT/VS) to format files; and writing EXECs.

CMS User's Guide

This manual contains general information on the CMS component of VM. It provides information and examples regarding the CMS file system, the CMS batch facility, the HELP facility, and windowing support. Also included are examples on using the System Product Editor to create and edit CMS files and using the System Product Interpreter to create and use EXECs.

EXEC 2 Reference

This is a reference manual that defines the EXEC 2 language. It contains all the formats, syntax rules, and descriptions of the arguments for EXEC 2 statements. An EXEC 2 primer for new users is included. It summarizes the language and what it is capable of. A detailed discussion of the different types of EXEC 2 statements is followed by examples. It lists the error messages and return codes issued by the EXEC 2 interpreter.

System Facilities for Programming

This manual provides a system programmer with detailed information on facilities available in VM. These facilities include the DIAGNOSE instruction, the Inter-User Communications Vehicle (IUCV) for CP and CMS, CP System Services, the Virtual Machine Communication Facility (VMCF), the programmable operator facility, and information on getting national languages on your system. Information was extracted from the *System Programmer's Guide.*

Group Control System Command and Macro Reference

This manual provides detailed reference material that describes the functions and use of all macros supported in the Group Control System. Each macro description contains information on general usage, format, all available parameters, messages, and return codes. The manual is intended for personnel who are developing application programs to run on the Group Control System.

Introduction

This manual is an extension to the *VM/SP General Information* manual. It describes, at an introductory level, what VM is and what it can do for you. It is intended for anyone who wants basic information about VM facilities and capabilities. This manual is useful for those who plan a VM installation, use licensed programs with VM, or migrate to VM from another operating system. Topics are discussed only to a depth needed to introduce VM. This manual is suggested as a prerequisite before reading the more detailed reference manuals in the library.

Programmer's Guide to the Server-Requester Programming Interface for VM/SP

This manual provides an application programmer with information on how to write and install IBM Enhanced Connectivity Facilities servers in a VM system. For the work station (for example, IBM Personal Computer) user, the manual also gives information on how to start IBM Enhanced Connectivity Facilities communications on VM.

Problem Reporting Guide

This manual serves as a guide to help customers identify problems when they occur, gather information that describes the problem, and report this data in a complete, organized, and useful form.

The manual also includes the *VM/SP Problem Reporting Summary,* SX24-5171-0, a quick reference wall poster summarizing the *Guide.* You can order additional copies of the *Summary* separately.

System Product Editor Command and Macro Reference

This publication is a reference manual that contains all the command formats, syntax rules, and operand and option descriptions for the XEDIT subcommands and macros. It tells how to enter XEDIT commands, subcommands, and macros. It contains the format description, and operand and option list for the XEDIT command, which is used to invoke the editor. It lists EDIT subcommands and their XEDIT counterparts. It tells how to define windows and virtual screens used with the CMS Session Services. You should be familiar with the information in the *System Product Editor User's Guide* before attempting to use this manual.

System Product Editor User's Guide

This manual is intended for the individual who has limited data processing experience. It is designed to give the user a working knowledge of the System Product Editor (invoked by the XEDIT command). XEDIT provides a wide range of functions for text processing and programming development. Both a full screen and a line mode editor, it can be used on display and typewriter terminals.

System Product Interpreter Reference

This manual provides reference information about System Product Interpreter statements and their use. It is suitable for experienced programmers, particularly those who have used another high-level language (for example, PL/I, Algol, or Pascal). It includes error messages and describes syntax, instructions, functions, debugging aids, and parsing.

System Product Interpreter User's Guide

This manual is a step-by-step guide to using the System Product Interpreter, the new and powerful interpretive command and macro language. It is intended for a user with some knowledge of terminals, editors, and VM, but the user need not have any previous programming experience.

The novice should read the System Product Interpreter chapter in the *VM/SP CMS Primer* for prerequisite knowledge.

Terminal Reference

This manual is intended for those users who plan to use terminals with VM in their operations. It discusses the characteristics of terminals in general and the physical characteristics of some terminals and consoles. It contains a typical session that gives working examples from logon to logoff.

Transparent Services Access Facility (TSAF) Reference

This manual contains all the reference material required to use the transparent services access facility (TSAF). It includes information for the system administrator to run the TSAF virtual machine, and the service tools provided with it. For the application programmer, it includes a complete description of the Advanced Program-to-Program Communication (APPC/VM) protocol, new with TSAF, and the system services associate with TSAF.

Supplementary Publications

Input/Output Configuration Program User's Guide and Reference

This publication describes the VM/SP and stand-alone versions of IOCP. It is intended for system programmers and customer engineers who are responsible for defining, installing, and configuring the channels, control units, and I/O devices for a 308x Processor Complex.

Input/Output Configuration Program User's Guide and Reference—3090 Processor Complex

This publication is intended for system programmers and customer engineers who are responsible for defining, installing, and configuring the channels, control units, and I/O devices for a 3090 processor complex.

VM/Directory Maintenance General Information Manual

This publication is for planning purposes and contains information about the VM/Directory Maintenance licensed program, program number 5748-XE4.

VM/Directory Maintenance Program Logic Manual

This publication is intended for use by system programmers who are responsible for the maintenance of the CP directory. It provides a description of the program logic, module descriptions, and cross references.

VM/Directory Maintenance Guide for General Users

This publication is intended for the user who needs to modify control statements in his own directory entry. The general user cannot make changes that involve system resources.

VM/Directory Maintenance Installation and System Administrator's Guide

This publication is intended for system programmers responsible for installing and maintaining the directory maintenance licensed program, and for system administrators responsible for maintaining the system's user directory. The publication provides system installation information and describes the directory maintenance commands.

Device Support Facilities User's Guide and Reference

This publication describes the Device Support Facilities processor and commands. It also discusses hardware considerations, operating system considerations, planning, and installation. It is intended for installation managers, system programmers, system operators, and other data processing personnel who manage or use direct access storage devices.

VM/SNA Problem Source Identification (PSI) Guide: Methods and Components

This book is written for system programmers and others involved in problem determination in a VM/SNA environment. The information enables the reader to identify a problem when it occurs in a VM/SNA system, gather information that describes the problem, and report the problem to IBM in a complete, organized, and useful form.

VM/SNA Problem Source Identification (PSI) Guide: Use of Tools

This document discusses tools that can be used to perform problem determination in a VM/SNA environment. It is written for system programmers and others involved in problem determination. It presumes that the user has experience in installing and using VM systems.

Online HELP Facility

Online HELP, intended for both naive and experienced users, contains information about commands, instructions, and messages. Online HELP provides menus of commands and tasks, as well as several ways to display this information. HELP information is available for CMS and IPCS commands; for EDIT, XEDIT, and DEBUG subcommands; for EXEC and EXEC2 control statements; for Restructured Extended Executor (REXX) language instructions; and for CP and CMS messages. The novice user should read the HELP chapter in the *VM/SP Primer* for introductory information.

Chapter 6. Program Distribution

This chapter briefly describes the following system requirements for VM/SP HPO:

- Product tape
- Feature numbers
- System maintenance
- Testing period
- License
- Program services
- Warranty.

VM/SP HPO Product Tape

IBM distributes VM/SP HPO on product tapes that you can load onto your system's direct access storage devices. The product tapes are distributed in the following formats:

- 9-track 6250 BPI reel
- 18-track 38K BPI 3480 cartridge.

The product tape contains updated text, MACLIBs, EXECs, and source. When you merge the product tape with the prerequisite VM/SP, you obtain an operational system that combines the features of VM/SP with the functional extensions available in VM/SP HPO. Refer to the following page for an illustration of the layout of the product tape.

If you are installing an IBM virtual machine facility licensed program for the first time, you must order a starter system. The starter system is a basic system with control program and conversational monitor system functions. These functions provide the system support necessary for generating VM/SP HPO.

Starter systems must be restored to DASD. IBM makes available starter systems that can be restored to 3350, 3375, and 3380 DASD. You should obtain the starter system that conforms to your system DASD configuration. See Figure 9 for the layout of the starter system.

If you have an existing system that is running one of the following, it is not necessary to use a starter system; you can generate VM/SP HPO from your existing system.

- VM/370 Basic System Extensions — Release 2
- VM/370 System Extensions — Release 2
- VM/System Product.

See "Feature Numbers" on page 99 for feature number information.

Product Tape Layout for VM/SP HPO Release 5

Figure 8 lists the files that are written on the product tape for VM/SP HPO Release 5.

File Number	Contents
File 1	Header
File 2	Installation Exec
File 3	Sample files
File 4	VM/SP HPO miscellaneous files (loader, CNTRL files, and EXECs)
File 5	VM/SP HPO text files
File 6	VM/SP HPO MACLIB
File 7	VM/SP HPO Miscellaneous (system disk modules)
File 8	VM/SP HPO HELP files
File 9	AUX files for applying PTFs to VM/SP HPO assemble source or updates
File 10	PTF source for VM/SP HPO modules and VM/SP HPO reach-ahead APARS
File 11	AUX files for applying PTFs to VM/SP HPO MACLIB
File 12	PTF source for VM/SP HPO MACLIB
File 13	VM/SP HPO source
File 14	VM/SP reach-ahead APARS
File 15	Release 5 migration aids

Figure 8. Product Tape Layout

Starter System Tape Layout

Figure 9 shows the layout of the starter system tape.

Contents
Device Support Facility Program
DMKFMT – Format/Allocate Service Program
DMKDDR – DASD Dump Restore Service Program
Starter System

Figure 9. Starter System Tape Layout

Tape layouts are subject to change. You should always refer to the Program Directory (available from the HONE system through your branch office) for the most current format.

Feature Numbers

When you order VM/SP HPO starter systems, you must specify tape density and DASD type. For example, if your DASD configuration consists of 3380 direct access storage devices and 3420 tape drives, you should order a starter system tape with 6250 user bytes per inch (BPI) for restoration to the 3380. Feature numbers are available to assist you in ordering the starter system tapes for your system.

Starter System Feature Numbers

Figure 10 lists valid starter system feature numbers. All starter systems include the VM/SP HPO product tape. As mentioned previously, if you have an operational system, a starter system is not necessary.

Release 5	Description
5851	3350 starter system 6250 BPI
5852	3350 starter system 3480 Cartridge
5861	3375 starter system 6250 BPI
5862	3375 starter system 3480 Cartridge
5871	3380 starter system 6250 BPI
5872	3380 starter system 3480 Cartridge

Figure 10. Starter System Feature Numbers

Product Feature Numbers

Because the product tape does not have to be restored to a DASD unit, you do not have to be concerned about DASD types when ordering; however, you should order the correct tape density. To order the VM/SP HPO product tape and control program listings, use the features numbers listed in Figure 11.

Release 5	Description
5841	Product Tape 6250 BPI
5842	Product Tape 3480 Cartridge
5523	EPL 6250 BPI
5589	EPL 3480 Cartridge
8243	Control Program Listings–UP
8244	Control Program Listings–AP/MP

Figure 11. VM/SP HPO Release 5 Product Feature Numbers

Feature numbers for the 6250 BPI starter system include the 6250 BPI product tapes. Feature numbers for the 3480 cartridge starter system include the 3480 cartridge product tapes.

System Maintenance

IBM periodically distributes a Program Update Tape (PUT) to aid you in maintaining your system. The PUT you receive contains cumulative service for all licensed programs and system control programs for which your installation is licensed. A cover letter accompanying the PUT describes the procedure necessary for printing the machine-readable Memo to Users. This document describes what the PUT contains and how to apply service to your system.

There are instances, however, when your installation may need to apply an update to an individual module or apply a fix that is not included in the PUT. In addition, you may wish to modify your system to suit a special need. The *VM/SP HPO Installation Guide* provides procedures you can follow to manually update your system using established service routines.

Testing Period

The testing period is 2 months for National Marketing Division, National Accounts Division, and World Trade Americas/Far East; 1 month for World Trade Europe/Middle East/Africa.

License

A separate license is required for each designated machine on which the licensed program materials will be used except as otherwise provided by IBM.

Program Services

Central service, including the IBM Support Center, for the basic license will be available until discontinued by IBM upon 12 months' written notice under the terms and conditions of the Agreement for IBM Licensed Programs. Central service, including the IBM Support Center, for DSLO licenses will be provided only through the customer location designated for the basic license.

Local licensed program support is available under the terms and conditions of the Agreement for Local Licensed Program Support for IBM Licensed Programs at the monthly licensed program support charge, or monthly multiple licensed program support charge, or will be provided at the applicable IBM hourly service rate.

The Agreement for Local Licensed Program Support for IBM Licensed Programs has been withdrawn, but licensed program support under this Agreement remains available until December 31, 1987, for Agreements in effect prior to December 16, 1986. Contact your IBM marketing representative for additional information.

With the availability of National Language Features worldwide, any problem that a customer believes is related to the use of a supported IBM program must be reported in the language normally used by the IBM Support Center to ensure the proper level of product service and support.

Warranty

VM/SP HPO is warranted to conform to its Licensed Program Specifications when shipped to the customer if properly used in accordance with the "Specified Operating Environment" section of the Licensed Program Specifications.

Licensed Program Specifications may be updated from time to time, and such updates may constitute a change in the specifications.

Following the discontinuance of all program services, this program will be distributed on an 'As Is' basis without warranty of any kind either express or implied.

Part 3. Environmental, Migration, and Performance Considerations

This part of the manual discusses:

- Environmental considerations for installing Release 5 (Chapter 7)
- Migration to VM/SP HPO Release 5 (Chapter 8)
- Performance variables that are likely to change (Chapter 9).

Chapter 7. Environmental Considerations

This chapter describes environmental considerations for installing Release 5.

Transparent Services Access Facility

Userids, Node IDs, and Resource IDs within a Collection

A group of systems that each have the TSAF virtual machine component installed and running can form what is known as a *collection*. A collection can have up to eight systems.

Assigning Unique Userids

Your applications may rely on the userids of the connecting applications to maintain security and check authorization. The userid that TSAF presents is always the userid of the virtual machine that originated the request. Even if the connection is through the TSAF virtual machine, TSAF presents the userid of the originating virtual machine, not the TSAF virtual machine userid.

TSAF does not enforce it, but make sure no two users in a collection have the same userid. The exception is when a user has the same userid on multiple nodes within the collection. In this case, the user has the same authorization for resources from the system in the collection the user is logged onto.

A single user, however, can have userids on multiple nodes within the collection. In this case, the user can keep the same userid across systems and have the same authorization for resources from whatever system in the collection the user is logged onto.

Assigning Unique Node IDs

The following are different identifiers for each processor (that is, system):

- The processor ID, or CPUID, is a preassigned identification.
- The node ID is an identification the system administrator assigns at the time of installation.

The SYSTEM NETID file, an existing CMS file, associates the CPUID of a processor with its node ID. Two processors with the same nodeid cannot join the same collection.

Assigning Unique Resource IDs

A resource can be on the local system or on any system within the collection. Each global resource name within a collection must be unique. For local or global resources, do not specify the name to be the same as a userid within the collection. Also, do not specify a resource name as ALLOW, ANY, or SYSTEM.

When two collections are merging and the same resource name exists on each collection, TSAF automatically awards management responsibility to one of the systems. Two systems in the same collection cannot manage the same global resource at the same time.

Reliability in a Collection

The processors within a collection must support at least one of the following connections to another processor:

- 3088 links
- Channel-to-channel (CTC) adapters
- Binary synchronous communication (BSC) lines.

In general, the reliability of communication within a collection depends on how you set up the collection. For example, communication from a processor where TSAF has three links to three different processors is more reliable than if the processor has only one link to other processors. If a processor with only one link to the rest of the collection loses communication capability in that link, the collection is partitioned.

Multiple Links from TSAF Virtual Machine to TSAF Virtual Machine

Multiple active links from one TSAF virtual machine to another TSAF virtual machine can adversely affect the ability of these TSAF machines to join. When there are multiple links, both TSAF machines might not use the same link to communicate.

For example, Figure 12 shows two dedicated links between the TSAF virtual machines (link1 and link2). If link1 and link2 were both up and added to TSAF, the two TSAF virtual machines might not be able to join. The timing of messages crossing these links can cause this. For example, the TSAF virtual machine on Proc A might want to use link1, while the TSAF virtual machine on Proc B might want to use link2.

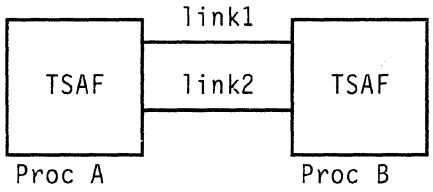


Figure 12. Multiple Connections between TSAF Virtual Machines

If you want to have more than one link available between two TSAF virtual machines, one link should remain detached from the TSAF virtual machines or deleted from TSAF's table of communications links. Then, when needed, you can attach the link or add the link to TSAF's table of communications links. For example, in Figure 12, link2 can be unattached. But when link1 fails, you can attach link2.

On the other hand, you can have two or more links connecting the same two processors (shown in Figure 13), one between the TSAF virtual machines and the other links between other virtual machines, such as RSCS or PVM.

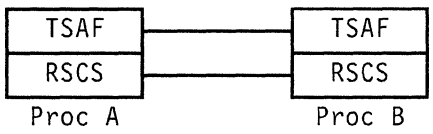


Figure 13. TSAF with RSCS

Multiple Links to Processors in a Collection

When setting up a collection of more than two processors, try to assign each processor a link to at least two other processors. In this way, each processor has at least two fully or partially distinct physical routes to communicate through, rather than just one.

In Figure 14, assume processors A, B, C, and D each have TSAF running. The processors, through the TSAF virtual machines, are connected by links A to B, B to C, and C to D. These systems form a collection.

If the link from B to C fails, the collection is partitioned. In this case, users on A who were communicating with, for example, programs on C are disconnected from those programs.

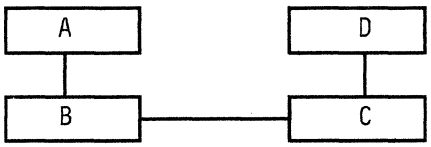


Figure 14. A TSAF Collection

On the other hand, if you add a link between processors A and D, as shown in Figure 15, the collection is more reliable. Again, if a user on A communicates with programs on C, and the link from B to C failed, communication continues on the path from A to D to C.

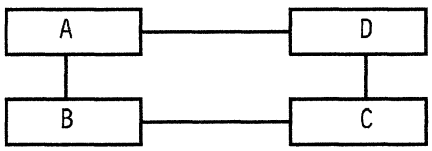


Figure 15. A More Reliable TSAF Collection

National Language Support

If your installation has World Trade capabilities, your system administrator can make a language other than American English available on your system and can make this language the system default. Refer to "Making Other Languages Available" on page 8 for more information.

A *levelid* lets you have multiple versions of language-related information.

You can specify this levelid at one of the following times:

- During the CMS nucleus build. This lets you have several versions of language information for the nucleus.
- During the DCSS build for a language (on the LANGGEN command). This lets you have several versions of a language DCSS.

Chapter 8. Migrating to VM/SP HPO Release 5

This chapter discusses migration considerations for using the new function provided by VM/SP HPO Release 5. It discusses the following:

- Previous Releases
- Licensed Programs
- Spool Files
- Shutting Down Your Current System during Migration
- Storage Management and Tuning
- Scheduler Algorithms
- System Behavior and Performance
- APPC/VM and IUCV
- Central Message Facility
- Parsing Facility
- National Language Support
- CMS Session Services
- System Profile
- HELP Facility
- Installation and Service
- LOGON/LOGOFF Enhancements
- SPOOL File Compression Support
- Processing reader files
- IPCS
- DETACH Command
- PRINTL Macro
- IDENTIFY Command
- Extended Data Stream Support for VM/Pass-Through Facility
- Message Changes Affecting Programmable Operator Routing Tables
- Changes to NUCON.

Previous Releases

This release fully supports existing installation configurations and is compatible with prior releases of VM/SP HPO.

The format and text for HELP files and some messages have been changed. You might have to update existing execs and/or programs to reflect the changes in messages and HELP text.

To install VM/SP HPO with current service, you must use the new installation features in CMS Release 5. As a result, you must install VM/SP Release 5 before you insall VM/SP HPO Release 5.

Licensed Programs

Some licensed programs that you may use with VM/SP HPO Release 5 have not converted to full-screen CMS. Evaluate the use of programs in your installation's environment to determine if you should SET FULLSCREEN OFF.

If you have Professional Office System (PROFS), you will not require PRPQ #88600 (program number 5799-CJJ) on Release 5. The PROFS PRPQ was introduced for VM/SP HPO Release 4.2 to help relieve constraint with spool files. The spool file enhancement in Release 5 eliminates the need for this PRPQ. If you were operating PROFS with this PRPQ on a Release 4.2 system, you do not need to do anything to remove the PRPQ; the Release 5 code will not recognize it.

Spool Files

Migrating Spool Files to VM/SP HPO Release 5 from Release 4.2

Refer to the VM/SP HPO Release 5 Program Directory for the procedures. If you have APAR VM26856 installed, you must use the method in the Program Directory to migrate from Release 4.2. If you do not have APAR VM26856 installed, you may use either the method in the Program Directory or the method below.

Migrating Spool Files to VM/SP HPO Release 5 from Releases 3.4, 3.6, and 4.0

Since the size of the SFBLOK has changed, you must perform a cold start if you are migrating to VM/SP HPO Release 5. You must perform a cold start whether or not you intend to increase the number of spool files. To help you with this task, an optional migration modification is provided on the product tape to allow you to go to VM/SP HPO Release 5 and back to your previous release without multiple cold starts. The optional migration modification is provided for VM/SP HPO Releases 3.4, 3.6, 4.0, and 4.2 and consists of:

- APAR VM27304. The PTF numbers are:
  - Release 3.4 – PTF UV27400
  - Release 3.6 – PTF UV27401
  - Release 4.0 – PTF UV27402
  - Release 4.2 – PTF UV27403 (Refer to the Program Directory.)
- Migration aid code on the product tape (file 15).

You should plan to perform the migration during a time of minimum spooling activity.

Before you migrate to VM/SP HPO Release 5, do the following to your current HPO release:

1. Apply the migration aid code from the product tape. This support increases the size of SFBLOK and allows you to increase the size of the checkpoint and warm start areas in anticipation of the new spool file support.
2. Modify the SYSRES macro in your DMKSYS assemble file to indicate the new sizes of the checkpoint and warm start areas.
3. Apply APAR VM27304. This APAR handles VM/SP HPO Release 5 spool files when you migrate back to your current release.
4. Preserve existing spool files using the SPTAPE command.
5. Perform one cold start.

   Note: This allows you to do a planned cold start on your current system and then migrate to VM/SP HPO Release 5 at your convenience.

6. Restore spool files using the SPTAPE command. These files are SYS HELD.

When migrating to VM/SP HPO Release 5, follow these rules:

1. If you may have to migrate back to your current system, use the SYSSPL operand of the SYSRES macro to limit your Release 5 system to 9900 spool files.
2. Define checkpoint and warm start areas for your Release 5 system that are the same size as the checkpoint and warm start areas that you defined for your current system in step 2.
3. Migrate to VM/SP HPO Release 5 with a checkpoint start.

Migrating Spool Files Back to Your Previous Release

If you want to migrate back to your previous release without doing a cold start, make sure that you perform the steps under "Migrating Spool Files to VM/SP HPO Release 5" on page 112.

Since the checkpoint areas of your old system and your new system are the same size, you can perform a CKPT/Force start on your new system. You cannot perform a warm start.

If you did not use the SYSSPL operand of the SYSRES macro to limit your Release 5 system to 9900 spool files, and if your new system has more than 9900 spool files, the optional migration modification will issue the following message and prompt:

```
SPOOL FILE ID LIMIT EXCEEDED
DO YOU WISH TO CONTINUE CHECKPOINTING (YES/NO)?
(FILES WILL BE PURGED)
```

If you answer **yes**, all the excess spool files will be deleted and the checkpoint start will continue. If you answer **no**, the system will go into

disabled wait state X'00E'. You can then re-IPL HPO 5 and SPTAPE dump any files in excess of 9900.

Other Considerations concerning the Spool File Support

Spool file support is consistent with applications, such as RSCS and PROFS, that are dependent on a maximum spool file ID of 9900. However, programs and EXECs that rely on a spool file ID's being consistent during its life within the system will require modifications. The reason is that spool file IDs change when they are transferred among users.

Any program that uses the DCP command or DIAGNOSE code X'04' to chain through SFBLOKs in real storage will no longer find reader SFBLOKs. These control blocks are now in virtual storage. These programs can be converted to use the new DIAGNOSE X'D8' to access any SFBLOK.

You may have to modify EXECs and programs that depend on the syntax or exact response of several class D commands.

The VMBLOK has been changed. If you are adding to this block, particularly if you are adding more than three doublewords, you will have to do it differently. You might consider organizing local mods into a satellite control block pointed to by the VMBLOK.

Shutting Down Your Current System during Migration

Warning: During SHUTDOWN processing, code is read into storage from the SYSNUC area on DASD and is used to complete the SHUTDOWN. The CP nucleus at SHUTDOWN time must therefore be at the **same** level as when the system was originally IPLed. **DO NOT** replace the CP nucleus of your production system with a new release level nucleus before the SHUTDOWN. If you do, the SHUTDOWN may fail and you may have to do a cold start.

Storage Management and Tuning Support

You may have to modify any program that specifically references the logical swap monitor data or uses the QUERY SRM SWPQTIME or SET SRM SWPQTIME commands. These commands are deleted because they are no longer needed.

If your installation has user modifications or EXECs that adjust the tuning parameters to parallel shifts in working set size or demands by the paging subsystem, you may have to modify them.

Modified Scheduler Algorithms

You may notice that the size of your projected working sets is a bit higher with this support. This is because scheduler algorithms are now considering total page acquires in calculations.

Changes to System Behavior and Performance

You may notice the existence of an eligible list where previously there was none. This is because virtual machines are now held on the eligible list if processor time is not available unless the virtual machine has a higher priority than the last virtual machine already on the run list.

SET MINWS has almost no effect on memory residency with 5.0. SET QDROP OFF will function well in this manner, since it grants extra memory residency (double below the 16m line, quadruple above it) to the designated guest(s). Unless your system is lightly loaded, try setting MINWS OFF initially: Release 5 systems tend to swap a good deal more than previous systems. Refer to "General Performance Indicators That Are Likely to Change" on page 126 for details on performance variables that are likely to change.

IUCV

All IUCV modules are now resident by default.

The IPARML DSECT has changed. You must recompile application programs that access this.

APPC/VM and IUCV

APPC/VM, like IUCV, supports virtual-machine-to-virtual-machine communication. But in addition to communication within a system, APPC/VM supports communication between different systems. APPC/VM does not support communication with CP System Services.

APPC/VM is a half-duplex protocol. In other words, only one communicator can send on a path at one time.

Modifying IUCV Applications to Use APPC/VM

IUCV applications continue to work on your systems. However, if you want the new function of TSAF, you have to modify existing IUCV applications to use APPC/VM and the Identify System Service or create new APPC/VM applications.

Coexistence of IUCV and APPC/VM Applications

APPC/VM uses the IUCV facility. For example, APPC/VM and IUCV applications use a common interrupt buffer. Like IUCV, APPC/VM supports but does not recognize multiple programs in a virtual machine.

CMS IUCV support and GCS IUCV support let more than one IUCV and/or APPC/VM program within a virtual machine share the IUCV facility in a nondisruptive manner. Applications written for the CMS or GCS environments should use the CMS or GCS IUCV support.

IUCV or APPC/VM applications that can run in a virtual machine with other IUCV or APPC/VM applications should be careful in their use of IUCV DESCRIBE, IUCV TESTCMPL, and IUCV TESTMSG functions because these functions can "steal" interrupts intended for another application.

Central Message Facility

Most CP, CMS, and GCS message texts are no longer in individual modules. Message texts for these components now reside in central "repository" files. Modules now issue messages by accessing these files.

The texts of most CP and CMS messages have also changed—many messages are mixed case (instead of uppercase), some are reworded, and some have different punctuation. As a result, you might have to change applications that check for exact message texts.

Parsing Facility

If you SET ABBREV OFF, CMS command resolution accepts the full command name or the full synonym of a command name (if one exists), regardless of whether the command is an exec or a module.

National Language Support

CMS now searches for command translations and translation synonyms before it searches for command synonyms.

CMS Session Services

The System Product Editor

- XEDIT no longer carries out its own I/O. Windowing functions are responsible for XEDIT I/O. As a result, certain CMS settings affect the XEDIT environment, especially the following:
  - SET LANGUAGE (affects Double-Byte Character Sets [DBCS] display and the nondisplayable character set)
  - SET APL/TEXT
  - SET FULLREAD
  - SET NONDISP
  - SET REMOTE
- The XEDIT SET BRKKEY works differently. XEDIT no longer restores the BRKkey to whatever it was when SET BRKKEY ON was issued. Instead, if BRKKEY was set in XEDIT, the CP setting remains when you are no longer in XEDIT.

  In addition, the initial SET BRKKEY setting now reflects the CP TERMINAL BRKKEY setting. It is no longer always on by default.

  When you enter full-screen CMS, the TERMINAL BRKKEY is set to the new option NONE. **You cannot drop into CP by pressing your PA1 key. This means that it is impossible to interrupt a program or EXEC that is in an infinite loop unless you explicitly specified a BRKKEY before you started the command or EXEC.**
- The default PA1 key for XEDIT (and the NAMES and SENDFILE commands) is now COMMAND CMS POP WINDOW WM if BRKKEY is not assigned to the PA1 key.
- QUERY and EXTRACT return virtual screen information rather than physical screen information.
- COPYKEY copies the contents of the virtual screen, rather than the contents of the physical screen, into the printer spool.
- The initial SET ETMODE setting is no longer OFF by default. This setting is now based on whether the terminal in use is capable of handling double-byte characters.
- If you are using a 3277 terminal and you issue QUERY PF, you now get the settings for 24 PF keys instead of just 12.
- Nullkey is an existing option you can specify on any XEDIT PF or PA key or on the Enter key. Now, the nullkey function replaces trailing

blanks with nulls on the field of the screen that contains the cursor. If the cursor is on a prefix area, the nulls are written to the field of the file line associated with that prefix area. Before, the nullkey function wrote the nulls on the line containing the cursor.

Full-Screen CMS

The default is SET FULLSCREEN ON. This may alter the way you use CMS.

CONSOLE and HNDINT Macros

You can specify the EXIT parameter for the OPEN function of the CONSOLE macro instruction to handle unrequested device interrupts.

If EXIT is specified, **do not** define an interruption routine via the HNDINT macro for the same device. Use of the CONSOLE macro and use of the HNDINT macro are mutually exclusive. CONSOLE OPEN with EXIT supersedes an HNDINT routine when the interrupt is requested. Therefore, if you want to do I/O to a 3270 device, use the CONSOLE macro instead of the HNDINT macro.

Applications Using DIAGNOSE Code X'58'

DIAGNOSE code X'58' applications should use the CONSOLE macro so that CMS regulates the use of the screen between an application's output and CMS output (for example, messages and responses).

Applications that modify PSWs in low storage and issue their own DIAGNOSE code X'58', handle CSW error status, or handle their own I/O interrupts, should SET FULLSCREEN OFF or SET FULLSCREEN SUSPEND.

Applications using DIAGNOSE code X'58' and interacting with XEDIT should also convert to using the CONSOLE macro.

Console Spooling

When you are in full-screen CMS, console spooling does not record your input and CMS output in the CP console spool file. Instead, you can use the SET LOGFILE command to record input and output.

Other Considerations

Reassemble any command or module that uses console I/O using the VM/SP Release 5 MACLIBs.

System Profile

To properly use the system profile and the new CMS parameters,

```
PARMRGS=(0,15)
```

must be coded in the NAMESYS macro for the CMS named system. If not, existing CMS parameters continue to work, but new functions might not work as you expect.

HELP Facility

The visual screens and PF keys have changed.

Installation and Service

Deletion of CMSL

The CMS saved system is defined in DMKSNT at a higher virtual storage address, the address formerly occupied by the CMSL saved system. Refer to "Free-Storage Requirements" on page 125 for details on how this change may affect performance.

LOGON/LOGOFF

AUTOLOG, LOGON, FORCE, and QUERY Commands

This support does not change how you invoke the AUTOLOG, LOGON, FORCE, and QUERY commands. Changes made to them for Release 5 are:

- AUTOLOG, LOGON, FORCE, and QUERY issue message

  ```
  361E LOGOFF/FORCE PENDING FOR USER userid
  ```

  when they are invoked by or for a virtual machine user in the process of logging off.

- If you are being forced off, you are no longer notified of the force, because the possibility of hardware problems with your console can inhibit a message from being displayed. If you are logged onto a remote device, however, you receive the normal accounting message produced at logoff in addition to message

  ```
  LOGOFF AT hh:mm:ss zone weekday mm/dd/yy BY SYSTEM
  ```

LOGON from the Logo Screen

This function uses nine lines on the Logo screen. As a result, the installation-defined logo (DMKBOX) cannot exceed the size of the smallest physical screen in the installation - 9 lines.

DMKDID Module

LOGON/LOGOFF enhancements require module DMKDID to be in the CP nucleus. If you build a CP nucleus without module DMKDID, it can abnormally terminate (ABEND) during LOGOFF or FORCE processing for a virtual machine.

In previous releases of VM, you could generate a smaller CP nucleus by using the CPLOADSM loadlist instead of the CPLOAD loadlist. The CPLOADSM loadlist was coded so module DMKDID and other optional CP modules were not included in the nucleus load deck. Now, the CPLOADSM loadlist is coded so module DMKDID is included in the nucleus load deck.

SPOOL File Compression Support

The content of virtual SPOOL files has changed in two ways:

- The original record length is saved with each output line written to a virtual console, printer, or punch.

  The spool file block (SFBLOK) is marked to indicate the availability of the original record length. The original length is the length of the record presented to the virtual machine's spooling device before CP truncates trailing blanks. Application programs needing a record image with all trailing blanks intact must be modified to locate the original byte count for each record and use it to pad the record with blanks.

- The original sequence of carriage control commands is saved without any merge operation.

  CP no longer replaces multiple carriage control commands with a single equivalent command. Instead, application programs reading the virtual SPOOL files encounter the original sequence of carriage control operations.

Before Release 5, the original record lengths and carriage control sequences were not available to receivers of spooled data.

Processing Reader Files

Consider the following when you issue the RECEIVE, READCARD, and DISK LOAD commands or when you use these commands in execs and disconnected virtual machines.

- A message is displayed at your terminal for each file that you receive whether it is unique or the same as an existing file.
- Now, each file in a spool file in DISK DUMP format is considered separately. In previous releases:
  - You received all files in a spool file if the first file did not replace an existing file.
  - You did not receive any of the files in the spool file if the first file would replace an existing file.
- If a spool file in your reader contains a single file and it is in either DISK DUMP or NETDATA format, a prompt is issued if the name of the spool file differs from the name of the file in the spool file.

  If a spool file in your reader contains multiple files in DISK DUMP format, a prompt is issued for the first file of the spool file only if its name differs from the name of the spool file. A prompt is always issued for the second and subsequent files of the spool file.
- If a virtual machine is running disconnected and a prompt is issued, the virtual machine is eventually logged off. The virtual machine must either specify NOPROMPT in the invocation of RECEIVE or have NOPROMPT as the default for the RECEIVE command to avoid being logged off.
- Responses from DISK LOAD or READCARD commands and from spool files in NETDATA format have changed. If you have an exec that depends on the format of these responses, change the exec.
- READCARD CMSUT2 is a reserved fileid. Change any existing uses of that fileid to a different name.
- Syntax processing accepts the rightmost option as overriding any previous specification of the same option. This eases the issuing of commands from execs that set up overridable defaults.
- If you specify a command that issues a prompt while you are under a full-screen application, such as RDRLIST, your full-screen application is temporarily suspended until you respond to the prompt. Once you have responded, control returns to the full-screen application.

In "Chapter 10. Design Changes by Function," this function is referred to as *composite reader file support.*

TSAF

You must have CMS and CP Release 5 installed to use TSAF.

IPCS

Use Release 5 functions of IPCS only on Release 5 CMS. If you try to use the Release 5 functions on a previous release, you lose print support.

DETACH Command

In addition to the two new options (UNLOAD and LEAVE) for the class B user, error handling has changed. Before this release, you could enter miscellaneous information on the command line following the last valid operand. Now, if there is information on the command line following the last valid operand, you receive an error message.

PRINTL Macro

If you are a present user of the PRINTL macro and want to print multiple lines with a single request, place your fixed-length records in a buffer or provide a list containing both the address and the length of each record to be printed. If you want to continue using the PRINTL macro to print a line at a time, you do not have to recompile.

If you use the OS PUT/WRITE macros and direct the output to the virtual printer, you might want to block the output records (if previously unblocked).

IDENTIFY Command

The IDENTIFY command is now nucleus resident and, therefore, cannot be NUCXDROPed. If the SYSTEM NETID file is changed, CMS must be re-IPLed to force IDENTIFY to reread the information in SYSTEM NETID.

Extended Data Stream Support for VM/Pass-Through Facility

For the INITIATE function of DIAGNOSE code X'7C', the high-order byte of register Rx+1 indicates the following optional features:

Bit 0 – 3270 extended features to be supported
Bit 1 – ACCEPT function must be followed by STATUS function
Bit 2 – Specific device address requested.

Existing applications that use the high-order byte of Rx+1 will experience migration and coexistence problems.

Message Changes Affecting Programmable Operator Routing Tables

When the SPOOL command is used to close an output device, the informational message

```
PRT
PUN  FILE spoolid  TO   userid COPY nnn  HOLD
CON                FOR                   NOHOLD
```

is received by the userid specified. This message, previously specified as type 3 (CPCONIO) in a programmable operator routing table, is now an informational message (IMSG) and should be changed to type 7. (See Figure 16.)

```
:
:
*------------------------ --- --- -- -------- -------- -------- --------
*T                        S   E   T  U        N        A        P
*E                        C   C   Y  S        O        C        A
*X                        O   O   P  E        D        T        R
*T                        L   L   E  R        E        N        M
*------------------------ --- --- -- -------- -------- -------- --------
* ROUTE SPECIFIC MESSAGE TO THE LOGICAL OPERATOR
*------------------------ --- --- -- -------- -------- -------- --------
/PRT /FILE $TO                      7                  DMSPOS   LGLOPR
*------------------------ --- --- -- -------- -------- -------- --------
:
:
```

Figure 16. Programmable Operator Message Class Changes

Changes to NUCON

The following GLOBALed library fields have been removed from NUCON:

DOSDIRC
DOSLIBL
MACDIRC
MACLIBL
NUCLDLIB
NUCLDIRC
TXTLIBS

The following console fields have been removed from NUCON:

CONINBLK
CONINBUF

Change applications that reference these fields to use higher-level interfaces (such as the QUERY command) that are not release-dependent.

Chapter 9. Performance

This chapter:

- Describes the performance impact of enhancements in VM/SP HPO Release 5
- Discusses variables that are likely to change.

Free-Storage Requirements

Reader spool file blocks are no longer part of free storage. Thus, the requirement for free storage may decrease. Review the free-storage reports in VMMAP to evaluate whether you can allocate less free storage on the SYSCOR macro.

By default in Release 5, the CMS shared segment is located just below 16Mb. Previously it was placed at a lower location. This new placement causes an increase in the need for CP free storage which may cause performance degradation in systems with constrained storage below the 16Mb line. If this is a problem, you may consider placing the CMS shared segment at a lower location. Refer to the chapter on Saved Systems, Discontiguous Saved Segments, and Shared Segments in *CP for System Programming* for information on how to change the location of the CMS shared segment.

General Performance Indicators That Are Likely to Change

VMMAP Indicators of System Contention Points

When using CMS, you should expect the VMMAP variable VIO (virtual I/O) to decrease significantly. The variable IOQ (I/O queue) may also decrease, because the default of the CMS FORMAT command is changed to 4K and because the internal CMS file system changes allow for more than one disk block to be read with a virtual I/O.

If you are not running CMS, you should expect IOQ (I/O queue) to increase.

With Release 5, you will see less contention for the system lock. You should expect a decrease in VMMAP variable DEFRQ (deferred request queue). You should also expect a significant decrease in CPUQ (CPU queue) and a significant increase in STGQ (storage queue).

Swapping and Paging

In general, you should expect a large increase in swap rates and a slight decrease in page rates. To account for this change, consider the following:

- Add more swap space for Release 5. You may be able to reduce the amount of paging space.
- Initially set the following parameters as follows:
  - SET MINWS OFF
  - SET RESERVE OFF
  - SET QDROP OFF for service machines, such as VTAM or PROFS.
- Initially set your swap set size at 9. Large swap sets will increase storage contention.
- Swap table migration will perform somewhat differently. Since pages may be taken from in-queue users, those users will page and swap while they are in-queue and experience more swap table migration than before.

Stealing

Stealing will probably increase. This will show up in VMMAP as an increased STEALRATE and will be very apparent in the IND LOAD response, which will show both increased stealing and increased load. This will make the SET PAGING command more effective.

If your system was experiencing stealing under 4.2, the total amount of spin time on the real-storage management (RM) lock may drop. This is measured by VMMAP variables RMTIME * RMNUM.

Working Set Sizes

Working set sizes will probably increase. Working sets of individual virtual machines may differ from 4.2, especially larger storage guests.

The Eligible List

The eligible list will increase on processor-bound systems. This should increase the effect of the SET FAVOR command. However, you should probably restrict use of the SET FAVORED command to the V=R guest or to guests with reserved pages and working set sizes of 0.

The VMMAP variable CURRBIAS is proportional to the amount of time the user spends on the eligible list. Since the amount of time the user spends on the eligible list has increased, this variable will increase from zero to some significant value.

Queue-Drop

The approximation of the 300-ms queue-drop delay will increase the average length of the queue-drop delay. This may shift a small amount of work from Q1 into Q2.

Since HPO Release 3.4, IBM has cautioned against setting QDROP OFF, because pages were not trimmed while a user was in-queue (this meant that the working set of a user with QDROP set OFF could grow without limit). However, since pages are now selected while a user is in-queue, you may use SET QDROP OFF and the NOQ2 or NOQ3 option more freely.

Miscellaneous VMMAP Variables

VMMAP variables LOHI (the number of pages moved from <16Mb to >16Mb) and HILO (the number of pages moved from >16Mb to <16Mb) values will change. You should expect LOHI to increase and HILO to decrease. Virtual machines with reserved pages are no longer exempt from LOHI moves.

The number of pages in the <16Mb free list should be proportional to the number of pages in the <16Mb DPA. For systems with more than 16Mb storage, you can expect more pages to be on the <16Mb free list and, therefore, the VMMAP variable NOFREE (number of times the <16Mb free list is empty) should decrease. When tuning, your goal should be to keep both NOFREE and HINOFREE zero. To optimize performance, try reducing MINNUMSS as low as you can until either NOFREE or HINOFREE is nonzero. Then, increase MINNUMSS a little to obtain zero values for NOFREE and HINOFREE.

Because of changes to CMS and to the way in which shared pages are managed, VMMAP variable SHRPGS (shared pages) is likely to change. The number of quiesces (request of one processor to stop the other processor) is also likely to change. VMMAP variables QUIIPL and QUINIPL will reflect this.

The following VMMAP variables are likely to change: STGUTIL (storage utilization), RECLAIM (number of reclaims), STEALCK (number of pages checked per second for page steals), FLUSHSWAP (number of pages paged off the flush list), STEALSCANS (number of complete scans of coretable), and STEALRATES. The corresponding variables above the line are also likely to change: HISTGUTIL, HIRECLAIM, HISTEALCK, HIFLSHSWAP, and HISTEALRAT. On light to moderately loaded systems, expect PFAULT (number of page faults) to drop.

Part 4. Internal Design Changes

This part of the manual (Chapters 10 and 11) lists changes to the internal design of VM/SP HPO Release 5. It may help you with planning.

Chapter 10. Design Changes by Function

This chapter lists new and changed CP, CMS, XEDIT, and IPCS modules, control blocks, macros, and so on, for the new and changed functions. It can help you with planning. The functions are listed alphabetically. Information about GCS and TSAF is not included, because the source code for GCS and TSAF modules is not always distributed.

Alternate Nucleus Support

New and Changed CP Modules

DMKALO	DMKCKF	DMKCKH	DMKCKP	DMKCKT
DMKCPI	DMKCPJ	DMKCPS	DMKDMP	DMKHVE
DMKIOG	DMKMES	DMKOPE	DMKRSP	DMKSAV
DMKTOD	DMKUDR	DMKWRM		

New and Changed CP Control Blocks and Macros

CKPLIST	SYSRES

Alternate Tape Drive Support

New and Changed CMS Modules

DMSFLD	DMSFLE	DMSMVE	DMSSOP	DMSTLB
DMSSTP	DMSTIO	DMSTLM		

New and Changed CMS Control Blocks and Macros

CMSCB	DEVSECT	DMSTLW	FDEFSECT

Alternate Userid Support (DIAGNOSE Code X'D4'

New and Changed CP Modules

DMKHVC DMKHVF DMKIUC DMKOVR DMKSPL
DMKUSO

New and Changed CP Control Blocks and Macros

VMBLOK ALTBLOK

APPC/VM

New and Changed CP Modules

DMKDIR DMKHVF DMKIUA DMKIUB DMKIUC
DMKIUE DMKIUG DMKIUJ DMKIUL DMKIUN
DMKIUP DMKIUS DMKLOH DMKPGS DMKUSO

New and Changed CP Control Blocks and Macros

ALTBLOK APPCVM CALL CONEXT
IPARML IUCVBLOK UDIRECT VMBLOK

ASCII Enhancements (Merged PTF)

New and Changed CP Modules

DMKBLD DMKCFT DMKCNS DMKCQU DMKGRF
DMKHVE DMKNES DMKQCN DMKRGC DMKTBN
DMKTTX DMKTTY DMKUSQ DMKVCP DMKVCQ
DMKVCR DMKVCS DMKVCV

New and Changed Control Blocks and Macros

RDEVICE RDEVBLOK VMBLOK

New and Changed Copy Files

DEVTYPES COPY RBLOKS COPY VMBLOK COPY

CP Module Split

Original Module	Split Into
DMKTTY	DMKTTY DMKTTX

Central Message Facility

New and Changed CMS Modules

DMSABN	DMSACC	DMSAMS	DMSARE	DMSASM
DMSASN	DMSBOP	DMSBTB	DMSBTP	DMSBWR
DMSCCK	DMSCIO	DMSCIT	DMSCLS	DMSCMP
DMSCPY	DMSCRD	DMSCVH	DMSCWR	DMSDAS
DMSDBD	DMSDBG	DMSDDL	DMSDIO	DMSDLB
DMSDLK	DMSDOS	DMSDSK	DMSDSL	DMSDSV
DMSEIO	DMSERD	DMSERS	DMSEXD	DMSEXE
DMSEXL	DMSEXM	DMSEXQ	DMSFCH	DMSFET
DMSFLD	DMSFNC	DMSFNS	DMSFOR	DMSFRE
DMSGAM	DMSGLB	DMSGLO	DMSGMF	DMSGND
DMSGRN	DMSGVE	DMSHDS	DMSICP	DMSIDE
DMSINI	DMSINS	DMSINT	DMSITE	DMSITP
DMSITS	DMSIUC	DMSLBD	DMSLBM	DMSLBT
DMSLDF	DMSLDR	DMSLDS	DMSLGT	DMSLIB
DMSLIC	DMSLIO	DMSLKD	DMSLLU	DMSLMX
DMSLOA	DMSLOS	DMSLSB	DMSLST	DMSMCM
DMSMDP	DMSMES	DMSMGC	DMSMGD	DMSMGE
DMSMGM	DMSMGX	DMSMOD	DMSMVE	DMSMVG
DMSNAM	DMSNUC	DMSNXD	DMSNXL	DMSNXM
DMSOPL	DMSOPT	DMSOR1	DMSOSR	DMSOVR
DMSOVS	DMSPIO	DMSPOA	DMSPOC	DMSPOD
DMSPOE	DMSPOL	DMSPOP	DMSPOQ	DMSPOR
DMSPOS	DMSPRE	DMSPRT	DMSPRV	DMSPUN
DMSQRS	DMSQRT	DMSQRU	DMSQRV	DMSQRW
DMSQRX	DMSQRY	DMSQRZ	DMSRDC	DMSRDR
DMSREX	DMSRFN	DMSRIN	DMSRNM	DMSROS
DMSRRV	DMSRSV	DMSSBS	DMSSCT	DMSSEB
DMSSET	DMSSLN	DMSSMN	DMSSOP	DMSSPR
DMSSRT	DMSSRV	DMSSSK	DMSSTG	DMSSTT
DMSSTX	DMSSUB	DMSSVT	DMSSYN	DMSTLB
DMSTLM	DMSTMA	DMSTPD	DMSTPE	DMSTPF
DMSTPG	DMSTPH	DMSTPI	DMSTPJ	DMSTVS
DMSTYP	DMSUPD	DMSUTL	DMSVIB	DMSVIP
DMSVLT	DMSXBG	DMSXCG	DMSXCM	DMSXCN
DMSXCT	DMSXDC	DMSXDS	DMSXED	DMSXER
DMSXFC	DMSXFD	DMSXFL	DMSXGT	DMSXIN
DMSXIO	DMSXMA	DMSXMB	DMSXMC	DMSXMD
DMSXML	DMSXMS	DMSXPO	DMSXPT	DMSXPX
DMSXQR	DMSXRE	DMSXSC	DMSXSD	DMSXSE
DMSXSF	DMSXSS	DMSXST	DMSXSU	DMSXTB
DMSXTE	DMSXTF	DMSXTR	DMSXUP	DMSXWS
DMSZAP				

New and Changed CMS Control Blocks and Macros

APPLMSG	DMSMSG	DMSSWPL

New and Changed CMS and XEDIT Execs

ALL	CANCEL	CMSGEND	CMSLOAD
DEFAULTS	DISCARD	EXECUPDT	EXECUTE
EXPAND	FILELIST	JOIN	LANGGEN
LANGMERG	MACLIST	NAMES	NOTE
PEEK	PREFIXX	PRFSHIFT	PRFSHOW
PROFFLST	PROFMLST	PROFNOTE	PROFPEEK
PROFRLST	PROPHCHK	PROPST	RDRLIST
RECEIVE	RGTLEFT	SENDFILE	SI
SPLTJOIN	STATUS	TELL	VMFNLS
X$MLST$X	X$SEND$X	ZAPTEXT	

CMS Session Services

New and Changed CMS Modules

DMSABN	DMSALA	DMSCCS	DMSCLR	DMSCPF
DMSCRD	DMSCUR	DMSCWR	DMSDEF	DMSDEL
DMSDRP	DMSFNC	DMSGET	DMSHID	DMSINA
DMSITI	DMSMAX	DMSMIN	DMSPPO	DMSPST
DMSPUT	DMSQRF	DMSQRG	DMSQRH	DMSQRY
DMSREF	DMSRES	DMSROU	DMSSCL	DMSSEF
DMSSET	DMSSHO	DMSSIZ	DMSWAT	DMSWBX
DMSWEN	DMSWEX	DMSWID	DMSWIF	DMSWIM
DMSWIN	DMSWIO	DMSWIR	DMSWIS	DMSWIT
DMSWIW	DMSWLR	DMSWLW	DMSWMI	DMSWMM
DMSWMO	DMSWMU	DMSWMX	DMSWQI	DMSWQM
DMSWRD	DMSWRT	DMSWST	DMSWVC	DMSWVD
DMSWVE	DMSWVL	DMSWVQ	DMSWVS	DMSWVT
DMSWVX	DMSXBG	DMSXCM	DMSXCT	DMSXED
DMSXFC	DMSXIN	DMSXIO	DMSXMA	DMSXMC
DMSXMD	DMSXML	DMSXPO	DMSXPX	DMSXQR
DMSXSC	DMSXSD	DMSXSE	DMSXSF	DMSXSS
DMSXSU	DMSXTE	DMSXTR	DMSXWS	

New and Changed CMS and XEDIT Control Blocks and Macros

CQYSECT	DMSCDEV	DMSDSBLK	DMSEDWCL
DMSLRDP	DMSLWRP	DMSOSSAV	DMSQFSC
DMSQPLST	DMSSCRCB	DMSSMEQU	DMSWMLPL
DMSWMUPL	IO	LINERD	LINEWRT
LSCREEN	NUCON	PRSCB	VSDB
VSQB	ZBLOCKS		

CMS Support of APPC/VM

New and Changed CMS Modules

DMSABN DMSINS DMSITE DMSIUC

New and Changed CMS Control Blocks and Macros

CMSIUCV IUCVTAB

CMSDEV Macro

New and Changed CMS Modules

DMSDEV DMSFNC DMSPIO

New and Changed CMS Control Blocks and Macros

CMSDEV

New and Changed CMS Execs

CMSLOAD

Collection Resource Management and Identify System Services

New and Changed CP Modules

DMKCPJ DMKDIR DMKIDR DMKIUB DMKIUC
DMKCRM DMKUDR

New and Changed CP Control Blocks and Macros

IUCVBLOK PSA SRTBLOK SSCBLOK

COMPARE Command

New and Changed CMS Modules

DMSCMP

Composite Reader File Support

New and Changed CMS Modules

DMSDDL DMSRDC DMSDSK

New and Changed CMS and XEDIT Execs

RECEIVE DEFAULTS X$PEEK$X

CP DETACH Command

New and Changed CP Modules

DMKVDC DMKVDD DMKVDR

New and Changed CP Control Blocks and Macros

VDEVBLOK

DIAGNOSE Code X'08'

New and Changed CP Modules

DMKEPS DMKHVC DMKLNK DMKMES DMKQCN

New and Changed CP Control Blocks and Macros

VMBLOK VMBLK

DIAGNOSE Code X'BC'

New and Changed CP Modules

DMKHVC DMKHVF DMKVSW

DIAGNOSE Code X'B4'

New and Changed CP Modules

DMKHVC DMKHVE DMKXAB

New and Changed CP Control Blocks and Macros

SFBLOK VSPXBLOK

DIAGNOSE Code X'B8'

New and Changed CP Modules

DMKHVC DMKHVE DMKXAB

New and Changed CP Control Blocks and Macros

SFBLOK VSPXBLOK

New and Changed CP Control Blocks and Macros

UDEVBLOK UDIRBLOK UMACBLOK

New and Changed CP Copy Files

DPLIST UDIRECT

Directory Option for Restricting Vector Use and Monitor Enhancements (Merged PTF)

New and Changed CP Modules

DMKDIR DMKLOH DMKMOO DMKVFD
DMKVFE DMKVFR

New and Changed Macros and Copyfiles

MONBLOKS UDIRECT MN000 MN001
UMACBLOK VECTOR VMBLOK VMBLOK
VFPLIST

Enhanced Connectivity Facilities on VM (Merged PTF)

New and Changed CMS Modules

DMSABN	DMSADD	DMSALC	DMSAST	DMSBCT
DMSBLG	DMSCCP	DMSCDI	DMSCLN	DMSCRT
DMSCST	DMSDFT	DMSDRO	DMSEVC	DMSGRQ
DMSGTU	DMSIAC	DMSINS	DMSMKS	DMSPBK
DMSRTE	DMSSMG	DMSSRE	DMSSRH	DMSSRP
DMSSRQ	DMSSTC	DMSUPP	DMSUSR	DMSUST
DMSVLD				

New and Changed CMS Control Blocks and Macros

ADDENTRY	CPRB	CSMRETCD	DELENTRY
DMSBFREE	DMSBFRET	SENDREQ	

New and Changed CMS Execs

CMSGEND	CMSLOAD	CMSSERV

Error Logging System Service

New and Changed CP Modules

DMKIOF	DMKIUA	DMKIUB	DMKIUC	DMKIUP

New and Changed CP Control Blocks and Macros

PSA

Error Recording Enhancements (Merged PTF)

New and Changed CP Modules

DMKACR	DMKACS	DMKCCH	DMKMCH

New and Changed CP Control Blocks and Macros

MCHAREA	MCRECORD	CCHREC

Execs in Storage

New and Changed CMS Modules

DMSEXD DMSEXG DMSEXL DMSEXM DMSINI
DMSINS DMSQRT DMSQRY DMSSET

New and Changed CMS Control Blocks and Macros

EXISBLK NUCON

New and Changed CMS and XEDIT Execs

SYSPROF EXECUPDT X$EUPD$X

FORMAT Command

New and Changed CMS Modules

DMSFOR

GLOBAL Command

New and Changed CMS Modules

DMSABN DMSFCH DMSGLB DMSLDR DMSLGT
DMSLIB DMSLOS DMSNUC DMSQRW DMSSCT
DMSSLN DMSSOP DMSSTG DMSSVT

New and Changed CMS Control Blocks and Macros

NUCON

HELP Facility

New and Changed CMS Modules

DMSHLB DMSHLC DMSHLI DMSHLL DMSHLM
DMSHLP DMSHLR DMSHLS DMSHLT DMSHLZ
DMSXTB

New and Changed CMS and XEDIT Control Blocks and Macros

DMSHELP DMSHLNXT HELP HELPXED
HLPSECT

Deleted CMS Modules

DMSHLE

CMS Module Split

Original Modules	Split Into
DMSHLL	DMKHLC DMSHLL DMSHLM DMSHLR DMSHLT DMSHLZ

New and Changed CMS Execs

DEFAULTS MOREHELP

Installation and Service

New and Changed CMS Execs

ITASK SNTMAP SPGEN SPLOAD
UTILITY VMFLOAD VMFMERGE VMFNLS
VMFREMOV VMFTXT

Deleted CMS Execs

GCSGEN GENERATE GENERAT2 GENERAT3
PREP

New and Changed CMS Files

DMSNGP ASSEMBLE SPGEN PROFILE SPLOAD PROFILE
$DASD$ CONSTS $MSG4I$ EXEC

Deleted CMS Files

X$GENR$X

New and Changed CMS Control Blocks and Macros

DEFNUC MRGSC

New and Changed CP Modules

DMKSSP

Interactive Problem Control System Changes

New and Changed IPCS Modules

DMKBIO DMMCPA DMKDSP DMMEDM DMKIOF
DMKIUA DMKIUB DMKIUC DMKIUG DMKIUJ
DMKIUL DMKIUN DMKIUP DMKMSG DMKPRV
DMKVCT DMKVCW DMMVMB DMKVMG

New and Changed CP Control Blocks and Macros

CALL IPARML IUCV IUCVBLOK PSA

CP Module Split

Original Module	Split Into
DMKVCT	DMKVCT DMKVCW

New and Changed CP Modules (VM/SP Release 4)

DMKCFS DMKCMD DMKCQR DMKDIR DMKEMD
DMKLOH DMKSVC

New and Changed CP Control Blocks and Macros

VMBLOK UMACBLOK

Interactive Problem Control System Support for TSAF

New and Changed IPCS Modules

DMMCOM DMMDCM DMMDCP DMMDIN DMMDIR
DMMDSC DMMFED DMMLOC DMMMAP DMMPRT
DMMSCN DMMSCR DMMTAB DMMTRC DMMTRD
DMMVAL DMMVMF

New and Changed IPCS Control Blocks and Macros

WORKCP

Logical Device Host Limit Relief (Merged PTF)

New and Changed CP Modules

DMKHPS DMKHPT DMKSCN

LOGON from the Logo Screen

New and Changed CP Modules

DMKBOX DMKCFM DMKCFR DMKCNS DMKCPB
DMKDIA DMKDID DMKGRF DMKGRT DMKHPT
DMKLOG DMKMES DMKQVM DMKRGA DMKRGB
DMKRGC DMKRNH DMKUSO DMKUSQ DMKVCR
DMKVCT DMKVCV DMKVCX DMKVDA DMKVDR
DMKVDS

New and Changed CP Control Blocks and Macros

BOXBLOK CALL GRTBLOK NETWORK
RBLOKS SNARBLOK TIMER VMBLOK
WEBLOK

LOGON/LOGOFF Enhancements

New and Changed CP Modules

DMKCFD DMKCNS DMKCQG DMKCQQ DMKCQY
DMKDID DMKGRF DMKLOH DMKMES DMKRGA
DMKUSO DMKUSQ

New and Changed CP Control Blocks and Macros

IOBLOKS RBLOKS TIMER VMBLK VMBLOK

Message Identifier Enhancement

New and Changed CP Modules

DMKHVC

Migration of CMS Commands and Modules to the CMS Nucleus

New and Changed CMS Modules

DMSCPY DMSFNC DMSGLO DMSIDE DMSINS
DMSNUC DMSPRT DMSRSF

New and Changed CMS Control Blocks and Macros

DMSIDEWK

New and Changed CMS Execs

CMSGEND CMSLOAD

Miscellaneous Programming Changes

New and Changed CP Modules

DMKBLD	DMKCFS	DMKCFY	DMKDIB	DMKDIF
DMKDMP	DMKDSP	DMKFRE	DMKFRT	DMKIDU
DMKLOJ	DMKMOO	DMKPMA	DMKPRV	DMKPTT
DMKSCH	DMKSTP	DMKSTR	DMKTRQ	DMKUSO
DMKUSQ	DMKVDA	DMKVDG	DMKVDH	

New and Changed CP Control Blocks

ALOCBLOK	EQU	FRECOM	MICBLOK
MN400	MONBLOKS	PAGTABLE	SCBLOK
SFBLOK	SPUBLOK	SYSPAG	SYSPLIST
VMBLOK	VMBLK	VMSBLOK	

National Language Support for CMS

New and Changed CMS Modules

DMSABN	DMSACC	DMSAMS	DMSARE	DMSASM
DMSASN	DMSBOP	DMSBTB	DMSBTP	DMSBWR
DMSCCK	DMSCIO	DMSCIT	DMSCLS	DMSCMP
DMSCPY	DMSCRD	DMSCSF	DMSCVH	DMSCWR
DMSDAS	DMSDBD	DMSDBG	DMSDDL	DMSDIO
DMSDLB	DMSDLK	DMSDOS	DMSDSK	DMSDSL
DMSDSV	DMSEIO	DMSERD	DMSERS	DMSEXD
DMSEXE	DMSEXL	DMSEXM	DMSEXQ	DMSFCH
DMSFET	DMSFLD	DMSFLE	DMSFNC	DMSFNE
DMSFNS	DMSFOR	DMSFRE	DMSGAM	DMSGLB
DMSGLO	DMSGMF	DMSGND	DMSGRN	DMSGVE
DMSHDI	DMSHDS	DMSHLB	DMSHLD	DMSHLI
DMSHLP	DMSHLS	DMSHTB	DMSICP	DMSIDE
DMSIMM	DMSINA	DMSINI	DMSINS	DMSINT
DMSITE	DMSITP	DMSITS	DMSIUC	DMSLBD
DMSLBM	DMSLBT	DMSLCK	DMSLDF	DMSLDR
DMSLDS	DMSLFS	DMSLGT	DMSLIB	DMSLIC
DMSLIO	DMSLKD	DMSLLU	DMSLMX	DMSLOA
DMSLOS	DMSLSB	DMSLST	DMSMCM	DMSMDP
DMSMES	DMSMGC	DMSMGD	DMSMGE	DMSMGM
DMSMGX	DMSMOD	DMSMVE	DMSMVG	DMSNAM
DMSNUC	DMSNXD	DMSNXL	DMSNXM	DMSOPL
DMSOPT	DMSOR1	DMSOSR	DMSOVR	DMSOVS
DMSPAR	DMSPCA	DMSPCB	DMSPCC	DMSPCL
DMSPCR	DMSPCT	DMSPCW	DMSPDB	DMSPIO
DMSPKT	DMSPMD	DMSPOA	DMSPOC	DMSPOD
DMSPOE	DMSPOL	DMSPON	DMSPOP	DMSPOQ
DMSPOR	DMSPOS	DMSPPL	DMSPRB	DMSPRE
DMSPRI	DMSPRJ	DMSPRT	DMSPRV	DMSPSC
DMSPSM	DMSPTC	DMSPTK	DMSPTL	DMSPTR
DMSPTT	DMSPUN	DMSPVF	DMSQRS	DMSQRT

DMSQRU	DMSQRV	DMSQRW	DMSQRX	DMSQRY
DMSQRZ	DMSRDC	DMSRDR	DMSREV	DMSREX
DMSRFN	DMSRIN	DMSRLD	DMSRNM	DMSROS
DMSRRV	DMSRSF	DMSRSV	DMSRTC	DMSRVA
DMSRXE	DMSSBS	DMSSCN	DMSSCR	DMSSCT
DMSSEB	DMSSET	DMSSLG	DMSSLN	DMSSMN
DMSSOP	DMSSPR	DMSSRT	DMSSRV	DMSSSK
DMSSTG	DMSSTT	DMSSTX	DMSSUB	DMSSVT
DMSSYN	DMSTLB	DMSTLM	DMSTMA	DMSTPD
DMSTPE	DMSTPF	DMSTPG	DMSTPH	DMSTPI
DMSTPJ	DMSTRT	DMSTVS	DMSTYP	DMSUPD
DMSUTL	DMSVIB	DMSVIP	DMSVLT	DMSXBG
DMSXCG	DMSXCM	DMSXCN	DMSXCT	DMSXDC
DMSXDS	DMSXED	DMSXER	DMSXFC	DMSXFD
DMSXFL	DMSXGT	DMSXIN	DMSXIO	DMSXMA
DMSXMB	DMSXMC	DMSXMD	DMSXML	DMSXMS
DMSXPO	DMSXPT	DMSXPX	DMSXQR	DMSXRE
DMSXSC	DMSXSD	DMSXSE	DMSXSF	DMSXSS
DMSXST	DMSXSU	DMSXTB	DMSXTE	DMSXTF
DMSXTR	DMSXUP	DMSXWS	DMSZAP	

New and Changed CMS Control Blocks and Macros

ACCSECT	DBGSECT	DMSABW	DMSPDBCB
DMSPGVAR	DMSPKTD	DMSPKTWK	DMSPSCCB
DMSPSDPL	DMSTRANS	EPLIST	FDEFSECT
IOSECT	LANGBLK	LDRST	NUCON
OVSECT	PARSECMD	PARSERCB	PARSERUF
PROPDTA	PVCENTRY	QRYWORK	SUBSECT
SVCSAVE	TABENT	TAPEWORK	TRANTBL

New and Changed CMS Execs

CMSGEND	CMSLOAD	CONVERT	DEFAULTS
DISCARD	FILELIST	LANGGEN	LANGMERG
MACLIST	NAMES	NOTE	PEEK
RDRLIST	RECEIVE	SENDFILE	TELL
VMFNLS			

National Language Support for CP

New and Changed CP Modules

DMKALG	DMKALO	DMKBLD	DMKCDM	DMKCDS
DMKCFC	DMKCFF	DMKCFG	DMKCFJ	DMKCFM
DMKCFO	DMKCFR	DMKCFS	DMKCFT	DMKCFU
DMKCFV	DMKCFY	DMKCKS	DMKCKT	DMKCKV
DMKCMD	DMKCNS	DMKCPB	DMKCPI	DMKCPJ
DMKCPO	DMKCPP	DMKCPT	DMKCPV	DMKCPW
DMKCPY	DMKCQC	DMKCQT	DMKCSB	DMKCSC
DMKCSF	DMKCSO	DMKCSP	DMKCSQ	DMKCST
DMKCSW	DMKDEF	DMKDEG	DMKDEI	DMKDIA
DMKDIB	DMKDID	DMKDIF	DMKDIR	DMKDRD
DMKDSP	DMKEPS	DMKERM	DMKGRF	DMKHVC
DMKHVD	DMKHVE	DMKHVF	DMKIDR	DMKIDU
DMKIOG	DMKIOH	DMKIUC	DMKIUJ	DMKIUP
DMKJRL	DMKLNM	DMKLOC	DMKLOG	DMKLOH
DMKLOJ	DMKLOM	DMKMCC	DMKMCD	DMKMIA
DMKMES	DMKMNI	DMKMNT	DMKMON	DMKMSG
DMKNEA	DMKNES	DMKNET	DMKNLD	DMKNLE
DMKOPE	DMKOVR	DMKPEI	DMKPEL	DMKPEN
DMKPEQ	DMKPER	DMKPET	DMKQCN	DMKQCO
DMKQCQ	DMKREI	DMKRGA	DMKRGB	DMKRNH
DMKRPD	DMKRSE	DMKRSP	DMKRST	DMKSCN
DMKSCO	DMKSND	DMKSPK	DMKSPL	DMKSPS
DMKSPT	DMKSSS	DMKSSU	DMKSSV	DMKSYS
DMKTCS	DMKTCT	DMKTOD	DMKTRA	DMKTRP
DMKTRT	DMKTRU	DMKTRX	DMKUDB	DMKUDR
DMKUDU	DMKUSO	DMKUSQ	DMKVAT	DMKVBM
DMKVCH	DMKVCN	DMKVCS	DMKVDA	DMKVDD
DMKVDE	DMKVDS	DMKVMA	DMKVMD	DMKVME
DMKVSP	DMKVST	DMKWRM	DMKWRN	

Deleted CP Modules

DMKEMA	DMKEMB	DMKEMC	DMKEMD	DMKEME
DMKEMR				

Changed IPCS Module

DMMCPA

New and Changed CP Control Blocks and Macros

IOBLOKS	LANGBLOK	LANGNTRY	MIHREC
NAMELANG	NLSTBL	PSA	UCNTRL
UDIRECT	VMBLK	VMBLOK	WEBLOK

Changed CP Loadlists (Execs)

APLOAD	AVLOAD	CPLOAD	CPLOADSM
VRLOAD			

OS Simulation Standard Label Tape Processing Exits (Merged PTF)

New and Changed CMS Modules

DMSFLD DMSFLE DMSFLO DMSLBD DMSSPM
DMSSEB DMSSOP DMSTLB

CMS Module Split

Original Module	Split Into
DMSFLD	DMSFLD DMSFLO

New and Changed CMS Macros

CMSCB FDEFSECT LABSECT TVISECT

New and Changed CMS Execs

CMSLOAD DMSSP

Paging Storage Enhancements (Merged PTF)

New and Changed CP Modules

DMKEMD DMKPST DMKSEL DMKXST

New and Changed Macros and Copyfiles

ALLOC SCCBLOK SYSPAG SYSXSTOR
SYSPLIST

Parsing Facility

New and Changed CMS Modules

DMSACC	DMSARE	DMSCMP	DMSCPY	DMSCSF
DMSDSK	DMSERS	DMSEXD	DMSEXL	DMSEXM
DMSFOR	DMSIDE	DMSINA	DMSINT	DMSITS
DMSLBT	DMSLST	DMSMDP	DMSNUC	DMSNXD
DMSNXL	DMSNXM	DMSOVR	DMSPAR	DMSPCA
DMSPCB	DMSPCC	DMSPCL	DMSPCR	DMSPCT
DMSPCW	DMSPDB	DMSPKT	DMSPMD	DMSPPL
DMSPRB	DMSPRI	DMSPRJ	DMSPRT	DMSPSC
DMSPSM	DMSPTC	DMSPTK	DMSPTL	DMSPTR
DMSPTT	DMSPUN	DMSPVF	DMSQRS	DMSQRY
DMSRDC	DMSRDR	DMSRNM	DMSRSV	DMSSET
DMSSRT	DMSSYN	DMSTPH	DMSTRT	DMSTYP
DMSUPD	DMSXBG			

New and Changed CMS Control Blocks and Macros

DMSPDBCB	DMSPGVAR	DMSPKTD	DMSPKTWK
DMSPSCCB	DMSPSDPL	DMSTRANS	EPLIST
NUCON	PARSECMD	PARSERCB	PARSERUF
PVCENTRY	SVCSAVE	TRANTBL	

New and Changed CMS Execs

CMSGEND	CONVERT	DEFAULTS	DISCARD
FILELIST	MACLIST	NAMES	NOTE
PEEK	RDRLIST	RECEIVE	SENDFILE
TELL			

PRINTL Macro Enhancements

New and Changed CMS Modules

DMSFNC DMSPIO

New and Changed CMS Control Blocks and Macros

PRINTL

Protected Application Environment

New and Changed CP Modules

DMKCFG	DMKCFM	DMKCFT	DMKCFY	DMKCMD
DMKCNS	DMKCQU	DMKDIR	DMKDSP	DMKGRF
DMKHVC	DMKHVE	DMKLOH	DMKPRG	DMKPTR
DMKREI	DMKRGA	DMKRGC	DMKSYM	DMKUSO
DMKUSQ	DMKVCP	DMKVCR	DMKVCU	DMKVDS
DMKVMA				

New and Changed CP Control Blocks and Macros

NAMESYS	PROTBLOK	SYSTBL	UMACBLOK
VCONCTL	VMBLOK		

PVM Extended Data Stream Support (Merged PTF)

New and Changed CP Modules

DMKBLD	DMKCPV	DMKCQV	DMKDIA	DMKGRF
DMKGRG	DMKHPS	DMKHPT	DMKHPU	DMKHVE
DMKSCN	DMKUSO	DMKUSQ	DMKVDA	DMKVDC
DMKVDE	DMKVDF	DMKVDS	DMKVIO	DMKVSI

New and Changed CP Control Blocks and Macros

VMBLOK	VMPSCOM

RDCARD Macro Enhancements

New and Changed CMS Modules

DMSABN	DMSCIO	DMSDDL	DMSEIO

New and Changed CMS Control Blocks and Macros

NUCON	RDCARD

Reduced Trace Table Size (Merged PTF)

New and Changed CP Modules

DMKSTA

New and Changed CP Control Blocks and Macros

SYSCOR

Remote and VM/VTAM Terminals

New and Changed CP Modules

DMKCFT DMKRGB DMKRGC DMKVCN DMKVCR
DMKVCS DMKVCU DMKVDS

New and Changed CP Control Blocks and Macros

WEBLOK VSMBLOK

Scheduler Algorithms Improved

Changed CP Module

DMKSCH

Shared Storage Access

New and Changed CMS Modules

DMSABN DMSACC DMSACF DMSACS DMSACP
DMSALU DMSLAD DMSSFD

New and Changed CMS Control Blocks and Macros

ACCSECT ADT DMSSFHDR NUCON

New and Changed CMS Execs

CMSGEND

Spool File Compression Support

New and Changed CP Modules

DMKRSP DMKVSP DMKVSQ DMKVST

New and Changed CP Control Blocks and Macros

SFBLOK

Spool File Limit Removal

New and Changed CP Modules

DMKACO	DMKCFM	DMKCFU	DMKCKD	DMKCKF
DMKCKH	DMKCKM	DMKCKN	DMKCKP	DMKCKR
DMKCKS	DMKCKT	DMKCKV	DMKCKW	DMKCPA
DMKCPJ	DMKCQH	DMKCQR	DMKCSQ	DMKCSR
DMKCST	DMKCSU	DMKCSV	DMKCSX	DMKDIR
DMKDMP	DMKDMQ	DMKDRD	DMKEDM	DMKEMR
DMKERP	DMKHVC	DMKHVF	DMKIDU	DMKIOT
DMKLOC	DMKLOG	DMKLOH	DMKMES	DMKMIA
DMKMOO	DMKNLE	DMKRSE	DMKRSP	DMKRST
DMKSAV	DMKSCH	DMKSEG	DMKSFB	DMKSPK
DMKSPL	DMKSPR	DMKSPS	DMKSPT	DMKSYM
DMKTCS	DMKTCT	DMKTRR	DMKTRT	DMKTRU
DMKUSP	DMKVMB	DMKVMD	DMKVME	DMKVSD
DMKVSE	DMKVSF	DMKVSG	DMKVSP	DMKVSQ
DMKVSW	DMKWRM	DMKWRN		

New and Changed CP Control Blocks and Macros

CKPLIST	PPMAP	PSA	RDEVBLOK
RHTBLOK	RHXTABLE	SFBLOK	SHQBLOK
SPTBLOK	SPUBLOK	SYSCOR	SYSRES
TSKBLOK	VMBLOK		

SPOOL System Service

New and Changed CMS Modules

DMSEIO DMSPIO DMSPRT DMSRDR

New and Changed CP Modules

DMKAPS DMKAPT DMKAPU DMKAPV DMKAPW
DMKAPX DMKAPY DMKAPZ DMKCKF DMKCKH
DMKCKS DMKCKV DMKCPT DMKCQG DMKCQH
DMKCQP DMKCQQ DMKCSF DMKCSO DMKCSP
DMKCSQ DMKCSR DMKCSU DMKCSV DMKCSW
DMKCSX DMKHVC DMKHVE DMKIUA DMKIUB
DMKIUC DMKIUP DMKMNT DMKMSG DMKRSP
DMKSEP DMKSND DMKSPK DMKSPL DMKSPS
DMKSPT DMKURS DMKVDD DMKVDF DMKVSP
DMKVSQ DMKVSR DMKVSX DMKWRM DMKXAB
DMKXAD

New and Changed CP Control Blocks and Macros

CKPLIST DEVTYPES LPRTBLOK LSPLCTL
PSA RSPXBLOK SFBLOK SPLINK
VBFBLOK VSPLCTL VPRXBLOK VSPXBLOK

Storage Management and Tuning Enhancements

New and Changed CP Modules

DMKATS DMKBLD DMKCFU DMKCPI DMKCQS
DMKMCC DMKMES DMKMIA DMKMON DMKMOO
DMKPGM DMKPGS DMKPRG DMKPRV DMKPTR
DMKPTS DMKPTT DMKRPA DMKSCH DMKSEL
DMKSRM DMKSTD DMKSTP DMKSTR DMKSWA
DMKSYM DMKTEF DMKUSO

New and Changed CP Control Blocks and Macros

CORTABLE MN000 MN002 MN006
MN300 MN305 MN400 PAGTABLE
SCBLOK SYSMON VMBLOK

System Profile

New and Changed CMS Modules

DMSACC DMSINI DMSINS DMSINT

New and Changed CMS Control Blocks and Macros

DEFNUC

New and Changed CMS Execs

SYSPROF

TSAF Changes to CPTRAP, TRAPRED, and QUERY

New and Changed CP Modules

DMKCFC DMKCKF DMKCMD DMKCPP DMKCQC
DMKTRP DMKTRR DMKTRT DMKTRU DMKTRX

New and Changed CP Control Blocks and Macros

CPTRAP OTABDATA TRTDATA

TXTLIB Enhancement

New and Changed CMS Modules

DMSLBT

VALIDATE Command

New and Changed CMS Modules

DMSFNC DMSSTT DMSRNM

3380 Direct Access Storage Device Support under DOS Simulation

New and Changed CMS Modules

DMSASN DMSBOP DMSDLK DMSDSV DMSFCH
DMSSET

3422 Magnetic Tape Support (Merged PTF)

New and Changed CMS Modules

DMSASN DMSTIO DMSTPH VMFPLC2

New and Changed CP Modules

DMKACR DMKACS DMKCCS DMKCCW DMKCFR
DMKCPB DMKCPM DMKCPO DMKCPP DMKCPS
DMKCPT DMKCPW DMKDDR DMKDMQ DMKDSP
DMKIOC DMKIOE DMKIOF DMKIOJ DMKIOS
DMKMCC DMKMCT DMKMNT DMKMSW DMKQVM
DMKSPT DMKSSP DMKTAP DMKTAQ DMKVDS
DMKVIO DMKVSI

New and Changed CMS Control Blocks and Macros

TAPEWORK

New and Changed CP Control Blocks and Macros

CALL DEVTYPES IOER OBRRECN
RCTLUNIT RDEVICE SAD SDRBLOK
VBLOKS

New and Changed CP Execs

SADUMP

3480 Volume Serial Error Recording (Merged PTF)

New and Changed CP Modules

DMKERP DMKHVC DMKIOE DMKIOF DMKIOJ
DMKIOS DMKTPE DMKVER

New and Changed CMS Modules

DMSTLB

Chapter 11. General Design Changes

This chapter also applies to CP, CMS, XEDIT, and IPCS. Information about GCS and TSAF is not included, because the source code for GCS and TSAF modules is not always distributed.

This chapter summarizes the new and changed modules, control blocks, macros, and execs.

New CP Modules

DMKACS	DMKAPS	DMKAPT	DMKAPU	DMKAPV
DMKAPW	DMKAPX	DMKAPY	DMKAPZ	DMKCCD
DMKCCO	DMKCCF	DMKCCS	DMKCCT	DMKCKR
DMKCKW	DMKCPN	DMKCKR	DMKCKW	DMKCQC
DMKCQI	DMKCRM	DMKCSW	DMKCSX	DMKCSY
DMKDIF	DMKERP	DMKGRD	DMKGRE	DMKGRG
DMKGRI	DMKHVF	DMKIDR	DMKIUB	DMKIUN
DMKIUP	DMKIUS	DMKMES	DMKQCQ	DMKREI
DMKSFB	DMKSPC	DMKSPR	DMKSVD	DMKTRX
DMKTTX	DMKVBM	DMKVCU	DMKVCW	DMKVDF
DMKVSD	DMKVSE	DMKVSF	DMKVSG	DMKXAB
DMKXAD	DMKXST			

Changed CP Modules

DMKACO	DMKACR	DMKACS	DMKALG	DMKALO
DMKAPI	DMKAPS	DMKAPT	DMKATS	DMKBIO
DMKBLD	DMKBOX	DMKCAC	DMKCCD	DMKCCH
DMKCCO	DMKCCS	DMKCCW	DMKCDM	DMKCDS
DMKCFC	DMKCFD	DMKCFF	DMKCFG	DMKCFJ
DMKCFM	DMKCFO	DMKCFP	DMKCFQ	DMKCFR
DMKCFS	DMKCFT	DMKCFU	DMKCFV	DMKCFY
DMKCKD	DMKCKF	DMKCKH	DMKCKM	DMKCKN

DMKCKP	DMKCKS	DMKCKT	DMKCKV	DMKCMD
DMKCNS	DMKCPB	DMKCPE	DMKCPI	DMKCPJ
DMKCPM	DMKCPN	DMKCPO	DMKCPP	DMKCPS
DMKCPT	DMKCPU	DMKCPV	DMKCPW	DMKCPY
DMKCPZ	DMKCQC	DMKCQG	DMKCQH	DMKCQI
DMKCQP	DMKCQQ	DMKCQR	DMKCQS	DMKCQT
DMKCQU	DMKCQY	DMKCSB	DMKCSC	DMKCSF
DMKCSO	DMKCSP	DMKCSQ	DMKCSR	DMKCST
DMKCSU	DMKCSV	DMKCSW	DMKCSX	DMKCSY
DMKDAD	DMKDAS	DMKDDR	DMKDEF	DMKDEG
DMKDEI	DMKDGD	DMKDIA	DMKDIB	DMKDID
DMKDIF	DMKDIR	DMKDMP	DMKDRD	DMKDSP
DMKEMD	DMKEPS	DMKERM	DMKERP	DMKEXT
DMKFMT	DMKFPS	DMKFRE	DMKFRT	DMKGRC
DMKGRF	DMKGRG	DMKGRI	DMKGRT	DMKHPS
DMKHPT	DMKHPU	DMKHVC	DMKHVD	DMKHVE
DMKHVF	DMKIDR	DMKIDU	DMKIOB	DMKIOC
DMKIOE	DMKIOF	DMKIOG	DMKIOH	DMKIOJ
DMKIOQ	DMKIOS	DMKIOT	DMKIUA	DMKIUB
DMKIUC	DMKIUE	DMKIUG	DMKIUJ	DMKIUL
DMKIUP	DMKIUS	DMKIUZ	DMKJRL	DMKLD00E
DMKLNK	DMKLNM	DMKLOC	DMKLOG	DMKLOH
DMKLOJ	DMKLOM	DMKMCC	DMKMCD	DMKMCH
DMKMCT	DMKMES	DMKMIA	DMKMNI	DMKMNT
DMKMON	DMKMOO	DMKMPO	DMKMSG	DMKMSW
DMKNEA	DMKNEM	DMKNES	DMKNET	DMKNLD
DMKNLE	DMKOPE	DMKOVR	DMKPAG	DMKPAH
DMKPEI	DMKPEL	DMKPEN	DMKPEQ	DMKPER
DMKPET	DMKPGM	DMKPGS	DMKPGT	DMKPMA
DMKPRG	DMKPRV	DMKPSA	DMKPST	DMKPTR
DMKPTS	DMKPTT	DMKQCN	DMKQCO	DMKQCP
DMKQCQ	DMKQVM	DMKRGA	DMKRGB	DMKRGC
DMKRNH	DMKRPD	DMKRSE	DMKRSP	DMKRST
DMKSAV	DMKSBL	DMKSCH	DMKSCN	DMKSCO
DMKSEG	DMKSEL	DMKSEP	DMKSND	DMKSPK
DMKSPL	DMKCPM	DMKSPS	DMKSPT	DMKSRM
DMKSSP	DMKSSS	DMKSSU	DMKSSV	DMKSTA
DMKSTD	DMKSTP	DMKSTR	DMKSVC	DMKSVD
DMKSWA	DMKSWM	DMKSYM	DMKSYS	DMKTAP
DMKTAQ	DMKTBN	DMKTCS	DMKTCT	DMKTED
DMKTEF	DMKTHI	DMKTMR	DMKTOD	DMKTPE
DMKTRA	DMKTRP	DMKTRQ	DMKTRR	DMKTRT
DMKTRU	DMKTRX	DMKTTX	DMKTTY	DMKUDB
DMKUDR	DMKUDU	DMKUNT	DMKURS	DMKUSO
DMKUSP	DMKUSQ	DMKVAT	DMKVBM	DMKVCH
DMKVCN	DMKVCP	DMKVCQ	DMKVCR	DMKVCS
DMKVCT	DMKVCU	DMKVCV	DMKVCX	DMKVDA
DMKVDC	DMKVDD	DMKVDE	DMKVDG	DMKVDH
DMKVDR	DMKVDS	DMKVDT	DMKVER	DMKVFC
DMKVFD	DMKVFE	DMKVFR	DMKVFS	DMKVIO
DMKVMA	DMKVMC	DMKVMD	DMKVME	DMKVMG
DMKVRR	DMKVRS	DMKVSC	DMKVSI	DMKVSP
DMKVSQ	DMKVSR	DMKVST	DMKVSW	DMKVSX
DMKWRM	DMKWRN	DMKXAB	DMKXST	DMKZTD

Deleted CP Modules

DMKEMA DMKEMB DMKEMC DMKEMD DMKEME
DMKEMR

CP Module Splits

Original Modules	Split Into
DMKACR	DMKACR DMKACS
DMKCCW	DMKCCD DMKCCF DMKCCO DMKCCS DMKCCT DMKCCW
DMKCDB	DMKCDB DMKCDD
DMKCNS	DMKCNS DMKCNT
DMKCPT	DMKCPT DMKCPN
DMKCQG	DMKCQF DMKCQG
DMKCQH	DMKCQH DMKCQI
DMKCSU	DMKCSU DMKCSW
DMKCSV	DMKCSV DMKCSX
DMKCSX	DMKCSX DMKCSY
DMKDIA	DMKDIA DMKDIF
DMKDRD	DMKDRD DMKDRE
DMKGRF	DMKGRD DMKGRE DMKGRF DMKGRG DMKGRI
DMKIUA	DMKIUA DMKIUB
DMKIUC	DMKIUC DMKIUP
DMKIUE	DMKIUE DMKIUN
DMKQCN	DMKQCN DMKQCQ
DMKSVC	DMKSVC DMKSVD
DMKTRT	DMKTRT DMKTRX

Original Modules	Split Into	
DMKTTY	DMKTTY	DMKTTX
DMKVCP	DMKVCP	DMKVCU
DMKVCT	DMKVCT	DMKVCW
DMKVDD	DMKVDD	DMKVDF

New CP Control Blocks and Macros

ACIPARMS	ALTBLOK	APPCVM	CCWSAVE
CONEXT	DPLIST	LANGBLOK	LANGNTRY
LPRTBLOK	LSPLCTL	NAMELANG	NLSTBL
PLIST	PROTBLOK	SSCBLOK	SRTBLOK
SYSXSTOR			

Changed CP Control Blocks and Macros

ACCOUNT	ACCTOFF	ALLOC	BOXBLOK
CALL	CCHREC	CCWSAVE	CKPLIST
CORE	CPTRAP	DEVTYPES	EQU
FRECOM	GRTBLOK	IOBLOKS	IOER
IPARML	IUCV	IUCVBLOK	JPSCBLOK
LBLOKS	MCHAREA	MCRECORD	MIHREC
MONBLOKS	MSFBLOK	NAMESYS	NETWORK
OBRRECN	OTABDATA	PPMAP	PSA
PWDIBLOK	RBLOKS	RCTLUNIT	RDCBLOK
RDEVICE	RDEVBLOK	RSPXBLOK	SAD
SCCBLOK	SDRBLOK	SFBLOK	SNARBLOK
SPLINK	SPOOL	SRTBLOK	SSCBLOK
SYSCOR	SYSLOCS	SYSMON	SYSPAG
SYSPLIST	SYSRES	SYSJRL	SYSTBL
TED	TIMER	TRANS	TRTDATA
TTYDATA	UCNTRL	UDEVBLOK	UDIRBLOK
UDIRECT	UMACBLOK	VBFBLOK	VBLOKS
VCONCTL	VDEVBLOK	VECTOR	VMBLK
VMBLOK	VMQBLOK	VPRXBLOK	VSMBLOK
VSPXBLOK	VSPXCTL	WEBLOK	

Changed CP Loadlists (Execs)

APLOAD	AVLOAD	CPLOAD	CPLOADSM
SADUMP	VRLOAD		

New CMS and XEDIT Modules

DMSACG	DMSACS	DMSADD	DMSALA	DMSALC
DMSAST	DMSBCT	DMSBLG	DMSCCP	DMSCDI
DMSCLN	DMSCLR	DMSCRT	DMSCST	DMSCUR
DMSDEF	DMSDEL	DMSDEV	DMSDFT	DMSDRO
DMSDRP	DMSEVC	DMSEXG	DMSFLO	DMSFND
DMSFRC	DMSGET	DMSGRQ	DMSGTU	DMSHID
DMSHLC	DMSHLL	DMSHLM	DMSHLR	DMSHLT
DMSHLZ	DMSIAC	DMSINV	DMSMAX	DMSMES
DMSMGC	DMSMGD	DMSMGE	DMSMGM	DMSMGX
DMSMIN	DMSMKS	DMSPAR	DMSPBK	DMSPCA
DMSPCB	DMSPCC	DMSPCL	DMSPCR	DMSPCT
DMSPCW	DMSPDB	DMSPKT	DMSPMD	DMSPPL
DMSPPO	DMSPRB	DMSPRI	DMSPRJ	DMSPSC
DMSPSM	DMSPST	DMSPTC	DMSPTK	DMSPTL
DMSPTR	DMSPTT	DMSPUT	DMSPVF	DMSQRF
DMSQRG	DMSQRH	DMSREF	DMSRES	DMSROU
DMSRTE	DMSRTV	DMSSCL	DMSSEF	DMSSFD
DMSSHO	DMSSIZ	DMSSLG	DMSSMG	DMSSPM
DMSSRE	DMSSRH	DMSSRP	DMSSRQ	DMSSTC
DMSTLW	DMSTRT	DMSUPP	DMSUSQ	DMSUSR
DMSUST	DMSVLD	DMSWAT	DMSWBX	DMSWEN
DMSWEX	DMSWID	DMSWIF	DMSWIM	DMSWIN
DMSWIO	DMSWIR	DMSWIS	DMSWIT	DMSWIW
DMSWLR	DMSWLW	DMSWMI	DMSWMM	DMSWMO
DMSWMU	DMSWMX	DMSWQI	DMSWQM	DMSWRD
DMSWRQ	DMSWRT	DMSWST	DMSWVC	DMSWVD
DMSWVE	DMSWVL	DMSWVQ	DMSWVS	DMSWVT
DMSWVX	DMSZIN			

Changed CMS and XEDIT Modules

DMSABN	DMSACC	DMSACF	DMSACM	DMSAMS
DMSARE	DMSASM	DMSASN	DMSAUD	DMSBOP
DMSBTB	DMSBTP	DMSBWR	DMSCCK	DMSCCS
DMSCIO	DMSCIT	DMSCLS	DMSCMP	DMSCPF
DMSCPY	DMSCRD	DMSCSF	DMSCVH	DMSCWR
DMSDAS	DMSDBD	DMSDBG	DMSDDL	DMSDIO
DMSDLB	DMSDLK	DMSDOS	DMSDSK	DMSDSL
DMSDSV	DMSEIO	DMSERD	DMSERS	DMSEXD
DMSEXE	DMSEXL	DMSEXM	DMSEXQ	DMSEXT
DMSFCH	DMSFET	DMSFLD	DMSFLE	DMSFNC
DMSFNE	DMSFNS	DMSFOR	DMSFRE	DMSGAM
DMSGLB	DMSGLO	DMSGMF	DMSGND	DMSGRN
DMSGVE	DMSHDI	DMSHDS	DMSHLB	DMSHLD
DMSHLI	DMSHLP	DMSHLS	DMSHTB	DMSICP
DMSIDE	DMSIMM	DMSINA	DMSINI	DMSINS
DMSINT	DMSITE	DMSITI	DMSITP	DMSITS
DMSIUC	DMSLAD	DMSLBD	DMSLBM	DMSLBT
DMSLCK	DMSLDF	DMSLDR	DMSLDS	DMSLFS
DMSLGT	DMSLIB	DMSLIC	DMSLIO	DMSLKD
DMSLLU	DMSLMX	DMSLOA	DMSLOS	DMSLSB
DMSLST	DMSMCM	DMSMDP	DMSMOD	DMSMVE
DMSMVG	DMSNAM	DMSNUC	DMSNXD	DMSNXL
DMSNXM	DMSOPL	DMSOPT	DMSOR1	DMSOSR
DMSOVR	DMSOVS	DMSPIO	DMSPOA	DMSPOC
DMSPOD	DMSPOE	DMSPOL	DMSPON	DMSPOP
DMSPOQ	DMSPOR	DMSPOS	DMSPRE	DMSPRT
DMSPRV	DMSPUN	DMSQRS	DMSQRT	DMSQRU
DMSQRV	DMSQRW	DMSQRX	DMSQRY	DMSQRZ
DMSRDC	DMSRDR	DMSREV	DMSREX	DMSRFN
DMSRIN	DMSRLD	DMSRNM	DMSROS	DMSRRV
DMSRSF	DMSRSV	DMSRTC	DMSRVA	DMSRXE
DMSSAB	DMSSBS	DMSSCN	DMSSCR	DMSSCT
DMSSEB	DMSSET	DMSSLN	DMSSMN	DMSSOP
DMSSPR	DMSSRT	DMSSRV	DMSSSK	DMSSTG
DMSSTP	DMSSTT	DMSSTX	DMSSUB	DMSSVQ
DMSSVT	DMSSYN	DMSTIO	DMSTLB	DMSTLM
DMSTMA	DMSTPD	DMSTPE	DMSTPF	DMSTPG
DMSTPH	DMSTPI	DMSTPJ	DMSTRK	DMSTVS
DMSTYP	DMSUPD	DMSUTL	DMSVIB	DMSVIP
DMSVIS	DMSVLT	DMSXBG	DMSXCG	DMSXCM
DMSXCN	DMSXCT	DMSXDC	DMSXDS	DMSXED
DMSXER	DMSXFC	DMSXFD	DMSXFL	DMSXGT
DMSXIN	DMSXIO	DMSXMA	DMSXMB	DMSXMC
DMSXMD	DMSXML	DMSXMS	DMSXPO	DMSXPT
DMSXPX	DMSXQR	DMSXRE	DMSXSC	DMSXSD
DMSXSE	DMSXSF	DMSXSS	DMSXST	DMSXSU
DMSXTB	DMSXTE	DMSXTF	DMSXTR	DMSXUP
DMSXWS	DMSZAP			

Deleted CMS Modules

DMSHLE

CMS Module Splits

Original Modules	Split Into
DMSACC	DMSACC DMSACP
DMSDIO	DMSDIO DMSDIP
DMSFLD	DMSFLD DMSFLO
DMSHLL	DMKHLC DMSHLL DMSHLM DMSHLR DMSHLT DMSHLZ
DMSINI	DMSINI DMSINQ
DMSINS	DMSINS DMSIND
DMSSEB	DMSSEB DMSSTP

New CMS and XEDIT Control Blocks and Macros

ACCSECT	ADDENTRY	APPLMSG	CPRB
CQYSECT	CSMRETCD	DEFNUC	DELENTRY
DMSABW	DMSBFREE	DMSBFRET	DMSCDEV
DMSDSBLK	DMSEDWCL	DMSFCACH	DMSFCHIN
DMSHELP	DMSHLNXT	DMSIDEWK	DMSLRDP
DMSLWRP	DMSMSG	DMSOSSAV	DMSPAGWK
DMSPATH	DMSPDBCB	DMSPKTD	DMSPKTWK
DMSPSDPL	DMSQFSC	DMSQPLST	DMSSCRCB
DMSSFHDR	DMSSMEQU	DMSSWPL	DMSSYSPL
DMSTRANS	DMSWMLPL	DMSWMUPL	DMSUSRPL
DMSXADT	HELP	IOSECT	LANGBLK
LINERD	LINEWRT	PARSECMD	PARSERCB
PARSERUF	PROPDTA	PVCENTRY	SENDREQ
TABENT	TRANTBL	TVISECT	VSDB
VSQB			

Changed CMS and XEDIT Control Blocks and Macros

ADT	AFT	CMSCB	CMSDEV
CMSIUCV	CVTSECT	DBGSECT	DCH
DEVSECT	DMSFRT	DMSFRWD	DMSFRWN
DMSFRWS	DMSGTWD	DMSGTWN	DMSGTWS
DMSPLAS	DMSPROC	DMSTLW	EPLIST
FDEFSECT	FVS	FVSECT	HELP
HELPXED	HLPSECT	IO	IOSECT
IUCVTAB	LABSECT	LDRST	LSCREEN
MRGSC	NUCON	OVSECT	PRINTL
QRYWORK	RDCARD	PRSCB	SUBSECT
SVCSAVE	SVCSECT	TAPEWORK	ZBLOCKS

New CMS and XEDIT Execs

CMMSERV	CONVERT	COPROC	ITASK
LANGGEN	LANGMERG	MOREHELP	SPGEN
SPLOAD	SYSPROF	UTILITY	VMFNLS
VMFREMOV	VMFTXT	X$EUPD$X	

Changed CMS and XEDIT Execs

ALL	CANCEL	CMSGEND	CMSLOAD
DEFAULTS	DISCARD	EXECUPDT	EXECUTE
EXPAND	FILELIST	JOIN	MACLIST
NAMES	NOTE	PEEK	PREFIXX
PRFSHIFT	PRFSHOW	PROFFLST	PROFMLST
PROFNOTE	PROFPEEK	PROFRLST	PROPHCHK
PROPST	RDRLIST	RGTLEFT	RECEIVE
SENDFILE	SI	SNTMAP	SPLTJOIN
STATUS	TELL	VMFLOAD	VMFMERGE
X$MLST$X	X$SEND$X	ZAPTEXT	

Deleted CMS and XEDIT Execs

GCSGEN	GENERATE	GENERAT2	GENERAT3
PREP	X$GENR$X		

Miscellaneous New CMS Files

SPGEN PROFILE SPLOAD PROFILE $DASD$ CONSTS

New IPCS Modules

DMMTRD DMMDIN DMMSCN

Changed IPCS Modules

DMMCOM	DMMCPA	DMMDCM	DMMDCP	DMMDIR
DMMDSC	DMMFED	DMMLOC	DMMMAP	DMMPRT
DMMSCR	DMMTAB	DMMTRC	DMMVAL	DMMVMF

IPCS Module Splits

Original Modules	Split Into
DMMFED	DMMDIN DMMFED
DMMTRC	DMMTRC DMMTRD

New IPCS Copy Files

WORKCP

Appendix A. Overview of VM/SP HPO prior to Release 5

This appendix introduces you to IBM Virtual Machine/System Product High Performance Option (VM/SP HPO). It provides an overview of VM/SP HPO prior to Release 5. It:

- Describes the relationship of VM/SP HPO to its base program product, VM/SP.
- Describes the users of VM/SP HPO.
- Describes the programming enhancements, microcode assists, and additional features contained in VM/SP HPO prior to VM/SP HPO Release 5.

What Is VM/SP HPO?

VM/SP HPO is a separately orderable program product that can be installed and executed in conjunction with VM/SP. The VM/SP HPO program package is not executable by itself. It requires installation of VM/SP or an equivalent program product. When you install and use VM/SP HPO in conjunction with the prerequisite VM/SP release, you obtain an operating system that extends the capabilities of the VM/SP with programming enhancements, support for microcode assists, and additional features.

Who Uses VM/SP HPO?

VM/SP HPO offers enhancements for large or complicated system environments. These enhancements include system management performance improvements, additional processor and I/O support, and enhanced MVS/SP support.

What Are the Main Functions of VM/SP HPO?

VM/SP HPO contains all of the base functions and enhances the capabilities of VM/SP with the following:

- System management performance improvements:
  - Virtual machine assist — segment protection extension
  - Hardware segment protect follow-on
  - Free-storage management improvements
  - Dispatching and scheduling modifications
  - Enhanced paging subsystem support
  - Expanded Storage support
- Additional processor support:
  - Extended storage protection key support
  - Extended storage support
  - Performance enhancements for dyadic and dual processors
  - 3090 processor support
- Additional I/O support:
  - IBM 3880 Model 11 and 21 Storage Subsystems support
  - IBM 3880 Model 13 and 23 Storage Subsystems support
  - Extended Channel support
  - Extension of the number of virtual devices supported
- Enhanced MVS/SP support:
  - Preferred machine assist support
  - Control switch assist extensions to preferred machine assist
  - 3033 Extension feature virtual machine assist enhancement
  - Enhanced availability in the MVS/SP V=R environment
  - Single processor mode operational enhancements.
- Vector Facility.

System Management Performance Improvements

Virtual Machine Assist — Segment Protection Extension

Segment protection support in VM/SP HPO uses the segment protection feature — a processor enhancement that uses microcode assist — to provide shared segment protection. The segment protection extension, a standard feature on the 308x, 3090, and 4381 processors, prevents altering of shared segments that are designated as protected in the NAMESYS macro instruction.

The feature offers a significant performance improvement for CMS read-only shared segment users by eliminating the control program processing that monitors shared segment pages. Additionally, segment protection extension eliminates the need for the control program to maintain duplicate page tables and swap tables in attached processor or multiprocessor systems with protected shared segments. Virtual machine operating systems executing in extended control mode with dynamic address translation active may also use the segment protection feature.

The control program tests for the presence of the segment protection feature at system initialization. If present, the control program activates the feature to prevent altering of protected segments by virtual machine users. If the feature is not present, the control program handles shared segment protection.

If the segment protection extension is installed on your processor, you do not have to activate it. You may operate without segment protection by specifying PROTECT=OFF in the NAMESYS macro instruction.

Hardware Segment Protect Follow-On

If a virtual machine running in EC mode, in virtual supervisor state, and with dynamic address translation on attempts to have CP store into a page protected by the hardware segment protect feature, CP does not execute the privileged instruction. The virtual machine receives a protection exception.

Free-Storage Management Improvements

To perform system-related functions such as building control blocks, processing I/O operations, or building save areas, the control program obtains free storage. Requests for free storage are processed by obtaining the required storage from fixed-size storage groups called **subpools**.

Free-storage management improvements in VM/SP HPO process free-storage requests more efficiently. These improvements make available more subpools in a greater variety of sizes. Processing required to return free-storage to the system is also more efficient.

Overall, free-storage improvements in VM/SP HPO reduce the amount of processing overhead associated with allocating and releasing free storage.

Dispatching and Scheduling Modifications

This support incorporates modifications that improve the efficiency of virtual machine dispatching functions. These changes are provided in the following areas.

Dispatch List

The VM/SP HPO control program scheduler maintains the run list, which contains virtual machines in either executable or nonexecutable states. Prior to this support, the dispatcher examined the run list in its search for an executable virtual machine. A new dispatch list is implemented to reduce the amount of time required to select an executable virtual machine. The dispatch list contains a subset of the virtual machines in the run list; however, only dispatchable virtual machines are placed in the dispatch list. The dispatcher now references only the dispatch list when selecting a virtual machine to run.

Using the dispatch list, the dispatcher no longer has to scan the run list in search of an eligible virtual machine. The scheduler's maintenance of the run list is unchanged.

Dispatcher Fast Path

After a virtual machine is dispatched, frequently an event occurs that stops the virtual machine's execution. An event such as an I/O interruption, a page fault, or a disk diagnose (DIAGNOSE X'18') does not change the status of the virtual machine, but the event does interrupt the virtual machine's execution. If the virtual machine is operating in basic control mode and is interrupted by one of the events described earlier, the control program saves information regarding the status of the virtual machine. With this information, there is no need to reexamine the status of the virtual machine. The virtual machine can be redispatched without resetting the required states and modes for the system. The next time the virtual machine is dispatched, it executes using the dispatcher fast path.

Basic control mode virtual machines (CMS, for example) can take advantage of the dispatcher fast path when the processor adheres to all of the following characteristics:

- Virtual machine assist is on
- The system is generated and operating in AP/MP mode
- Segment protection extension is available and used to prohibit access to all shared segments.

The dispatcher fast path results in greater processor utilization. If, upon examination of new status fields, it can be determined that the virtual machine is eligible for the dispatcher fast path, other tests for dispatchability are bypassed, reducing the time spent examining and readying an executable virtual machine.

Enhanced Paging Subsystem

Enhanced paging subsystem support, including block paging support, improves paging performance. This support uses main storage as a high-speed buffer. The system groups together user-pages that are likely to be used together. Single start I/O (SIO) operations swap these pages in and out of main storage. The SYSPAG macro provides for more efficient use of DASD and gives the system programmer a finer tuning capability over the paging and spooling resources.

Enhanced paging subsystem support simplifies CP code by handling Fixed-Block-Architecture (FBA) devices and Count-Key-Data (CKD) devices on pseudocylinder boundaries for paging and spooling devices.

Expanded Storage Support

Expanded Storage is a paging assist on the 3090 processor. It is used by CP as a high-speed paging area. Only CP has access to it; virtual machines cannot access Expanded Storage.

The SYSPAG or SYSXSTOR macros let you specify whether you want the system to use Expanded Storage as a swap area, a preferred paging area, or both.

To collect information on Expanded Storage's effect on system performance, several Monitor records have been expanded or enhanced.

The DASD Dump Restore program (DDR) is extended to support Expanded Storage in a stand-alone environment. It now prints selected pages of Expanded Storage in hexadecimal and EBCDIC, on a printer or terminal.

Additional Processor Support

Extended Storage Protection Keys

Extended storage key support in VM/SP HPO allows the control program to initialize itself on processors that have real-storage frames protected by a single 4K storage protection key rather than two 2K storage protection keys. The following processors use 4K storage protection keys to protect real-storage frames:

- The 3090 processor
- All models of the IBM 308x processor (except 3081 Model D16)
- The 3033 processor Models A24 and U24
- The 4381 processor when it has more than 16 Mb of storage configured.

On these processors, a guest virtual machine can manipulate the storage keys by issuing the new machine instructions Insert Storage Key Extended (ISKE), Set Storage Key Extended (SSKE), and Reset Reference Bit Extended (RRBE).

VM/SP HPO supports use of the extended key instructions for virtual machine operating systems executing in extended control mode on processors that use 4K storage protection keys. The appropriate level of the virtual machine operating system that uses 4K storage keys is required. For example, the following program products (with the appropriate releases) execute as a guest virtual machine operating system under VM/SP HPO:

- MVS/SP
- OS/VS1 Basic Programming Extensions
- VSE/Advanced Functions

- VM/SP
- VM/SP HPO.

VM/SP HPO continues to provide 2K storage protection key support for the 3081 Model D16 —as well as other processors that use 2K storage protection keys— to allow execution of virtual machine operating systems that use 2K storage protection keys (for example, DOS/VSE, OS/VS1, and MVS 3.8).

Extended Storage Support

This feature allows the VM/SP HPO control program to manage real storage on processors that have increased storage capacity. When the amount of real storage defined exceeds 16 megabytes, the control program uses the extended storage area (above 16 Mb) as an additional dynamic paging area. Though the control program itself must remain in the real storage area below 16 Mb, it uses the extended storage area for virtual machine pages.

Given this flexibility, you can configure the system and the extended storage area for:

- Exclusive use by the control program
- Exclusive use by the MVS/SP preferred guest
- Partitioned use by both the control program and the MVS/SP preferred guest.

With extended storage configured and online, systems previously constrained by limited availability of real storage will be able to improve system throughput.

Performance Enhancements for Dyadic and Dual Processors

The performance on dyadic and dual processors with store-in caches is improved by implementing the following: control block alignment, local dispatcher and free-storage queues for each processor, and dispatcher queue scanning.

Frequently used control blocks are aligned on cache-line boundaries. Dispatcher and free-storage queues are provided for each processor. Thus, two processors will modify and reference the same storage areas less frequently. In addition, when a processor completes its dispatchable work, it scans the dispatcher queues of the other processor instead of going into a wait state. Thus, the other processor no longer has to signal the idle processor when there is a piece of work that the idle processor can perform.

IBM 3090 Processor Complex

VM/SP HPO supports the 3090 processor as a dyadic processor in System/370 mode.

The 3090 processor yields high performance and has the flexibility to meet expanding installation requirements. It combines basic support with options to reduce channel contention and to add optional storage for use by CP. Thus, it provides faster response time and increases overall system throughput at an improved price-to-performance ratio.

The 3090 service processor provides I/O configuration and storage information and executes commands that modify the real-system configuration.

Additional I/O Support

IBM 3880 Model 11 and 21 Storage Subsystems

Excessive system paging demands can cause active pages to be transferred from real storage to auxiliary storage. Preferred system paging keeps frequently used pages more readily available to the system. The IBM 3880 Model 11 or 21 control unit, when operating in conjunction with 3350 direct-access storage devices, establishes a paging subsystem that the control program uses to implement preferred system paging.

If a 3880 Model 11 or 21 storage subsystem is installed and properly defined to the system, active pages are transferred into a high-speed buffer area, or **cache**. Subsequent paging requests quickly transfer the necessary pages back into real storage.

The 3880 Model 11 or 21 storage subsystem also has extended addressing capability. When you supply a real device address for the 3880, the control program automatically generates three additional addresses. Multiple addresses allows the 3880 to operate in two modes of operation:

- Direct mode uses I/O operations to format and allocate the 3350 direct access storage devices.
- Paging mode uses I/O operations to access the cache.

This flexibility improves data transfer rates by providing access to I/O devices through several paths.

The VM/SP HPO monitor is enhanced to collect status information for the 3880 Model 11 or 21 storage subsystem. Using monitor class DASTAP, you receive information regarding the configured and available size of the subsystem cache in addition to other performance-related indicators.

DMKFMT, the format/allocate program, formats 3880 Model 21 devices without dummy records.

IBM 3880 Model 13 and 23 Storage Subsystems

The 3880 Models 13 and 23 are high-performance cached DASD subsystems designed especially for nonpaging applications (application data that resides on DASD that is not defined as paging, swapping, spooling, or dump area). This support is provided to improve performance for MVS or CMS guest virtual machines running with 3380 DASDs. The performance improvement is accomplished principally by maximizing the number of read accesses that can be satisfied by accessing the cache (subsystem storage) copy. This support includes:

- Selective use of the cache by virtual device and minidisk as specified in the user's directory.
- Operator commands to enable or disable the caching function so that the cache can be taken offline. In addition, the operator commands provide the ability to select and display the devices that are eligible to use the cache.
- A directory option on the MDISK control statement to specify which minidisks on a 3880 Model 13 and 23 device can be used for caching.
- Recognition of 3880 Model 13 and 23 hardware errors.
- Monitor records that depict cache usage from both storage directors.
- Dedicated guest virtual machine control of the cache.

For effective use of the caching function, frequently used data must remain in the cache and must not be displaced by infrequently used data.

Extended Channel Support

Extended channel support allows an installation to configure its resources over 48 channels for a 3090 processor. This minimizes channel contention, improves system performance and availability, and provides an installation with room for increased work loads.

With extended channel support, three-digit real device addresses that appear in certain commands, messages, and macros (in the form "cuu") are extended to four-digit addresses ("ccuu").

To support the extended channels, the DASD Dump Restore (DDR) program is changed to accommodate three- or four-digit device addresses. The DDR control statements with extended device address fields are INPUT, OUTPUT, and SYSPRINT.

Two directory control statements are changed to specify three- or four-digit addresses. Both the 'ccuu' parameter of the DIRECTORY statement and the 'rdev' parameter of the DEDICATE statement are supported.

FORMAT/ALLOCATE control statements now support extended channels by including three- or four-digit device addresses in the messages they issue.

The VM Monitor now maintains the larger number of values produced by extended channel support. It keeps a "channel busy" count and tracks the number of I/O tasks queued on channels 16−31 of both processors.

The device address that the loader can manipulate is extended from X'0000' to X'1FFF'. This allows the printer or reader to be on any channel.

Extension of the Number of Virtual Devices Supported

The number of virtual devices supported for an ECMODE virtual machine ranges from one to a maximum of 3277 devices.

The option MAXDEV xxxx (used with the OPTION directory control statement) allows an ECMODE virtual machine to attach the number of devices specified by MAXDEV xxxx up to 3277. This maximum depends on VDEVSIZE which is 10 doublewords. To be able to attach this maximum number, you must have the maximum device option specified on the option statement in your virtual machine's directory. In addition, there must be sufficient contiguous free storage available.

If you do not have the MAXDEV xxxx option in your directory, then you will be able to attach up to 410 devices to your virtual machine.

Enhanced MVS/SP Support

VM/SP HPO incorporates new functions that enhance the performance of an MVS/SP virtual machine operating system. These functions are:

- Preferred machine assist
- Control switch extensions to preferred machine assist
- 3033 Extension feature enhancement to virtual machine assist
- Enhanced availability in the MVS/SP V=R environment
- Single-processor-mode operational enhancements.

Appendix

Preferred Machine Assist

VM/SP HPO provides support for the preferred machine assist feature, a microcode processor enhancement that is standard on the 4381, 3090, and 308x processors and is separately orderable for the 3033. Preferred machine assist produces a new mode of operation for the MVS/SP V=R virtual machine. Preferred machine assist significantly reduces control program processing, allowing the MVS/SP **preferred guest** to achieve improved performance.

As a preferred guest, MVS/SP operates in supervisor state with direct control of its hardware resources and I/O operations. The preferred guest can also use extended storage (greater than 16 Mb), providing additional performance potential for storage-constrained MVS/SP systems.

Additionally, preferred machine assist removes restrictions for using single-processor mode and dynamic system control program (SCP) transition. Users executing MVS/SP with preferred machine assist can use the single-processor mode and dynamic SCP transition functions of VM/SP HPO.

Control Switch Assist Extensions to Preferred Machine Assist

This support, available on 308x, 4381, and 3090 processors, allows the MVS/SP preferred guest to use IUCV, some DIAGNOSE instructions, and some Service Call instructions. It also reduces line time-out problems for such guests by letting CP reflect virtual I/O interruptions to the guest. You must install the control switch assist to obtain this support.

3033 Extension Feature Enhancement to Virtual Machine Assist

A combination of processor and microcode enhancements, the 3033 Extension feature (#6850) takes advantage of the numerous programming enhancements implemented in MVS/SP Release 3.

The 3033 Extension feature enhancement to virtual machine assist allows VM/SP HPO to use the 3033 Extension feature (#6850). When installed on the IBM 3033 processor, VM/SP HPO uses this microcode assist RPQ to reduce the overhead for dynamic address translation. This enhancement permits MVS/SP virtual machines (Version 1 Release 3 and subsequent releases) to use hardware assists in the 3033 Extension feature (#6850) to improve performance. VM/SP HPO supports this feature for 3033 and 3042 processors.

The 3033 Extension feature enhancement to virtual machine assist improves the performance of the MVS/SP Release 3 virtual machine operating system by:

- Reducing paging operations
- Enhancing real-storage management functions
- Increasing the performance of cross-memory services
- Increasing the performance of page-fault processing.

MVS/SP Release 3 cross-memory services gain an improvement in performance on processors equipped with the 3033 Extension feature. The 3033 Extension feature extends the capability of programs to communicate between address spaces through enhanced data movement and program calling procedures.

When the dual-address-space (cross-memory) assist is active, the 3033 Extension feature improves the performance of MVS/SP page-fault processing. VM/SP HPO support of the 3033 Extension feature reduces the amount of time needed to handle page translation exception interruptions that occur the first time certain MVS/SP tasks reference storage acquired by a GETMAIN macro instruction.

Additionally, restrictions for using single-processor mode or nondisruptive transition are eliminated. 3033 users executing MVS/SP Release 3 can use the single-processor mode or nondisruptive transition functions of VM/SP HPO.

Virtual machine assist support in VM/SP HPO allows 3033 processors equipped with this feature to execute the extended key instructions. The extended key instructions allow the control program or virtual machine operating systems to manipulate the storage protection keys for storage frames that are protected by a single storage key.

The 3033 Extension feature enhancement to virtual machine assist is available as a programming RPQ (#EJ1156). The 3033 Extension feature (#6850) is the prerequisite feature.

On 4381, 3090, and 308x processors, MVS/SP utilizes the functions of the 3033 Extension feature natively when MVS/SP is executing as the preferred virtual machine. When MVS/SP is executing as a nonpreferred guest, MVS/SP simulates cross-memory instructions. Preferred machine assist is a standard feature on the 308x Processor Complex.

Enhanced Availability in the MVS/SP V=R Environment

VM/SP HPO increases the availability of the MVS/SP V=R virtual machine by attempting to save the status of the MVS/SP virtual machine after the control program terminates with a software abend. When the control program is automatically restarted, the MVS/SP V=R virtual machine resumes execution.

When the MVS/SP virtual machine is operating with preferred machine assist active, additional recovery capability is provided. If the VM/SP HPO control program encounters a condition that would place it in a disabled wait state, the control program attempts to pass control to the MVS/SP preferred guest. If the attempt is successful, the MVS/SP preferred guest continues to operate in native state. To restore VM/SP HPO operations, the system operator must shut down MVS/SP and reinitialize (using IPL) the VM/SP HPO control program.

Single-Processor-Mode Operational Enhancements

Single-processor mode allows your installation to restrict the VM/SP HPO control program to a single processor of an attached processor or multiprocessor system, leaving the other processor for the exclusive use of the MVS/SP virtual machine. The single-processor-mode enhancements in VM/SP HPO make it easy for you to switch between single-processor mode and attached-processor mode or multiprocessor mode. Given this flexibility, your installation can pass a second processor between the MVS/SP V=R virtual machine and the VM/SP HPO control program without disrupting the MVS/SP virtual machine.

The MVS/SP virtual machine is able to issue MP instructions (CONCS, SPX, STPX, STAP, and SIGP) before single-processor mode is activated for the system. When the system operator varies the second processor (non-IPL processor) offline, it becomes available to the MVS/SP virtual machine. There is no need to reinitialize the MVS/SP virtual machine operating system.

Single-processor-mode users on the 3033 processor can now use a subset of the shadow table bypass assist functions. For other processors and specific releases of MVS/SP, the single processor user must also be the MVS/SP preferred guest to use this subset of the shadow table bypass assist functions.

The processor handles execution of STNSM and STOSM instructions, eliminating VM/SP HPO control program processing.

Vector Facility

Support is provided for the Vector Facility in System/370 mode configured to a 3090 processor. The Vector Facility is a synchronous vector/scalar instruction processor that can manipulate values (usually floating-point) at a high speed. Compiled engineering and scientific FORTRAN applications can use the array processing capability of the Vector Facility. VM/SP HPO supports multiple virtual machines' use of this facility.

The VM Monitor collects CP overhead time and the number of saves and restores for each processor. In addition, the VM Monitor collects data concerning the number of saves and restores and timer values associated with each virtual machine's use of the Vector Facility.

VM/SP HPO also allows many virtual machines to use the Vector Facility. Commands are provided that enable a Vector Facility user to display and change the various sets of registers within the Vector Facility and to determine the availability of the facility and the amount of time spent using the facility.

Glossary

This part of the manual defines some common terms that are used in the publication.

A

access mode. A method used by VM to control user access to data files. Access modes allow users to read and write data to a file, or only read data from a file.

active disk table (ADT). A table residing in the user's copy of the CMS nucleus that contains an entry for each valid filemode letter, that is, for each disk that has been accessed.

active file table (AFT). A table residing in the user's copy of the CMS nucleus that contains an entry for each disk file that is currently open.

active link. In RSCS, a teleprocessing link for which a line driver has been initiated; the RSCS operator uses the RSCS START command to initiate a line driver. The link is active until the line driver is terminated by another operator command.

active record. A record that has been added or appended to a file currently in use.

address translation. In VM/SP HPO, the process of changing the address of an item of data or an instruction from its virtual storage address to its real storage address.

Advanced Program-to-Program Communication/VM (APPC/VM). An application program interface (API) for communicating between two virtual machines that is mappable to the SNA LU 6.2 APPC interface and is based on IUCV functions. Along with the TSAF virtual machine, APPC/VM provides this communication within a single system and throughout a collection of systems.

all-points addressability (APA). The ability to refer to any pixel on the printable area of the screen. (Pixel is a dot that forms part of an image on the screen.)

APA. All-points addressability.

APAR. Authorized program analysis report.

application program interface (API). The formally defined programming language interface between an IBM system control program or licensed program and its user.

For VM, the term API is interpreted to mean the boundary between an external licensed program and VM itself. API specifically does not include any exclusive component-to-component interfaces that may exist within VM; for example, between the control program (CP) component and the transparent services access facility (TSAF) component.

authorized application. A GCS application, started with the OSRUN command, that operates in supervisor state and is allowed to use privileged functions. Contrast with *ordinary application.*

authorized program. Synonym for *privileged program.*

authorized program analysis report (APAR). A report of a problem caused by a suspected defect in a current unaltered release of a program.

authorized virtual machine. A GCS virtual machine identified by userid.

auxiliary storage. Data storage other than main storage; in VM/SP HPO, auxiliary storage is usually a direct access device.

B

basic control (BC) mode. A mode in which the features of System/360 computing system and additional System/370 features, such as new machine instructions, are operational on a System/370 computing system. See also *extended control mode.*

BC mode. Basic control mode.

border. A boundary around a window. A user can enter one-letter window manager commands from the corners of the border. For example, the letter P entered from a border corner pops a window. The border corners are indicated by a "+" (plus) sign.

buffer. An area of storage, temporarily reserved for performing input or output, into which data is read or from which data is written.

C

cache. In a processing unit, a high-speed buffer that is continually updated to contain recently accessed contents of real storage. Its purpose is to reduce access time.

cache line. Bytes of real storage that map to a specific area in the cache or high-speed buffer.

CE. Channel end, customer engineer.

channel-set switching. A facility used in some attached processor environments to allow processing to continue in uniprocessor mode on the attached processor after the main processor enters a disabled wait state following an uncorrectable error (a hard machine check or channel check), or after the system operator varies the main processor offline. CP switches all active channels on the main processor to the attached processor, and processing continues in uniprocessor mode.

channel-to-channel adapter (CTCA). A hardware device used to connect two channels on the same computing system or on different systems.

channel-to-channel (CTC) device. A hardware device used to connect two channels on the same computing system or on different systems. CTC devices include both channel-to-channel adapters (CTCAs) and 3088 Multisystem Communications Units (MCUs).

CKD. Count-Key-Data.

class A user. See *primary system operator privilege class.*

class Any user. A subset of CP commands used to log on to VM/SP HPO, to have the terminal logically connected to a multiple-access virtual machine, and to send messages to the operator or another user.

class B user. See *system resource operator privilege class.*

class C user. See *system programmer privilege class.*

class D user. See *spooling operator privilege class.*

class E user. See *system analyst privilege class.*

class G user. See *general user privilege class.*

class override file. A file containing control statements defining changes in the privilege classes of CP commands and/or diagnose codes. The override program, DMKOVR, uses the class override file to establish a new class structure of commands. See *user class restructure.*

CMS. Conversational monitor system.

CMS Batch Facility. A facility that allows a user to run time-consuming or noninteractive CMS jobs in another CMS virtual machine dedicated to that purpose, thus freeing this user's terminal and virtual machine for other work.

CMSSERV. The command that starts a CMS router in the Enhanced Connectivity Facilities environment of VM.

collection. A group of up to 8 VM operating systems that can share resources. Each system within the collection must have the transparent services access facilities (TSAF) virtual machine installed and running.

concurrently. Implies a mode of operation that includes the performance of two or more operations within a given interval of time.

connectivity program request block (CPRB). An interface control block used by requesters and servers to communicate information.

conversational monitor system (CMS). A virtual machine operating system that provides general interactive time-sharing, problem solving,

and program development capabilities, and that operates only under the control of the VM/SP or VM/SP HPO control program.

Count-Key-Data (CKD). Those DASD devices whose architecture defines variable-size records consisting of count, key, and data fields.

CPRB. Connectivity program request block.

cylinder. Specific space on count-key-data direct access storage devices.

D

DASD. Direct access storage device.

DASD dump restore (DDR) program. In VM, a service program used to copy all or part of a minidisk onto tape, or to load the contents of a tape onto a minidisk.

DDP logical operator. The person who handles nonroutine (nonprogrammed) messages forwarded from the local systems' programmable operator; the person who is "logically" responsible for distributed data processing system operations. See also *distributed data processing.*

DDP operator. The person who handles nonroutine (nonprogrammed) messages forwarded from distributed systems' programmable operators; the person who is "logically" responsible for distributed data processing network. See also *distributed data processing.*

DDR program. In VM, refers to the DASD dump restore program.

deadline priority. A value that the scheduler (DMKSCH) uses to determine when the user gets his next time slice. This value is calculated each time a user is dropped from a queue and is based on paging activity, processor usage, and the load on the system as well as on user priority.

dedicated channel. A channel that is attached to a virtual machine, for its sole use, so that CP can bypass translating the addresses of virtual devices.

dedicated device. An I/O device or line that is not being shared among users. The facility may be permanently assigned to a particular virtual machine via a VM directory entry, or temporarily attached by the resource operator to the user's virtual machine.

demand page area. A paging area defined as either TYPE=PP or TYPE=PG using the SYSPAG macro.

DIAGNOSE interface. Under VM, a programming mechanism that allows any virtual machine, including CMS, to communicate directly with CP via the DIAGNOSE instruction. Specific interface codes allow a virtual machine to request specific CP services more efficiently.

direct access storage device (DASD). A storage device in which the access time is effectively independent of the location of the data.

directory. For VM/SP HPO, a CP disk file that defines each virtual machine's normal configuration: the userid, password, normal and maximum allowable virtual storage, CP command privilege class or classes allowed, dispatching priority, logical editing symbols to be used, account number, and CP options desired.

discontiguous saved segment. An area of storage beyond the address of your virtual machine address space (not contiguous with your virtual storage) where segments are loaded as needed.

dispatcher queues. All the queues that the dispatcher references (IOBLOK/TRQBLOK, CPEXBLOK, and dispatch list queues).

dispatcher/scheduler favoring scheme. A set of criteria used by the dispatcher and scheduler to create a bias in favor of queue 1 (Q1) users. Q1 users are usually highly interactive users.

distributed data processing (DDP). The operation of a network of interconnected processors/systems each capable of independent operation. These processors/systems are linked so it is not necessary to store all data and programs at every site. Authorized users of such a network can use the facilities of any part of this network. Such use can either be intentional or transparent to the user; that is, the user might intentionally request service from a remote system, or a user's request for data or a program might automatically be routed to the appropriate part of the network by that system.

distributed logical operator. A virtual machine at the distributed system to which machine intervention requests are sent. There is a machine attendant who mounts forms and tapes, and turns the power on/off for that site.

DPA. Dynamic paging area.

dual. A processor complex comprising two processors in one unit. Both processors share central storage, are controlled by a single operating system, and communicate directly with each other. A dual configuration differs from a dyadic configuration because the channels in the dual configuration are attached directly to each processor and channel set switching is not provided. The 4381 Model 3 is an example of a dual processor.

dyadic. A processor complex comprising two processors in one unit. Both processors share central storage, are controlled by a single operating system, communicate directly with each other, execute I/O operations through a common element, and can run with one central processor if the other is removed from the configuration because of an error. A dyadic processor cannot be configured into two independent uniprocessor units. Note that each processor has access to its own assigned channel set. The 3081 and the 3090 Processor Complexes are examples of dyadic processors.

dynamic paging area (DPA). The area of real storage that is used by CP for the temporary storage of pages when paging occurs.

E

EC mode. Extended control mode.

ECPS:VM/370. Extended Control-Program Support.

edit. To make changes, additions, or deletions to a file that is on a disk, and to make these changes interactively. The edit function is also used to generate information in a file that did not previously exist.

enhanced connectivity. The strategy for sharing services and resources in a heterogeneous network.

entry point. An address or label of an instruction performed upon entering a computer program, a routine, or a subroutine. A program may have several different entry points, each corresponding to a different function or purpose.

EREP file. A collection of error records produced by the malfunctioning of hardware components on a computer and stored for processing by the Environmental Recording, Editing, and Printing (EREP) Program.

error recording area. The DASD space that the system programmer defines during system generation on the system residence volume. CP uses this space to record formatted outboard error recordings, machine check records, and channel check records. For count-key-data devices, this area is between two and nine contiguous cylinders in size; for FB-512 devices, the size of this area can be any number of contiguous pages.

Expanded Storage. A performance feature on the 3090 processor that VM/SP HPO uses as a high-speed, CP-owned paging area.

extended channel support. Allows an installation to configure its resources using 48 channels for a 3090 processor.

extended control mode. A mode in which all the features of a System/370 computing system, including dynamic address translation, are operational. See also *basic control (BC) mode.*

Extended Control-Program Support (ECPS:VM/370). A hardware assist feature, available on certain processors, that improves the performance of CP by reducing CP overhead. ECPS:VM/370 consists of CP assist, expanded virtual machine assist, and virtual interval timer assist.

Extended Count-Key-Data. Those DASD devices that have a faster data transfer rate than some processors can utilize and that are connected to the processor through the use of a "speed matching buffer." You must use slightly different channel programs to communicate with such devices.

extended storage. Storage above the 16 megabyte line.

F

FB-512. Refers to the IBM 3370 and 3310 Direct Access Storage Device.

FBA. Fixed-Block-Architecture.

Fixed-Block-Architecture (FBA). Those DASD devices whose architecture uses fixed blocks or records of 512 bytes.

FLUSHLIST. A set of pages readily available to replenish the FREELIST.

FREELIST. A set of pages above or below the 16 Mb line that can be allocated to satisfy both virtual machine and system page requests. To satisfy

system requests, pages below the 16 Mb line must be used.

full-screen CMS. In VM, when a user issues the command SET FULLSCREEN ON, CMS is in full-screen mode. Various classes of output are routed to a set of predefined windows. CMS is in a window and can take advantage of 3270-type architecture and window support. Also, users can type commands anywhere on the physical screen.

G

GCS. Group control system.

general user privilege class. The subset of CP commands that allows the Class G user to manipulate and control his virtual machine.

global system lock. A defer lock that provides system integrity for AP and MP support of command processing and code executed via IOBLOK, TRQBLOK, or CPEXBLOK.

group control system (GCS). An operating environment that provides a problem state OS subtasking environment with common storage access for members of a virtual machine group.

guest virtual machine. A virtual machine in which an operating system is running.

H

HELP. An online tool for supplying reference information on commands and messages for VM components.

high-speed buffer. A cache or a set of logically partitioned 128-byte blocks that provides significantly faster access to instructions and data than central storage.

I

IBM System/370 to IBM Personal Computer Enhanced Connectivity Facilities for VM. (1) A program that provides the server-requester programming interface (SRPI) and a communication manager on an IBM System/370 using VM/CMS. (2) The implementation of enhanced connectivity on a VM system with CMS installed.

initial program load (IPL). The initialization procedure that causes an operating system to commence operation. A virtual machine user must IPL the specific operating system into the virtual machine that will be used to control productive work. Each virtual machine can be loaded with a different operating system.

interactive. (1) An application in which each user entry calls forth a response from a system or program. (2) The classification given to a virtual machine or its storage pages based on this virtual machine's processing characteristics. When a virtual machine uses less than its allocated time slice, for example, because of terminal I/O, the virtual machine is classified as being interactive. See also *noninteractive.*

interactive problem control system. A component of VM/SP HPO that manages software failure, analysis, and tracking. It is an online facility for diagnosing and reporting software failures and for managing problem information and status.

inter-user communication vehicle (IUCV). A VM generalized CP interface that facilitates the transfer of messages either among virtual machines or between CP and a virtual machine.

IPL. Initial program load.

IUCV. Inter-User Communication Vehicle.

IUCV/APPC. Inter-User Communication Vehicle/Advanced Program-to-Program Communication. A modified subset of IUCV whose function can be mapped to the base set of the SNA Advanced Program-to-Program Communication protocol.

L

local. Two entities (for example, a user and a server) are said to be local to each other if they belong to the same system within a collection or to the same node within an SNA system.

logon. The procedure by which a user begins a terminal session.

logoff. The procedure by which a user ends a terminal session.

M

minidisk. See *virtual disk.*

N

NCCF. Network Communication Control Facility.

Network Communication Control Facility (NCCF). An IBM product that can control a VM/SP HPO system through the programmable operator facility in a mixed environment.

noninteractive. The classification given to a virtual machine or to its storage pages based on this virtual machine's processing characteristics. When a virtual machine usually uses all of its allocated time slice, it is classified as being noninteractive or CPU-bound. See also *interactive.*

nonprivileged program. A program, called by a group control system application, that operates in problem state. Contrast with *privileged program.*

O

object directory. The output from the directory program.

ordinary application. A group control system application, started with the OSRUN command, that operates in problem state. Contrast with *authorized application.*

override file. See *class override file.*

P

partitioned processing mode. A mode that occurs when the 3084 processor is reconfigured into two separate and independent dyadic processors, each capable of executing an operating system of unique type or version. The 3084 is a four-way multiprocessor.

password. In VM, a 1-to-8-character symbol that the user supplies as identification when logging on. The password is normally protected from inadvertent disclosure to unauthorized personnel by not displaying the password or by masking the password as it is keyed in. A password may also be assigned to a virtual disk to control or limit access to that disk.

personal computer (PC). A properly configured IBM Personal Computer or 3270 Personal Computer that allows communication between enhanced connectivity programs. These communicating programs reside on both a personal computer and a host system.

preferred guest. An MVS/SP virtual machine that runs with preferred machine assist under VM/SP HPO.

preferred machine assist. The hardware feature of the IBM 308x, 4381, and 3090 processor complexes that improves MVS/SP (Release 1 enhancement, or later) V=R virtual machine performance. It is also an optional feature on the IBM 3033 processor. The MVS/SP guest virtual machine operates in supervisor state with direct control of its own I/O operations under VM/SP HPO.

primary system operator. The first CP privilege class A user that is logged on to VM after system initialization. Although class A may be assigned to more than one user, only one user at a time can use class A privileges.

primary system operator privilege class. The CP privilege class A user; this operator has primary control over the VM system, and can enable and disable teleprocessing lines, lock and unlock pages, force users off the VM system, issue warning messages, query, set (and reset) performance options for selected virtual machines, and invoke VM accounting. If the current primary system operator logs off, the next class A user to log on becomes the primary system operator.

privilege class. One or more classes assigned to a virtual machine user in the directory entry; each privilege class specified allows a user to access a logical subset of the CP commands. There are eight IBM-defined privilege classes that correspond to specific administrative functions: class A – operations; class B – resource; class C – programmer; class D – spooling; class E – analyst; class F – service; class G – general; and class H – reserved for IBM use. Installations may change the IBM-defined privilege classes to meet specific needs.

privileged program. A program, called by a group control system application, that operates in supervisor state and can use privileged functions. A privileged program is one that meets either of the following requirements: (1) It runs in an authorized

virtual machine; (2) it is called through the AUTHCALL facility.

processor-local queues. Those queues that are owned primarily by one processor.

program temporary fix (PTF). A temporary solution or bypass of a problem diagnosed by IBM service personnel as a result of a defect in a current unaltered release of the program.

programmable operator facility. This facility enables automatic filtering and routing of messages from a specified virtual machine (for example, the operator) to a logical operator virtual machine in a local distributed or mixed environment. The programmable operator facility also permits installation-defined actions to be performed automatically.

pseudocylinder. A CCPD (cylinder, page, device) representation of a PPPD (page, device) FBA DASD address or page number. It allows the same control block structure to be used for FBA devices, CKD devices, and Expanded Storage. A pseudocylinder corresponds to an access position for an FBA device and to one-half megabytes for Expanded Storage.

PTF. Program temporary fix.

Q

queue-add. Occurs when the system scheduler adds a runnable virtual machine to the run list and the dispatch list.

queue-drop. Occurs when the system scheduler removes a virtual machine from the run list and dispatch list.

R

RACF. Resource Access Control Facility.

real address. A main storage address that identifies a location in real storage. When a real address is used for an access to main storage, it is converted, by means of prefixing, to an absolute address.

real machine. The actual processor, channels, storage, and input/output (I/O).

reply. The answer to a service request that came from the server.

requester. The program that relays a request to another computer through the server-requester programming interface (SRPI). Contrast with *server*.

Resource Access Control Facility (RACF). A licensed program that provides for access control by identifying and verifying users to the system, authorizing access to DASD data sets, logging detected unauthorized attempts to enter the system, and logging detected accesses to protected data sets.

restricted passwords. Commonly published passwords that are not permitted in the object directory. A user who supplies a restricted password is denied access to the system. These commonly published or restricted passwords are contained in a file called RPWLIST DATA.

route. A connection to another system via a logical link and a number of intermediate systems. In TSAF, a number of links and possible intermediate systems that allow the connection of one system to another.

router. An enhanced connectivity program that interprets requests for services and directs them to the applicable server. See also *server-requester programming interface (SRPI).*

run list. The list of virtual machines that can be given control of a processor.

S

secondary console image facility. A VM facility that allows console messages and replies to be handled by another virtual machine whenever the originating virtual machine is disconnected.

section size. The number of elements of a vector register; the dimension of a vector.

segment protect. A hardware feature that provides protection for shared segments at the hardware level.

server. A program or set of programs executing in a virtual machine and managing access to one or more VM resources; also called a *resource manager*.

server-requester programming interface (SRPI). (1) A protocol between requesters and servers in an enhanced connectivity network. Includes the protocol to define cooperative processing subsystem. (2) The interface that

enables enhanced connectivity between requesters and servers in a network.

server system. A data processing system containing one or more servers providing services in response to a request from another computer.

SNA. Systems network architecture.

source directory. The directory control statements that constitute the input to the directory program.

spool, spooled, spooling. Relates to the reading of input data streams and the writing of output data streams on auxiliary storage devices.

spooling operator privilege class. The CP privilege class D user who controls the real unit record equipment and all closed spool files.

SRPI. Server-requester programming interface.

subpools. Fixed-size storage groups that the system uses to satisfy free-storage requests.

swap area. An area on a Count-Key-Data DASD or in Expanded Storage allocated for swapping by the SW option on the SYSPAG macro.

swap set. A group of pages belonging to a specific virtual machine to be written/read to and from DASD or Expanded Storage as a group. The maximum number of pages contained in a swap set is a system generation variable.

swapping. The process of moving pages to and from the SWAPLIST or a swap area.

SYSPAG macro. A macro in DMKSYS used to define how the CP-owned volumes will be allocated for swapping, paging, spooling, page migration, and dump, and how Expanded Storage increments will be allocated for swapping and paging.

SYSPLIST. A control block generated by the SYSPAG or SYSXSTOR macro. An SYSPLIST control block is created for every SYSPAG or SYSXSTOR macro specified in DMKSYS.

system analyst privilege class. The CP privilege class E user, normally the VM system analyst, who can query, examine, and print or display, but not modify, certain areas of the CP nucleus, and can create saved systems.

system programmer privilege class. The CP privilege class C user, normally, the system programmer, who can alter the contents of any real-storage locations in the machine.

system resource operator privilege class. The CP privilege class B user, who controls all the real resources of the machine, such as real storage, disk drives, and tape drives, that are not controlled by the primary system or spooling operators.

system restart. The restart that allows reuse of previously initialized areas. System restart usually requires less time than IPL.

systems network architecture (SNA). The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through and controlling the configuration and operation of networks.

SYSXSTOR macro. A macro in DMKSYS used to define how Expanded Storage increments will be allocated for swapping and paging.

T

terminal. A device, usually equipped with a keyboard and some kind of display, capable of sending and receiving information over a communication channel. With VM/SP HPO, the terminal is used to communicate with the system.

time sharing. Sharing of computer time and resources.

transparent. An application-to-server interface is said to be transparent if it is identical for local and remote servers.

transparent services access facility (TSAF). A facility that lets users connect to and communicate with local or remote virtual machines within a group of systems. With TSAF, a user can connect to a program by specifying a name that the program has made known, instead of specifying a userid and nodeid.

trimming. The process by which the unreferenced pages of a virtual machine are placed on the FLUSHLIST at queue-drop.

TSAF. Transparent services access facility.

TSAF virtual machine component. A component in VM that handles communication between systems

by letting APPC/VM paths span more than one system.

U

user class restructure. The extension of the class structure of control program instructions from 8 classes to 32 classes for each user, command, and diagnose code within the system. This extension allows the installation greater flexibility in authorizing the use of control program instructions.

userid. A predefined set of one to eight characters that uniquely identify a user to the system.

V

virtual address. An address that refers to virtual storage or a virtual I/O device address. It must therefore be translated into a real storage or I/O device address when it is used.

virtual device. A device simulated for a virtual machine by CP. The MAXDEV xxxx option on the OPTION Directory control statement allows you to attach up to 3277 devices to your virtual machine when VDEVSIZE is 10 doublewords. Without the MAXDEV option, you can attach 410 devices to your virtual machine.

virtual disk. A logical subdivision (or all) of a physical disk storage device that has its own address, consecutive storage space for data, and an index or description of the stored data so that the data can be accessed. A virtual disk is also called a minidisk.

virtual machine. A functional simulation of a computer and its associated devices.

virtual storage. Storage space that can be regarded as addressable main storage by the user of a computer system in which virtual addresses are mapped into real addresses. The size of virtual storage is limited by the addressing scheme of the computing system and by the amount of auxiliary storage available, and not by the actual number of main storage locations.

virtual storage access method (VSAM). An access method for direct or sequential processing of fixed- and variable-length records on direct access storage devices. The records in a VSAM data set or file can be organized in logical sequence by a key field (key sequence), in the physical sequence in which they are written on the data set or file (entry-sequence), or by relative-record number.

VSAM. Virtual storage access method.

VSE. The generalized term used to indicate the combination of the VSE/System Package system control program and the VSE/Advanced Functions licensed program. Note that, in certain cases, the term DOS is still used as a generic term; for example, disk packs initialized for use with VSE or any predecessor DOS or DOS/VS system may be called DOS disks. Also note that the DOS-like simulation environment provided under the VM/SP CMS component and CMS/DOS exists on VM/SP and VM/SP High Performance Option licensed program and continues to be referred to as CMS/DOS.

VSM. VTAM service machine.

VTAM service machine (VSM). A virtual machine that contains an operating system (OS/VS1) or VSE/System Package, an access method (ACF/VTAM or ACF/VTAME), and VM/VCNA. VSM forms the interface for SNA communication in VM/SP HPO.

W

working set. (1) The set of user's pages that must be active in order to avoid excessive paging. (2) For swap enhancement support, this term has additional meaning. Working set, in this context, refers to the set of virtual machine pages that is placed on the swap list when the virtual machine is dropped from the queue.

The VM/SP HPO Library

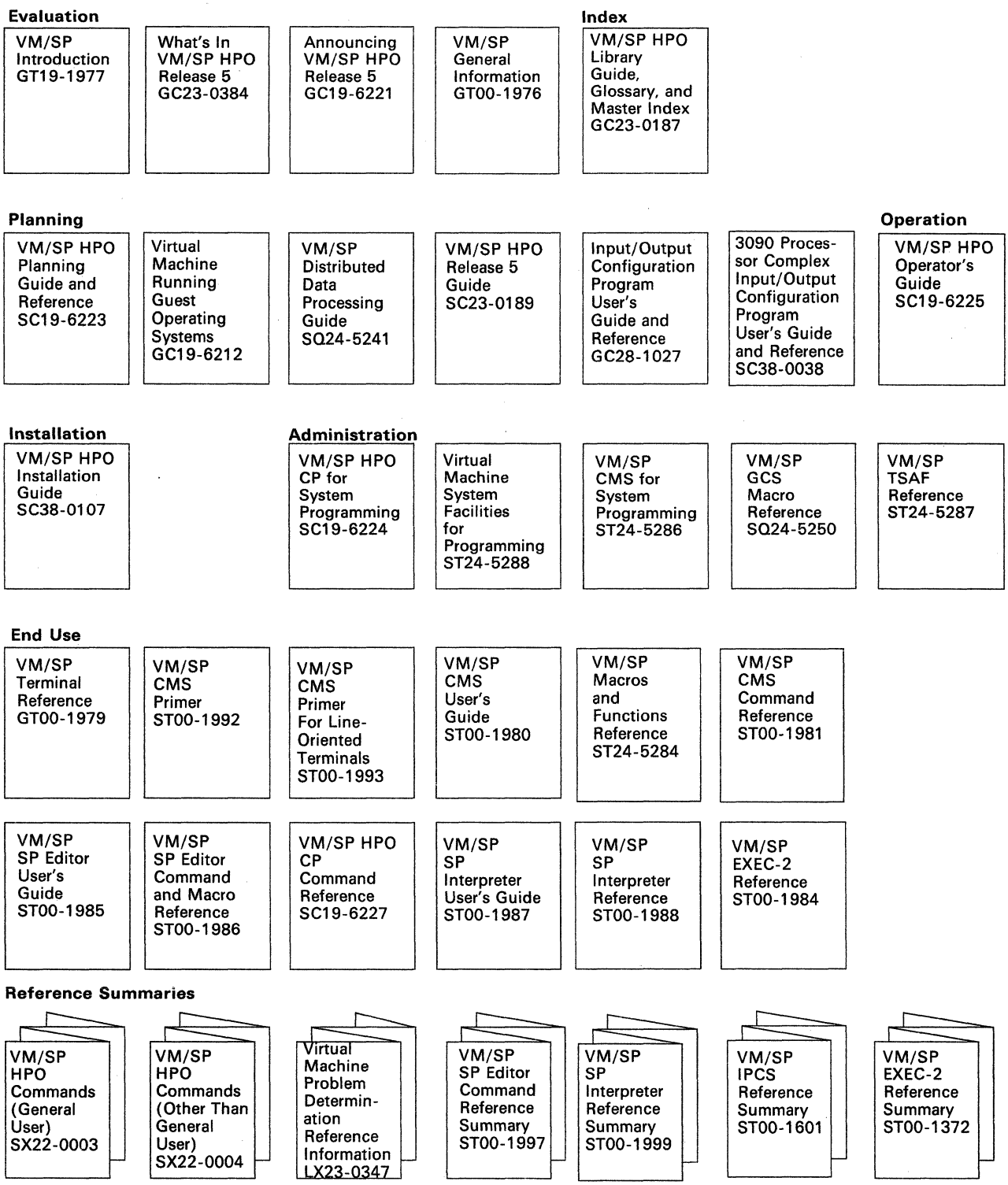
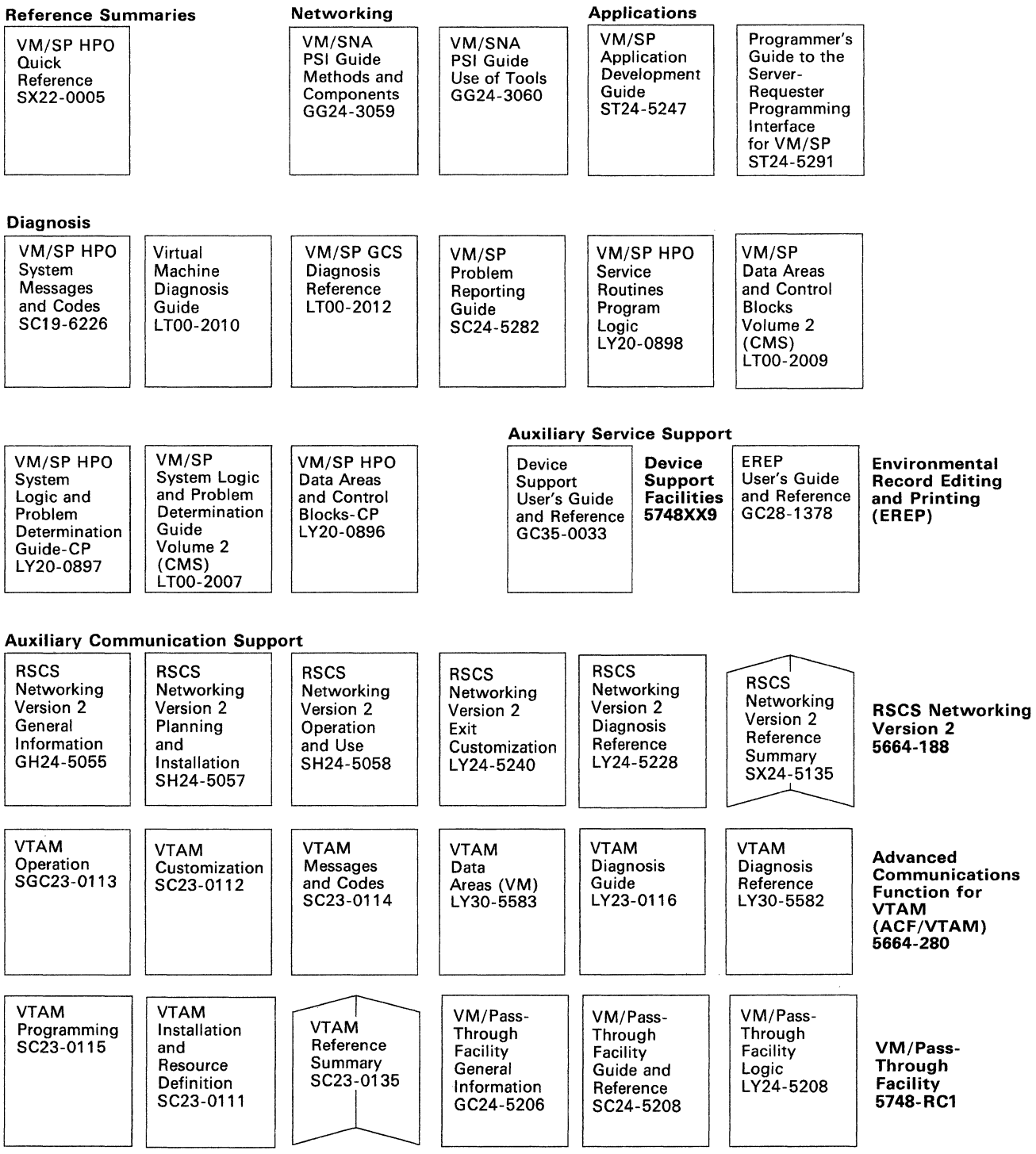


Figure 17 (Part 1 of 2). The VM/SP HPO Library



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READER'S COMMENT FORM

Release 5 Guide

Order No. SC23-0189-3

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