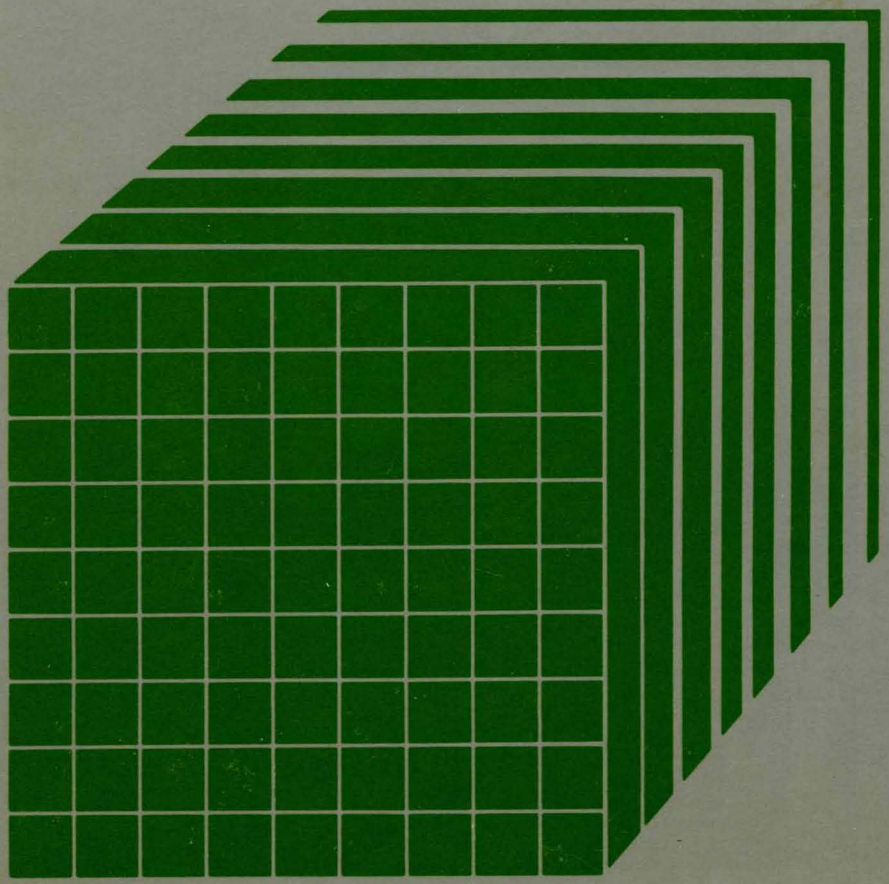
IBM

Virtual Machine/ System Product

Release 4 Guide

Release 4

SC24-5248-1



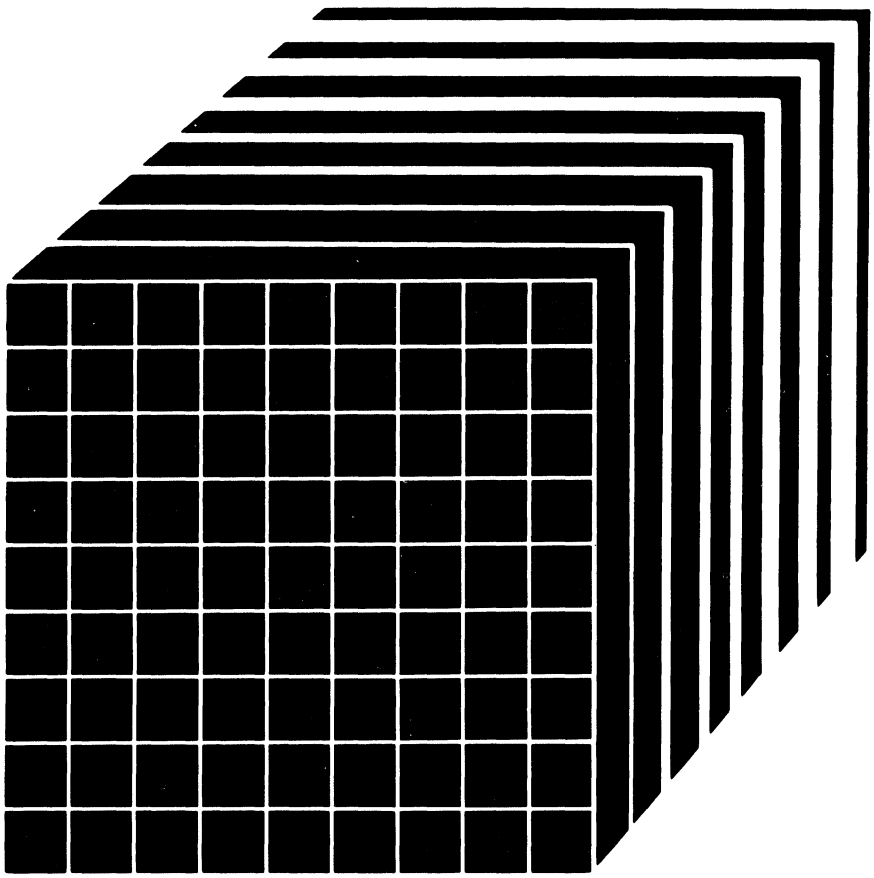
IBM

Virtual Machine/ System Product

Release 4 Guide

Release 4

SC24-5248-1



Second Edition (July 1985)

This edition, SC24-5248-1, is a revision of SC24-5248-0, and applies to Release 4 of the Virtual Machine/System Product (VM/SP), program number 5664-167, unless otherwise indicated in new editions or Technical Newsletters.

Changes are made periodically to the information herein; before using this publication in connection with the operation of IBM systems, consult the latest *IBM System/370 and 4300 Processors Bibliography*, GC20-0001, for the editions that are applicable and current.

References in this publication to IBM products, programs, or services do not imply that IBM intends to make them available in all countries in which IBM operates. Any reference to an IBM program product is not intended to state or imply that only IBM's program product may be used. Any functionally equivalent program may be used instead.

Publications are not stocked at the address given below. Requests for IBM publications should be made to your IBM representative or to the IBM branch office serving your locality.

A form for reader's comments is provided at the back of this publication. If the form has been removed, comments may be addressed to IBM Programming Publications, Dept. G60, P.O. Box 6, Endicott, NY, U.S.A. 13760. IBM may use or distribute whatever information you supply in any way it believes appropriate without incurring any obligation to you.

Preface

This manual describes the new and changed functions in Virtual Machine/System Product (VM/SP) Release 4. By describing in one place the main effects of each change, this manual makes it easier for you to understand and take advantage of the changes. However, this manual is not intended to replace the full VM/SP library for either new or current users.

Information applying to previous releases of VM/SP, yet similar to that found in this publication can be found in the following publications:

For VM/SP Release 3:
VM/SP Release 3 Guide, SC24-5240

For VM/SP Release 2:
VM/SP General Information Manual, GQ20-1838

For VM/SP Release 1:
VM/SP General Information Manual, GT20-1838

Who This Manual Is For

This manual is intended for current users of VM/SP Release 3 who plan to migrate to Release 4. It is written for data processing managers, system programmers, system analysts, and other programming personnel responsible for migrating an installation from VM/SP Release 3 to VM/SP Release 4. However, other users, for example application programmers, will also be able to learn about the effects of the new release.

How This Manual Is Organized

"Part 1: General Information" is an overview of VM/SP Release 4. It summarizes the environmental considerations of the release and describes the changes in the VM/SP library.

"Part 2: New Facilities and Enhancements" describes the functional changes introduced in Release 4.

"Part 3: Migration" describes the general requirements and aids for migrating to Release 4.

"Part 4: Internal Design Changes" describes changes to the internal design of VM/SP that affect performance, usability, or maintenance.

How To Use This Manual

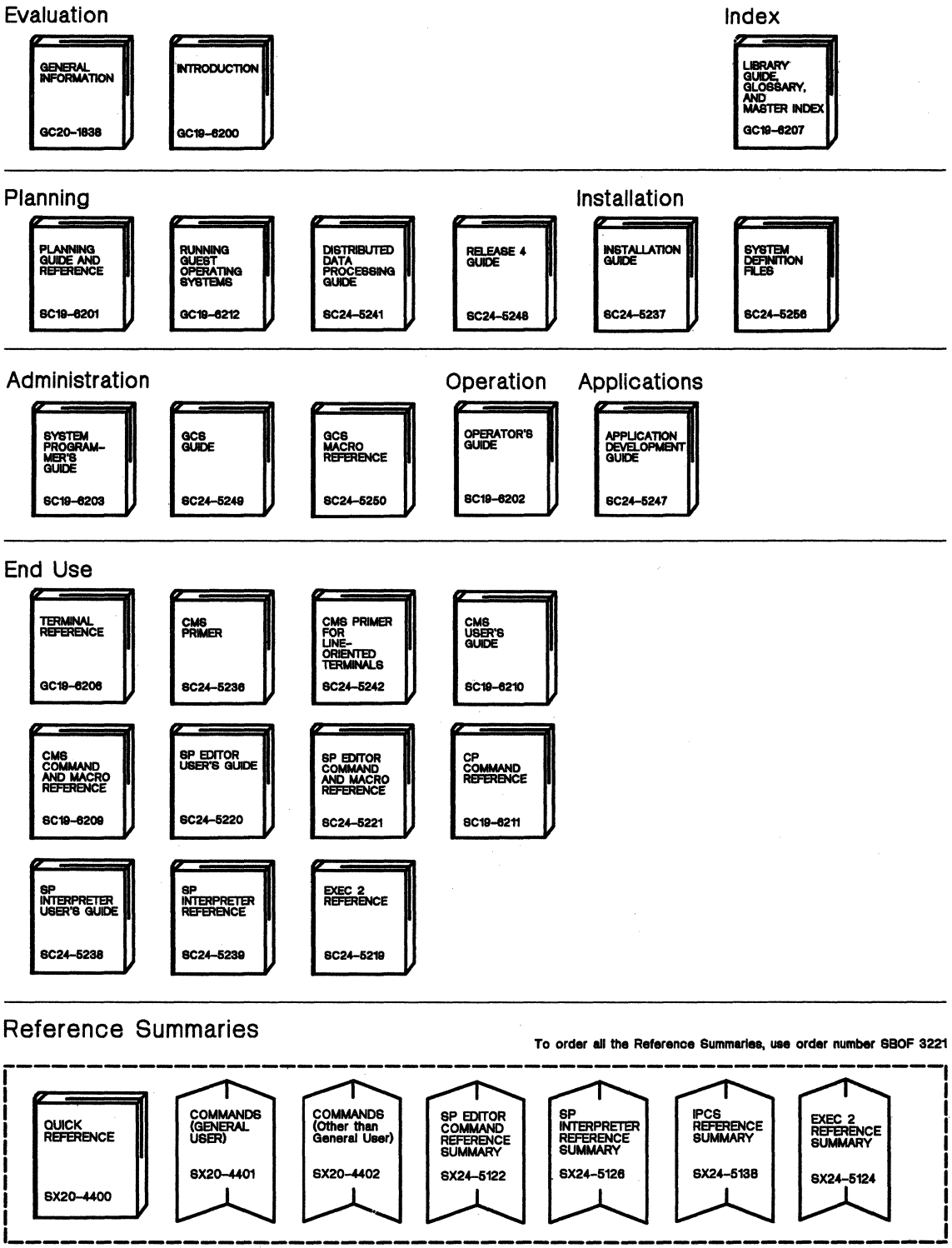
When using this manual you should:

- Refer to Part 1 for a general overview of VM/SP Release 4.
- Refer to Part 2 for the functional changes introduced in VM/SP Release 4.
- Refer to Part 3 for information about migrating from VM/SP Release 3 to VM/SP Release 4.
- Refer to Part 4 for the internal design changes in VM/SP Release 4.

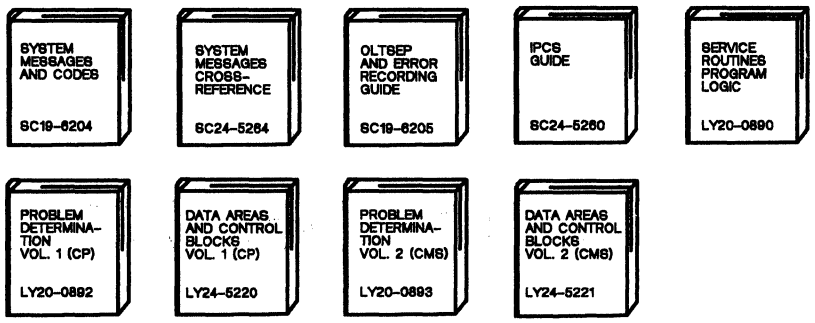
Privilege Classes

The privilege classes (A-G) mentioned in this book refer to the IBM-defined classes. An installation can override any of the IBM-defined privilege classes, in which case the installation's administrator is responsible for any new authorizations and restrictions.

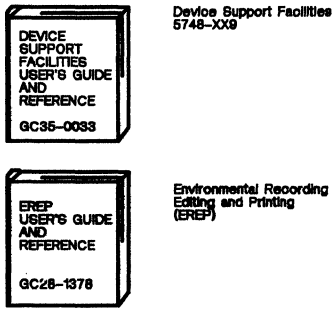
The VM/SP Library



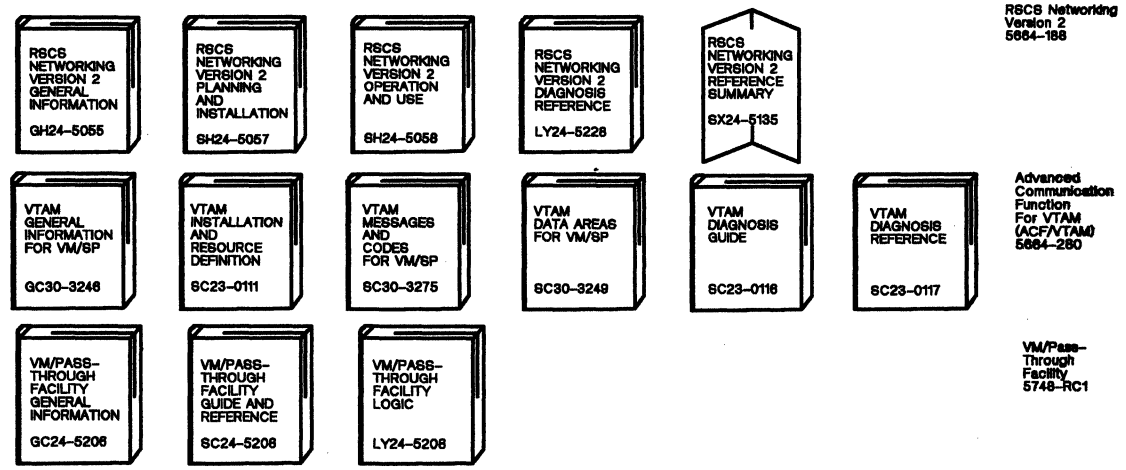
Diagnosis



Auxiliary Service Support



Auxiliary Communication Support



Contents

Part One: General Information

Part Two: New Facilities and Enhancements

Part Three: Migration

Part Four: Internal Design Changes

Figures

Part One: General Information

This part of the manual introduces you to VM/SP Release 4.

Its three sections:

- Give an overview of the new facilities and enhancements
- Present environmental considerations
- Describe changes to the VM/SP library.

Chapter 1. An Overview of VM/SP Release 4

This section gives you an overview of VM/SP Release 4.

It includes:

- Short descriptions of the most significant changes
- A summary of other additions and enhancements

Significant Changes

Significant changes provided by VM/SP Release 4 include:

- Additions
  - Group Control System
  - Interactive Problem Control System
- Enhancements
  - Programmable Operator Facility
  - System Product Editor
  - User Class Restructure
  - CMS file searching
  - HELP facility
  - System Product Interpreter
  - DASD Dump Restore Program
  - Installation and Service Procedures
- Added support
  - 3480 Magnetic Tape Subsystem
  - Communications Controllers

Addition of the Group Control System

The Group Control System (GCS) is a new component of VM/SP Release 4. It is a virtual machine supervisor with multiple-task management capabilities. It supports a native VM/SNA network without the need for a guest DOS/VSE or VS1 operating system. GCS supports subsystems such as ACF/VTAM Version 3 for VM/SP, and the following networking applications:

- Advanced Communications Functions/Network Control Program (ACF/NCP) Version 3
- Advanced Communications Functions/System Support Programs (ACF/SSP) Version 3

- Remote Spooling and Communication Subsystem (RSCS) Networking, Version 2
- Network Communications Control Facility (NCCF) Version 2.

More information on the Group Control System can be found under "Chapter 4. Addition of the Group Control System" on page 4-1.

Addition of the Interactive Problem Control System

The functions of the VM/Interactive Problem Control System Extension (IPCS/E), Program Product 5748-SA1, plus enhancements have been incorporated as a component of VM/SP. This component, the Interactive Problem Control System (IPCS), replaces the unmodified VM/370 Interactive Problem Control System. The IPCS/E Program Product no longer needs to be ordered by the user.

IPCS provides VM/SP users with an interactive, online facility for diagnosing and reporting software failures and for managing problem information and status. IPCS is intended to help system programmers reduce the time, effort, and expense required to solve software problems and to improve communications between the user and the IBM Support Center.

VM/SP Release 4 continues to support the Release 2 level of IPCS/E. However, the new IPCS component of VM/SP is the service vehicle recommended for the components of VM/SP Release 4. For additional information refer to "Chapter 5. Addition of the Interactive Problem Control System" on page 5-1.

IPCS/E is a separate program product that is shipped on a separate tape.

Enhancement of the Programmable Operator Facility

The Programmable Operator Facility is designed to help increase the efficiency of system operation and to allow remote operation of systems in a distributed data processing environment.

Changes have been made in VM/SP Release 4 to provide:

- Distributed data processing in an SNA environment
- Control of VM systems by a Network Communication Control Facility (NCCF) operator
- A command that dynamically changes the assignment of the logical operator.

Refer to "Chapter 6. Enhancement of the Programmable Operator Facility" on page 6-1 for additional information.

Enhancement of the System Product Editor

The System Product Editor has numerous new or improved functions. The primary emphasis of this increased support is in the areas of:

- Programmed symbol set support
- Indented text entry in a file via the new SI XEDIT macro
- Improved performance when trying to edit files that are too large for the amount of available free storage
- Mixed-case messages and status information on XEDIT screens
- Control of CP BRKKEY
- Editing and manipulation, on the 5550 Multi Station, of files that contain double-byte character set (DBCSs) strings.

Additional information can be found under "Chapter 7. Enhancement of the System Product Editor" on page 7-1.

Enhancement of User Class Restructure

User class restructure (UCR) provides the capability to extend the privilege-class structure of Control Program (CP) commands within VM/SP Release 4 from 7 classes to 32 classes.

The system administrator assigns classes to commands and diagnose codes and authorizes each user in the directory to access only the classes containing the commands needed by that user. If the administrator uses the IBM-defined privilege class structure, the CP commands and diagnose codes are divided into 7 functional classes, ranging from system operator functions to general user functions; however, with UCR the administrator can choose to divide the commands and codes into as many as 32 different classes. This gives the installation greater flexibility.

UCR is an optional feature; thus, the class assignments are changed only if directed by the system administrator.

The main objectives of UCR are to:

- Better meet the installation's needs by offering more command classes
- Allow the installation to change the class distinctions for commands and diagnose codes if the IBM-defined classes do not meet its needs.

You can find more detailed information about UCR under "Chapter 8. User Class Restructure" on page 8-1.

Enhancement of CMS File Searching

The paging overhead required when CMS is searching for files has been reduced by changing the list of preferred filetypes and by the use of two new tables. For additional information, see "Chapter 9. Enhancement of CMS File Searching" on page 9-1.

Enhancement of the HELP Facility

The HELP facility has been enhanced to make it easier to use and to improve its performance. Among these enhancements are the following that enable users to:

- Display selected portions of the HELP files
- Display CMS and CP commands on a single menu
- Tailor the HELP options to their own needs
- Use command synonyms and abbreviations for components other than CMS.

A new command, HELPCONV, is provided to assist customers in migrating unformatted files from previous releases to the new formatted form.

Other enhancements provide improved performance and displays. For information about all of the enhancements, see "Chapter 10. Enhancement of the HELP Facility" on page 10-1.

Enhancement of the System Product Interpreter

Enhancements to the System Product Interpreter include:

- A new instruction, OPTIONS, that enables the user to use double-byte character set (DBCS) strings in a program

- Two new functions, DIAG(8C) and DIAGRC(8C), that return information about the virtual console.

Additional information about the System Product Interpreter can be found under "Chapter 11. Enhancement of the System Product Interpreter" on page 11-1.

Enhancement of the DASD Dump Restore Program

A new option, COMPACT, of the DASD Dump Restore Program allows the program to store data on tape in a format that requires less space than was previously required. You can find more information about the DDR Program under "Chapter 12. Enhancement of the DASD Dump Restore Program" on page 12-1.

Enhancement of Installation and Service Procedures

Installation and service procedures have been enhanced and new execs have been added. The new execs are:

SNTMAP EXEC to process SNT macro definitions

VMFLKED EXEC to link-edit modules into a loadlib

VMFMERGE EXEC to apply PTFs

VMFZAP EXEC to apply ZAPs.

Some other changes were:

- The Device Support Facilities (DSF) program is now the first file on the Starter System Tape.
- MAINT's 190 minidisk is split into 2 minidisks, the 190 system disk and the 193 base disk.

For more information about these enhancements, refer to "Chapter 13. Enhancement of Installation and Service Procedures" on page 13-1.

Support for the 3480 Magnetic Tape Subsystem

Support for the 3480 Magnetic Tape Subsystem is included in VM/SP Release 4. The 3480 Subsystem stores data on tape cartridges rather than individual reels. It reads and writes 18 tracks at an effective density of 38,000 bytes per inch. The 3480 Subsystem consists of one control unit that is capable of addressing up to eight tape drives or two control units that are capable of addressing up to 16 tape drives. Additional information is presented under "Chapter 14. Support for 3480 Magnetic Tape Subsystem" on page 14-1.

Support for Communications Controllers

VM/SP Release 4 provides support for the 3725 Communications Controller Models 1 and 2. The 3725 is a programmable communications controller. It runs under control of the Advanced Communications Functions for Network Control Program (ACF/NCP) Version 2 or the Emulation Program (EP/3725). It allows attachment of up to 256 lines, thus providing communication with a large range of terminals. For more information, see "Chapter 15. Support for Communications Controllers" on page 15-1.

Summary of Other Additions and Enhancements

This section lists other additions and enhancements provided by VM/SP Release 4.

- Enhancement of Serviceability
  - Enhancement of Control Program initialization and shutdown
  - Enhancement of the CPTRAP function
  - Addition of the stand-alone dump facility
  - Addition of the CP FRET trap
  - Enhancement of the VMDUMP function
  - Enhancement of the PER command.
- Enhancement of the Control Program
  - Addition of Virtual Machine Group support
  - Addition of CP signal system service
  - Enhancement of the Inter-User Communication Vehicle
  - Enforcement of the restriction on mixing shared and nonshared virtual devices
  - Removal of the saved system 8-megabyte limit
  - Removal of the system name table (DMKSNT) 4K-size restriction
  - Addition of DIAGNOSE code X'98'
  - Extension of the prefixed storage area
  - Enhancement of the GENIMAGE Utility Program
  - Enhancement of the DEFINE command
  - Enhancement of the START command
  - Query STATUS command
  - Terminals.

- Enhancement of the Conversational Monitor System
  - Enhancement of the NUCXLOAD command
  - Migration of CMS commands and modules to the CMS nucleus
  - Enhancement of the command search function
  - Support for loading EXECs in storage
  - Enhancement of the EXECIO command
  - Enhancement of the SETPRT command
  - Enhancement of the MACLIB command
  - Addition of the MACLIST command
  - Enhancement of the DEFAULTS command
  - Addition of improved multivolume tape support for OS simulation
  - Establishment of TAPE and VMFPLC2 as nucleus extensions.
- Hardware support
  - 4361 and 4381 Processors
  - 3370 Direct Access Storage Device Models A2 and B2
  - 3800 Printing Subsystems Models 3 and 8 compatibility support
  - 4248 printer.

Chapter 2. Environmental Considerations

This section describes environmental considerations for installing VM/SP Release 4.

Programming Requirements

Group Control System

If VSAM files are not going to be used, the Group Control System (GCS) does not require additional program products other than those required for VM/SP Release 4. If VSAM files are going to be used, GCS requires that the VSE/VSAM Program Product be installed. GCS is designed specifically to support VM/SNA networking program products. If you are going to define a VM/SNA network, these are the products required:

- ACF/VTAM Version 3
- ACF/NCP Version 3
- ACF/SSP Version 3.

ACF/NCP Version 3 and ACF/SSP Version 3 are not required if you are using a communications adapter (CA).

The following products are recommended for systems having a VM/SNA network:

- RSCS Networking Version 2
- NCCF Version 2 (VSE/VSAM Program Product is recommended).

Discussions of the above products follow.

ACF/VTAM Version 3

The Advanced Communications Functions/Virtual Telecommunications Access Method (ACF/VTAM) Version 3 runs under the control of the GCS supervisor, which is a component of VM/SP Release 4. ACF/VTAM allows an installation to participate in an SNA network without the need for a guest DOS/VSE or VS1 operating system.

ACF/NCP Version 3

The Advanced Communications Functions/Network Control Program (ACF/NCP) Version 3 runs in the network control unit and is managed by ACF/VTAM Version 3. This program product performs many of the functions in a network that were formerly handled by an access method. Some of the functions it can handle include control line traffic, delete and insert communication control characters, and start and shut down lines.

ACF/SSP Version 3

The Advanced Communications Functions/System Support Programs (ACF/SSP) Version 3 run under the control of ACF/VTAM Version 3. This program product provides utility functions for 3705 and 3725 Communications Controllers.

RSCS Networking Version 2

The Remote Spooling and Communication Subsystem (RSCS) Networking Version 2 is designed specifically to run under the control of the GCS supervisor for VM/SP Release 4. RSCS Version 2 provides for the receiving and transmission of messages, files, commands, and jobs over a network to and from remote systems, work stations, and printers. RSCS Version 2 can communicate with an SNA network by interacting with ACF/VTAM Version 3 through the GCS.

NCCF Version 2

The Network Communications Control Facility (NCCF) Version 2 runs under the control of ACF/VTAM Version 3 as a VTAM application. This program product assists the operator in managing many routine operator tasks. These include executing commands, restricting network resources, and routing commands and responses to and from remote systems and devices.

Chapter 3. VM/SP Library

This section lists the manuals that make up the VM/SP library and describes changes to the library for Release 4.

The section includes:

- Between-release publications
- Bill-of-forms for easy ordering
- Changes to the library

Between-Release Publications

From time to time, IBM provides new VM/SP support that is announced between releases. Such support may be described in a separate publication for each support item. This publication describes the new support, hardware device, new or changed commands and messages, system generation considerations, and new and changed modules. This means that the publication contains the information that would be contained in several Technical Newsletters (TNLs) if TNLs were published for the support item. This also means that if you are installing two or more new hardware devices, you will have to refer to the publication for each device.

The publication contains only new information, and therefore, is to be used along with the regular library. If your installation has subscribed to the Systems Library Subscription Service via VM/SP program number, you will automatically receive one copy of all of these publications that are issued between releases.

TNLs will continue to be published when they are the best way to describe a new support item.

The online HELP facility is updated on the PUT tape that contains the new support.

Bill-of-Forms Number for Easy Ordering

VM/SP Manuals

For easy ordering, there is one bill-of-forms number, SBOF-3220, that you may use to order the entire set of:

ten binders
one set of labels
29 publications

Or, you may order them separately:

- SX24-5129 - one binder
- SX24-5131 - one set of labels
- Publications:

1. GC19-6200 *VM/SP Introduction*
2. GC19-6206 *VM/SP Terminal Reference*
3. GC19-6207 *VM/SP Library Guide, Glossary, and Master Index*
4. GC19-6212 *Virtual Machine Running Guest Operating Systems*
5. GC20-1838 *VM/SP General Information*
6. SC19-6201 *VM/SP Planning Guide and Reference*
7. SC19-6202 *VM/SP Operator's Guide*
8. SC19-6203 *VM/SP System Programmer's Guide*
9. SC19-6204 *VM/SP System Messages and Codes*
10. SC19-6205 *VM/SP OLTSEP and Error Recording Guide*
11. SC19-6209 *VM/SP CMS Command and Macro Reference*
12. SC19-6210 *VM/SP CMS User's Guide*
13. SC19-6211 *VM/SP CP Command Reference for General Users*
14. SC24-5219 *VM/SP EXEC 2 Reference*
15. SC24-5220 *VM/SP System Product Editor User's Guide*

16. SC24-5221 *VM/SP System Product Editor Command and Macro Reference*
17. SC24-5236 *VM/SP CMS Primer*
18. SC24-5237 *VM/SP Installation Guide*
19. SC24-5238 *VM/SP System Product Interpreter User's Guide*
20. SC24-5239 *VM/SP System Product Interpreter Reference*
21. SC24-5242 *VM/SP CMS Primer for Line-Oriented Terminals*
22. SC24-5247 *VM/SP Application Development Guide*
23. SC24-5248 *VM/SP Release 4 Guide*
24. SC24-5249 *VM/SP Group Control System Guide*
25. SC24-5250 *VM/SP Group Control System Macro Reference*
26. SC24-5256 *VM/SP System Definition Files*
27. SC24-5260 *VM/SP Interactive Problem Control System Guide*
28. SC24-5264 *VM/SP System Messages Cross-Reference*

Reference Summaries

You may order reference summaries by using the bill-of-forms number SBOF-3221. The reference summaries you will receive by ordering via this bill-of-forms number are:

1. SX20-4400 *VM/SP Quick Reference*
2. SX20-4401 *VM/SP Commands (General User) Reference Summary*
3. SX20-4402 *VM/SP Commands (Other than General User) Reference Summary*
4. SX24-5122 *VM/SP SP Editor Command Language Reference Summary*
5. SX24-5124 *VM/SP EXEC 2 Language Reference Summary*
6. SX24-5126 *VM/SP System Product Interpreter Language Reference Summary*
7. SX24-5138 *VM/SP Interactive Problem Control System Reference Summary*

For additional VM/SP library information, including a description of tasks, see the *VM/SP Library Guide, Glossary, and Master Index*, GC19-6207.

Release 4 Items Not Available in a Bill-of-Forms

You may order any of the following with their order numbers:

1. SX24-5123 Editor Program Function Key Template
2. SX24-5139 Publication Storage Box
3. SC24-5241 *Distributed Data Processing Guide*

Changes to the Library

New Manuals

The following new manuals have been added to the VM/SP library for Release 4.

Group Control System Guide, SC24-5249

This manual provides information for VM/SP programmers so they can plan for, administer, and use the Group Control System (GCS). This manual also contains command reference information that operators can use.

Group Control System Macro Reference, SC24-5250

This manual provides detailed reference material that describes the functions and use of all macros supported in the Group Control System.

Interactive Problem Control System Guide, SC24-5260

This manual is intended for the system programmer or the IBM support representative. It is a reference manual for users of the VM/SP Interactive Problem Control System (IPCS). This system standardizes the problem reporting process and provides: online problem management, interactive problem diagnosis, online debugging facilities for disk-resident dumps, and problem tracking facilities that can be updated either by the user or, automatically, by the system. The manual contains IPCS command formats and instructions for their use, along with messages associated with IPCS.

Release 4 Guide, SC24-5248

This manual provides current users of VM/SP Release 3 with a summary of the changes and functional enhancements offered by the new release. It will improve the installation time of Release 4 and improve customer productivity by describing new functional enhancements and defining the related user interfaces. It includes information about migrating from VM/SP Release 3 to VM/SP Release 4 and identifies new and changed modules.

VM/SP System Definition Files, SC24-5256

The *VM/SP System Definition Files* manual contains samples of directories for the following device types: FB-512, 3310, 3330, 3340, 3350, 3370, 3375, and 3380. For each device type, there is a sample of the directory, a directory map, a DMKRIO file, a DMKSYS file, and a DMKSNT file supplied with the product tape.

The manual also contains a VMSRES pack layout for each device-type starter system.

System Messages Cross-Reference, SC24-5264

This manual contains cross-reference information for the messages in the manual, *VM/SP System Messages and Codes*, SC19-6204. The cross-reference information relates messages to the commands that caused them to be issued, lists messages alphamerically by message identifier, relates messages to the module that issued them, and lists the messages in alphameric order by message text. The manual consists of four appendices, one for each of the VM/SP components CMS, CP, GCS, and IPCS. The message prefixes for the four components are DMS, DMK, CSI, and DMM respectively.

Release 3 Manuals

The following two manuals relate to VM/SP Release 3, but descriptions of them do not appear in the *VM/SP Release 3 Guide*, SC24-5240, because they were published after the *VM/SP Release 3 Guide.*

Application Development Guide, SC24-5247

This manual 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) and the Structured Query Language/Data System (SQL/DS).

CMS Primer for Line-Oriented Terminals, SC24-5242

This manual is an interactive tutorial for VM/SP users of line-oriented (line mode) video display terminals. The manual, which is similar in scope and content to the *VM/SP CMS Primer*, SC24-5236, is designed to give the reader a working knowledge of CMS in less than one week. Topics include logging on; editing, managing, and printing files; sending and receiving messages, notes, and files; using the Document Composition Facility (Script) to format files; and writing EXECs.

Enhancements and Changes to Existing Publications

All of the existing manuals in the VM/SP library have been changed as a result of changes required by VM/SP Release 4. The following existing manuals in the library have undergone enhancements and changes other than those required by changes to VM/SP:

- *VM/SP CMS Primer*, SC24-5236: A new chapter on creating and running programs has been added. It describes how to create a program file and how to compile and run programs under CMS.

- *VM/SP CMS Command and Macro Reference*, SC19-6209: Additional examples illustrating common uses of CMS commands have been added.

- *VM/SP OLTSEP and Error Recording Guide*, SC19-6205: Information about the Environmental Recording and Editing Program (EREP) and the CPEREP Program has been removed from the *VM/SP OLTSEP and Error Recording Guide* and is now contained in the *EREP User's Guide and Reference*, GC28-1378.

- *VM/SP Installation Guide*, SC24-5237: This manual has been completely rewritten. It includes descriptions for installing and servicing CMS, CP, GCS, and IPCS. The sample directories for the various types of DASDs have been removed and are now contained in the *VM/SP System Definition Files*, SC24-5256.

- *VM/SP Planning Guide and Reference*, SC19-6201: A chapter describing User Class Restructure has been added to this manual.

- *VM/SP System Product Interpreter Reference*, SC24-5239: An appendix explaining the differences between the System Product Interpreter operating in the CMS environment and in the GCS environment has been added to this manual.

- *VM/SP System Messages and Codes*, SC19-6204: The cross-reference information that appeared in the appendices to this manual is now contained in the *VM/SP System Messages Cross-Reference*, SC24-5264.

Part Two: New Facilities and Enhancements

This part of the manual describes the functional changes introduced in Release 4.

The subjects described are:

- Group Control System
- Interactive Problem Control System
- Programmable Operator Facility
- System Product Editor
- User Class Restructure
- CMS File Searching
- HELP facility
- System Product Interpreter
- DASD Dump Restore Program
- Installation and Service Procedures
- 3480 Magnetic Tape Subsystem
- Communications Controllers
- Virtual Storage Extended guest environments
- Enhancement of serviceability
- Enhancement of the Control Program
- Enhancement of the Conversational Monitor System
- Hardware support.

Chapter 4. Addition of the Group Control System

The **Group Control System (GCS)** is a virtual machine supervisor that is used to manage subsystem environments made up of program products that support an SNA network.

GCS is a virtual machine supervisor that is part of VM/SP Release 4. An installation has the option of installing it during system generation. If you plan to install GCS, you will need an additional pack. Its purpose is to manage subsystems and programs that support an SNA network.

The GCS supervisor runs in a virtual machine. It is initialized using the IPL command. The GCS supervisor provides facilities that are suited for managing subsystems and other applications.

These facilities include:

- Multiple-Task Management: The GCS supervisor is capable of managing the concurrent execution of multiple tasks for a virtual machine. This permits a task that is waiting for an event to finish (such as an input or output operation) to relinquish control to another task that is ready to run. Control is passed from task to task on a priority basis.

- Virtual Machine Group Support: A Virtual Machine Group is a group of virtual machines running under the same GCS supervisor. Although each virtual machine in a group can run a different application, they all share common supervisor and subsystem services, and common read/write storage areas.

- Common Storage Facility: All virtual machines in a Virtual Machine Group have access to read/write common storage. Group members use the common read/write storage area to pass information to other members of the group. In addition, an installation can create read/only shared segments containing code, which can be shared by members of the group.

GCS Support for The System Product Interpreter

The Group Control System supports the System Product Interpreter, which processes the Restructured Extended Executor (REXX) Language. Most capabilities of the REXX language that are available in CMS are also available in GCS. However, there are some differences. For more information, see the *VM/SP System Product Interpreter Reference*, SC24-5239.

Chapter 5. Addition of the Interactive Problem Control System

---

The **VM/SP Interactive Problem Control System** is an interactive, online facility that diagnoses and reports software failures and manages problem information and status.

The functions of the VM/Interactive Problem Control System Extension (IPCS/E) Program Product 5748-SA1, plus enhancements have been added as a component of VM/SP. This means the user need not order the IPCS/E Program Product. The new Interactive Problem Control System (IPCS) component provides VM/SP users with an interactive, online facility for diagnosing and reporting software failures and for managing problem information and status. IPCS is intended for use by system programmers to help them reduce the time, effort, and expense required to resolve software problems and to improve communications between the user and the IBM Support Center.

IPCS can perform these functions for CP abend dumps; CMS, PVM, RSCS, stand-alone, and GCS dumps; and any dump created by the VMDUMP command or DIAGNOSE code X'94'. By using the VMDUMP command, the operator of a guest virtual machine can make a dump of any user-detected software problem available to IPCS.

A new manual, the *Interactive Problem Control System Guide*, SC24-5260, has been added to the VM/SP library to aid the system programmer in using IPCS.

Major Functions of IPCS

The major functions of IPCS are problem diagnosis, problem reporting, and problem and data management.

Problem Diagnosis

The problem diagnosis function allows the user to interactively view disk-resident problem data (that is, CP, CMS, PVM, RSCS, stand-alone, and GCS abend dumps; and any dump created by the VMDUMP command or DIAGNOSE code X'94').

This function allows the user or problem service representative (PSR) to interactively diagnose a dump-related problem from any VM/SP supported terminal without the need for hard-copy problem data.

Problem Reporting

The problem reporting function standardizes the problem reporting process, identifies duplicate problems on the system, and should quickly identify similar problems previously experienced.

Duplicate problem recognition should:

- Reduce the amount and expense of unnecessary hard-copy documentation
- Allow faster identification of available fixes that can be applied to the system.

Problem and Data Management

The problem and data management function allows the user to:

- Update the individual disk-resident problem reports and summary status
- Display and print problem reports and status reports
- Print a hard-copy Authorized Program Analysis Report (APAR) and move problem data to tape for later submission to IBM.

This function allows the user or PSR to track and manage problems from occurrence through resolution.

Support for Symptom Records

VM/SP has been enhanced to support symptom records. This support is equivalent to, and compatible with, the symptom record support in the IPCS/E Program Product.

Symptom record support aids in program problem determination and problem source identification. Symptom record information is useful for communicating problems to the IBM support center. You can find more information about IPCS and symptom records in the *VM/SP Interactive Problem Control System Guide*, SC24-5260.

HELP Screens

The CMS HELP function supports HELP screens for the VM/SP Interactive Problem Control System (IPCS) commands. The user can get complete descriptions of each command by invoking the HELP screens, which are duplicated from the *VM/SP Interactive Problem Control System Guide*, SC24-5260.

Chapter 6. Enhancement of the Programmable Operator Facility

Enhancements to the **Programmable Operator Facility** have provided the following:

- The use of distributed data processing in an SNA environment
- The capability for a Network Communication Control Facility (NCCF) operator to be identified to the Programmable Operator Facility. This allows any messages intended for the logical operator to be routed to that NCCF operator.
- The capability for an NCCF operator to issue Programmable Operator Facility commands and receive responses
- A command that dynamically changes the assignment of the logical operator.

The Programmable Operator Facility is designed to increase the efficiency of system operation and to allow remote operation for systems in a distributed data processing environment. It intercepts all messages/requests directed to its virtual machine and handles them according to preprogrammed actions. It determines whether a message is to be recorded for future reference, and whether the message is to be acted upon or sent on to the logical operator to handle.

To ensure that the Programmable Operator Facility will function properly, a user (other than the Programmable Operator Facility virtual machine on the local system or in the distributed system) is identified to the Programmable Operator Facility to receive messages. This user is called the logical operator, as opposed to the CP system operator. This logical operator may be in the same system as the Programmable Operator Facility, in a separate system (which may be called the HOST system), or at an NCCF operator station.

Running the Programmable Operator Facility from NCCF

One enhancement to the Programmable Operator Facility allows it to be controlled by an NCCF operator, thus giving this operator control over mixed VM, OS/VS, and VSE distributed systems and host systems.

The NCCF Logical Operator

To run a VM system from NCCF, an NCCF operator must be assigned as the logical operator of the Programmable Operator Facility in that particular system. This operator is the NCCF logical operator. The routing table should specify which NCCF operators may be assigned as logical operators. The network installation through NCCF and VTAM defines where such NCCF operators may be logged on. This is independent of the Programmable Operator Facility.

The Programmable Operator/NCCF Message Exchange

The Programmable Operator/NCCF Message Exchange (PMX) serves as a pipeline to transfer Programmable Operator Facility commands from NCCF to the Programmable Operator Facility virtual machine and to transfer routed messages and Programmable Operator Facility responses to NCCF. The PMX executes in a VM/SP Group Control System (GCS) virtual machine with NCCF thus making GCS a requirement for Programmable Operator Facility and NCCF communication.

PMX uses the Inter-User Communication Vehicle (IUCV) to communicate with the Programmable Operator Facility. PMX also uses an NCCF command processor and the NCCF DSIMQS macro to communicate with the NCCF logical operator and an NCCF exit routine, DSIEX15, to handle some aspects of NCCF operator termination. For more information on NCCF, see the appropriate NCCF publications starting with *Network Communications Control Facility General Information*, GC27-0429. For more information on GCS, see the *VM/SP Group Control System Guide*, SC24-5249.

Using the LGLOPR Command

The LGLOPR command provides three options for assigning and releasing logical operators. These options (ASN, RLS, and RPL) allow the role of logical operator to be passed back and forth between VM users and/or NCCF operators. Authorization for operators to use the LGLOPR command is made by an entry for "/LGLOPR /" in the routing table to be used. Specify DMSPOR as the action routine, and LGLOPR as the parameter to DMSPOR. The format of the LGLOPR command is found in the *VM/SP Operator's Guide*, SC19-6202.

Additional information about the Programmable Operator Facility is presented in the *VM/SP System Programmer's Guide*, SC19-6203.

Chapter 7. Enhancement of the System Product Editor

Enhancements to the **System Product Editor** include:

- Programmed symbol sets
- SI XEDIT Macro
- Improved performance of XEDIT
- Improved appearance of XEDIT screens
- SET BRKKEY subcommand
- XEDIT command
- Changed filetype defaults for IBM basic
- Double-byte character set usage.

Programmed Symbol Sets

Certain 3270 terminals having a feature known as "programmed symbols," or PS, allow you to define a character set to be used by the terminal. You can use the SET COLOR subcommand to associate a specific character set with certain areas of the XEDIT screen.

The new format of the SET COLOR subcommand is:

```
[SET] COLOR field [color] [exthi] [High|Nohigh] [PSs]
       *
```

where:

PSs indicates the character set to be used. You must specify PS followed by a character (A through F or 0).

To make a different character set available for use by the terminal, the Graphic Data Display Manager (GDDM) Program Product (5748-XXH) or an application that can load a programmed symbol set must be used.

Although any valid operands are accepted by the SET COLOR subcommand, the result depends on the features available on your terminal.

The current setting of the SET COLOR subcommand can be displayed by the QUERY COLOR subcommand and returned to a macro by the EXTRACT subcommand. The SET RESERVED and SET CTLCHAR subcommands are also enhanced to allow you to specify character sets for reserved lines and parts of a reserved line.

SI XEDIT Macro

The SI (structured input) XEDIT macro makes it easy for you to add indented text into a file. The SI macro can be issued from the command line, assigned to a PF key, or entered in the prefix area.

When SI is issued from a PF key (or from the command line), a new line is added following the line that contains the cursor. Otherwise, if you type SI in the prefix area and press the ENTER key, a blank line is added immediately following the line where SI was specified.

The cursor is positioned on the new line at the same column where the text on the previous line begins. The notice '.....' will appear in the prefix area of the newly added line and in the status area to indicate that SI is pending. You can continue to add lines and position the cursor by typing on the new line and pressing the ENTER key. SI continues to be pending until you enter a null line. The following is an example of using the SI prefix macro.

Type the characters "SI" in the prefix area.

```
===== Chocolate-Nut Cookie Ingredients
=====
=====      1/2    Pound butter
=SI==      1 1/2  Cups graham cracker crumbs
=====      3 1/2  Ounces coconut flakes
=====      2      Ounces chopped nuts
```

Pressing the ENTER key results in:

```
===== Chocolate-Nut Cookie Ingredients
=====
=====       1/2    Pound butter
=====       1 1/2  Cups graham cracker crumbs
.....
=====       3 1/2  Ounces coconut flakes
=====       2      Ounces chopped nuts
```

Another new line is added each time that you type on the new line and press the ENTER key.

Improved Performance of XEDIT

The performance of XEDIT has been improved when you try to edit a file that is too large for the amount of available free storage. The amount of free storage available for a file is calculated before the file is read in. If sufficient storage is available, the file is read in as usual. If there is not enough storage available, you will receive a message that tells you that the file is too large.

Improved Appearance of XEDIT Screens

The appearance of XEDIT screens has been improved by the addition of mixed-case message support. XEDIT now issues messages in mixed case.

SET BRKKEY Subcommand

The SET BRKKEY subcommand allows you to specify whether the system drops into CP mode when the terminal BRKKEY (defined by CP TERMINAL BRKKEY command) is pressed.

The format of the SET BRKKEY subcommand is:

```
[SET] BRKKey ON          OFF
```

where:

ON indicates that pressing the key defined as the BRKKEY causes a control break-in by CP. This is the initial setting.

OFF indicates that no control break-in is desired and that XEDIT can use the definition of the key that was depressed. You can then use this key in XEDIT as it has been defined by the SET PF/PA subcommand.

XEDIT Command

The XEDIT command has been enhanced to support the MEMBER option. This option indicates that the fileid specified on the XEDIT command is a macro library (maclib) and that only the specific member is to be brought into storage to be edited. You can use this option from the MACLIST screen, or you can call directly to edit a member of a macro library. Refer to "Addition of the MACLIST Command" on page 19-5 for information on the MACLIST screen. Refer to the *VM/SP System Product Editor Command and Macro Reference*, SC24-5221, for more information on the XEDIT command and the MEMBER option.

Changed Filetype Defaults for IBM BASIC

Default values have been changed as follows in the System Product Editor for BASDATA and BASIC filetypes:

```
FILETYPE   SERIAL TRUNC  LRECL  RECFM  VERIFY  ESCAPE  CASE  SPILL  IMAGE

BASDATA      OFF   255    255     V       T       /      M     OFF    ON
BASIC        OFF   156    156     V       T       /      M     OFF    ON
```

The default tab settings for these two filetypes have also been changed.

Double-Byte Character Set Usage

Many languages have more characters than can be displayed using one-byte codes (KANJI, for example). A double-byte character set (DBCS) is used to represent these characters, which may appear in a sentence with characters from other languages that are displayed in one-byte codes. ETMODE is a new option of the SET subcommand added for this support.

SET ETMODE Subcommand

In XEDIT, you are able to specify that XEDIT should recognize DBCS strings by issuing: "SET ETMODE ON".

The format of the SET ETMODE subcommand is:

```
[SET] ETMODE  ON|OFF
```

where:

OFF specifies that all data should be treated as one-byte EBCDIC data (in the same manner that XEDIT currently treats data). The initial setting is OFF.

ON specifies that XEDIT will recognize and manipulate DBCS strings that begin with a shift-out character and end with a shift-in character.

In this Extended Mode, XEDIT scans for shift-out and shift-in characters and performs DBCS string validation.

The current setting of ETMODE can be displayed by QUERY, MODIFY, and STATUS subcommands and returned (to a macro) by the EXTRACT subcommand.

SET ETARBCH Subcommand

The ETARBCH option of the SET subcommand allows you to define an extended arbitrary character within a DBCS string. An extended arbitrary character used between two character strings in a target definition means "all intervening characters are to be ignored when searching for a match in the file."

The format of the SET ETARBCH subcommand is:

```
[SET] ETARBCH   ON|OFF [char]
```

where:

ON turns on the use of a double-byte special character as an extended arbitrary character.

char specifies the character to be used as the extended arbitrary character. The initial setting is a double-byte monetary symbol (X'415B').

OFF turns off the use of a special character as an extended arbitrary character without changing the current character definition. The initial setting is OFF.

The current ETARBCH setting can be displayed by QUERY and MODIFY subcommands and returned (to a macro) by the EXTRACT subcommand. Issuing the PRESERVE subcommand will save the ETARBCH setting until a subsequent RESTORE subcommand is issued.

Refer to the *VM/SP System Product Editor Command and Macro Reference*, SC24-5221 for complete information on using DBCSs in XEDIT.

Chapter 8. User Class Restructure

User Class Restructure (UCR) provides the capability to extend the privilege-class structure of CP commands within VM/SP Release 4 from 7 classes to 32 classes.

UCR allows an installation to tailor the CP command classes to suit its needs. The system administrator assigns classes to commands and diagnose codes and authorizes each user in the directory to access only the classes containing the commands and diagnose codes needed by that user. By carefully defining the class structure and assigning the classes to the users, the system administrator tightly controls the functions that can be used by each user.

Each user is thus authorized to use from 1 to 32 different command classes. To assign the classes to the users, the system administrator uses the USER control statement and, optionally, the CLASS control statement.

UCR is an optional feature. If an installation chooses not to use UCR, the file containing the directory control statements is not changed and is, therefore, compatible with prior VM/SP releases.

The security of the installation may be increased as a result of the new command classes. By carefully managing the class structure, the system administrator can control access to CP commands and diagnose codes. Thus, a user cannot gain access to functions beyond his authorized need.

The IBM-defined privilege classes for commands and diagnose codes are divided into seven functional groups based on general levels of access: system operator functions, resource functions, programmer functions, spooling functions, analyst functions, support functions, and general user functions. The IBM-defined class structure assigns a single class to each functional group; thus anyone having access to that class has access to all the commands within that group.

UCR does not alter the seven functional classes but adds flexibility by allowing an installation to group and regroup the commands within these functions to create more classes. The installation can take the commands of one function and divide them into several classes (for example, classes 1, 2, and 3 could each define commands that are analyst functions), or take commands from several functions and combine them into one class. The

new classes thus range from mere subsets of one functional group to cross-sections of many functional groups and are uniquely created to suit the installation. Up to 32 unique command classes can be created.

Changing the IBM-Defined Privilege Classes

To override the IBM-defined command and diagnose-code classes, the system administrator or other authorized person must do the following in the order listed:

1. Create the class-override file. The OVRD area on the CP-owned volume holds this file. The area must be allocated by a system programmer prior to this step. To create the file, the system administrator enters (1) the DESTINATION control statement to identify the CP-owned volume, and (2) one OVERRIDE control statement for each command or diagnose code to be overridden.

2. Invoke the OVERRIDE program to process the class-override file. To convert the class-override file from external statements to internal format, the system administrator invokes the OVERRIDE program without any options. To return to the IBM-defined classes, the system administrator invokes the OVERRIDE program with the FREE option. To simply check the syntax of the file, the administrator invokes the OVERRIDE program with the EDIT option.

3. Update the directory to assign new classes to users.

4. Activate the class overrides by re-initializating the system.

5. Update the HELP files to match any changes in classes for general user commands. That is, if Class G instructions are removed or inserted, they should likewise be removed from or inserted into the HELP files.

Responsibilities of the Installation

The installation has the responsibility to:

- Redefine the class structure if the existing classes do not meet its needs
- Take care when redefining the class structure; the installation has the ability to over-limit or over-extend user access to commands.
- Update the HELP files if there are any changes to the classes for general user commands.
- Update application programs that reference the VMCLEVEL field. See "User Class Restructure" on page 22-3 for more information.

New Commands and Macros

The following UCR commands and macros are new in Release 4:

- The COMMANDS command displays the commands and diagnose codes to which the user has access
- The OVERRIDE command converts an external class-override file to an internal format or restores the IBM-defined class structure.
- The COMMD macro, which replaces the COMND macro, creates the internal CP command tables required to validate user access to a command. When a user issues a command, CP references this table to see if the command class of the user matches the command class of the command. If they match, the user is authorized to use the command. This macro expands the table to hold all 32 classes.
- The SYSFCN macro describes the user classes, either IBM-defined or installation-defined, which are authorized to use internal CP functions. This macro is used by the installation to change the existing classes.

Advantages of UCR

UCR provides greater control of the system by permitting the system administrator to strictly authorize the commands and diagnose codes to be used by each user.

For more detailed information about UCR, refer to the *VM/SP System Programmer's Guide*, SC19-6203.

Chapter 9. Enhancement of CMS File Searching

When you access a read-only disk, a hyperblock map table (HYPMAP) is built by the system. When you access a read/write disk, a hash table (HASHTAB) is built. These two tables decrease the paging overhead when the system is searching for files.

Hyperblock Map Table

The hyperblock map table is an indexing table that, when used, can speed the search for files on sorted read/only disks. It contains a header and a variable number of entries, depending on the number of pages of hyperblocks/file status tables (hyperblocks/FSTs) associated with the disk. Each entry contains (1) a pointer to the first hyperblock/FST in the page mapped by the entry and (2) the filename/filetype of the last file in the page mapped by the entry. When the system searches for a file on a sorted read/only disk, the page(s) of hyperblocks/FSTs that will contain the desired FST can be directly found by first scanning the table, thus saving the additional paging that would otherwise be required.

Hash Table

The hash table is used to speed the search for files on read/write disks. Since read/write disks do not remain sorted, a different technique than use of the hyperblock map is required to find the hyperblock that will contain the desired FST. A hashing mechanism is used to build and maintain this table and is also used when searching for a file on a read/write disk. The hashing mechanism operates on the filename/filetype of the requested file, yielding a displacement into the hash table, which through a series of pointers and checks will result in the address of the hyperblock(s) that will contain the desired FST. The number of entries in the hash table will vary with the number of files on the associated disk. The use of this technique saves the paging that would otherwise be required when searching for a file.

The hyperblock map table is not built if the hyperblocks that are searched do not span three or more pages, and the hashing table is not built if the hyperblocks that are searched do not span two or more pages.

The paging overhead required when the system is searching for files has been further reduced by changing the list of preferred filetypes. The new list of preferred filetypes is as follows:

- EXEC
- MODULE
- CMSUT1
- AUTOSAVE
- XEDTEMP
- XEDIT
- SYSUT1
- TEXT

For additional information about these two tables see the *VM/SP Data Areas and Control Block Logic Volume 2 (CMS)*, LY24-5221.

Chapter 10. Enhancement of the HELP Facility

Enhancements to the HELP facility include the following:

- Formatted files
- Display options
- Uniting of CMS and CP commands
- Enhancement of the DEFAULTS command
- Extended abbreviation support
- Addition of task-oriented menus
- Enhanced message search order
- Enhancement of performance for line-mode terminals
- Enhanced XEDIT HELP search order
- HELPCONV command.

Formatted Files

In VM/SP Release 4, the HELP files will be shipped in a formatted form rather than the unformatted form that was used in previous releases. The formatted files will contain .cs control words (Document Composition Facility conditional section control words) inserted in the proper places to allow selective use of the content of the files. The use of formatted files will remove restrictions on how the information in the files may be formatted. Customers may now use whatever methods they find most convenient to create HELP files. These methods may include the Document Composition Facility (Script), Generalized Markup Language (GML), etc. The use of the .cm (comment) control word and the new .mt (format) control word will also be supported to aid in using the formatted files.

Display Options

Three new options have been added to the HELP facility to enable the user to select for display only that portion of the HELP file needed. The options and their uses are:

Option	Displays
OPTIONS	Specified HELP file starting with option descriptions
NOTES	Specified HELP file starting with user's notes
ERRORS	Specified HELP file starting with error messages.

As an example of the use of these options, the command

```
HELP COPYFILE (NOTES
```

will display only the user's notes section of the HELP file for the COPYFILE command.

Uniting of CMS and CP Commands

CMS and CP commands are now grouped together on one menu that is displayed by entering:

```
HELP COMMANDS
```

The commands may also be displayed on separate menus by entering HELP CMS to display information about the CMS commands and HELP CP to display information about the CP commands. For those commands that conflict, the CMS HELP file will be displayed. It will contain notes referring the user to the proper CP commands for more information.

The user no longer needs to know whether a command is a CMS or CP command to get help for it.

Enhancement of the DEFAULTS Command

The DEFAULTS command has been enhanced to allow users to tailor the HELP options to their own needs. The format of the DEFAULTS command for HELP use is:

```
DEFAULTS SET HELP options
```

Extended Abbreviation Support

Abbreviation processing is extended to other components besides CMS; for example, CP and XEDIT. This is achieved by using a file called HELPABBR that contains a list of command synonyms and abbreviations. This extended support will allow users to create abbreviation files for their own HELP support.

Addition of Task-Oriented Menus

New task-oriented menus guide a user to the HELP facilities. These menus provide descriptions of tasks to be performed rather than lists of commands. They will point to submenus or to a command file.

Enhanced Message Search Order

Prior to Release 4, help for user's messages had to be requested using the message ID without the module identifier; for example, HELP DMS250W. This enhancement will allow specification of the HELP command with the full message identifier; for example, HELP DMSHEL250W.

Enhancement of Performance for Line-Mode Terminals

The following enhancements have been made to improve the performance of line-mode terminals when the HELP facility is being used:

- Invoking of XEDIT and the EXEC processor will be bypassed by the HELP module. Instead, the HELP file will become a direct output of the HELP module.
- Multiple blank lines have been replaced by a single blank line to speed the display.
- Prompting for line-mode terminals has been replaced by generalized CP scrolling support.

Enhanced XEDIT HELP Search Order

The HELP facility will resolve abbreviations and special characters for XEDIT subcommands. The XEDIT HELP subcommand will take advantage of this support.

HELPCONV Command

HELP files for VM/SP Release 4 will be shipped in a formatted form rather than the unformatted form that was previously used. A new command, HELPCONV, is provided to assist customers in migrating unformatted files from previous releases to the new formatted form.

Miscellaneous

The HELP screen header now includes the size of the file and the user's location in the file.

The last PF key used is highlighted on the menu so the user is aware of the last action taken.

Sections of the HELP file may be highlighted on the screen by using control characters.

The HELP disk will not interfere with a user's HELP files as it is accessed at the last available mode.

Chapter 11. Enhancement of the System Product Interpreter

Enhancements to the **System Product Interpreter** are:

- OPTIONS instruction
- DIAG(8C) and DIAGRC(8C) functions
- GCS Support for the System Product Interpreter.

OPTIONS Instruction

The new instruction, OPTIONS, allows you to specify whether you want to use double-byte character set (DBCS) strings in a program. The format of the OPTIONS instruction is:

```
OPTIONS [expression]
```

If one of the words in 'expression' is ETMODE, then literal strings containing DBCS characters may be used in the program. If one of the words is NOETMODE, then DBCS strings may not be used in the program.

For more information, see the *VM/SP System Product Interpreter Reference*, SC24-5239.

DIAG(8C) and DIAGRC(8C) Functions

Two new functions, DIAG(8C) and DIAGRC(8C), have been added to the RXSYSFN external function package. These functions return information about the virtual console.

For more information, see the *VM/SP System Product Interpreter Reference*, SC24-5239.

GCS Support for The System Product Interpreter

The Group Control System supports the System Product Interpreter, which processes the Restructured Extended Executor (REXX) Language. Most capabilities of the REXX language that are available in CMS are also available in GCS. However, there are some differences. For more information, see the *VM/SP System Product Interpreter Reference*, SC24-5239.

Chapter 12. Enhancement of the DASD Dump Restore Program

The **DASD Dump Restore Program** now stores data on tape in a format that requires less space than was previously needed.

The DASD Dump Restore (DDR) Program now gives you the option to store data on tape in a compact format. DDR stores data in compact format by compressing strings of duplicate data into a smaller amount of space and reducing the amount of space necessary to represent the characters in the data. Data stored in the compact format takes up less tape space than data stored in the standard, noncompact format. All equipment that is currently supported by DDR using the standard format is also supported using the compact format.

Using the Compact Format

The DDR Program performs five tasks. Each task and how it is affected by the COMPACT option of the DDR Program are explained here.

Dump Task

DDR dumps data from a direct access storage device (DASD) to tape. The data may be put onto tape in the compact format. To make this happen, you specify an option on the OUTPUT control statement. After the data has been dumped to a tape, if you specified the COMPACT option, you will receive messages telling you the number of bytes processed and the number of tracks and blocks ***not*** put in compact format.

Restore Task

DDR transfers data from tape to a DASD. The input tape may be in standard or compact format. You need not specify anything to the program about the format of the input tape. DDR checks to see which format the tape is in and expands the data back to standard format if needed. (Data is never stored in compact format on a DASD.) After data has been transferred, you will receive a message telling you how many bytes of data were restored.

Copy Task

DDR copies data from one device to another device of the same type. When data is copied from one DASD to another DASD, the format is never compact. When data is copied from tape to tape, the format stays the same. The output tape will be in the compact format only if the input tape was also in compact format. You may not specify anything to the program about tape format when specifying the copy task. You will receive a system message telling you the COMPACT option is ignored if you try to specify the COMPACT option.

Print Task

DDR prints data stored on tape or DASD. Data stored on tape may be in either standard or compact format. The printed output is not affected by the input format. You need not specify anything to the program about the format of an input tape when specifying the print task.

Type Task

Data stored on tape or a DASD is displayed by DDR on a terminal. Again, data stored on tape may be in either standard or compact format, and the displayed output is not affected by the input format. You need not specify anything to the program about the format of an input tape when specifying the type task.

Restriction

The 8809 tape drive cannot operate efficiently in streaming mode while DDR is processing data in the compact format.

Chapter 13. Enhancement of Installation and Service Procedures

Enhancement of the Device Support Facilities

The Device Support Facilities (DSF) program is now the first file on the Starter System Tape. This program is a stand-alone utility that you can use to help solve problems that may be associated with the DASD on your system.

New EXEC Procedures

Addition of the SNTMAP EXEC: The SNTMAP EXEC processes SNT macro definitions from a DMKSNT ASSEMBLE file and produces two CMS files.

- DASD SNTMAP, which is a list of the DCSS names and DASD allocations for each pack that has DCSS resources defined.
- MEMORY SNTMAP, which is a list of DCSS names and segment allocations arranged in order by memory location.

Addition of the VMFLKED EXEC: The VMFLKED EXEC invokes the CMS LKED command to link-edit modules into a loadlib. VMFLKED gives you the option of:

- Link editing only the modules that include module-name
- Getting a printout of the link edit output.

New Service EXEC Procedures

The service execs mentioned below require certain files and tables to process correctly. Refer to the *VM/SP Installation Guide* for a description of these files and tables.

Addition of the VMFMERGE EXEC: The VMFMERGE EXEC processes PTFs, letting you specify or exclude specific lists of service control files. You can issue VMFMERGE to process a single PTF, a list of PTFs, or all PTFs contained on the input disk for a product. It also checks for prerequisite and corequisite PTFs that require processing.

Addition of the VMFZAP EXEC: The VMFZAP EXEC applies ZAPs and maintains a record of them in a ZAP log. VMFZAP builds a list of TEXT file names with ZAPs applied to them, erases these TEXT files from the ZAP disk, and applies ZAPs to the first version of the TEXT file found among the other disks.

Enhancement of the MAINT Minidisk

MAINT's 190 minidisk is now split into MAINT's 190 system disk and MAINT's 193 base disk. You will use the MAINT 193 minidisk for system maintenance and generation.

Chapter 14. Support for 3480 Magnetic Tape Subsystem

The 3480 Magnetic Tape Subsystem is a new, nonshared type of tape subsystem that uses tape cartridges rather than the reels used by current tape subsystems such as the 3420 Magnetic Tape Subsystem. The 3480 Subsystem consists of one control unit that is capable of addressing up to eight tape drives or two control units that are capable of addressing up to 16 tape drives. In the two-control-unit configuration, each of the control units can address all 16 tape drives.

The 3480 Subsystem attaches to system processors through System/370 I/O interface block multiplexer channels and the high-speed data streaming channels.

The 3480 Subsystem reads and writes 18 tracks on a magnetic tape at an effective density of approximately 38,000 bytes per inch. Data to be written on tape may be transferred to the 3480 Subsystem in either of two modes: Buffered Write Mode or Tape Write Immediate Mode.

In Buffered Write Mode, data is transferred to a data buffer in the 3480 Control Unit. When the data transfer has been completed successfully, a "complete" signal is issued and the processor and control unit are disconnected from each other. The control unit then physically writes the data on the tape and performs error checking and error recovery operations if needed.

In Tape Write Immediate Mode, the data is physically written on the tape and read-back checked (verified) by the microprogram in the 3480 Control Unit while the processor is connected to the control unit. The "complete" signal is issued after the data is actually on the tape. Tape Write Immediate Mode is provided, at a severe performance degradation, for nonrestartable write operations.

Writing to a 3480 is performed in Buffered Write Mode for the CP functions of spool-to-tape (SPTAPE), monitor recording, and system dump recording. The DASD Dump Restore Program also writes to a 3480 in Buffered Write Mode.

Support for the 3480 Magnetic Tape Subsystem is provided in both the CP and CMS components of VM/SP. This support is compatible with the support for the 3420 Magnetic Tape Subsystem.

Copying data between shared (e.g., 3420) and non-shared (e.g., 3480) tape subsystems requires two virtual control units. See "Moving Data Between

Shared and Non-Shared Tape Subsystems" on page 22-6, for an example of commands that accomplish this task.

CP allows attachment of a 3480 to a virtual machine for its use. System functions, for example, spool-to-tape, DASD dump/restore, and system dump recording, are supported. A 3480 can be attached to a guest machine for its use provided the guest operating system contains 3480 support and does not use certain 3480 functions such as set path group ID or assign/unassign.

MVS guest use of a 3480 device is possible if the MVS system generates the device in 3420 Compatibility Mode.

VM/SP supports the 3480 Tape Subsystem in the following areas:

- System generation (system macro definition)
- I/O management

  The 3480 Subsystem can be attached to a virtual machine for guest use.
- Utilities

  DASD Dump Restore (DDR)

  VMFPLC2 command
- Error recovery (Read-opposite error recovery is not supported.)
- System functions:

CP	CMS
MONITOR command	FILEDEF command
SPTAPE command	MOVEFILE command
System dump recording	RDTAPE macro
	TAPE command
	TAPECTL macro
	TAPEMAC command
	TAPESL macro
	TAPPDS command
	WRTAPE macro

The CMS MOVEFILE command currently gives a return code of 24 for error message DMSMVE002E (FILE 'fn ft fm' NOT FOUND), although the documentation states that a return code 28 is given. MOVEFILE has been corrected to issue a return code of 28.

For additional information on operating the 3480 Magnetic Tape Subsystem under VM, see the entry entitled "3480 Magnetic Tape Subsystem Support" in the *VM/SP Operator's Guide*.

Chapter 15. Support for Communications Controllers

VM/SP:

- Supports the 3704, 3705, and 3725 communication controllers.
- Provides loading and dumping facilities for the 3704 and 3705 communication controllers. VM/SP only loads an EP (Emulator Program) program number 5744-AN1. VM/SP does not load or dump a 3725 communication controller. VM/VTAM and ACF/NCP-SSP are available to load, dump, and generate control programs (NCP, EP, and PEP) for 3705 and 3725 communications controllers.
- Supports and controls only the EP lines in a 37XX. VM/SP does not support or control NCP lines. VM/VTAM and ACF/NCP provides support in the VM environment for 3705 and 3725 communication controllers with NCP lines.
- Supports the sharing of a 3705 or 3725 communication controller between/among multiple processors. Each operating system uses its own set of unique communication line addresses.

Note: If the 3705 was loaded by VM with the AUTOMATIC LOAD facility on and the system goes down, on restart, VM will reload the 3705 which wipes out the lines for the other processor.

Publications used with 3704, 3705, and 3725 Communication Controllers are:

1. *ACF/NCP-SSP, V3 Installation and Resource Definition Guide* (explains how to generate and load the NCP), SC30-3253.
2. *EP/3725 Installation and Resource Definition Guide and Reference*, SC30-3172.
3. *EP/3705 Generation and Utilities Guide and Reference*, GC30-3242.
4. *ACF/NCP V4, ACF/SSP V3 Diagnosis Guide* (explains how to dump the contents of the 37X5, how to run ACF/TAP and CRP), SC30-3255.

Support for 3725 Communications Controller Models 1 and 2

The 3725 Communications Controller is a new modular, programmable communications controller that runs under control of the Advanced Communications Functions for Network Control Program (ACF/NCP) Version 2, or Emulation Program (EP/3725). ACF/NCP communicates with an SNA access method located in one or more host processors (for example, IBM System/370, or IBM 3030, 3081, or 4300 Processors). The 3725 can be channel-attached or link-attached through another 3725 or IBM 3705 Communications Controller. The 3725 can be link-attached to a 4331 Processor with the integrated communications adapter (ICA). This capability allows network growth by permitting combinations of 3725 and other communications controllers in a network environment.

The 3725 allows attachment of up to 256 lines. The lines can be either half duplex or full duplex, using either synchronous or asynchronous protocols, at line speeds from 50 to 256,000 bits per second (bps). Thus, the 3725 provides communication with a large range of terminals. The total number of lines that may be attached depends on the line speed and protocols, message lengths, and other factors.

The line interface couplers provide great flexibility. A single type of line interface coupler (LIC1) can handle Synchronous Data Link Control (SDLC) or Binary Synchronous Communication (BSC) protocols at speeds up to 19,200 bps as well as asynchronous protocols at speeds up to 1200 bps.

The new IBM 3725 Communications Controller is supported by VM/SP. The RDEVICE macro (DEVTYPE operand) and the RCTLUNIT macro (CUTYPE operand) accept the 3725 as a valid parameter.

Support for the 3704 and 3705 Communications Controllers

The functions of the IBM 3705 Communications Controller have been enhanced. These include:

- Sharing of an IBM 3705/3725 Communications Controller between VM/SP and other operating systems that support these controllers. Each operating system uses its own set of unique communication line addresses.

  The IBM 3704 Communications Controller may not be shared by more than one operating system.

- Making the system generation process for the IBM 3705 Communications Controller less confusing to users. The RDEVICE macro now accepts all models (A1-H8,J1-L4) of the 3705.

- Running the 3705 Communications Controllers under control of either the Emulation Program (EP), program number 5744-AN1 which VM/SP loads and supports or the EP program number 5735-XXB which ACF/SPP loads and supports.

  The IBM 3704 Communications Controller can run under control of the EP but not the NCP. The 3704 may not be shared among processors.

Chapter 16. Support for Virtual Storage Extended Guest Environments

The following Virtual Storage Extended (VSE) guest environments are supported by VM/SP Release 4:

- VSE/System Package Version 2 Release 1 (VSE/SP 2.1)

  Note: CMS/DOS services, provided by VM/SP, support VSE/Advanced Functions Version 1, Release 3, Modification Level 5 (VSE/AF 1.3.5) as originally announced by IBM. Subsequently released small programming enhancements to VSE/AF 1.3.5 are not supported.

- VSE System Installation Productivity Option Extended (VSE/IPO/E) Version 1 Release 4.

VM/SP Release 4 requires no changes in the installation or operating procedures of the VSE guest environments when migrating from Release 3.1.

Chapter 17. Enhancement of Serviceability

Enhancements to the serviceability of the system include:

- Enhancement of Control Program initialization and shutdown
- Enhancement of the CPTRAP function
- Addition of the stand-alone dump facility
- Addition of the CP FRET trap
- Enhancement of the VMDUMP function
- Enhancement of the PER command.

Enhancement of Control Program Initialization and Shutdown

A new option, REIPL, for the SHUTDOWN command causes an automatic warm start to follow the system shutdown. This action is similar to the automatic restart that occurs when the system is dumped to a DASD device.

Setting of the time-of-day clock has been made easier. The operator may now specify the time using either periods (HH.MM.SS) or colons (HH:MM:SS).

Modules DMKCPI and DMKCPJ, together, have been split into eight separate modules, and module DMKCKP has been split into six modules. The changes include both restructuring of the logic and thorough documentation of the modules.

These changes will enhance serviceability and maintainability by providing restructured code and better documentation. The restructuring and splitting will also solve addressability problems.

The new logic structure is described in the *VM/SP System Logic and Problem Determination Guide Volume 1 (CP)*, LY20-0892.

Enhancement of the CPTRAP Function

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

Enhancements to the TRAPRED reduction program make it easier to review the trap data by providing the ability to display and print formatted data from the CPTRAP file.

The STOP subcommand of the TRAPRED reduction program has been removed to prevent inadvertent purging of the CPTRAP file. To purge a file now, the user must issue an explicit CP PURGE command.

Addition of the Stand-Alone Dump Facility

The stand-alone dump facility provides support personnel with the capability of dumping up to 16 megabytes of real storage. Dumping of real storage is required when VM/SP is not able to create a CP abend dump. All resident pages, (CP and non-CP) are dumped. The stand-alone dump facility is not supported as a facility to dump the virtual machine or to dump non-resident pages from the paging device. This stand-alone dump program can be IPLed from tape or disk, and the output can be directed to tape or printer.

A new operand, SADUMP, is added to the SPTAPE command to move stand-alone dump facility data from tape output files to a spool file for processing with the Interactive Problem Control System.

Addition of the CP FRET Trap

Installations experiencing problems caused by improper use of CP free storage and problems with storage overlays can now trap these occurrences with the addition of this feature. The design of the CP FRET Trap allows it to produce "tracks" in storage associated with each free storage request. The trap detects the release of areas of free storage that were previously released, outside the boundaries of the storage given, or not assigned.

A new option, &FRETRAP, was added to the OPTIONS COPY file to specify whether or not the trap is to be enabled. Based on the value of the option &FRETRAP, the trap code is conditionally assembled in modules DMKCPI, DMKFRE, and DMKFRT. The default value of &FRETRAP is 0 for normal operations without the trap. The trap may be installed at system generation time. Refer to the *VM/SP Installation Guide*, SC24-5237, for installation instructions.

The CP FRET Trap does the following:

- Disables the CP Assist FREE, FRET, DSP1, DSP2, and UNTFR instructions.
- Expands each request for free storage by a trap extension area. The trap extension area contains a tag for the status of the request, the size of the requested free storage block, and other saved information. For the format of the extension area, refer to control block FREEXT in the *Data Areas and Control Block Logic Volume 1 (CP)*, LY24-5220.
- Checks each request to release free storage for the expected tag.
- Checks the size of the free storage area to be released against the saved size in the extension area, and abends in illegal situations. Three new abend codes were added: FRT013, FRT015, and FRT016.

When the trap is installed, performance is degraded for systems using CP Assists due to the disabling of the FREE, FRET, DSP1, DSP2, and UNTFR instructions. Also, performance for storage constrained systems having many users is degraded due to the expansion of each free storage request to include the trap extension area. However, the performance degradation is not likely to be a problem while suspected free storage problems are being trapped. When the trap is not installed, the overall performance of the system is not affected.

Refer to the *VM/SP System Programmer's Guide*, SC19-6203, for more information about the trap.

Module DMKFRE was split into two modules, DMKFRE and DMKFRT. The following changes resulted from the split of DMKFRE:

- Entries DMKFRERS, DMKFRETR, and DMKFRETE have been moved to the new module DMKFRT as DMKFRTRS, DMKFRTTR, and DMKFRTTE respectively.
- Calls to DMKFRET have not been changed. The CP Assist FRET instruction at DMKFRET remains in DMKFRE. If the request to release free storage cannot be assisted, control is passed to DMKFRTT. DMKFRTT contains the code for the nonassisted path for calls to DMKFRET.
- A new macro, FRECOM, has been created for variables and equates in DMKFRE that were needed by DMKFRT. The FRECOM macro generates live code for DMKFRE and a DSECT in DMKFRT.
- Subroutine FREE09B has been changed from a subroutine to the new entry, DMKFRTSN, in DMKFRT.
- Abends FRE001 through FRE005, FRE007, FRE008, FRE009, and FRE011 are now issued from DMKFRT as FRT001, FRT002, FRT003, FRT004, FRT005, FRT007, FRT008, FRT009, and FRT011 respectively.

Enhancement of the VMDUMP Function

Two enhancements to the VMDUMP function provide the following:

- A new diagnose code that allows a virtual machine to request dumping of its virtual storage
- A capability that allows additional addresses to be specified in the VMDUMP command.

DIAGNOSE code X'94' supports the same parameters and performs the same functions as the VMDUMP command. In addition, DIAGNOSE code X'94' supports two additional parameters that allow:

1. Specification in hexadecimal of the storage to be dumped
2. Specification that the output produced by this diagnose code may not be transferred back to the invoker by the invoker at a later time.

A maximum of 2,049 address ranges can be specified with DIAGNOSE code X'94'.

The VMDUMP command has been enhanced to allow the user to specify as many addresses as can be contained on one command line. This provides greater selectivity of the data to be dumped.

Enhancement of the PER Command

The PER command is a major aid in problem determination. Enhancements to this command will aid in the selectivity of tracing second and third levels of storage.

Addition of the ZAPTEXT and EXPAND Command

The ZAPTEXT command lets you apply service to a text file. ZAPTEXT has expansion capabilities, via the EXPAND command, to let you add space to a program in object deck form so you can apply corrective service. ZAPTEXT uses the same control information as the current ZAP service program, with the addition of one new control record.

Chapter 18. Enhancement of the Control Program

Enhancements to the Control Program include:

- Addition of Virtual Machine Group support
- Addition of signal system service
- Enhancement of the Inter-User Communication Vehicle
- Enforcement of the Restriction on mixing shared and nonshared virtual devices
- Removal of the saved system 8-megabyte limit
- Removal of the system name table (DMKSNT) 4K-size restriction
- Addition of DIAGNOSE code X'98'
- Extension of the prefixed storage area
- Enhancement of the GENIMAGE utility program
- Enhancement of the DEFINE command
- Enhancement of the START command
- QUERY STATUS command
- Terminals.

Addition of Virtual Machine Group Support

Virtual Machine Group Support, which has been added to VM/SP Release 4, permits several virtual machines to be in a common group and to be controlled by a common supervisor. Virtual machines in a virtual machine group share common read/write storage.

A virtual machine is considered a member of a virtual machine group only after it has done two things:

1. IPLed a saved named system with VMGROUP=YES specified in the NAMESYS macro.

2. Performed an IUCV CONNECT to the signal system service.

Each virtual machine in a virtual machine group is identified by a unique signal ID. When a virtual machine is connected to the signal system service, the user can specify the signal ID to be assigned to the virtual machine. If the user does not specify a signal ID, the signal system service will assign one. Any virtual machine within a group can signal any other member of the group by specifying that member's signal ID in the IUCV SEND function of the IUCV macro.

More than one virtual machine group may exist. Each group has its own set of signal IDs, which are not unique across groups.

You can find more information about the NAMESYS macro in the *VM/SP Planning Guide and Reference.*

Addition of Signal System Service

The signal system service is a CP system service. This service allows a virtual machine in a virtual machine group to send signals to and receive signals from other members in the group. A virtual machine must be a member of a virtual machine group to use the signal system service.

When a virtual machine connects to the signal system service, the user may specify the following three items:

- The signal ID to be assigned to the virtual machine. If a signal ID is not specified, the signal system service will assign one to that virtual machine.

- The parameter that specifies the virtual machine is to be notified of other virtual machines entering the group.

- The parameter that specifies the virtual machine is to be notified of other virtual machines leaving the group.

Members that request notification of other virtual machines entering and leaving the group are automatically notified of these events.

A member of a virtual machine group can send 8 bytes of user information or signal data to other members in the group. Signals are sent via the IUCV SEND function of the IUCV macro specifying the signal ID of the virtual machine to be signaled.

You may find more information about the signal system service in the *VM/SP System Programmer's Guide*, SC19-6203, and the *VM/SP System Logic and Problem Determination Guide Volume 1 (CP)*, LY20-0892.

Enhancement of the Inter-User Communication Vehicle

Data Transfer

In previous releases of VM/SP, users identified one send, receive, and reply area for transmitting data via the SEND, RECEIVE, and REPLY functions. Users may now specify a list of lengths and addresses for buffers to handle Inter-User Communication Vehicle (IUCV) data transfer. The buffer addresses may be discontiguous.

A new BUFLIST= parameter provides a means for specifying a buffer list for IUCV SEND and RECEIVE functions.

A new ANSLIST= parameter provides a means for specifying an answer list for the IUCV SEND and REPLY functions.

Support for the Signal System Service

The signal system service uses the IUCV system service interface to send signals between virtual machines in a virtual machine group. This service can coexist with the IUCV system services: console communications services, message system service, and DASD block I/O system service.

Enforcement of the Restriction on Mixing Shared and Nonshared Virtual Devices

This enhancement rejects any attempts by the user to construct a virtual device configuration that mixes shared and nonshared devices on the same virtual control unit (VCU). (This restriction is not enforced for real devices.) In the past, a user could inadvertently ATTACH, DEFINE, or LINK both shared and nonshared devices to a single VCU. This action caused CP to loop or abend.

With the addition of this enhancement, the system detects any violation of the shared/nonshared restriction, rejects the issued command, and issues an error message. This restriction applies whenever virtual devices are created or moved to a different address.

For commands that involve a single device that violates the restriction, the requested operation (for example, LINK) is rejected. If more than one device is involved (for example, ATTACH CHANNEL), the operation is performed for all devices except the ones that violate the restriction. The first device applied to the VCU sets the subchannel protocol (shared or nonshared). For an ATTACH command with multiple devices, the devices are created in the order specified by the command. For a LOGON operation (or directory update), the directory control statements are applied in order of appearance in the directory source files.

Note: For most dedicated devices, the virtual protocol must be identical to the real protocol defined via DMKRIO. However, CP allows a dedicated tape drive to adopt (only at the virtual level) the protocol of the existing VCU. If the target VCU is empty, the VCU adopts the real protocol of the tape device.

The shared/nonshared restriction affects the following situations:

- **Starter System Generation:** Since the starter system is frequently tested in a virtual machine, the starter system defaults have been changed so that the matching virtual device configuration will not violate the restriction.

- **CP Directory Update:** When the system directory is updated, potential errors in the CP directory are flagged. If the virtual device represented by a directory control statement causes a protocol conflict on the VCU, the statement is rejected; the directory processing continues but the directory cylinders are not updated. During the directory check, only the effects of the T-DISK option of the MDISK statement, the NETWORK option of the DEDICATE statement, plus the CONSOLE, SPECIAL, and SPOOL statements are examined. Existing CP directories could contain violations of the restriction.

- **LOGON Processing:** As the user enters the system (via LOGON), CP now checks the device represented by each CONSOLE, DEDICATE, LINK, MDISK, SPECIAL, and SPOOL statement for a potential violation of the shared/nonshared restriction.

- **CP Console Operations:** When the CP commands ATTACH, DEFINE, LINK, or NETWORK ATTACH are issued to create or move a virtual device, CP now checks for a potential violation of the restriction on the VCU that supports the new device.

All currently supported processors and devices will continue to be supported by VM/SP. As a result of the shared/nonshared restriction, the reliability of the system has been enhanced.

Removal of the Saved System 8-Megabyte Limit

The capability to save and restore a page-image copy of a virtual machine has been increased from 8 megabytes to 16 megabytes. This change, which was accomplished by altering the VMSAVE, SAVESYS, and IPL functions, will improve the serviceability of virtual machines.

Saving a 16-megabyte virtual machine corresponds to saving 4096 pages; therefore, a single information page is no longer sufficient to contain the register contents, program status word, and storage keys. The number of additional information pages required by CP depends on the number of virtual-machine pages being saved. A chart showing the relationship between the number of virtual-machine pages being saved and the number

of information pages required by CP is presented in the *VM/SP Planning Guide and Reference* under "Saved System DASD Requirements."

The overall process of saving and restoring a saved system will work as it did before. This means, the invocation of existing CP commands and macros will not change.

To enforce the 16-megabyte limit, the NAMESYS macro was changed. The SYSPGCT operand in this macro is checked to prevent the user from specifying more than 4096 pages to be saved.

Removal of the System Name Table (DMKSNT) 4K-Size Restriction

The removal of the 4K-size restriction on the system name table allows you to define a greater number of segments. Before VM/SP Release 4, the system name table entries could not be larger than one page (4K). Now there is no limit to the number of pages the table may span.

With the removal of this restriction, there is a new requirement for similar entries (for example, all NAMESYS macros) in the DMKSNT module to be grouped together. If the entries are not grouped properly, you will receive an MNOTE indicating that the macro is out of sequence.

All functions that reference the system name table have been modified to recognize when the table spans more than one page, and when it does, to continue their search for a table entry across pages. Individual NAMESYS, NAMENCP, and NAME3800 entries do not span a page boundary.

Note: The DMKSNT module should be used as a pageable module. If it is made resident and is larger than one page, an SPB LOADER CARD should be punched at the beginning of the DMKSNT module to assure alignment at a page boundary.

You may find more information about the system name table in the *VM/SP System Programmer's Guide*, SC19-6203.

Addition of DIAGNOSE Code X'98'

A new diagnose code, DIAGNOSE code X'98', permits a virtual machine to build and execute its own real channel programs, thereby avoiding channel control word (CCW) translation overhead.

Three subfunction codes provided with the new DIAGNOSE code allow the virtual machine to:

- Lock the virtual pages containing its CCWs and data areas
- Execute the real channel program built by the virtual machine

- Unlock the virtual pages when they are no longer needed.

It is the user's responsibility to coordinate the locking and unlocking of pages while performing I/O operations.

In conjunction with DIAGNOSE code X'98', a new parameter, DIAG98, was added to the OPTIONS directory control statement. Specifying DIAG98 in a virtual machine's OPTIONS directory control statement allows that virtual machine to issue DIAGNOSE code X'98'.

Instructions for specifying parameters in the OPTIONS directory control statement can be found in the *VM/SP Planning Guide and Reference*, SC19-6201. More information on DIAGNOSE code X'98' can be found in the *VM/SP System Programmer's Guide*, SC19-6203.

Extension of the Prefixed Storage Area

VM/SP Release 4 provides the capability to increase the size of the prefixed storage area (PSA) when the current size of X'800' bytes is not adequate. The size of the PSA is not actually increased for this release of VM/SP. Two equates, CKPLOAD and PSASIZE, have been added to the PSA macro. CKPLOAD, which is equated to X'1000', defines the load point of the DMKCKP module at IPL and system restart. PSASIZE, which is equated to X'800', defines the space reserved for the PSA. All references to X'800' as the load point of DMKCKP have been replaced with references to CKPLOAD. When the PSA needs to be extended, changing the equate PSASIZE, rebuilding the maclib which contains the PSA macro, reassembling module DMKPSA, and relinking the system will effectively allocate more space to the PSA.

Enhancement of the GENIMAGE Utility Program

The GENIMAGE Utility Program was modified to process:

- Library character set (LCS) and graphic character modification module (GRAPHMOD) definitions in the 240 by 240 pel representations

- Ten lines-per-inch forms control buffer (FCB) definitions.

These modifications were made to provide support for the 3800 Model 3 and Model 8 Printing Subsystem.

Enhancement of the DEFINE Command

The DEFINE command can now be used to define a virtual 3800 Model 3 printer to a user's virtual machine.

Enhancement of the START Command

The VM system operator can now issue a CP START command to begin printing of a spooled file on a 3800 Model 3 printer.

QUERY STATUS Command

A new class-B CP QUERY command, Query STATUS raddr, enables the console operator to check the operational status of the direct access storage device at the real address specified.

Terminals

Enhancements for Usability

The VM/SP LOGON, DISCONNECT, and LOGOFF messages are now more informative. Changes include:

- The VM logo message "VM/370 ONLINE" is extended to tell the user what key to press to begin a session. The message text varies according to the user's terminal device type.
- A new message that is displayed after the screen is cleared prompts the user to enter one of the commands from a displayed list that includes LOGON, DIAL, MESSAGE, and LOGOFF.
- A new prompting message advises the user what key to press to continue, following a logoff or disconnect, or when a terminal is dropped from a session on a guest machine.
- A more informative message is presented to the user if an incorrect password is entered. A prompting screen advises the user to choose the appropriate command to continue. In addition, this prompting screen is presented to the user if other errors are made during the LOGON procedure.

Enhancements for TTY Terminals

Scrolling

VM/SP now allows **all** TTY terminal users to halt output scrolling with *****MORE***** displayed in the status area each time a specified number of lines are displayed. Scrolling is resumed by pressing the NEW LINE key (character mode) or the SEND key (block mode). The SCROLL operand of the TERMINAL command is used to set the number of lines to be scrolled. This support was previously available only to users of the IBM 3101 Display Terminal.

As a further enhancement to the 3101 as well as other TTY terminals, the scroll count is reset if either the *****MORE***** message is cleared or a READ operation for that device is initiated.

Support for Logical PF Keys on the 3101 Display Terminal

VM/SP support of the IBM 3101 Display Terminal (a TTY terminal) is extended to provide functions for 16 logical PF keys. These functions are in addition to the functions provided by the 8 physical PF keys. The functions of the logical PF keys are specified by striking certain combinations of keys. Instructions for using the logical PF keys are presented in *VM/SP Terminal Reference*, GC19-6206.

Support for SNA Terminals

Support for SNA terminals in VM/SP Release 4:

- Allows SNA graphics device users to use the DIAL command to access logged-on guest virtual machines. This requires the services of VM SNA Console Services (VSCS), a new Program Product supported by VM/SP for Release 4. VSCS runs in the VTAM Service Machine (VSM), a virtual machine that uses VTAM to control SNA devices. Its functions are similar to those provided by the VTAM Communications Network Application (VCNA) in previous releases of VM/SP. However, unlike VCNA, which requires a guest operating system running in a VSM, VSCS communicates with CP through the facilities of the Group Control System, a new facility in Release 4.

- Provides the system ID of the host virtual machine in the status area of terminals supported by VSCS.

- Provides Console Communications Services (CCS) access to data that describes real SNA terminal devices. This data is obtained as a result of the VSM issuing a write structured field (WSF) QUERY REPLY command.

- Uses a new buffer list option, described under "Enhancement of the Inter-User Communication Vehicle" on page 18-3, to improve response

time and buffer storage usage for IUCV SEND, RECEIVE, and REPLY functions.

- Makes support for TTY terminals attached via a VSM more compatible with support for natively attached TTY terminals. This includes support for:
  - Compatible translation of APL/ASCII characters
  - SCROLL and PROMPT options of the TERMINAL command
  - 3101 terminal PF keys
  - WRITE/READ chaining.

  This support requires that VSCS be the console service running in the VSM.

- Extends SNA TTY support to be equivalent to non-SNA support, with the exception of DIAL support.

- Prevents a disconnected VSM operator from logging on from a device controlled by the VSM. If attempted, the operator receives a message explaining the error. Documentation for previous releases of VM/SP advised the VSM operator not to take that action, but the system did not prevent it.

- Extends the GRAF and CONSOLE options of the QUERY command to return additional information about SNA graphics devices. This information includes:
  - **Class B user - GRAF option**
    - The userid of the VSM controlling the SNA devices
    - The SNA luname of each of these devices
    - The userid of each device owner.
  - **Class G user**
    - **GRAF option**: The SNA luname of the devices accessing the user's virtual machine and the userid of the controlling VSM
    - **CONSOLE option**: The SNA luname of the user's console device and the userid of the controlling VSM.

Expanded Diagnose Code X'8C' Support

This enhancement expands support for DIAGNOSE code X'8C'to obtain a pageable buffer to hold data resulting from a write structured field (WSF) QUERY. The WSF QUERY obtains descriptive data about the terminal's capabilities.

Prior to VM/SP Release 4 only six bytes of this data were available to virtual machines. Now all data returned as a result of CP issuing the WSF QUERY is made available to virtual machines. This is considerably more efficient than having the virtual machine issue the query to obtain the data.

Expanded Remote Terminal Support

This enhancement affects several areas of CP support for remote terminals:

- Some devices use a shared subchannel protocol and some use an nonshared subchannel protocol. Defining device addresses such that shared protocol and nonshared protocol devices use the same subchannel can cause conflict and result in error conditions. Users may not always be aware that this situation exists. For example, prior to VM/SP Release 4, a mix of shared/nonshared subchannel device protocols could be caused by the combination of the following conditions:

  - The operator NET ATTACHes a graphics printer to a device address on a virtual shared subchannel of a virtual machine

  - A 3277 Display Station (shared subchannel protocol) that accesses the virtual machine by use of the CP DIAL command.

  CP changes the device type of a NET ATTACHed printer from TYP3284 (shared subchannel protocol) to TYP3210 (nonshared subchannel protocol). CP also changes the device class from CLASGRAF to CLASTERM. This action is transparent to the user, but it causes a shared/nonshared protocol conflict when the printer device uses the same subchannel as the 3277 Display Station.

  New support treats the printer as TYP3277 and CLASGRAF so that the device subchannel protocol remains compatible with the 3277 display.

- New support provides accounting information for:

  - Remote dedicated printers

  - Remote graphic terminals dedicated to a virtual machine via the CP DIAL command.

  This support is similar to that provided for local DIALed devices prior to VM/SP Release 4.

- CP now allows tracing of SIO instructions to:
  - Attached remote printers
  - Remote graphics terminals dedicated to a virtual machine via the CP DIAL command.
- Both the class B and Class G QUERY GRAF command responses now provide information about remote devices.

  The QUERY GRAF (class B) command responses are extended to identify the real device addresses of remote GRAF or PRT devices, as well as the userid of the:
  - Resource owner using the device as a console, or
  - Virtual machine to which the device is DIALed (graphic display) or ATTACHed (remote printer).

  The QUERY GRAF (class G) command responses identify the real and virtual addresses of:
  - All remote graphic printers dedicated to a virtual machine (DEDICATE directory control statements or NET ATTACH command)
  - Remote graphic terminals dedicated to a virtual machine (CP DIAL command).

    These responses are in addition to those provided for locally attached devices prior to VM/SP Release 4.

3290 Information Panel

Description

VM/SP Release 4 provides limited support for the 3290 Information Panel. The 3290 is a computer terminal that has a monochromatic, variable-format, plasma screen (gas panel) that can display as many as 9920 characters (62 rows by 160 columns). Alternatively, it can display fewer characters of increased size.

The 3290 can operate simultaneously with as many as five logical terminals, four of which may be displayed at one time. Each logical terminal interacts independently with its own host program. That is, you can divide the display screen in half, either vertically or horizontally, or in quarters. Each half or quarter is a logical terminal that you may log onto as though it were an individual physical terminal.

Another feature of the 3290 allows you to "zoom" a single display. That is, you may increase the size of the characters, within limits, to make them easier to read. For additional information about the 3290, see the publication *IBM 3290 Information Panel Description and Reference*, GA23-0021.

Restrictions

VM/SP CMS support of the 3290 is limited to the XEDIT function. CMS full screen operation requires a minimum screen size of 24 rows by 80 columns. Logical screen sizes ranging from the minimum up to 62 rows by 160 columns are acceptable for CMS.

If you define the screen size larger than 150 columns in the XEDIT environment, the COPY key will work only if the virtual printer is defined as 3800.

The CP function requires a minimum screen size of 3 rows by 50 columns. If you define a screen size smaller than this, the screen will become the default size of 24 rows by 80 columns.

Many program products that run under VM/SP must be run in 3278 compatibility mode. For these program products, you must use the screen size associated with the model number defined during system generation. If you use a different screen size, the results are unpredictable. The 3278 model numbers and their associated screen sizes are:

Model	**Screen Size**
2A or 2C	20 rows by 80 columns
2	24 rows by 80 columns
3	32 rows by 80 columns
4	43 rows by 80 columns
5	27 rows by 132 columns

Keep in mind when using the 3290 that there are maximum lengths for input and output in VM/SP. In some cases, the command line of the 3290 allows more input characters than the maximum length of a command. To avoid losing part of a command due to truncation, make sure that your commands do not exceed the maximum lengths allowed. The following list shows the allowable maximum lengths, in characters, for inputs and outputs:

	Maximum Length
CMS Environment	
Input command line	130
Output	130
XEDIT Environment	
XEDIT subcommand from command line	255
Input following the logical line end character when in TYPEWRITER mode	130
CP Commands	240
RETRIEVE or ? (Redisplays the last input line or lines up to the maximum number of characters.)	255
CP Environment	
CP commands	240
RETRIEVE or ? (Redisplays the last input line or lines up to the maximum number of characters.)	240

Chapter 19. Enhancement of the Conversational Monitor System

Enhancements to the Conversational Monitor System include:

- Enhancement of the NUCXLOAD command
- Migration of CMS commands and modules to the CMS nucleus
- Enhancement of the command search function
- Support for loading EXECs in storage
- Enhancement of the EXECIO command
- Enhancement of the SETPRT command
- Enhancement of the MACLIB command
- Addition of the MACLIST command
- Enhancement of the DEFAULTS command
- Improved multivolume tape support for OS simulation
- Establishment of TAPE command as a nucleus extension.

Enhancement of the NUCXLOAD Command

You can now load a module, as a nucleus extension, that contains address constants requiring relocation.

A new option, RLDSAVE, has been added to the LOAD command and the INCLUDE command. This option instructs the CMS loader to save the relocation information from the text files.

To create a relocatable CMS module file, you can use the LOAD command (with the RLDSAVE option specified) and the GENMOD command. The relocatable file can then be established as a nucleus extension by issuing the NUCXLOAD command.

You must specify the RLDSAVE option on the LOAD or INCLUDE command if you want the relocation information saved. Relocation is performed only when the file is loaded by the NUCXLOAD command.

Migration of CMS Commands and Modules to the CMS Nucleus

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

Command	Modules
ACCESS	DMSACC DMSACF DMSACM
DLBL	DMSDLB
FILEDEF	DMSFLD DMSFLE
RELEASE	DMSARE
SET	DMSSET

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

The DMSROS module has also been made a part of the shared CMS nucleus and is, therefore, no longer loaded into private free storage. Programs that rely on this module residing in free storage must be modified. The DMSROS module uses the 16-word BALRSAVE area in DMSNUC. Programs should not rely on the contents of this area when invoking DMSROS.

Enhancement of the Command Search Function

This function provides you with the ability to invoke, from a program, a command that is to be resolved via the CMS command search hierarchy. The distinction here is the CMS command search hierarchy is used as opposed to the SVC 202 search hierarchy. The SVC 202 search hierarchy is a subset of the CMS command search hierarchy.

Support for Loading EXECs in Storage

This support allows you to load EXECs into storage and have them remain in storage. The EXECs you specify are loaded and prepared for execution. They remain in storage, ready for execution, until you specifically purge them.

This support consists of four new CMS commands:

EXECLOAD To load the specified EXEC and prepare it for execution.

EXECDROP To purge one or all of the EXECs currently resident in storage.

EXECMAP To display or stack a list of the EXECs currently resident in storage.

EXECSTAT To determine if a specific EXEC is currently resident in storage.

Enhancement of the EXECIO Command

Two options have been added to the EXECIO command to allow EXEC 2 or System Product Interpreter variables to be set directly, bypassing the use of the stack. The two options are:

VAR xxxxx

STEM xxxxx

xxxxx is the name of any valid EXEC 2 or System Product Interpreter variable. The effect of these options is to cause the EXECCOMM interface to be used rather than the stack. The VAR option specifies that the word following the option name is to be used as a variable for input or output. For input operations, the output will be placed in the variables; for output operations, the input will come from the variables. The STEM option defines a stem for an array to allow multiple variables to be set. If STEM is specified for an input operation, variable xxxx0 is set to the number of variables set.

Enhancement of the SETPRT Command

The SETPRT command is used to load a virtual 3800 printer. Since the 3800 Model 3 printer has a greater pel density than the Model 1, the SETPRT command was modified to load the proper library character sets (LCSs) and graphic character modification modules (GRAPHMODs). The command was also modified to load and construct 10-lines-per-inch forms control buffers.

Enhancement of the MACLIB Command

The MACLIB command has been enhanced to allow member names following the MAP operand and the new destination options (STACK, FIFO, LIFO, and XEDIT). You can now retrieve the MAP output for specific members of a maclib without having to search through the entire map of the library.

MACLIB MAP supports the STACK, FIFO, and LIFO options that place the MAP output in the program stack. The XEDIT option of MACLIB MAP inserts the MAP output into the file being edited. With the XEDIT option, each map line is 130 characters and contains the following twice on the line: the member name, index, size, library filename, library filetype, and library filemode. The XEDIT option does not return the header record. This option is valid only when MACLIB MAP is issued from the XEDIT environment.

Addition of the MACLIST Command

MACLIST is a new command that displays a list of all members in a specified CMS maclib. MACLIST provides you with an easy way to select and edit maclib members. CMS commands can be issued against the members directly from the displayed list. The DISCARD command may be specified in the MACLIST environment. DISCARD will perform a MACLIB DEL to delete a specified member. You can issue commands that apply to members of a CMS library (such as MOVEFILE, MACLIB, PRINT, PUNCH, TYPE, and XEDIT) on the list displayed by MACLIST.

In the MACLIST environment, information that is normally provided by the MACLIB command (with the MAP option) is displayed under the control of the System Product Editor. You can use XEDIT subcommands to manipulate the list itself.

Specifying the command:

MACLIST mylib

displays the sample MACLIST screen shown in Figure 19-1 on page 19-5. Note that the members are sorted alphabetically by member name. Members with the same name are then sorted by index number (least to greatest).

More information on the MACLIST command can be found in the *CMS Command and Macro Reference*, SC19-6209.

```
 VMUSER   MACLIST  A0  V 130  Trunc=130 Size=18 Line=1 Col=1 Alt=0
Cmd   Member name     Index     Records   Library name  Library type  Mode
      CAUTION           190           6   MYLIB         MACLIB        A1
      FAST              240          25   MYLIB         MACLIB        A1
      FORWARD           613          57   MYLIB         MACLIB        A1
      GO                197          25   MYLIB         MACLIB        A1
      GO                615          25   MYLIB         MACLIB        A1
      LTURN             546          55   MYLIB         MACLIB        A1
      NEUTRAL           266           5   MYLIB         MACLIB        A1
      PARK              602           4   MYLIB         MACLIB        A1
      REVERSE           272         118   MYLIB         MACLIB        A1
      RTURN             524          21   MYLIB         MACLIB        A1
      SKID              391          43   MYLIB         MACLIB        A1
      SLOW              671          61   MYLIB         MACLIB        A1
      SLOWER            435           5   MYLIB         MACLIB        A1
      SLOWEST           441          82   MYLIB         MACLIB        A1
      SPEED               2         132   MYLIB         MACLIB        A1
      STOP              607           5   MYLIB         MACLIB        A1
      SWERVE            223          16   MYLIB         MACLIB        A1
      YIELD             135          54   MYLIB         MACLIB        A1
1= Help     2= Refresh 3= Quit    4= Sort(name) 5= Sort(index)  6= Sort(size)
7= Backward 8= Forward 9= FL /n  10=           11= XEDIT       12= Cursor
====>
                                                        X E D I T  1 File
```

Figure 19-1. Sample MACLIST Screen

Enhancement of the DEFAULTS Command

The DEFAULTS command has been enhanced to allow you to specify default options for the MACLIST command. However, the options you specify in the command line when entering the MACLIST command override those specified in the DEFAULTS command.

For details about the DEFAULTS command, refer to the *CMS Command and Macro Reference*, SC19-6209.

Improved Multivolume Tape Support for OS Simulation

Multivolume Tape Support

CMS now provides multivolume tape support for OS simulation. You can use a maximum of 9999 tapes to process a file. Only standard labeled tapes are supported.

VOLID Parameter of the LABELDEF Command

To let the system know how many tapes you need, a new parameter has been added to the LABELDEF command. If you issue the following command:

```
LABELDEF FILE1 VOLID ?
```

the system responds with a message asking you to enter the VOLIDs you will be needing.

When you are at the end of a tape, you will receive messages letting you know that tape volume switching is taking place. For additional information, see "End-of-Volume and End-of-Tape Processing" in the *CMS User's Guide*, SC19-6210.

Establishment of TAPE Command as a Nucleus Extension

The TAPE command, which was formerly loaded in the transient area, is now established as a nucleus extension.

CMS Support of Diagnose 70

CMS now supports an SVC 202 function, TODACCNT that causes a DIAGNOSE 70 to be issued for activating the time-of-day clock accounting interface. The TODACCNT function helps to avoid specification exceptions issued by multiple DIAGNOSE 70 calls.

For information on the TODACCNT function, see the *VM/SP CMS Command and Macro Reference*.

Chapter 20. Other Hardware Support

VM/SP Release 4 includes support for the following new device types:

- Processors
- Direct access storage devices
- Printers.

Processors

4361 and 4381 Processors

VM/SP now supports the 4361 Processor Models 3, 4, and 5 and the 4381 Processor Models 1, 2, and 3. VM/SP also supports the 3279 Display Station Model 2C as a system console for the 4361 Processor Models 3, 4, and 5 and the 4381 Processor Models 1, 2, and 3.

Support of the IBM 4361 Processor Models 3,4, and 5 Auto Start Feature

The 4361 Processor Model 3

VM/SP Release 3 now supports the IBM 4361 Processor Model 3. The 4361 Processor Model 3 has enhanced engineering/scientific functions, and may be upgraded in the field to the 4361 Processor Model Groups 4 and 5.

The Auto Start Feature

The 4361 processor Model Groups 3, 4, and 5 are all available with the Auto Start feature. Using a battery operated clock, this feature maintains the time while the processor is powered off, and sets the system time-of-day clock after power on. For any 4361 processor that has the Auto Start feature, this new VM/SP support:

- lets the system operator power off the processor using the SHUTDOWN command
- can automatically IPL the system without the operator.

Using the SHUTDOWN Command for Power Off

Use the SHUTDOWN command with the POWEROFF parameter to shutdown VM/SP and power off a 4361 processor. If the processor has the Auto Start feature, the time of day is maintained during power off and is used to set the system time-of-day clock after power on. After you've issued the SHUTDOWN command with POWEROFF, if your processor has the Auto Start feature, you will not be prompted to set the time-of-day clock during the next IPL.

Automatic IPL

If you previously specified SHUTDOWN POWEROFF for a 4361 processor with the Auto Start feature, VM/SP is ready and waiting to do an automatic IPL. The only step remaining for you to do is to power on the processor. The 4361 processor with the Auto Start feature can be set to power on automatically at a given time, or it can be powered on via telephone from a remote location. Refer to *IBM 4361 Processor Operating Procedures*, GA33-1570 for information on how to power on the processor. Once the processor is powered on, an automatic IPL will take place provided that SHUTDOWN POWEROFF was issued previously and warm start data was saved.

Direct Access Storage Devices

3370 Direct Access Storage Device Models A2 and B2

VM/SP now supports the IBM 3370 Direct Access Storage Device, Model Series 2 (Models A2 and B2). These fixed-block architecture (FBA) devices feature a storage capacity of 729.8 megabytes and improved performance over existing 3370 devices (Models A1 and B1).

The A models attach to the system as the first device in a string. The Model A2 attaches to:

- 303x, 308x, 4341, 4361, and 4381 systems through a 3880 Storage Control Model 1, 2, or 4
- 4361 systems through a 4361 File/Tape Adapter (FTA).

Up to three B models may be attached to a Model A for a maximum string length of four. Model Series 2 may be intermixed with Model Series 1 within a string, with either a Model A1 or A2 at the head of the string.

Printers

3800 Model 3 Printing Subsystem

VM/SP users may now use the 3800 Model 3 Printing Subsystem in 3800 Model 1 compatibility mode. Support for this printer provides users with improved print quality by increasing the pel resolution of the printer (240 by 240 pel resolution compared with 180 by 144 pel resolution for the 3800 Model 1). A pel is a single element of a raster pattern.

In addition to improved printed images, the 3800 Model 3 printer provides a 10-lines-per-inch vertical spacing option. This gives the user an additional choice when deciding how many lines to print on a page.

Existing programs designed to produce output for the 3800 Model 1 printer may be used to produce output for Model 3 with little or no change.

The Model 3 can be attached to System/370, equivalent XA models running in 370 mode, and 43xx machines supported by the current release of VM/SP.

The following programs and features were updated to support the Model 3 printer:

- GENIMAGE utility program
- System generation procedure
- Spooling commands
- Error recovery procedures (ERPs)

- Printer objects
  - Character arrangement tables (CATs)
  - Graphic character modification modules (GRAPHMODs)
  - Library character sets (LCSs)

Note: Due to the change in pel density, customized LCSs and GRAPHMODs for the 3800 Model 1 are not interchangeable with the 3800 Model 3. Users may recode customized 3800 Model 1 LCSs and build new GRAPHMODs using the GENIMAGE utility program. The MVS Character Conversion Aid may also be used to convert customized Model 1 LCSs and GRAPHMODs to Model 3 pel density.

3800 Model 8 Printing Subsystem

The 3800 Model 8 Printing Subsystem is supported as a real device. It is available only in selected World Trade countries. References to the Model 3 apply to both Models 3 and 8 unless explicitly stated otherwise.

4248 Printer

VM/SP now supports the 4248 printer in extended function mode as a virtual, dedicated, or system printer. The following special features are supported:

- Extended forms control buffer (FCB) format that allows the user to:
  1. Produce a duplicate copy of a printed line to the right of the original line
  2. Control stacker levels and drop rates
  3. Vary printer speed.
- New sense data that describes the recovery actions the operating system should take.

The 4248 printer is a variable high speed (2200, 3000, 3600 lines per minute) impact printer using print band technology.

The 4248 accepts the FCB format for the 3211 printer and also accepts a new FCB format that supports the printer when it is running in extended function mode. Maximum output line lengths of 132 or 168 bytes are supported, depending upon the number of hammer positions installed on the printer.

A spool file containing the extended FCB can be printed only on:

- Printers that support this FCB type
- 1403 printer
- 3800 printer
- 3211-type printer started with the DEFFCB option.

A 4248 printer should have one of the system output spool classes defined uniquely to it. This will allow a user to send spool files containing extended FCBs to a printer that supports the FCB.

The 4248 printer is channel attached through a selector channel, block multiplexer channel, or byte multiplexer channel.

Part Three: Migration

This part of the manual describes general requirements for migration from VM/SP Release 3 to VM/SP Release 4.

It describes:

- Migration aids
- Migration compatibilities/incompatibilities.

Chapter 21. Migration Aids

IBM provides migration aids to speed the migration from VM/SP Release 3 to VM/SP Release 4.

Previous Releases

VM/SP Release 4 is compatible with VM/SP Release 3, VM/SP Release 2, VM/SP Release 1, VM/370 Release 6 and its extensions, VM/370 Basic System Extensions Program Product (Program Number 5748-XX8), and VM/370 System Extensions Program Product (Program Number 5748-XE1).

Other than the optional compatibility macros announced in VM/SP Release 1, and the conversion aids described in the *VM/SP Release 3 Guide* and the *VM/SP Release 4 Guide*, no other conversion aids are required to move from VM/Basic System Extensions Release 2, VM/System Extensions Release 2, or VM/SP Release 1 or 2, to Release 3 of VM/SP.

Interactive Problem Control System Conversion Utilities

The new IPCS component of VM/SP provides two utilities to aid in converting existing dump and HELP files to the format required by IPCS:

1. CONVERT command converts symptom summary and dump files created by VM/370 Release 6 to the formats required by IPCS.

2. CONVIPCS EXEC converts existing PVM Release 2 and and RSCS Release 3 HELP files (filenames of HELP PVM and HELP RSCSNET) to the format required by IPCS.

For detailed information about these utilities, see the *VM/SP Interactive Problem Control System Guide*, SC24-5260.

Note: The dump files created by the IPCS/E Program Product are compatible with IPCS and, therefore, need not be converted.

HELPCONV Command

The HELPCONV command is a new tool provided to aid customers in migrating unformatted HELP files from previous releases to the new formatted HELP files used in Release 4. The tool uses the DMSHLP module, which was used by the Release 3 HELP command to format the HELP files. The module has been modified to create the formatted files on disk for Release 4.

Chapter 22. Migration Compatibilities/Incompatibilities

Compatibilities and incompatibilities that may be encountered when migrating from VM/SP Release 3 to VM/SP Release 4 are described here.

The topics are:

- Support for SNA terminals
- Expanded DIAGNOSE code X'8C' support
- Enhancements for communications controllers
- User Class Restructure
- HELPCONV command
- Interactive Problem Control System
- DASD Dump Restore Program compact format
- CPTRAP function
- System name table (DMKSNT) migration
- Virtual Storage Extended (VSE) guest environments
- 3800 Model 3 Printing Subsystem
- Moving Data Between Shared and Non-Shared Tape Subsystems.

Support for SNA Terminals

Release 4 supports both the VTAM Communications Network Application (VCNA) and the new VM SNA Console Services (VSCS) versions of VM/SNA support. Because Console Communications Services (CCS) supports more than one concurrently active VTAM service machine (VSM), customers can run VCNA in one VSM to support terminal users while testing the VSCS in another VSM.

VSCS is required for:

- DIALing to logged on guest virtual machines
- Displaying the host system ID
- Supporting the new DIAGNOSE code X'8C' that makes all WSF QUERY data available to virtual machines.

Before using the VSCS "no logo" mode to access VM/SP, users must add the DIAL command word to the LGNCMDS operand of the DTIGEN macro. Then they must reassemble and linkedit DTIGEN. If the VSCS "logo" mode is used to access VM/SP, no user modification is required.

The CP DIAL support for SNA graphics devices does not apply to SNA TTY devices.

Expanded DIAGNOSE Code X'8C' Support

Because the residual count returned to the user in register Ry is now computed with a WSF QUERY REPLY data length of up to 502 bytes, VM/SP Release 3 applications that depend on the residual count value may not function properly.

Enhancements for Communications Controllers

The IBM 3705/3725 Communications Controllers can run under control of either:

- Emulation Program (EP), program number 5744-AN1 (a special version of the EP/VS System Control Program for VM)
- ACF/Network Control Program (NCP) Version 3, program number 5667-124. The ACF/NCP System Services Program (SSP) may be used to load the NCP into the 3705/3725. The 3705/3725 may be shared among processors, but the communication lines cannot be shared.

The IBM 3704 Communications Controller can run under control of the EP but not the NCP. The 3704 may not be shared among processors.

User Class Restructure

UCR is an optional feature. However, because the CP formatted version of the directory is changed, you must issue the Release 4 version of the DIRECT command to install the directory. You must do this before you IPL the Release 4 system.

The COMMD macro replaces the COMND macro. If any changes were made to the CP command table in COMND, the system administrator must recode these changes in COMMD. If new subcommands were defined, the system administrator must change the subcommand table in the module DMKCMD.

If You Use UCR

When you use UCR you may introduce one or both of the following incompatibilities:

- If you use the new CLASS statement in your directory source file, or if you use classes I through Z or 1 through 6, the directory source file will no longer be compatible with VM/SP Release 3 or earlier releases. The Release 3 version of the DIRECT command will not update the online directory if either of these conditions appear in the directory source file.

- Your installation may have application programs that use the VMCLEVEL field in VMBLOK to control access to privileged commands. Be aware that if the most recent IPL applied overrides, these programs will no longer recognize privileged access. Privilege classes are now reflected in a new field, VMCMDLEV, which is 4 bytes in length (for classes A-Z and 1-6). VMCLEVEL should no longer be used to determine privilege classes. The application should only reference VMCMDLEV if it provides a way to specify which classes are to be authorized for privileged functions.

If You Do Not Use UCR

If your installation does not use UCR:

- The source directory is compatible.

- Application programs that use VMCLEVEL to restrict functions can be run without modifications.

HELPCONV Command

To assist you in migrating unformatted files from previous releases to the new formatted form, use the new command, HELPCONV.

Interactive Problem Control System

The IPCS component of VM/370 should not be used in the VM/SP environment. The IPCS component of VM/370 has been replaced by VM/SP IPCS, which contains significant enhancements. VM/SP IPCS supports the Release 4 versions of CP, CMS, and GCS.

For additional information, see "Chapter 5. Addition of the Interactive Problem Control System" on page 5-1.

DASD Dump Restore Program Compact Format

Tapes produced by earlier levels of DDR may be used as input to DDR without any changes, but tapes created by DDR using the compact format may not be used as input to earlier levels of DDR.

CPTRAP Function

The enhancements to the CPTRAP function for VM/SP Release 4 define a new entry type in the CPTRAP file for virtual machine group data. This entry type (X'3D') is undefined in previous releases. As a result, if the CPTRAP file created by the Release 4 version of CPTRAP contains X'3D' entries, the file cannot be processed by prior releases of the CPTRAP reduction program. To do so will cause unpredictable results when attempting to process the X'3D' entries. If there are no X'3D' entries in the file, prior releases of the reduction program will be able to process the file. The VM/SP Release 4 version of the reduction program can be used to process CPTRAP files created by prior releases of VM/SP.

The format function for CP trace table entries is based on the Release 4 level of the entries. Using it for trace table entries from prior releases will cause unpredictable results.

System Name Table (DMKSNT) Migration

For DMKSNT CSECT files that existed before Release 4 and are intended to be used with Release 4, the installation must:

1. Change the CSECT label from DMKSNTBL to DMKSNT

2. Reassemble the files.

With the removal of this restriction, there is a new requirement for similar entries (for example, all NAMESYS macros) in the DMKSNT module to be grouped together. If the entries are not grouped properly, you will receive an MNOTE indicating that the macro is out of sequence.

The DMKSNT module should be used as a pageable module. If it is made resident and is larger than one page, an SPB LOADER CARD should be punched at the beginning of the DMKSNT module to assure alignment at a page boundary.

Virtual Storage Extended (VSE) Guest Environments

VSE/System Package Version 2 Release 1

VSE/SP Version 2 Release 1 will support VM/SP Release 3.1 and VM/SP Release 4. The installation and operating procedures for the VSE system are the same for both VM/SP Release 3.1 and VM/SP Release 4.

Note: CMS/DOS services, provided by VM/SP, support VSE/Advanced Functions Version 1, Release 3, Modification Level 5 (VSE/AF 1.3.5) as originally announced by IBM. Subsequently released small programming enhancements to VSE/AF 1.3.5 are not supported.

VSE System IPO/E Version 1 Release 4

If you are migrating your VSE guest system from VM/SP Release 3.1 to VM/SP Release 4, there are no changes in the VSE guest system generation or handling procedures. The installation and operating procedures for the VSE guest system with VM/SP Release 4 are the same as the procedures for VM/SP Release 3.1.

If you are migrating your VSE guest system from an earlier VM release (prior to VM/SP Release 3.1) to VM/SP Release 4, there are some changes for VSE guest system installation and operation. The changes are the same as the changes documented for migration to VM/SP Release 3.1 from prior VM releases. They are outlined in the *Memo to Users* document which is shipped with VSE System IPO/E Version 1 Release 4.

Native ACF/VTAM

If you currently use ACF/VTAM with a guest VSE machine, you can do so with VM/SP Release 4 without any modification of your existing network definition or operation. You would not use GCS and VM/VTAM.

3800 Model 3 Printing Subsystem

User programs that are sensitive to sense byte information must be modified to conform to the 3800 Model 3 printer environment.

Programs written for 3800 Model 2 or Model 8 double-byte fonts are not compatible with the 3800 Model 3.

Moving Data Between Shared and Non-Shared Tape Subsystems

Support has been added to VM/SP to allow the migration of data between shared (e.g., 3420) and non-shared (e.g., 3480) tape subsystems. Two virtual control units are required, with the shared tape subsystem assigned to one unit and the non-shared tape subsystem assigned to the other unit. To accomplish this, an additional twelve virtual tape addresses are now available for CMS tape processing, bringing the total to sixteen. These virtual addresses and their symbolic representations are:

Symbolic Name	Virtual Address	Symbolic Name	Virtual Address
TAP0	180	TAP8	288
TAP1	181	TAP9	289
TAP2	182	TAPA	28A
TAP3	183	TAPB	28B
TAP4	184	TAPC	28C
TAP5	185	TAPD	28D
TAP6	186	TAPE	28E
TAP7	187	TAPF	28F

Address 180 through 187 are at one virtual control unit and 288 and 28F are at a second. Using the FILEDEF command, assign the first tape drive to one virtual control unit (e.g., 181) and the other tape drive to the second virtual control unit (e.g., 288). For example, these commands copy data from one device to another:

```
FILEDEF IN TAP0 (18TRACK                    *TAP0 is assigned to 180
FILEDEF OUT TAP8 (9TRACK                    *TAP8 is assigned to 288
MOVEFILE IN OUT
```

or...

```
FILEDEF IN TAPA (18TRACK                    *TAPA is assigned to 2
FILEDEF OUT TAP1 (9TRACK                    *TAP1 is assigned to
MOVEFILE IN OUT
```

The sixteen virtual addresses for tape processing can be used to backup or restore data from a number of tapes. However, each I/O must use a CP DIAGNOSE X'20', which is synchronous, and only one I/O takes place at a time.

Part Four: Internal Design Changes

This part of the manual lists changes to the internal design of VM/SP that affect performance, usability, or maintenance.

It includes new and changed:

- CMS Modules
- CP Modules
- Control Blocks and Macros.

Chapter 23. Module, Control Block, and Macro Changes

This section applies to CMS, CP, and XEDIT. Information about GCS is not included because the source code for GCS modules is not distributed with VM/SP. Information about IPCS is not included because all of the modules in this system are new modules.

This section lists new and changed CP, CMS, and XEDIT modules, control blocks, macros, and EXECs for the new and changed functions. It may help you with planning. The functions are listed alphabetically.

Also included are lists of new modules and split modules.

CMS Command and Module Migration to the CMS Nucleus

New and Changed CMS Modules

DMSACC	DMSACF	DMSACM	DMSALU	DMSARE
DMSAUD	DMSDLB	DMSFLD	DMSFLE	DMSFNC
DMSINI	DMSLFS	DMSROS	DMSSET	

New and Changed CMS Control Blocks and Macros

NUCON

Deleted CMS Modules

ACCESS	DLBL	FILEDEF	RELEASE	SET

CMS File Searching

New and Changed CMS Modules

DMSABN DMSACF DMSALU DMSAUD DMSDSK
DMSERS DMSFNS DMSHTB DMSINS DMSLFS
DMSLST DMSQRT DMSQRY DMSRNM DMSSET
DMSTPE DMSTPJ VMFPLC2

New and Changed CMS Control Blocks and Macros

ADTSECT FVSECT HASHTAB HYPMAP NUCON
TAPEWORK

Miscellaneous

CMSLOAD EXEC CMSLOADL EXEC

CMS Support of DIAGNOSE 70

New and Changed CMS Modules

DMSFNC DMSTCA

New and Changed Control Blocks and Macros

NUCON

Command Search Function

New and Changed CMS Modules

DMSABN DMSCSF DMSINS DMSINT DMKSITS
DMSXCM

New and Changed CMS Control Blocks and Macros

EPLIST NUCON REXEXT

Communications Controllers

New and Changed CP Modules

DMKACR	DMKBLD	DMKCCW	DMKCFT	DMKCKD
DMKCNS	DMKCPI	DMKCPO	DMKCPV	DMKCPW
DMKCQG	DMKCQP	DMKCQQ	DMKCQR	DMKCQS
DMKCQT	DMKCQY	DMKDIA	DMKDIB	DMKEMC
DMKEMD	DMKEXT	DMKIDU	DMKIOS	DMKJRL
DMKLOG	DMKLOH	DMKMNT	DMKNEA	DMKNES
DMKQCN	DMKQCO	DMKQCP	DMKRGA	DMKSCN
DMKUSO	DMKVCH	DMKVDC	DMKVDS	DMKVIO
DMKVSI	DMKWRM			

New and Changed CP Control Blocks and Macros

CCPARM	CKPBLOK	CONTASK	DEVTYPES	NCPTBL
NICBLOK	PSA	RCTLUNIT	RDEVBLOK	RDEVICE
VMBLOK				

CP FRET Trap

New and Changed CP Modules

DMKACR	DMKBSC	DMKCPI	DMKCPM	DMKCPP
DMKCPU	DMKFRE	DMKFRT	DMKLNK	DMKMCC
DMKMCD	DMKMON	DMKPTR	DMKSPK	DMKSRM
DMKSTA	DMKSYM	DMKTAP	DMKTHI	DMKTMR
DMKUSP	DMKVCN	DMKVCP	DMKVCQ	DMKVCR
DMKVCS	DMKVCT	DMKVCV	DMKVCX	DMKVER
DMKVMD				

New and Changed CP Control Blocks and Macros

CALL	FRECOM	FREEXT	OPTIONS

CP Initialization

New and Changed CP Modules

DMKALO DMKCKD DMKCKF DMKCKH DMKCKM
DMKCKN DMKCKP DMKCNS DMKCPI DMKCPJ
DMKCPS DMKDMP DMKEMA DMKEMB DMKEMC
DMKEMR DMKERM DMKGRF DMKIDU DMKMNT
DMKOPE DMKRSP DMKSAV DMKSEG DMKSTA
DMKTOD DMKWRM

New and Changed CP Control Blocks and Macros

CKP CKPADDR CKPCALL CKPLIST CKPLOAD
CKPDLMD PSA

CP Signal System Service

New and Changed CP Modules

DMKIUA DMKIUC DMKPSA DMKVMG

New and Changed CP Control Blocks and Macros

PSA VGBLOK VMBLK VMBLOK

CPTRAP Function

New and Changed CP Modules

DMKCKF DMKEMB DMKEMD DMKTRP DMKTRR
DMKTRT DMKTRU

New and Changed Copyfiles

CPTRAP OTABDATA TRTDATA

DASD Dump Restore Program Compact Format

New and Changed CP Modules

DMKDDC DMKDDR DMKDDT DMKDNC DMKDNT

New and Changed CMS Modules

DDR

Miscellaneous

CMSGEND EXEC DDR Loader DMKDDRSA EXEC
GENERATE EXEC IPL DDR

DIAGNOSE Code X'8C'

New and Changed CP Modules

DMKGRC DMKHVE

New and Changed CP Control Blocks and Macros

GRTBLOK NICBLOK RDEVBLOK RDEVICE

DIAGNOSE Code X'98'

New and Changed CP Modules

DMKDIR DMKHVC DMKHVD DMKHVE DMKLOH
DMKVIO DMKVSI

New and Changed CP Control Blocks and Macros

UDIRECT

EXECIO Command

New and Changed CMS Modules

DMSEIO

EXECs in Storage

New and Changed CMS Modules

DMSABN DMSEXD DMSEXI DMSEXL DMSEXM
DMSEXQ DMSFNC DMSINT DMSITS DMSXBG
DMSXCT DMSXMA

New and Changed CMS Control Blocks and Macros

EXISBLK FLBLOCK NUCON REXEXT ZBLOCKS
ZMACST

HELP Facility

New and Changed CMS Modules

DMSHLD DMSHLE DMSHLI DMSHLL DMSHLP
DMSHLS

New and Changed CMS Control Blocks and Macros

HELPXED

Miscellaneous

DEFAULTS EXEC

Inter-User Communication Vehicle

New and Changed CP Modules

DMKIUA DMKIUC DMKIUE DMKIUG DMKIUJ
DMKIUL

New and Changed CP Control Blocks and Macros

IPARML IUCVBLOK IUSAVE MSGBLOK IUCV

NUCXLOAD Command

New and Changed CMS Modules

DMSABN DMSFNC DMSLDR DMSLIB DMSLIO
DMSLOA DMSLSB DMSMOD DMSNXL DMSRLD

New and Changed CMS Control Blocks and Macros

LDRST NUCON

Miscellaneous

CMSLOAD EXEC CMSLOADL EXEC

OS Simulation Tape Support

New and Changed CMS Modules

DMSFLD DMSFLE DMSLBD DMSQRU DMSSEB
DMSSOP DMSTIO DMSTLB DMSTVS

New and Changed CMS Control Blocks and Macros

LABSECT QRYSECT TVSPARMS VOLSECT

Miscellaneous

CMSLOAD EXEC CMSLOADL EXEC

Prefixed Storage Area Extension

New and Changed CP Modules

DMKPSA

New and Changed CP Control Blocks and Macros

PSA

Programmable Operator Facility

New and Changed CMS Modules

DMSPOA DMSPOC DMSPOD DMSPOE DMSPOL
DMSPON DMSPOP DMSPOQ DMSPOR DMSPOS

New and Changed CMS Control Blocks and Macros

PROP

Miscellaneous

PROPEPIF EXEC PROPLGER EXEC
PROPMX LKEDCTRL PROPPCHK EXEC
PROPPROF EXEC UMFLKED EXEC

New and Changed Copyfiles

CSIPNBLK PROPDTA

QUERY STATUS Command

New and Changed CP Modules

DMKCMD DMKCQT DMKEMC DMKIOE DMKIOS
DMKIOT

New and Changed CP Control Blocks and Macros

IOBLOKS

Remote Terminal Support

New and Changed CP Modules

DMKACO DMKCFM DMKCFQ DMKCQG DMKCQP
DMKCQT DMKDIB DMKHVD DMKNEA DMKRGA
DMKRGC DMKTRD DMKVCN DMKVDR DMKVDS
DMKVIO DMKVSI DMKVSJ

Restriction on Mixing Shared and Nonshared Virtual Devices

New and Changed CP Modules

DMKDEF DMKDEG DMKDIR DMKEMB DMKEMC
DMKEMD DMKEME DMKLNK DMKLOG DMKLOH
DMKLOJ DMKLOM DMKNEA DMKSSP DMKVCH
DMKVCN DMKVDA DMKVDE DMKVDS DMKVIO
DMKVSJ

New and Changed CP Control Blocks and Macros

RCTLUNIT UDIRECT

Saved System 8-Megabyte Limit Removal

New and Changed CP Modules

DMKATS DMKCFF DMKCFH DMKCKM DMKCPP

New and Changed CP Control Blocks and Macros

NAMESYS SAVTABLE

SNA Terminals

New and Changed CP Modules

DMKCFM DMKCQG DMKCQP DMKCQY DMKDIA
DMKDIB DMKHVD DMKLOH DMKQCN DMKQCO
DMKQCP DMKRGA DMKRGE DMKVCN DMKVCP
DMKVCQ DMKVCR DMKVCS DMKVCT DMKVCV
DMKVCX

New and Changed CP Control Blocks and Macros

SNARBLOK TRACEVCS VSMBLOK
WEBLOK WIDABLOK

Stand-Alone Dump Facility

New and Changed CP Modules

DMKSAD DMKSPT DMKSTA LDT

New and Changed CP Control Blocks and Macros

PSA

New and Changed CP Macros

SYSOPR TRACE

Miscellaneous

SADUMP EXEC

Symptom Record Enhancements

New and Changed Modules

DMKTED	DMMCPA	DMMEDM	DMMMOD	DMMSEG
DMKTEE	DMMCVD	DMMEDX	DMMNMP	DMMSTA
DMKTEF	DMMCVS	DMMEXT	DMMNUC	DMMSUM
DMKTEM	DMMDCC	DMMFED	DMMPRG	DMMTAB
DMKTES	DMMDCD	DMMFEX	DMMPRM	DMMTIU
DMMAMP	DMMDCM	DMMHEX	DMMPRO	DMMTRC
DMKCHN	DMMDCO	DMMINI	DMMPRT	DMMVAL
DMMCLR	DMMDCP	DMMINT	DMMREG	DMMVMB
DMMCMS	DMMDID	DMMIOB	DMMSCR	DMMVMF
DMMCOM	DMMDIR	DMMLOC	DMMSEA	DMMWRT
DMMCOR	DMMDSC	DMMMAP		

New and Changed Macros/Copyfiles

ADSSR	DMPEQU	IPCSINIT	SEGMAP	TABMAPS
BITDEF	ENTRYMAP	MSGCNTRL	SHARECON	TED
CONSTANT	HDRPLIST	MSGP	SSCSECT	TRACEFMT
DMMAC	HEADMAP	NUCMAP	TABCOMM	VMFSECT
DMMSAVE	IDASECT	SAVESECT		

Miscellaneous

APAR	CONVIPCX	CUSTOMER PROFILE
CONVIPCS	PRB	

System Name Table (DMKSNT) 4K-Size Restriction Removal

New and Changed CP Modules

DMKATS	DMKBLK	DMKCFF	DMKCFG	DMKCFH
DMKCFR	DMKCFS	DMKCKP	DMKCKV	DMKCPP
DMKCQY	DMKCSO	DMKDIR	DMKHVC	DMKHVD
DMKHVE	DMKLOH	DMKNLD	DMKPGS	DMKRSP
DMKSNC	DMKSNT	DMKSYS	DMKTCS	DMKUSO
DMKVER	DMKVIO	DMKVSI	DMKWRM	

New and Changed CP Control Blocks and Macros

NAMENCP	NAMESYS	NAME3800	NCPTBL	NPRTBL
SYSTBL	UDIRECT			

System Product Editor

New and Changed CMS Modules

DMSINA	DMSLBM	DMSXBG	DMSXCG	DMSXCT
DMSXDC	DMSXED	DMSXER	DMSXFC	DMSXFD
DMSXGT	DMSXIN	DMSXIO	DMSXMA	DMSXMB
DMSXMC	DMSXMD	DMSXPO	DMSXPT	DMSXPX
DMSXQR	DMSXSC	DMSXSD	DMSXSE	DMSXSF
DMSXSS	DMSXSU	DMSXTE	DMSXTF	DMSXTR
DMSXWS				

New and Changed XEDIT Control Blocks and Macros

ALTER	CANCEL	JOIN	LSCREEN	MODIFY
PRSCB	SCHANGE	SI	SORT	SPLIT
STATUS	XEDEQU	ZDESC	ZFONCS	ZMEMBER

New and Changed XEDIT EXECs

DEFAULTS EXEC	DISCARD EXEC	EXECUTE XEDIT
HEXTYPE XEDIT	JOIN XEDIT	PARSE XEDIT
PROFMLST XEDIT	MACLIST EXEC	SI XEDIT
SORT XEDIT	SPLIT XEDIT	STATUS XEDIT
X$MLST$X XEDIT		

System Product Interpreter

New and Changed CMS Modules

DMSRIN DMSRSF DMSRTC DMSRXE

New and Changed CMS Control Blocks and Macros

REXMINT REXEXT

Tape/VMFPLC2 Serviceability

New and Changed CMS Modules

DMSLMX DMSTPE DMSTPF DMSTPG DMSTPH
DMSTPI DMSTPJ VMFPLC2

New and Changed CMS Control Blocks and Macros

SCBLOCK TAPEWORK

Deleted

DMSTAPE

New and Changed CMS EXECS

CMSGEND

TTY Terminals

New and Changed CP Modules

DMKCFT DMKCNS DMKTTY

Usability Enhancements

New and Changed CP Modules

DMKCFC DMKCFM DMKCNS DMKDIB DMKEMA
DMKEMR DMKGRF DMKGRT DMKLOG DMKRGB
DMKUSO DMKVCS DMKVCX

New and Changed CP Control Blocks and Macros

WEBLOK SNARBLOK

User Class Restructure

New and Changed CP Modules

DMKALO DMKBLD DMKCCW DMKCFC DMKCFJ
DMKCFM DMKCFO DMKCFS DMKCFU DMKCFV
DMKCFY DMKCMD DMKCPI DMKCPJ DMKCPT
DMKCQG DMKCQH DMKCQP DMKCQQ DMKCQR
DMKCQS DMKCQT DMKCQY DMKCSU DMKCSV
DMKDDR DMKDEF DMKDIR DMKEMC DMKEME
DMKFMT DMKHVC DMKHVD DMKHVE DMKIOE
DMKJRL DMKLOG DMKLOH DMKLOJ DMKLOM
DMKMCD DMKMHV DMKMNT DMKMSG DMKNET
DMKNLD DMKNLE DMKOVR DMKPEQ DMKSRM
DMKSYS DMKTHI DMKUDR DMKUSU DMKVDA
DMKVDC DMKVDD

New and Changed CP Control Blocks and Macros

CMDTABLECOMMD SYSFCN SYSLOCS UDIRECT
UIPARMS VMBLK VMBLOK

Virtual Machine Group Support

New and Changed CP Modules

DMKCFG

New and Changed CP Control Blocks and Macros

NAMESYS

VMDUMP Enhancements

New and Changed CP Modules

DMKCSV DMKHVC DMKHVD DMKHVE DMKVIO DMKVMD DMKVME

New and Changed CP Control Blocks and Macros

SFBLOK

ZAP Enhancements

New and Changed Modules

DMSZAP ASSEMBLE

Miscellaneous

EXPAND EXEC ZAPTEXT EXEC

3290 Information Panel Support

New and Changed CP Modules

DMKBLD	DMKBOX	DMKCFT	DMKCFY	DMKCQR
DMKDIA	DMKGRC	DMKGRF	DMKGRT	DMKGRU
DMKGRV	DMKGRW	DMKGRX	DMKHPS	DMKHVD
DMKHVE	DMKQCN	DMKRGA	DMKRGB	DMKRGC
DMKRIO	DMKSEP	DMKSSP	DMKVCN	DMKVCP
DMKVCR	DMKVCV	DMKVCX		

New and Changed CP Control Blocks and Macros

ACCTON	BOXBLOK	CLUSTER
DEVTYPES	GRTBLOK	NETWORK (NICBLOK)
RBLOKS (RDEVBLOK)	RDEVICE	SYSLOCS
TERMINAL	WEBLOK	

3370 Direct Access Storage Device

New and Changed CP Modules

DMKBIO	DMKCPI	DMKCPW	DMKEMB	DMKIOC
DMKIOJ	DMKVDA	DMKVDE		

New and Changed CP Control Blocks and Macros

DEVTYPES RDEVBLOKS

3480 Magnetic Tape Subsystem

New and Changed CMS Modules

DMSFLD	DMSTIO	DMSTPE	DMSTPF	DMSTPG
DMSTPH	DMSTPI	DMSTPJ	VMFPLC2	

New and Changed CP Modules

DMKACR	DMKCCW	DMKCKP	DMKCPI	DMKCPM
DMKCPP	DMKCPS	DMKCPT	DMKCPU	DMKCPW
DMKCSB	DMKCSC	DMKDDR	DMKDIR	DMKDMP
DMKEMB	DMKEMC	DMKFMT	DMKIOC	DMKIOE
DMKIOH	DMKIOJ	DMKIOS	DMKIOT	DMKMCC
DMKMNT	DMKMON	DMKMSW	DMKPAG	DMKPAH
DMKSPK	DMKSPL	DMKSPS	DMKSPT	DMKTPE
DMKUSO	DMKUSP	DMKVSI	DMKVSJ	DMKZTD

New and Changed CMS Control Blocks and Macros

DMSTMS	FDEFSECT	RDTAPE	TAPECTL	TAPESL
TAPEWORK	WRTAPE			

New and Changed CP Control Blocks and Macros

DEVTYPES	LDBLOK	IOBLOKS	IOER	OBRRECN
PSA	RBLOKS	RCTLUNIT	RDEVICE	SDRBLOK
TNSREC				

3800 Model 3 Printing Subsystem

Changed CMS Modules

DMSIMA DMSPIO DMSPRT DMSSPR

New and Changed CP Modules

DMKCCW DMKCKP DMKCKS DMKCKV DMKCPI
DMKCPO DMKCPS DMKCPT DMKCPW DMKCQG
DMKCSO DMKDEF DMKDEG DMKDID DMKDIR
DMKEMB DMKIMG DMKIOJ DMKIOT DMKRSE
DMKRSF DMKRSP DMKSCN DMKSEP DMKSEQ
DMKSPL DMKSSP DMKTCS DMKTCT DMKURS
DMKVDR DMKVDS DMKVSQ DMKVSP DMKVST
DMKVSV DMKVSX DMKWRM

New and Changed CP Control Blocks and Macros

ERRBLOK DEVTYPES RDEVICE TNSREC VDEVBLOK

4248 Printer

New and Changed CMS Modules

DMSASN DMSPIO DMSPRT

New and Changed CP Modules

DMKCPB DMKCSB DMKCSC DMKCSO DMKDEF
DMKDIR DMKFCB DMKIOC DMKIOE DMKIOF
DMKIOJ DMKMSW DMKRSE DMKRSP DMKSEP
DMKSPL DMKSSP DMKURS DMKVDR DMKVSP
DMKVSQ DMKVSR DMKVST

New and Changed Control Blocks and Macros

DEVTYPES FCB LDBLOK RDEVICE SFBLOK
VFCBBLOK

4361 and 4381 Processors

New and Changed CP Modules

DMKCCH	DMKCKH	DMKCKP	DMKCPJ	DMKCPS
DMKEME	DMKGRF	DMKIOG	DMKMCH	DMKMCI
DMKOPE	DMKPRV	DMKSAV	DMKTOD	

New and Changed CP Control Blocks and Macros

CKP	MCHAREA	PSA	RDEVICE

General Changes

CP Module Splits

Original Modules	Split Into
DMKCFQ	DMKCFQ DMKCFR
DMKCKP	DMKCKP DMKCKD DMKCKF DMKCKH DMKCKM DMKCKN
DMKCPI	DMKCPI DMKALO DMKIDU DMKMNT DMKSEG DMKTOD
DMKCPI DMKCPJ	DMKCPI DMKCPJ DMKOPE
DMKCPU	DMKCPU DMKCPM
DMKCQP	DMKCQP DMKCQT
DMKCSO	DMKCSO DMKCSF
DMKEMA DMKEMB DMKEMC	DMKEMA DMKEMB DMKEMC DMKEMD DMKEME
DMKFRE	DMKFRE DMKFRT
DMKLOG	DMKLOG DMKLOJ
DMKLOH	DMKLOH DMKLOM
DMKRSE	DMKRSE DMKRSF
DMKRGA	DMKRGA DMKRGE
DMKSEP	DMKSEP DMKSEQ
DMKTRT	DMKTRT DMKTRU
DMKVCP	DMKVCP DMKVCQ
DMKVCR	DMKVCR DMKVCS
DMKVDA	DMKVDA DMKVDB
DMKVMD	DMKVMD DMKVME
DMKVSP	DMKVSP DMKVSX

New CP Copy Files

CKP	CKPLIST	CKPMAC	CMDTABLE	FREEXT
TRACEFMT	VGBLOK	WIDABLOK		

New CP Control Blocks and Macros

BITDEF	COMMD	EMSG	FRECOM	HEXNUM
SADUMP	SYSFCN	TED	TRACEFMT	

New CP Modules

DMKALO	DMKCKD	DMKCKF	DMKCKH	DMKCKM
DMKCKN	DMKCMD	DMKCPM	DMKCQT	DMKCSF
DMKEMD	DMKEME	DMKEMR	DMKFRT	DMKIDU
DMKMNT	DMKOPE	DMKOVR	DMKRGE	DMKSAD
DMKSEG	DMKSEQ	DMKTED	DMKTEE	DMKTEF
DMKTEM	DMKTES	DMKTPE	DMKTRU	DMKVCQ
DMKVCS	DMKVDB	DMKVME	DMKVMG	

Index

Special Characters

A

B

C

D

E

F

G

H

I

L

Q

R

S

T

U

V

W

X

Z

Numerics

SC24-5248-1

VM/SP Release 4 Guide (File No. S370/4300-20) Printed in U.S.A. SC24-5248-1

VM/SP
Release 4 Guide
Order No. SC24-5248-1

READER'S COMMENT FORM

This manual is part of a library that serves as a reference source for systems analysts, programmers, and operators of IBM systems. You may use this form to communicate your comments about this publication, its organization, or subject matter, with the understanding that IBM may use or distribute whatever information you supply in any way it believes appropriate without incurring any obligation to you.

Your comments will be sent to the author's department for whatever review and action, if any, are deemed appropriate. Comments may be written in your own language; English is not required.

Note: *Copies of IBM publications are not stocked at the location to which this form is addressed. Please direct any requests for copies of publications, or for assistance in using your IBM system, to your IBM representative or to the IBM branch office serving your locality.*

Note: Staples can cause problems with automated mail sorting equipment. Please use pressure sensitive or other gummed tape to seal this form.

	Yes	*No*
• Does the publication meet your needs?	☐	☐
• Did you find the material:		
Easy to read and understand?	☐	☐
Organized for convenient use?	☐	☐
Complete?	☐	☐
Well illustrated?	☐	☐
Written for your technical level?	☐	☐

• What is your occupation? _____

• How do you use this publication:

As an introduction to the subject?	☐	As an instructor in class?	☐
For advanced knowledge of the subject?	☐	As a student in class?	☐
To learn about operating procedures?	☐	As a reference manual?	☐

Your comments:

If you would like a reply, please supply your name and address on the reverse side of this form.

Thank you for your cooperation. No postage stamp necessary if mailed in the U.S.A. (Elsewhere, an IBM office or representative will be happy to forward your comments or you may mail directly to the address in the Edition Notice on the back of the title page.)

SC24-5248-1

Reader's Comment Form

Cut or Fold Along Line

Fold and Tape | Please Do Not Staple | Fold and Tape

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 40 ARMONK, N.Y.

POSTAGE WILL BE PAID BY ADDRESSEE:

International Business Machines Corporation
Department G60
P. O. Box 6
Endicott, New York 13760

Fold | Fold

If you would like a reply, *please print:*

Your Name _____

Company Name _____ *Department* _____

Street Address _____

City _____

State _____ *Zip Code* _____

IBM Branch Office serving you _____

IBM®

VM/SP Release 4 Guide (File No. S370/4300-20) Printed in U.S.A. SC24-5248-1

VM/SP
Release 4 Guide
Order No. SC24-5248-1

READER'S COMMENT FORM

This manual is part of a library that serves as a reference source for systems analysts, programmers, and operators of IBM systems. You may use this form to communicate your comments about this publication, its organization, or subject matter, with the understanding that IBM may use or distribute whatever information you supply in any way it believes appropriate without incurring any obligation to you.

Your comments will be sent to the author's department for whatever review and action, if any, are deemed appropriate. Comments may be written in your own language; English is not required.

Note: *Copies of IBM publications are not stocked at the location to which this form is addressed. Please direct any requests for copies of publications, or for assistance in using your IBM system, to your IBM representative or to the IBM branch office serving your locality.*

Note: Staples can cause problems with automated mail sorting equipment. Please use pressure sensitive or other gummed tape to seal this form.

	Yes	*No*
• Does the publication meet your needs?	☐	☐
• Did you find the material:		
Easy to read and understand?	☐	☐
Organized for convenient use?	☐	☐
Complete?	☐	☐
Well illustrated?	☐	☐
Written for your technical level?	☐	☐

• What is your occupation? _____

• How do you use this publication:

As an introduction to the subject?	☐	As an instructor in class?	☐
For advanced knowledge of the subject?	☐	As a student in class?	☐
To learn about operating procedures?	☐	As a reference manual?	☐

Your comments:

If you would like a reply, please supply your name and address on the reverse side of this form.

Thank you for your cooperation. No postage stamp necessary if mailed in the U.S.A. (Elsewhere, an IBM office or representative will be happy to forward your comments or you may mail directly to the address in the Edition Notice on the back of the title page.)

SC24-5248-1

Reader's Comment Form

Cut or Fold Along Line

Fold and Tape | Please Do Not Staple | Fold and Tape

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 40 ARMONK, N.Y.

POSTAGE WILL BE PAID BY ADDRESSEE:

International Business Machines Corporation
Department G60
P. O. Box 6
Endicott, New York 13760

Fold | Fold

If you would like a reply, *please print:*

Your Name _____

Company Name _____ *Department* _____

Street Address _____

City _____

State _____ *Zip Code* _____

IBM Branch Office serving you _____

IBM®

VM/SP Release 4 Guide (File No. S370/4300-20) Printed in U.S.A. SC24-5248-1

SC24-5248-1

SC24-5248-01