

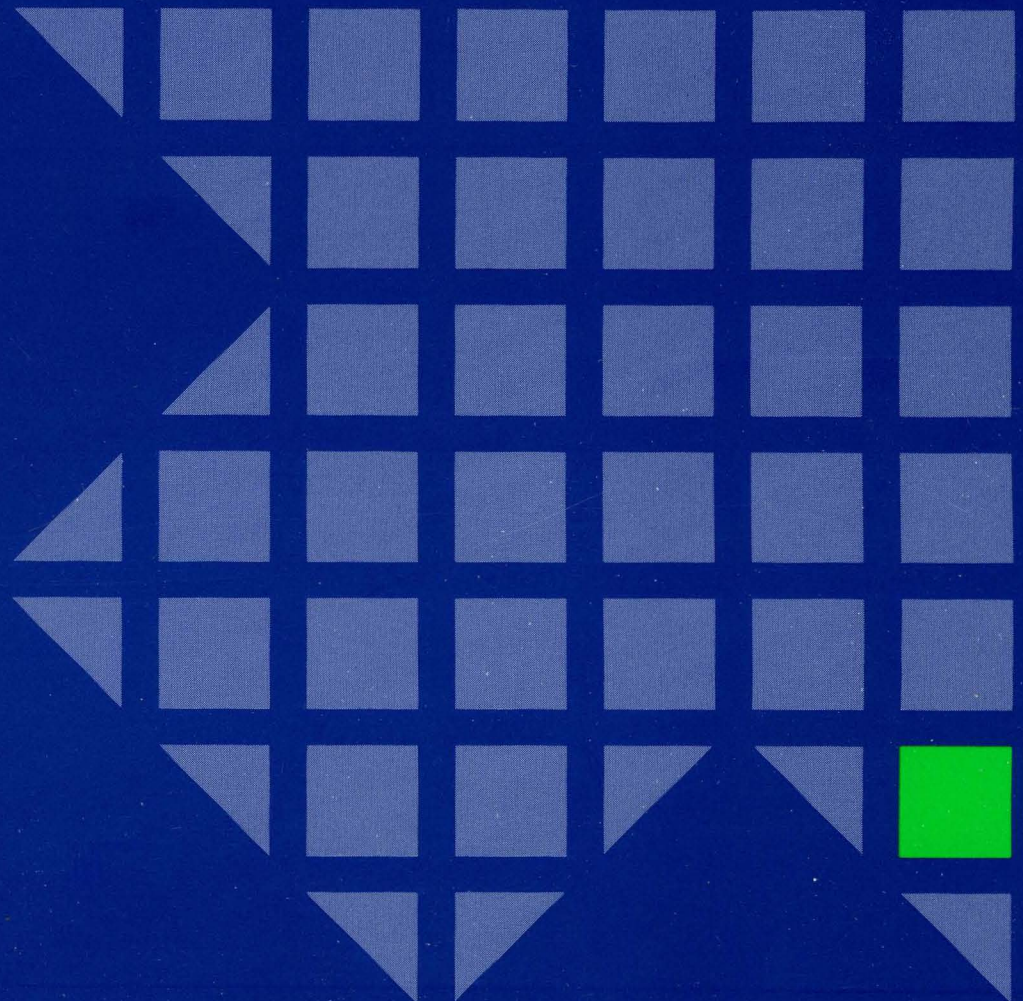


Virtual Machine/Extended Architecture™
System Product

SC23-0357-1

Conversion Notebook

VM/XA™ SP Release 2





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System Product

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Second Edition (September 1988)

This is a major revision of, and obsoletes, SC23-0357-0. See "Summary of Changes" on page 297 for a summary of the changes made to this manual.

This edition applies to Release 2 of the Virtual Machine/Extended Architecture System Product (VM/XA SP) Licensed Program 5664-308. 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, 30xx, 4300, and 9370 Processors Bibliography*, GC20-0001, for the editions that are applicable and current.

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Preface

Purpose

This publication describes how to plan and implement:

- A conversion from VM/SP HPO Release 4.2 or 5 to VM/XA SP Release 2
- A conversion from VM/XA SF Release 2 to VM/XA SP Release 2
- A migration from VM/XA SP Release 1 to VM/XA SP Release 2.

This manual does not address CMS application conversion in detail. For that information, see *VM/XA SP CMS Application Program Conversion Guide*.

Audience

This publication is for system programmers, system analysts, and system support personnel.

Prerequisite Knowledge

This publication assumes that you are familiar with the system from which you are converting.

How to Use This Publication

For those converting from VM/SP HPO Release 4.2 or 5: Read Part 1, “Converting from VM/SP HPO to VM/XA SP” on page 1.

For those converting from VM/XA SF Release 2: Read Part 2, “Converting from VM/XA SF to VM/XA SP” on page 147.

For those migrating from VM/XA SP Release 1: Read Part 3, “Migrating from VM/XA SP Release 1 to Release 2” on page 237.

Note on the Scope of This Notebook

The information in the notebook is designed for those interested in converting from VM/SP HPO or VM/XA SF, or migrating from VM/XA SP Release 1. You will find little information about exploiting the new and improved functions in VM/XA SP. IBM advises you to do your conversion or migration first, then exploit new functions on VM/XA SP as a second step. If you make improvements to your system while converting or migrating, this adds to the size of the project and hampers your ability to return to your previous system. While converting or migrating, make note of improvements you can make and return to them after you have completed the first step. In addition to making the scope of your job more manageable, converting or migrating first helps you set a clear criterion for the success of your conversion or migration; the same work you could do on your old system is what you can do on the new VM/XA SP system.

You can find more information about exploiting the advanced functions of VM/XA SP in the VM/XA SP publications.

If you are looking for more information about licensed programs or the hardware that VM/XA SP supports, see *VM/XA SP General Information* and the latest announcement materials. You can also get help from your IBM representative.

Related Publications

See the Bibliography at the back of this publication.

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Part 1. Converting from VM/SP HPO to VM/XA SP



Chapter 1. Overview: Systems Comparison

This chapter compares the Virtual Machine/Extended Architecture™ System Product (VM/XA™ SP) to the Virtual Machine/System Product High Performance Option (VM/SP HPO) by providing:

- A table summarizing compatibility
- Greater detail for key items in the table.

Summary of Compatibility between VM/SP HPO and VM/XA SP

IBM designed VM/XA SP to satisfy the growth needs of large VM systems and to offer an attractive growth path for VM/SP HPO customers. In general, VM/XA SP provides more addressing capability and processing power than VM/SP HPO.

While one of the primary objectives of VM/XA SP is to ease conversions by providing maximum compatibility with VM/SP HPO, factors such as architectural differences prevent full compatibility. IBM has made every effort to ease the conversion from VM/SP HPO by keeping, where possible, command syntax, responses, and message texts the same.

IBM designed the CP differences to minimize their effect on the end user and on application programs. Differences in CP functions between VM/XA SP and VM/SP HPO are in the areas of architecture, systems design, and enhancements to the VM/XA SP system. In addition to functional differences, CP commands, DIAGNOSE codes, and messages may also differ.

The CMS component in VM/XA SP is generally upwardly compatible with the CMS component in VM/SP HPO Release 5. If you are converting from VM/SP HPO Release 4.2, you must evaluate changes to CMS between VM/SP Release 4 and Release 5. Refer to VM/SP Release 5 publications to make this evaluation. See *VM/XA SP CMS Application Program Conversion Guide* for information about converting your applications to the VM/XA SP CMS.

Table 1 shows a summary of the compatibility between VM/SP HPO and VM/XA SP. In the table, “compatible” means the item has equivalent syntax, responses, and functions. “Upwardly compatible” means there are differences in syntax, responses, or functions, but invocations using previous syntax should continue to execute unchanged in application programs.

Table 1 (Page 1 of 7). Summary of Compatibility between VM/SP HPO and VM/XA SP	
VM/SP HPO Item	VM/XA SP's Support of the Item
Virtual machines	VM/XA SP supports System/370 and 370-XA mode virtual machines, whereas VM/SP HPO supports only System/370 virtual machines.

Table 1 (Page 2 of 7). Summary of Compatibility between VM/SP HPO and VM/XA SP	
VM/SP HPO Item	VM/XA SP's Support of the Item
Virtual Processors	In VM/XA SP, virtual machines can have up to 64 virtual processors, allowing you to test the multiprocessing configurations of guest operating systems. Note also that any virtual machine can control all but one of the real processors of the real machine as dedicated processors. Additional virtual processors run on the master processor. In contrast, VM/SP HPO allows up to two virtual processors for the preferred virtual machine only (one dedicated and one virtual that shares the other instruction processor).
Single-image mode	VM/XA SP runs on all 370-XA multiprocessors in single-image mode regardless of the number of instruction processors (N-way support), whereas VM/SP HPO supports up to two real instruction processors on a multiprocessor. For example, VM/SP HPO supports the 3090 Model 400 in partitioned processing mode only while VM/XA SP supports all four processors in single-image mode.
Preferred machine assist	In VM/SP HPO, the preferred machine assist microcode allows an MVS/SP preferred virtual machine to directly control separate channels dedicated to it, thus gaining a performance improvement. The start interpretive-execution assist, available on most supported processors, gives a similar benefit on VM/XA SP, but without the need to dedicate separate channels to the preferred virtual machine. This may make it simpler for you to configure a preferred virtual machine's I/O.
CP control blocks	In VM/XA SP, CP control blocks can be anywhere in real storage. In VM/SP HPO, in which large numbers of CMS users or a preferred guest can cause storage below the 16Mb line to be at a premium, system control blocks have to be kept in the first 16Mb of real storage.
Real storage size	VM/XA SP supports the architected real storage size of 370-XA, 2 gigabytes. VM/SP HPO supports a maximum of 64Mb.
Virtual storage addressing	VM/XA SP supports 24-bit or 31-bit virtual storage addressing, giving a range of 2Gb. The current virtual addressing range supported by CP is 999Mb, providing 62 times the addressing capability as with VM/SP HPO. VM/SP HPO supports 24-bit addressing only.
Expanded Storage	VM/XA SP allows you to share Expanded Storage among CP and virtual machines. VM/SP HPO uses Expanded Storage for CP paging and swapping only.
Preferred virtual machine	VM/XA SP allows up to six preferred guests (V = R and V = F; there can be only one V = R) whereas VM/SP HPO supports one (V = R).
System/370 architecture	System/370 mode virtual machines are compatible with System/370 architecture.

Table 1 (Page 3 of 7). Summary of Compatibility between VM/SP HPO and VM/XA SP	
VM/SP HPO Item	VM/XA SP's Support of the Item
I/O management	VM/XA SP uses the 370-XA channel subsystem, which moves the management of I/O from the processor and operating system into the channels themselves. Devices are addressed by any available path and an I/O interrupt does not always have to return on the same path from which it was started. This gives you improved performance, reliability, availability, and serviceability characteristics over those available when using System/370 I/O. Refer to "How I/O Differs" on page 10 for more information.
Real channel programs	As in VM/SP HPO, programs running in System/370 V=V machines may build and execute real channel programs, and use DIAGNOSE code X'98' or GCS macros to do this. But in VM/XA SP, you must reserve the real storage for these channel programs by specifying the RIO370 parameter of the SYSSTORE macro during system definition. (This same requirement exists in VM/XA SP for 370-XA V=V machines running in 24-bit addressing mode, but not for 370-XA V=V machines running in 31-bit addressing mode.)
Device numbers	VM/XA SP uses four-digit real and virtual device numbers, while VM/SP HPO uses four-digit real device addresses (VM/SP HPO is limited to channel X'1F' while VM/XA SP can support up to X'FF') and three-digit virtual device addresses. This difference does not affect command invocation, but does result in an incompatibility in command responses and messages, since some responses and messages carry four-digit device numbers.
Swapping	Block paging provides similar function. Refer to "How Block Paging Differs from Swapping" on page 15
Saved segment support	In VM/XA SP, you do not define saved segments in a systems name table (DMKSNT) at system initialization time. Rather, you define saved segments using CP commands. Refer to "How Saved Segment Support Differs" on page 17.
Spool files	The spool file format is different in VM/XA SP. As a result, you must use the SPTAPE command (along with a cold start) or RSCS to migrate spool files from VM/SP HPO to VM/XA SP. This is discussed in "Spool Files" on page 21.
Migrating system files	VM/XA SP does not support migrating system files between VM/SP HPO and VM/XA SP. System files include the following: <ul style="list-style-type: none"> • Files created by the VM/SP HPO ACNT, CPTRAP, and MONITOR commands • VM/XA SP named saved systems, saved segments, image libraries, user class restructure (UCR) files, and system trace files. • Virtual machine dumps, CP abend dumps, and CP stand-alone dumps from either VM/SP HPO or VM/XA SP.
Journaling	VM/XA SP supports RACF, which provides similar function. Refer to "Replacement for Journaling" on page 22.

Table 1 (Page 4 of 7). Summary of Compatibility between VM/SP HPO and VM/XA SP	
VM/SP HPO Item	VM/XA SP's Support of the Item
Networking facilities	As in VM/SP HPO, you can use the group control system (GCS) component of VM/XA SP to implement a native SNA communication network. There are several differences. Refer to "Networking Facilities" on page 23.
User minidisks	CMS minidisks are fully compatible and those that reside on VM/XA SP-supported devices can be used unchanged.
CMS commands	All VM/XA SP CMS commands are compatible except the DEBUG command. There are new CMS commands that invoke new function and there are enhanced commands to invoke enhanced function. The enhanced commands are upwardly compatible.
CMS macros	CMS macros in VM/XA SP are upwardly compatible.
CMS external control blocks	CMS external control blocks in VM/XA SP are compatible. VM/XA SP CMS does not have the FREELOWE field in NUCON. Particularly sensitive to the conversion are programs that "steal PSWs" or field external interrupts.
CP command privilege classes	Privilege classes for some VM/XA SP CP commands and DIAGNOSE codes may differ for the corresponding CP commands in VM/SP HPO.
Message action indicators	Action indicators (for example, the "E" in message 204E) on VM/XA SP CP messages may differ for the corresponding messages in VM/SP HPO, even though the message number may be the same.
Nonzero return codes	The nonzero return code and accompanying message that VM/XA SP returns for errors may not be the same as the nonzero return code that VM/SP HPO returns for corresponding errors.
Leading zeros	VM/XA SP suppresses leading zeros more often than VM/SP HPO does.
EXECs written in CMS EXEC, EXEC 2, or REXX	Generally, these EXECs are upwardly compatible. However, EXECs that use CP commands or DIAGNOSE codes must be examined for compatibility. You should also check return codes or CP responses. EXEC, EXEC 2, and REXX programs run in System/370 mode or 370-XA mode virtual machines but only below the 16Mb line.
Programs written in high-level languages	Programs written in the high-level languages (not the EXEC languages) that VM/XA SP supports are source and object code compatible.
Assembler application programs and any program using 24-bit addressing	They should execute without change. Exceptions could be programs that: <ul style="list-style-type: none"> • Depend on internal CP or CMS structure or control blocks • Depend on functions that CP does not provide • Depend on incompatible CP externals • Depend on explicit System/370 architecture implementation. Refer to Chapter 8, "Application Programming" on page 91 for more details.
OS simulation services	OS simulation is compatible with VM/SP Release 5 CMS. VM/XA SP adds MVS/XA macros.

Table 1 (Page 5 of 7). Summary of Compatibility between VM/SP HPO and VM/XA SP	
VM/SP HPO Item	VM/XA SP's Support of the Item
DOS/VSE simulation	DOS/VSE simulation is compatible with VM/SP Release 5 CMS.
Installing CP	Installation procedures for the VM/XA SP CP are generally compatible with VM/SP HPO. There are differences for the system definition (SYS) file, the real I/O (RIO) file, and the user directory. The system name table (SNT) does not exist in VM/XA SP. You generate saved segments while the system is operating, so you do not need to convert saved segments during the installation procedure. Refer to Chapter 3, "Installation and Service" on page 45 for a detailed discussion.
Installing CMS	Installing CMS on VM/XA SP is a similar, EXEC-driven procedure. CMS as a named saved system requires 2Mb of virtual storage.
Installing GCS	Installing GCS on VM/XA SP is a similar, EXEC-driven procedure.
Installing user-written applications and licensed programs in shared storage	Installing user-written applications and licensed programs in shared storage differs due to the improved usability of VM/XA SP's shared storage support. You have to rebuild named saved systems and saved segments into 1Mb segments (you can store more than one licensed program in this 1Mb segment) and remap saved segment storage layouts. This is a one-time effort. Refer to "How Saved Segment Support Differs" on page 17, "Managing Saved Segments" on page 61, and <i>VM/XA SP Planning and Administration</i> .
Licensed programs	You can find a list of supported licensed programs in <i>VM/XA SP General Information</i> .
Devices	You can find a list of supported devices in <i>VM/XA SP General Information</i> .
VM/RTM, VMMAP, and VMPPF	VM/XA SP supports a real time monitor called RTM/SF. Its output looks similar to VM/RTM's in VM/SP HPO but has different meaning due to architectural differences in the two systems. VM/XA SP does not support a monitor analysis program or a performance predictor facility. VM/XA SP does provide monitor data and a sample program called MONWRITE, which writes the raw monitor data to disk or tape.
CP monitor	The VM/XA SP monitor collects data in categories called domains rather than in categories called classes, samples, and events. The monitor writes records to saved segments, not to spool files. Refer to "The VM/XA SP Monitor" on page 75.
EREP	Files created by the CPEREPA command are stored in CMS files. You must set up a virtual machine to collect these files.

Table 1 (Page 6 of 7). Summary of Compatibility between VM/SP HPO and VM/XA SP	
VM/SP HPO Item	VM/XA SP's Support of the Item
Stand-alone utilities	<p>VM/XA SP supports a stand-alone dump utility program, the Device Support Facilities program, and two versions of the DASD dump restore program.</p> <ul style="list-style-type: none"> • One version, DDRXA, is a stand-alone program that can be run either on a real 370-XA processor or in a 370-XA virtual machine. • The other version, the System/370 DDR program, is a CMS facility that can be run only under CMS in a System/370 virtual machine. <p>VM/XA SP does not support a stand-alone directory program or Format/Allocate program.</p>
Checkpoint start	Checkpoint start is not required because of the VM/XA SP spooling design.
IPCS	VM/XA SP provides the dump viewing facility instead of IPCS. There are differences in the naming of dumps, in symptom record handling for non-CP dumps, in processing trace table data, and in display management capability. Also, the dump viewing facility does not support the problem recording and management functions of IPCS.
IUCV	IUCV in VM/XA SP is compatible with IUCV in VM/SP HPO except that VM/XA SP does not support the following CP system services: *CRM, *IDENT, *LOGREC, and *SPL. VM/XA SP adds a new CP system service, *MONITOR.
FBA devices	VM/XA SP supports the 3370 as dedicated-only.
Nondisruptive transition	Nondisruptive transition is no longer needed because of the way VM/XA SP handles the V = R machine.
Single processor mode	Single processor mode is no longer needed because of virtual machine multiprocessing.
Guest operating systems	VM/XA SP supports all VM/SP HPO-supported operating systems as guests except for IX/370 and MUSIC/SP. VM/XA SP adds MVS/XA, TPF, VM/XA SF, and VM/XA SP.
User modifications to the system	VM/XA SP and VM/SP HPO CPs have significantly different internal structures. You have to rework VM/SP HPO CP user modifications in order to apply them to the VM/XA SP CP. IBM provides a sample exec, called COMPSCAN SAMPEXEC, to help you convert applications. Refer to Appendix A, "Conversion Tools" on page 277.
ASCII terminals	VM/XA SP supports the connection of ASCII terminals through VTAM or an IBM 7171 Device Attachment Control Unit. VM/SP HPO supports the connection of ASCII terminals through VTAM, through an IBM 7171 Device Attachment Control Unit, or natively.
Advanced printing subsystem services (APSS)	VM/XA SP will support APSS after general availability of VM/XA SP Release 2.
Product documentation	The VM/XA SP documentation is structured by task. As a result, the VM/XA SP and VM/SP HPO CP manuals differ in structure.

Table 1 (Page 7 of 7). Summary of Compatibility between VM/SP HPO and VM/XA SP

VM/SP HPO Item	VM/XA SP's Support of the Item
<ul style="list-style-type: none"> • Alternate CP nucleus support • Indexed sequential access method (ISAM) • Line mode devices • Native CP communication line driver support • Page migration • Preallocated dump space • SHUTDOWN re-IPL • Transparent services access facility (TSAF) 	VM/XA SP does not support these VM/SP HPO functions.

New Functions That Do Not Affect Conversion

Some of the explanations in Table 1 describe new functions in VM/XA SP. Listed below are additional new functions. To exploit these functions, be sure to read the other publications in the VM/XA SP library. These new functions include:

- Multiple preferred guests, provided you have the Processor Resource/Systems Manager™ (PR/SM™) feature on your 3090 Model E processor
- Expanded Storage caching capability for virtual machine logon, IPL, and CMS system minidisks
- Ability to dedicate Expanded Storage to a guest
- Ability to attach logical devices
- Logged-on user limit changes
- Additional soft abend dump capability
- Automatic load balancing across paging devices
- New DIAGNOSE codes (see “VM/XA SP-Only DIAGNOSE Codes” on page 127)
- New commands or operands, which provide the ability to:
 - Retain spool files in hold status after processing (the KEEP operand of the CHANGE command)
 - Display the contents of third-level storage (the DISPLAY command)
 - Prevent specific users from logging on to the system (the HOLD LOGON command)
 - Specify more at logon (the LOGON command), such as your virtual machine storage size (the STORAGE operand) and an account number (the ACCOUNT operand)

Processor Resource/Systems Manager and PR/SM are trademarks of the International Business Machines Corporation.

- Display the number of allocated, in use, and available cylinders for DASD volumes attached to the system (the QUERY ALLOC command)
- Display the spool file limit for the system or for any individual user (the QUERY MAXSPOOL command)
- Display and set the current limit of logged-on users (the QUERY MAXUSERS and SET MAXUSERS commands)
- Specify whether CP or your virtual machine will handle the SVC76 instruction (the SET SVC76 command)
- Make a path to devices logically available or unavailable for use by the system (the VARY PATH command).

How I/O Differs

One of the major differences between System/370 and 370-XA architecture is in the way I/O is handled. Each architecture has a unique instruction set and a unique method of handling I/O to and from devices. 370-XA replaces System/370 channels with a channel subsystem.

The main differences are:

- The 370-XA channel subsystem is designed so all processors in the system can access all the devices attached to the system.
- In 370-XA, hardware, rather than software, handles path management.
- 370-XA device numbers do not have to correspond to the physical attachment of the I/O device. (For back off purposes, you should make the VM/XA SP device numbers correspond to the VM/SP HPO addresses.)

In System/370, you relate devices to control units or channels. For instance, I/O set up for device number 342 would be as shown in Figure 1.

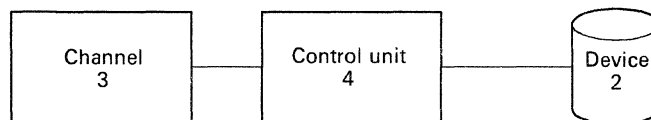


Figure 1. System/370 Rationale for Device Numbers

In 370-XA, you relate devices to subchannels. Since each subchannel is uniquely associated with one I/O device and that I/O device is uniquely associated with that one subchannel, the subchannel becomes the addressable unit.

The VM/XA SP channel subsystem is more efficient than the System/370 channels, because it moves I/O management functions out of the control program and into the hardware. This makes your job easier since you no longer need to define all the paths to a device in HCPRIO (the VM/XA SP equivalent of DMKRIO).

Figure 2 on page 11 and Figure 3 on page 12 provide a conceptual overview of the differences.

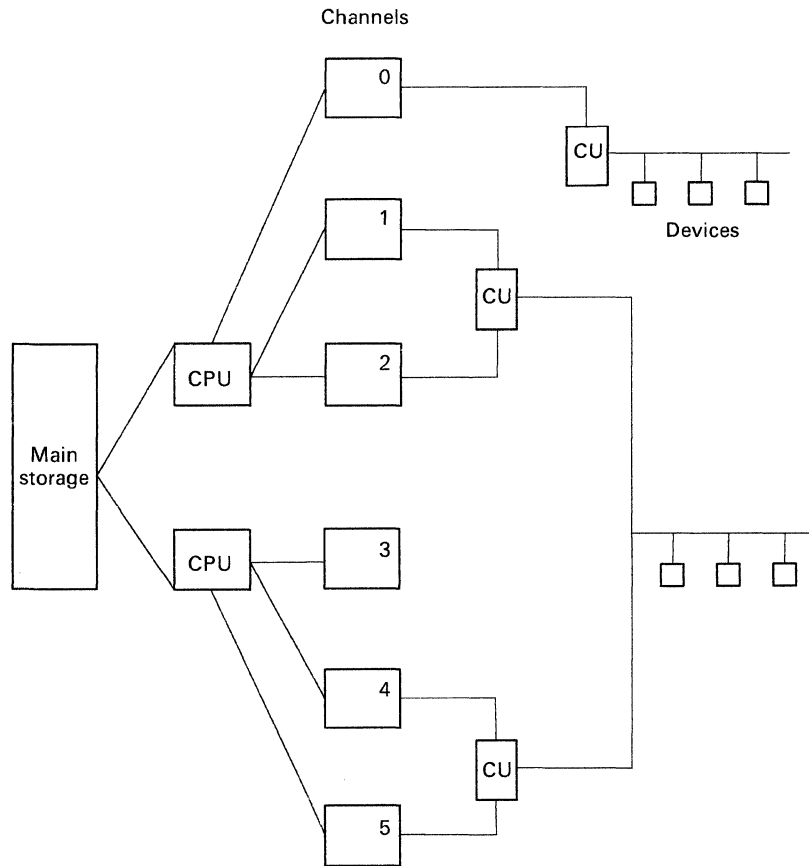


Figure 2. System/370 I/O Structure

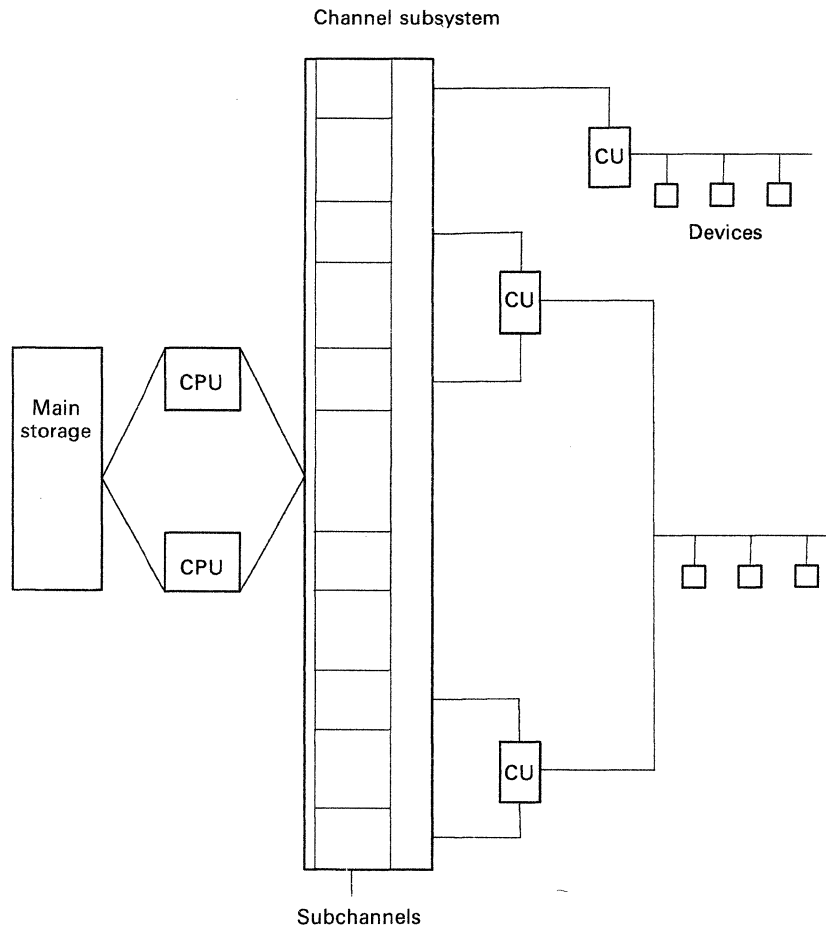


Figure 3. 370-XA I/O Structure

Creating an IOCDS

If you are running VM/SP HPO on a 308X or 3090, you must have defined the real I/O configuration to the hardware. Using the Input/Output Configuration Program (IOCP), you would have created an input/output configuration data set (IOCDS). VM/XA SP requires an IOCDS for 308X, 3090, and 4381 processors.

You can use the same IOCDS for VM/XA SP that you use for VM/SP HPO— unless you defined your I/O in an unconventional manner in VM/SP HPO. For instance, if you used expedient means in VM/SP HPO, such as assigning two addresses to the same device or defining each path to a control unit as a separate control unit (so you could share dedicated devices or attach a single tape unit to several virtual machine guests), you will have to create a new IOCDS. In VM/XA SP, the same expedient means may cause the system to hang or data integrity to be lost.

Even if your current IOCDS does not have these problems, you may benefit from reconfiguring your I/O. During the migration period, however, it is important to have an IOCDS that can be used in both System/370 and 370-XA modes. Therefore, you might consider reconfiguring your I/O in a manner that can be used for both the VM/SP HPO and VM/XA SP systems.

Recommendations for Configuring the I/O

You may want to consider the following:

- When configuring the I/O for the VM/XA SP system, ensure that the I/O configuration described in HCPRIO (the VM/XA SP equivalent of DMKRIO) matches that described in the IOCDS. At system initialization, CP sends warning messages to the primary system operator about devices it finds offline. CP does this by checking the hardware I/O configuration defined by HCPRIO ASSEMBLE. If you have assured that HCPRIO ASSEMBLE and the IOCDS are compatible, the primary system operator receives warning messages only for devices that are intended to be online but were inadvertently left offline.
- To make it easier to convert between your VM/SP HPO system and your VM/XA SP system, you should assign the same device numbers in your VM/XA SP system that you use in your VM/SP HPO system.
- In VM/XA SP, each subchannel is uniquely associated with one I/O device and that I/O device is uniquely associated with that one subchannel, regardless of the number of channel paths by which the I/O device is accessible.
- When running a System/370 operating system as a guest on VM/XA SP, you do not need to define alternate channels and alternate control units.

System/370 Example of IOCP and DMKRIO Files

Figure 4 is an example of a System/370 I/O configuration.

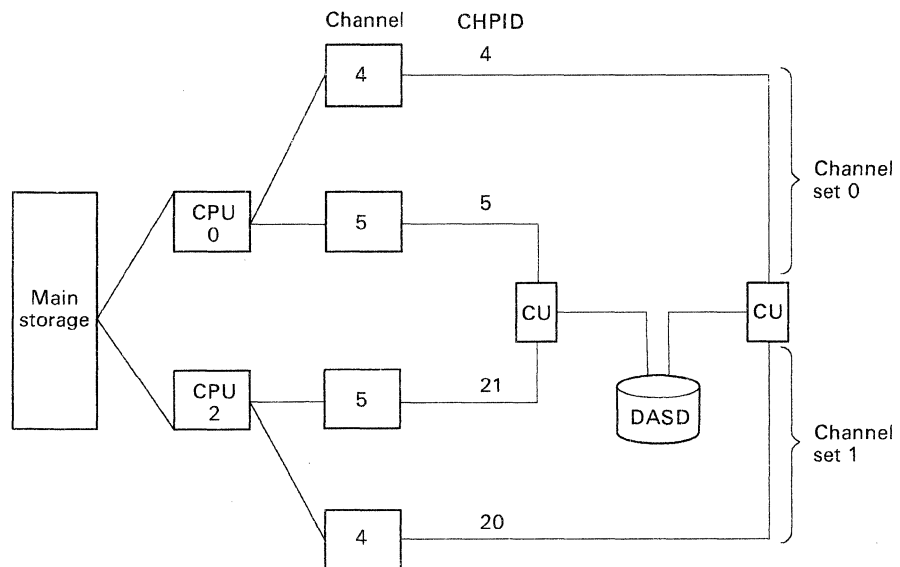


Figure 4. Example of a System/370 I/O Configuration

IOCP and DMKRIO files that define the configuration in Figure 4 follow.

VM/SP HPO IOCP file:

```

CHPID    PATH=((04,4,0)),TYPE=BL
CHPID    PATH=((05,5,0)),TYPE=BL
CHPID    PATH=((20,4,1)),TYPE=BL
CHPID    PATH=((21,5,1)),TYPE=BL
CNTLUNIT CUNUMBR=042,PATH=(04,20),SHARED=N,UNIT=3880,
          PROTOCL=S,UNITADD=((20,32))
CNTLUNIT CUNUMBR=052,PATH=(05,21),SHARED=N,UNIT=3880,

```



```

PROTOCL=S,UNITADD=((20,32))
IODEVICE ADDRESS=(420,32),CUNUMBR=(042,052),UNIT=3380
    
```

VM/SP HPO DMKRIO file:

```

RDEVICE ADDRESS=(420,32),DEVTYPE=3380,ALTCU=520
RCTLUNIT ADDRESS=420,CUTYPE=3880
RCTLUNIT ADDRESS=520,CUTYPE=3880
RCHANNEL ADDRESS=4,CHTYPE=BLKMPXR
RCHANNEL ADDRESS=5,CHTYPE=BLKMPXR
    
```

In the VM/SP HPO IOCP and DMKRIO files you can see that:

- Each channel must be assigned to a specific processor.
- Each piece of hardware must have its own definition.
- There can be multiple paths to a DASD through multiple address ranges. In this example, there are four paths to one DASD through two address ranges.

370-XA Example of IOCP and HCPRIO Files

A corresponding 370-XA I/O configuration would look as shown in Figure 5.

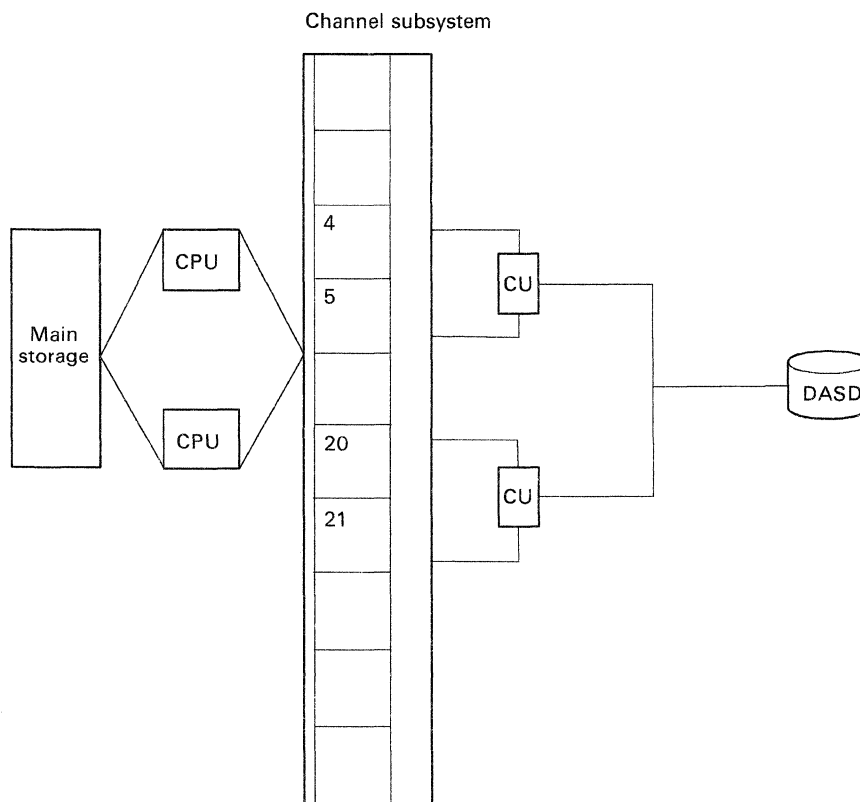


Figure 5. Example of a 370-XA I/O Configuration

Corresponding 370-XA IOCP and HCPRIO files would look as follows.

VM/XA SP IOCP file:

```

CHPID    PATH=((04)),TYPE=BL
CHPID    PATH=((05)),TYPE=BL
CHPID    PATH=((20)),TYPE=BL
CHPID    PATH=((21)),TYPE=BL
CNTLUNIT CUNUMBR=042,PATH=(04,20),SHARED=N,UNIT=3880,
          PROTOCL=S,UNITADD=((20,32))
CNTLUNIT CUNUMBR=052,PATH=(05,21),SHARED=N,UNIT=3880,
          PROTOCL=S,UNITADD=((20,32))
IODEVICE ADDRESS=(420,32),CUNUMBR=(042,052),UNIT=3380

```

VM/XA SP HCPRIO file:

```
RDEVICE DEVNO=(420,32),DEVTYPE=3380
```

In the VM/XA SP IOCP and HCPRIO files you can see that:

- Each channel can be accessed by any processor.
- There can be a 'logical' control unit made up of two real control units.
- There can be multiple paths to a DASD through a single address range. In this example, there are four paths to one DASD through only one address range.

Vary Channel Path Support

VM/XA SP provides commands to vary channel paths online and offline logically. The VARY PATH command allows the system operator to logically make a path to one or more devices available or unavailable for system use. Without this support, you would have to reload (IPL) the entire VM system or vary *all* devices offline, then online, just to gain the one or more paths desired. The vary channel path support allows you to isolate control units for maintenance or dynamically add a new channel path without disrupting the entire system's I/O configuration.

This support also includes commands that allow the system operator to obtain path allocation information. The QUERY PATHS command displays the logical online or offline status of all paths leading to a specified device. The QUERY CHPID command allows the operator to find all the devices accessible through a specified channel path and the logical online and offline status of each device on that path.

How Block Paging Differs from Swapping

VM/XA SP's block paging capability was designed to meet the same objectives as VM/SP HPO's swapping function. (Do not confuse the block paging capability with the function of Expanded Storage.) Like swapping, block paging retrieves groups of pages rather than a single page at a time. This reduces page read overhead, recognizes user working sets, reduces the page fault rate, and utilizes DASD technology.

However, the design of block paging differs from that of swapping. Table 2 on page 16 compares VM/SP HPO's swapping with VM/XA SP's block paging.

Table 2 (Page 1 of 2). How Block Paging Differs from Swapping	
VM/SP HPO Swapping	VM/XA SP Block Paging
You define an amount of space to be used for paging and a separate amount of space to be used for swapping. You split the paging space between primary paging, general paging, and page migration.	There is no distinction between paging and block paging space. You define a single amount of space; CP uses the space for both single pages and blocks of pages. There is no distinction between primary and general paging. Also, there is no page migration.
You can define a fixed value for the swap sets (such as 9) on the SYSPAG macro in DMKSYS.	You do not define the size of blocks.
You can specify a prepage value (such as 2 swap sets) using the SET SRM PREPAGE command. This means that the specified number of pages are brought in before the virtual machine executes.	There is no prepage function; block paging is performed on demand only.
CP forms swap sets without regard to virtual addresses.	CP forms blocks only within the same 1Mb segment of the virtual machine.
CP switches DASD volumes after every swap set.	CP switches DASD volumes after allocating twice the number of records that can fit on a track.
<p>When CP reads a page from the paging area, it does not destroy the data. Thus, CP only needs to rewrite the page if it is changed.</p> <p>When CP reads swap sets from the swap area, it destroys the data after reading it. Thus, CP needs to rewrite all pages in the swap set, regardless of whether they are changed.</p>	When CP reads a single page or a block of pages, it destroys the data after reading it. Thus, CP needs to rewrite all pages (both single pages and blocks of pages), regardless of whether they are changed.
CP includes in a swap set all pages referenced by the user within a time interval, whether or not the user changed the page. Similarly, CP removes pages from the swap set when they are unreferenced by the user, not when they are unchanged.	This works the same way in VM/XA SP as in VM/SP HPO. CP includes in a block of pages all pages referenced by the user within a time interval, whether or not the user changed the page. Similarly, CP removes pages from the block when they are unreferenced by the user, not when they are unchanged.
After using a swap set, CP writes the unreferenced pages out to the paging area and writes the referenced pages in swap sets out to the swapping area.	Since there is only one area for both paging and block paging, CP writes both referenced and unreferenced pages to the same area.

Table 2 (Page 2 of 2). How Block Paging Differs from Swapping	
VM/SP HPO Swapping	VM/XA SP Block Paging
The cursor moves from the beginning to the end of the swapping area. When it reaches the end, it returns to the beginning and starts over. As a result, seek time increases as the size of the swap area increases. This means that you must be careful not to allocate more swap space than you need.	The cursor moves through the paging area but does not necessarily move all the way to the end. When the space behind the cursor is 75% empty, the cursor returns to the beginning. This means that you don't have to worry about allocating too much paging space. CP uses only the amount that it needs.

Refer to "Guidelines for Converting Your VM/SP HPO Paging and Swapping" on page 75 for administrative suggestions.

How Saved Segment Support Differs

Although the basic concept is the same, the saved segment support in VM/XA SP differs from the saved segment support in VM/SP HPO. Table 3 summarizes the differences.

Table 3 (Page 1 of 2). How Saved Segment Support Differs	
VM/SP HPO Saved Segment Support	VM/XA SP Saved Segment Support
You define saved segments during system initialization using a system names table (DMKSNT).	You define saved segments while the system is running using CP commands. This is discussed in "Managing Saved Segments" on page 61.
Storage is comprised of 64K segments, each containing 16 pages of 4K storage.	Storage is comprised of 1Mb segments, each containing 256 pages of 4K storage.
You can store only one licensed program in each 64K segment. The licensed program must be stored on a 64K boundary.	You can store several licensed programs in one or more 1Mb segments as long as you do not store both shared code and nonshared (exclusive) code in the same 1Mb segment. Each licensed program must be stored on a page boundary. This is discussed in "Storing Multiple Licensed Programs in One Segment" on page 18.
You define the ranges of licensed programs in decimal values. Messages and responses are in decimal.	You define the ranges of licensed programs in hexadecimal values. Messages and responses are in hexadecimal.

Table 3 (Page 2 of 2). How Saved Segment Support Differs	
VM/SP HPO Saved Segment Support	VM/XA SP Saved Segment Support
CMS can use a program in a saved segment only when the segment is outside its address space. This is why the saved segments are called discontinuous.	CMS can use a program in a saved segment whether the segment is inside or outside its address space. If the saved segment is inside the address space, it is not considered discontinuous.

Because of the major differences between VM/SP HPO and VM/XA SP in this area, you must completely remap your installation's shared storage. You cannot simply convert your DMKSNT to be used in VM/XA. This remapping is a one-time effort.

When converting to VM/XA SP, you should maintain the DMKSNT file on the VM/SP HPO SYSRES in case you need to back off to VM/SP HPO. The VM/XA SP saved segments and saved systems are kept in system data files and cannot be transferred to VM/SP HPO using SPTAPE. (You can move files between VM/XA SP systems using SPTAPE.)

Storing Multiple Licensed Programs in One Segment

As in VM/SP HPO, you can define a saved segment into which you can store one licensed program. In VM/SP HPO, the discontinuous saved segment (DCSS) is on a 64K boundary; in VM/XA SP, the saved segment is on a megabyte boundary.

But, to provide more efficient use of storage, VM/XA SP also allows you to define *segment spaces* into which you can store multiple licensed programs. In this case, the segment space is on a megabyte boundary but each licensed program is stored on a page boundary. Thus, you can store many more programs in a given area without wasting storage. This is particularly important to you when running application programs in 370-compatibility mode because you need to fit all your licensed programs below the 16Mb line. Once you exploit VM/XA SP and can address licensed programs above the 16Mb line, you do not need to store licensed programs so tightly; 1Mb segments will be sufficient.

You can mix shared and nonshared code within the same segment space as long as you do not mix them within the same 1Mb segment. So, if you have a licensed program, such as PROFS, which requires both shared and exclusive code, you can store both parts in the segment space but you must store them in separate 1Mb segments.

Figure 6 on page 19 shows ISPF/PDF, ISPF, and PROFS all stored in one segment space which spans three 1Mb segments (from the beginning of megabyte 1 to the end of megabyte 3). In this case, ISPF/PDF, ISPF, and PROFS are all considered *member saved segments* of this segment space. Note that the boundaries of the segment space are rounded to megabyte boundaries.

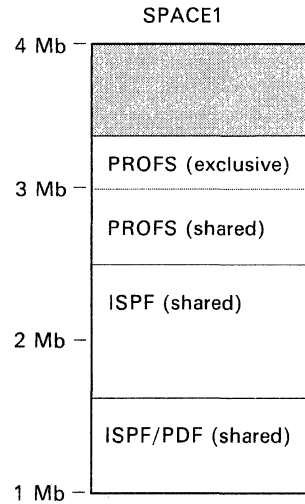


Figure 6. Using a Segment Space to Store Licensed Programs

Overlaying Licensed Programs

As in VM/SP HPO, you can overlay saved segments (that is, define multiple saved segments at the same address range) to make more efficient use of virtual storage.

You can also overlay segment spaces. When you do this, the second segment space replaces the entire address range of the first segment space, even if it is not defined at exactly the same location as the first segment space. If a segment space overlays part of another segment space, it causes all of the currently loaded space to be removed from the user's address space. For example, look at the storage layout in Figure 7 on page 20. If you load SPACE3 while SPACE2 is loaded, all of SPACE2 is removed from the guest's address space even though only part of SPACE2 is overlapped. Similarly, if you load SPACE4 while SPACE2 is loaded, all of SPACE2 is removed from the user's address space. Refer to "Managing Saved Segments" on page 61 for a discussion of how to manage saved segments in VM/XA SP.

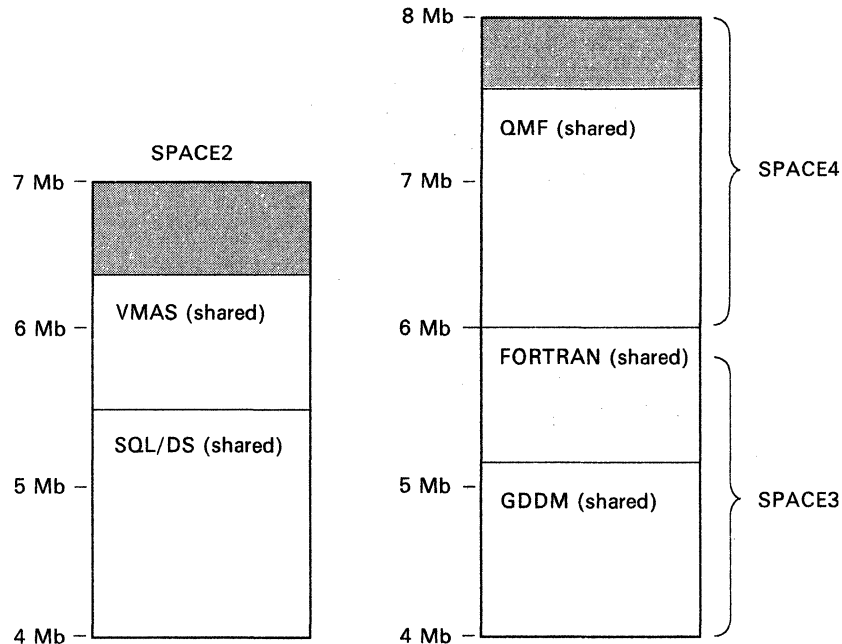


Figure 7. Using Segment Spaces to Overlay Licensed Programs

Saved Segment Terminology

Table 4 explains terminology used to describe attributes of saved segments.

Table 4 (Page 1 of 2). Saved Segment Terminology		
DCSS	Segment Space	Member Saved Segment
Contains one or more megabytes of storage	Contains one or more megabytes of storage	Contains one or more megabytes of storage
Beginning address is rounded down to the nearest megabyte boundary	Beginning address is rounded down to the nearest megabyte boundary	Beginning address is a page boundary
Ending address is rounded up to the nearest megabyte boundary.	Ending address is rounded up to the nearest megabyte boundary	Ending address is rounded up to the last byte in its last page
Minimum size is 1Mb, regardless of how many pages are defined; maximum is 999Mb	Minimum size is 1Mb, regardless of how many pages are defined; maximum is 999Mb	Minimum size is 4K, maximum is 999Mb
May span megabyte boundaries	May span megabyte boundaries	May span megabyte boundaries
May be saved by name with the SAVESEG command	May <i>not</i> be saved by name	May be saved by name with the SAVESEG command

DCSS	Segment Space	Member Saved Segment
May be loaded ¹ by name with DIAGNOSE X'64'	May be loaded ¹ by name with DIAGNOSE X'64'	May be loaded ¹ by name with DIAGNOSE X'64'
May be purged ¹ by name	May be purged ¹ by name	May be purged ¹ by name
Contains a single shared item	Contains up to 64 member saved segments	Is associated with up to 64 segment spaces

Use of System Data Files

VM/XA SP stores saved segments in *system data files*.

A system data file is a special type of spool file that resides in system spool space and contains a collection of data associated with a particular system function. You can create, purge, or replace system data files dynamically without regenerating the operating system, thus maintaining system availability while doing routine management. If you need to do a cold start of the system, the system data files survive.

VM/XA SP uses system data files for:

- Saved segments and named saved systems
- Image libraries for all printers
- CP command privilege class override data
- System trace files.

Spool Files

Because of the incompatibilities in spool file formats between VM/SP HPO and VM/XA SP, you must perform a cold start when converting to VM/XA SP or backing off from VM/XA SP. Use RSCS or the SPTAPE command to transport the spool files back and forth.

If you bring up a VM/SP HPO guest on VM/XA SP and have RSCS service machines running on VM/SP HPO and VM/XA SP, you can use RSCS to send the VM/SP HPO spool files to the VM/XA SP system.

If you do not bring up a VM/SP HPO guest, you must use the SPTAPE command to migrate spool files from VM/SP HPO to VM/XA SP. This is discussed in detail in "Migrating Spool Files" on page 54.

¹ Loading and purging may instead be done with the CMS SEGMENT command or SEGMENT macro.

Spool File Limit

VM/SP HPO Release 4.2 allows up to 9900 spool files per system while VM/SP HPO Release 5 allows up to 9900 spool files per user. VM/XA SP allows up to 9999 spool files per user.

In VM/SP HPO Release 5, you control the total number of spool files in the system using the SYSSPL parameter on the SYSRES macro and the size of the checkpoint area. In VM/XA SP, there is no parameter for limiting the number of spool files in the system. The total number of files allowed in the system is determined by the size of the warm start area.

Although VM/XA SP does not provide a parameter for limiting the number of spool files in the system, it does provide a parameter for limiting the number of spool files for individual users. You do this using the MAXSPOOL parameter on the SPOOLFILE directory control statement.

Determining the Amount of Spool Space Needed

Each DASD type can hold a specific number of pages per cylinder. For instance, a 3380 holds 150 pages per cylinder, allowing nearly 154,000 files. See *VM/XA SP Installation and Service* for the number of pages you can fit on a cylinder of a specific DASD type.

The total spooling space you need depends on the type of spool files you typically have. Small files such as PROFS notes typically use about two pages of DASD storage. Large files like listings, documents, and dumps require much more. Since trailing blanks are suppressed, "narrow" files of many lines require less space than "wide" files with right-hand margins, such as listings. Printer fonts are large and may consume space in environments that process sophisticated documents. A typical installation needs to allocate about 500 cylinders for spool space. See *VM/XA SP Planning and Administration* for details.

Your system operator will receive a warning message when spooling space is nearly full. The operator can bring additional spooling volumes online if those volumes are defined on the SYSCPVOL macro. Otherwise, your operator should request that spool files be purged, processed, or put on tape with the SPTAPE command.

If You Are Converting from VM/SP HPO Release 4.2

If you are converting from VM/SP HPO Release 4.2, do not exceed 9999 spool files in the VM/XA SP system until you are sure that you will not need to back off to VM/SP HPO. Otherwise, you will not be able to migrate all of the spool files back to VM/SP HPO.

Replacement for Journaling

Since VM/XA SP does not support journaling, you may want to install the Resource Access Control Facility (RACF) Version 1 Release 8 to provide this on your system. If you do install RACF, take note of the following:

- You can operate RACF in defer mode. This means that although RACF does authority checks, it issues only warning messages. Access to the resource is granted based on regular VM/XA SP access checks. Defer mode eases your conversion during the period immediately after you install RACF.

After you have completed your conversion to RACF, you can operate RACF in full fail mode, which denies access to a resource when the RACF authority

check fails. If a RACF authority check succeeds, a command completes execution with no change. If the RACF authority check fails, the command terminates with a message.

- End users are affected by RACF. RACF does not immediately lock a user out of the system when the password expires. For instance, if a user's password is expired, RACF allows the user to change the password during logon. (Previous releases of RACF allowed a user to change the password whether or not it was expired. RACF 1.8 allows a user to change the password at logon only if it is expired.)

RACF can be shared among multiple systems, whether they are first-level or second-level.

Networking Facilities

As in VM/SP HPO, you can use the group control system (GCS) component of VM/XA SP to implement a native SNA communication network. Differences are:

- VM/XA SP does not support the transparent services access facility (TSAF) and therefore does not support the Advanced Program-to-Program Communication/VM (APPC/VM) protocol.
- In VM/SP HPO, a virtual machine gains access to the GCS supervisor by a link (the LINK command or LINK directory control statement) to the GCS system disk. In VM/XA SP, this access is controlled by the RSTD operand of the DEFSYS command (to define the GCS named saved system as restricted) and by the NAMESAVE directory control statement (placed in the directories of virtual machines that are allowed to access the GCS named saved system).
- In VM/SP HPO, you use the DMKSNT file to define the name and location of VTAM saved segments. In VM/XA SP, you use the DEFSYS (for GCS) and DEFSEG (for VTAM) commands to define skeleton files that provide similar functions. You then load these files with GCS and VTAM as named saved systems.

Several customers report using the same parameter values for DEFSYS as for DMKSNT.

- To execute real I/O, which moves data between main storage and real I/O devices, VTAM must build a channel program in real storage. In VM/XA SP, VTAM does this by locking pages of virtual storage into real storage, requiring you to:
 - Specify how much real storage to lock by using the RIO370 parameter of the SYSSTORE macro in HCPSYS, the system control file. RIO370 specifies the number of 4K page frames used by a System/370 V=V machine (like VTAM) or a 370-XA V=V machine operating in 24-bit addressing mode that executes real channel programs.
 - Authorize the VTAM service machine to execute real channel programs by specifying the DIAG98 option of the OPTION directory statement in the VTAM service machine's directory.

You can determine the RIO370 parameter value from calculations described in *Network Program Products Storage Estimates*. In the table for constant common storage requirements, complete the calculations for major node activated (channel-attached communication controllers and channel-attached devices). The total of these calculations (with the exception of the calculation

for NetView™ PIU trace activity), rounded up to a 4K multiple, is your RIO370 value for VTAM. If you have other V=V 24-bit machines that execute real channel programs in addition to VTAM, you must add their values to the VTAM value. If you set the RIO370 value too low, VTAM can fail. Several customers with VTAM and two channel-to-channel adapters report using values between 120 and 200.

You can use the QUERY FRAMES command to display the status of the RIO370 area.

How System Scheduling, Tuning, and Monitoring Differ

Refer to "Managing System Performance" on page 70 for a discussion of the VM/XA SP scheduler, tuning controls, and the VM/XA SP monitor.

Chapter 2. Planning for Conversion

Developing a Conversion Plan

A conversion plan is the key to a successful conversion to VM/XA SP. Planning should begin early, ideally as soon as you make the decision to order VM/XA SP. To begin your plan, take inventory of your current system hardware and software, and then establish goals for what your new system environment will contain.

Planning for the conversion is the process of organizing the conversion project in such a way as to produce a new system that meets requirements set by your installation.

Key points you have to consider for conversion planning are:

1. **Develop a statement of purpose for your system conversion.**

The goals for conversion set boundaries on the conversion process and help you put a plan in place that meets your requirements.

2. **Understand the conversion requirements.**

These include:

- **Technical requirements.** What is the technical goal for the new system? For example, your goal might be to remove storage constraints for applications.
- **Schedule.** When do you expect the conversion to be complete? A conversion takes considerably longer than a release-to-release migration.
- **Human resources.** How many people do you need to perform the conversion? It is best to have one person coordinate the conversion. The number of other people involved varies from installation to installation and is based on the complexity of the system, the experience of the personnel, the number of applications, and many other factors. Remember to have backups for key people.
- **Cost.** What is the acceptable limit to the conversion expense?
- **Workload.** What is the maximum workload given current resources? Are additional resources needed?

3. **Establish or update your system technical inventory.**

You should begin your conversion with an accurate inventory of all the elements of your system. Make a list of:

- **Hardware configuration.** This should reflect what is already installed plus any hardware you plan to install or remove during the conversion time period.
- **Software products.** All installed licensed programs, both IBM and vendor products, that are used on your current system.
- **Applications.** You should make an inventory of all applications on your VM/SP HPO system, especially those that use CP and CMS interfaces such as CP commands, DIAGNOSE codes, messages, CP macros, CMS macros, CP control blocks, and CMS control blocks.

- System modifications. This should include any changes you have made to code provided by IBM. You may have to change these modifications.
 - User-installed tools.
4. **Determine which licensed programs, applications, and modifications are necessary and which ones can be replaced or eliminated.**

To find out which programs are used and how often they are used, you can either survey your end users or set up an automated procedure. One way to automate the procedure is to add a statement to the beginning of each EXEC, program, or macro that sends an IUCV *MSG to an IUCV service machine. The service machine will then record the number of times an application is called.

- Refer to *VM/XA SP General Information* or contact your IBM representative for a list of IBM licensed programs supported by VM/XA SP. Determine if these programs offer sufficient functions for your production system. Determine the impact of the functions that are not supported. Order the correct level of the programs that you need, and order any prerequisites or corequisites if you do not already have them.
 - Contact other software companies about non-IBM products.
 - Determine the impact of converting necessary applications and modifications.
5. **Identify specific users or groups of users who will benefit from converting to VM/XA SP and the order in which you will convert them.**

Also, identify users who cannot convert to VM/XA SP because they require functions that are not supported. Plan what you will do with these users; for example, consider running them as users on VM/SP HPO running as a preferred guest under VM/XA SP or moving them to a system that is not yet targeted for conversion.

6. **Evaluate your service agreements with your end users.**

Can you negotiate for different reliability and availability criteria during the conversion period? Also, you may want to warn end users that availability means that the system is up, not that all applications are necessarily working.

7. **Understand the impact of major items that are handled differently in VM/XA SP.**

These include:

- The I/O subsystem
- Block paging instead of swapping
- Saved segment support
- Spool file formats.
- System scheduling, performance monitoring, and tuning.

These items, as well as other major differences between VM/SP HPO and VM/XA SP, are discussed in Chapter 1, "Overview: Systems Comparison" on page 3.

8. **Educate your staff about VM/XA SP.**

Key personnel who need education are:

- **Planners**, who require information about what hardware and software is supported by VM/XA SP

- **System administrators**, who require information about new and changed procedures for controlling system resources
- **Support personnel**, who require information about 370-XA architecture and VM/XA SP system internals
- **Application programmers**, who require information about VM/XA SP application programming interfaces and 370-XA architecture
- **End Users**, who require information about VM/XA SP commands that are different from VM/SP HPO. See Chapter 7, “Application End Use” on page 89 for a list of these commands.

For information about education that IBM offers, contact your IBM representative.

Order an adequate supply of manuals. See “VM/XA System Product Publications” on page 305 for titles and order numbers.

It is important that managers, support personnel, application programmers, and end users understand the changes that will occur when your installation converts to VM/XA SP. An understanding of your installation’s goals, the benefits of VM/XA SP, and the changes required to convert to VM/XA SP will help your organization commit to the project.

9. Create a detailed conversion plan.

This plan should provide a detailed map of the activities and schedules needed to complete a successful conversion. Develop strategies for how you will approach the conversion. You must determine:

- Groups of work items that can be combined and managed together.
- A beginning and an end date for each work item.
- A reporting structure for managing the conversion process—that is, how each member of the conversion team reports progress to the person responsible for the entire conversion.
- A strategy for converting to VM/XA SP. This includes:
 - What users or groups of users you will convert and the order in which you will convert them
 - How and when you will share DASD
 - What kind of communications network you will implement
 - How you will handle the directory and security of the system
 - How you will test and cut over to the new system.

10. Create a back-off plan.

Determine back-off criteria, plans, and schedules.

11. Understand how application programs need to be changed to run in VM/XA SP.

IBM provides sample EXECs to help you determine how much work you need to do to convert programs to run on VM/XA SP. For more information, see Chapter 8, “Application Programming” on page 91 and Appendix A, “Conversion Tools” on page 277.

12. Communicate.

Before converting, communicate the conversion plan to the users of your current system. During the conversion, communicate the status of the conversion to the users of your new system.

Inform your users of the justifications for the conversion, the benefits of the new system, the dates for the main tasks in your conversion plan, the system resources that will be unavailable at certain times, and what your users' role is in the conversion process (that is, testing their individual applications and EXECs).

Because much of the impact of the conversion is to applications and EXECs, you should involve application programmers in the conversion. They will have to check their applications and EXECs, recode them if changes are required, and test them. Involve end users, too, because the external of some system functions may change. For instance, the logon procedure changes if you install RACF on the new system.

Some forms of communication are:

- Classroom education
- User service representatives
- A bulletin board facility or conferencing system, which could be implemented in several ways:
 - As read-only or help files that users can browse.
 - As a disconnected virtual machine to which users can submit questions and comments that are available for all to read and respond to. The questions and comments would reside in files, and users would link with read access to the minidisks containing these files. As users submit their questions or comments (updates), the disconnected virtual machine would append the updates to the appropriate file based upon file name or file type.

Conversion Strategies

The conversion from VM/SP HPO to VM/XA SP will be different from your usual migration to a new VM/SP HPO release since VM/XA SP does not run as an operating system on VM/SP HPO. As a result, all testing of the CP code must be done off-shift or on a separate processor.

One way to approach this is to choose a pilot group that will move to VM/XA SP first; for example, you might choose your system support personnel. Move them to VM/XA SP and have them test and debug their applications. Once they are running, you can move more and more users until your production workload is running on VM/XA SP.

Splitting workload is one way to implement such a conversion. However, because it means that you will have to split your production across several systems, it can cause some problems for you. You must determine:

- Whether to use one or two systems
- How users on the VM/SP HPO system will share data with users on the VM/XA SP system
- What you will do about the directory, data bases, and security

- How users on the VM/SP HPO system can communicate with users on the VM/XA SP system
- If necessary, how you will back off.

These concerns are addressed in the following sections.

Should I Use One System or Two?

Whether to use one or two systems depends on your installation's configuration and hardware.

When you convert to VM/XA SP, you will need additional capacity on the new system to accommodate new functions.

Using Two Processors

If you have a separate processor on which you can bring up VM/XA SP or if you can bring up VM/XA SP on half of a physically partitioned processor, you can install and test without affecting your VM/SP HPO production system.

When you are satisfied with the reliability of the VM/XA SP system, you can move the VM/SP HPO workload to production on VM/XA SP. For planning purposes, if you are running on the same hardware, it is projected that you will achieve up to 85% of VM/SP HPO native performance, depending on your configuration and workload characteristics.

Your plan might look like this:

1. If your VM/SP HPO system is processor-constrained, you may need to upgrade your processor.
2. Using your existing VM/SP HPO system, generate a small VM/XA SP system. IPL this system on a separate processor or on half of a physically partitioned processor.
3. Use this small VM/XA SP system to test and become familiar with VM/XA SP. Once you understand VM/XA SP, generate a larger VM/XA SP system.
4. Before you convert any CMS users, you should sufficiently test the VM/XA SP system. Once users convert their applications and begin to exploit VM/XA SP CMS, you will have a harder time backing off. To ensure that the system is stable, you may want to run VM/XA SP for a period of time before you move users. During this time, you can train the data processing and operations staff, install and test licensed programs, convert service machines and system applications, and convert the programmable operator and other automated functions.
5. While you continue the majority of your production work on the separate VM/SP HPO system, move the first group of users (probably your data processing support group) to VM/XA SP. Have them convert and test their own application programs on VM/XA SP CMS. To prepare for a possible back-off, either keep a copy of the System/370 versions of applications or code the applications so that they run in either architectural mode.
6. Move more users to VM/XA SP. You might consider moving application programmers or a group of people that work independently of others (that is, they do not share data bases with a large number of people). Have them convert and test application programs on VM/XA SP CMS.

- Continue to move users to VM/XA SP until you have moved everyone that is scheduled. If you have some users that cannot go to VM/XA SP because they need function that is not available, you may not be able to complete the conversion until a later release of VM/XA SP.

Figure 8 depicts this conversion strategy using two processors.

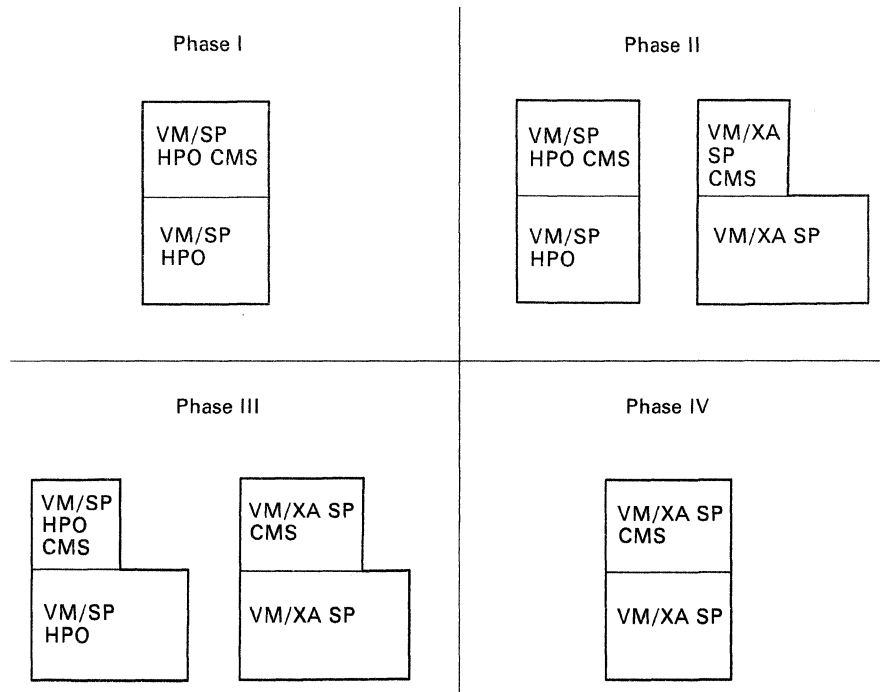


Figure 8. Conversion from VM/SP HPO to VM/XA SP Using Two Processors

Using One Processor with Logical Partitioning

If you have a 3090E processor with the PR/SM feature operating in logically partitioned (LPAR) mode, you can install and test VM/XA SP in one of the partitions without affecting your VM/SP HPO production system that is running in another partition. The PR/SM feature allows you to run old and new operating systems and application programs in independent logical partitions that are active on the same processor complex at the same time.

VM/XA SP Release 2 is supported in LPAR mode for test and development only. This support will be available after general availability of Release 2 and does not include V = F or V = R guest support.

Using One Processor without Logical Partitioning

Once you are satisfied with the reliability of your VM/XA SP system, you can install VM/SP HPO as a guest and migrate users to VM/XA SP.

For planning purposes, you may make the following assumptions. If you take the entire VM/SP HPO workload and run it in a VM/SP HPO virtual machine under VM/XA SP on a non-3090E processor, it is projected that you will achieve up to 60% of VM/SP HPO native performance. If you take the entire VM/SP HPO workload and run it in a VM/SP HPO virtual machine under VM/XA SP on a 3090E processor without the Processor Resource/Systems Manager (PR/SM) feature,

it is projected that you will achieve up to 80% of VM/SP HPO native performance. If you have the PR/SM feature operating in ESA/370 mode, it is projected that you will achieve up to 90% of VM/SP HPO native performance (assuming a V=R or V=F guest). Your specific system performance may vary due to workload, I/O configurations, or hardware.

To reduce the workload running in the VM/SP HPO virtual machine under VM/XA SP, consider moving some users to the VM/XA SP production level right away.

You tune the VM/SP HPO preferred guest the same way that you tuned the VM/SP HPO native system.

In summary, if you are constrained on your current processor (that is, storage, I/O, processor), you should consider upgrading your system before you convert.

Example: If you are 95% processor-constrained running your VM/SP HPO system on a 3081 processor, you might consider moving to a 3090 Model 200E processor. This would reduce the processor utilization to near 62%, providing the additional capability that you will need to grow with VM/XA SP.

Your conversion plan might look like this:

1. If your VM/SP HPO system is constrained, you may need to upgrade your equipment.
2. Using your existing VM/SP HPO system, generate a small VM/XA SP system. Re-IML the processor and IPL the VM/XA SP system off-shift on the same processor.

Use this small VM/XA SP system to test and become familiar with VM/XA SP. Once you understand VM/XA SP, generate and test a larger VM/XA SP system.

Throughout this effort, you must test off-shift and restore your VM/SP HPO system for production work until you are satisfied with the VM/XA SP system reliability.

A technique you can use to shorten a test is to avoid dumping and restoring spool files before and after the test, provided this is acceptable to your users. In order to do this you must:

- Notify users who will be testing that they will not have their spool files available during the test. If they require their spool files for the test they must process them prior to the changeover.
 - Bring up VM/XA SP without the spool files.
 - Upon completion of the test, use SPTAPE to dump the spool files created during the test.
 - After bringing up your VM/SP HPO production system again, use SPTAPE to restore the spool files that you dumped during the VM/XA SP test.
3. When you are satisfied with the VM/XA SP system's reliability, load your VM/SP HPO system as a V=R preferred guest operating system in the new VM/XA SP environment.
 4. Before you convert any CMS users, you should sufficiently test the VM/XA SP system. Once users convert their applications and begin to exploit VM/XA SP CMS, you will have a harder time backing off. To ensure that the system is stable, you may want to run VM/XA SP for a week or so before you move users. During this time, you can train the data processing and operations staff,

install and test licensed programs, convert service machines and system applications, and convert the programmable operator and other automated functions.

5. While you continue the majority of your production work on the preferred guest, move the first group of users (probably your data processing support group) to native VM/XA SP. Have them convert and test their own application programs on VM/XA SP CMS. To prepare for a possible back off, either keep a copy of the System/370 versions of applications or code the applications so they run in either architectural mode.
6. Move more users to VM/XA SP. You might consider moving application programmers or a group of people who work independently of others (that is, who do not share data bases with a large number of people). Have them convert and test application programs on VM/XA SP CMS 5.
7. Continue to move users to VM/XA SP until you have moved everyone that is scheduled. If you have some users who cannot go to VM/XA SP because they need functions that are not available, you may need to maintain a VM/SP HPO guest and complete the conversion at a later release of VM/XA SP.

Figure 9 depicts the conversion scenario using one processor.

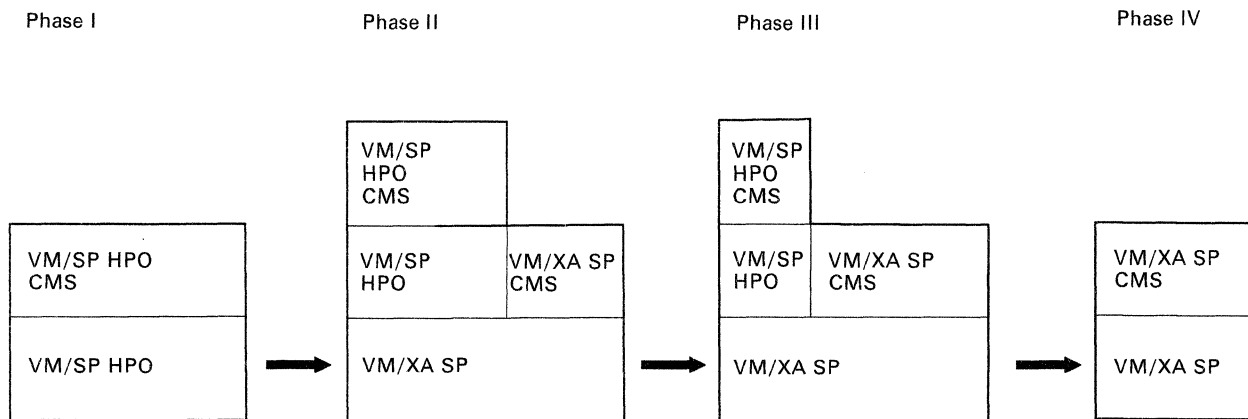


Figure 9. Conversion from VM/SP HPO to VM/XA SP Using One Processor

Creating a Pilot Production System

Depending on the conversion strategy you choose, you might want to create a VM/XA SP pilot production system from the original production system. The pilot production system could be in a separate partition or on a separate processor; it could not be a guest. After the regular production system is converted to VM/XA SP, the pilot production system could be merged back into the original production system.

A major concern for the users of the pilot system would be that if their node IDs change they would not get spool files and PROFS documents that are inadvertently sent to the old node ID. To avoid this problem, it is possible to make user IDs on the pilot node appear to the network as though they still reside at the original node.

Consider the following items when attempting to create the pilot system from the original system:

- Spool files (CMS notes, PROFS notes, SENDFILE files, and so forth)

- PROFS documents
- PROFS calendar access
- Data shared via links
- Data base access.

Spool Files

In order to make the change in systems unnoticeable to those sending and receiving spool files, you can do the following.

On the original system:

- Do not delete IDs of users who have moved to the pilot system. You want them to be able to receive spool files on the original system but to be prevented from logging on to the original system. You can do this by changing the users' passwords without telling them their new passwords or, if RACF is installed, by having the ID RACF revoked.
- Set up a service machine with the appropriate privilege class to transfer spool files to the pilot system. The service machine should transfer, at an installation-determined interval, the files in the readers of the IDs that were migrated to the pilot system by tagging the files with the ID of that node. You can use a table lookup to determine which IDs are to receive this treatment.

The files transferred from the original system appear in the reader of the pilot machine just as if they were sent there directly.

On the pilot system:

- Have the users update their nickname files to include both node and ID so that files can be sent to user IDs that remain on the original system.

PROFS Documents

If PROFS is installed, PROFS documents must also be transferred to users on the pilot system. To do this:

1. Move the PROFS document data base to the pilot system as follows:
 - a. Copy the data base.
 - b. Within the new document data base, use XEDIT to change node ID references to reflect the pilot node ID instead of the original node ID.
2. Transfer documents to IDs on the pilot system by using the PROFS EPRERELN user exit for all nodes in the network that send PROFS documents to the pilot system. The exit invokes a user-written EXEC that does a table lookup using node and ID as the argument to determine, for the pilot users only, which PROFS MAILMAN should receive the documents.
3. When pilot production has ended, merge the documents created on the pilot system back into the production system data base as follows:
 - a. On the pilot system, use an ID with link privileges to all PROFS user IDs to invoke a user-written EXEC that extracts, from each ID's mail log, the documents created during pilot system operation and sends them back to the original system. The EXEC could use a table of IDs to do this for each PROFS ID on the pilot system.
 - b. On the original system, read in the PROFS documents sent back from the pilot system.

PROFS Calendar Access

To migrate the calendar data to the pilot system, the files that represent individual months per user must be transferred to that system. You can do this using RSCS. You can use the same process to migrate the pilot users back when pilot production ends.

Users at the two systems will no longer be able to see one another's calendars as they could when integrated into a single system.

Data Shared via Links

Minidisks shared between the two systems must be controlled so that accessing a minidisk for write from both systems at the same time cannot happen. This can be done using RACF.

Data Base Access

Data bases, such as PROFS and SQL data bases, cannot be shared. All activity must be from one of the two systems for a given data base.

Some products with nonshared data bases, such as PROFS and SQL, do not permit coalescence (merging) of data if a return to one common data base is required. For example, if the original system has a PROFS document data base and you create one on the pilot system for users you move there, you cannot merge the pilot system data base back into the original system data base when you move the pilot system users back to the original system.

What If I Have a Guest Operating System Running on VM/SP HPO?

If you have an operating system, such as MVS, running on VM/SP HPO, you should install it as a guest operating system on VM/XA SP rather than as a guest operating system on a VM/SP HPO guest running under VM/XA SP. Be aware, though, that you have to convert any EXECs used by your operations personnel to run on VM/XA SP CMS and that you may have to change other operational procedures.

How Can VM/SP HPO and VM/XA SP Users Share Data?

If you migrate users from the VM/SP HPO system to the VM/XA SP system in a staged fashion, your production will be split between several systems. One major concern is how you will share data between these systems.

VM/XA SP software allows you to share information on a DASD volume in the following ways:

- Between multiple virtual machines using virtual reserve/release.
- Between one virtual machine and operating systems running on other processors using real reserve/release.
- Between multiple virtual machines and operating systems running on other processors using concurrent virtual and real reserve/release. The virtual machines and operating systems must support real reserve/release CCWs.

Virtual reserve/release, real reserve/release, and concurrent virtual and real reserve/release all work the same way in VM/XA SP as they do in VM/SP HPO.

The sections that follow include examples of virtual reserve/release and concurrent virtual and real reserve/release. For a complete discussion, refer to *VM/XA SP Planning and Administration*.

What If We Cannot Share Data through Reserve/Release?

In some instances, you will not benefit from or will not be able to share DASD through VM/XA SP's reserve/release. For instance, if:

- You need to share data between multiple virtual machines on multiple systems and the operating systems running in the virtual machines do not support concurrent virtual and real reserve/release. CMS is an example of a virtual machine that does not support this type of sharing.
- Your system is constrained and you cannot afford the performance degradation that results from shared DASD (particularly concurrent virtual and real reserve/release).
- You need to share data bases (such as SQL or APL) between several groups of users and not all of the users can be moved to VM/XA SP.
- There are incompatibilities that prevent VM/SP HPO and VM/XA SP from accessing the same data. This is the case with the user directory.

In these cases, you might:

- Replicate the data.
- Maintain the data on one system only and give two user IDs to users who need to access the data.
- Physically attach the DASDs you want to share to the second system and allow write access from only one system. If you have RACF, you can use it to find out who has access and to limit the write access from one system. You should be aware however that this method of sharing is not protected by VM/XA SP software; you must set up the controls yourself.

How Do I Share Data between Multilevel Virtual Machines?

Using Virtual Reserve/Release

If you want to share data between virtual machines running under VM/XA SP that support virtual reserve/release, and you do not need to share this data with operating systems running on other processors, use virtual reserve/release. MVS is an example of a virtual machine that supports virtual reserve/release. CMS is an example of a virtual machine that does *not* support virtual reserve/release.

Virtual reserve/release works the same way in VM/XA SP as it does in VM/SP HPO. Figure 10 on page 36 depicts MVS virtual machines sharing DASD through virtual reserve/release.

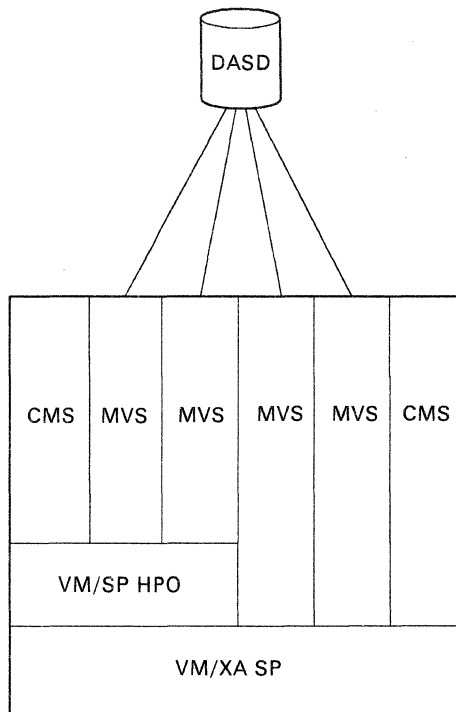


Figure 10. Sharing DASD Using Virtual Reserve/Release

On the VM/SP HPO guest:

1. Define the DASD as a minidisk for one of the virtual machines, perhaps A, in the VM/SP HPO directory. Specify MWV as the access mode on the MDISK statement.
2. Code the LINK statement for the remaining virtual machine, B, in the VM/SP HPO directory. Specify MW as the access mode.

On the VM/XA SP system:

1. Define the DASD where the minidisk resides on the RDEVICE macro in HCPRIO and on the SYSCPVOL or SYSUVOL macro in HCPSYS.
2. Code the MDISK statement in VM/SP HPO's directory entry in the VM/XA SP directory. You must append a V to the primary access mode (read, write, multiple write, and so on) indicating that this minidisk can be shared between virtual machines. For example:

```
MDISK 197 3350 000 400 WORKPK MWV GANDALF
```

3. Code the LINK statement in Y and Z's directory entry. For example:

```
LINK HPO 197 197 MW
```

4. Specify that the DASD will not be shared with another operating system. The default setting of the SHARED option of the RDEVICE macro (SHARED=NO) takes care of this for you.

Now, virtual machines running in the VM/SP HPO virtual machine under VM/XA SP may have write access to the same information as virtual machines running on VM/XA SP.

Without Using Virtual Reserve/Release

If you want to share data between virtual machines running under VM/XA SP and the virtual machines do not support virtual reserve/release, such as CMS, you cannot use virtual reserve/release. You define the DASD as a minidisk, giving read/write access to only one of the CMS users running on the VM/SP HPO guest; the others can only have read access. This is shown in Figure 11.

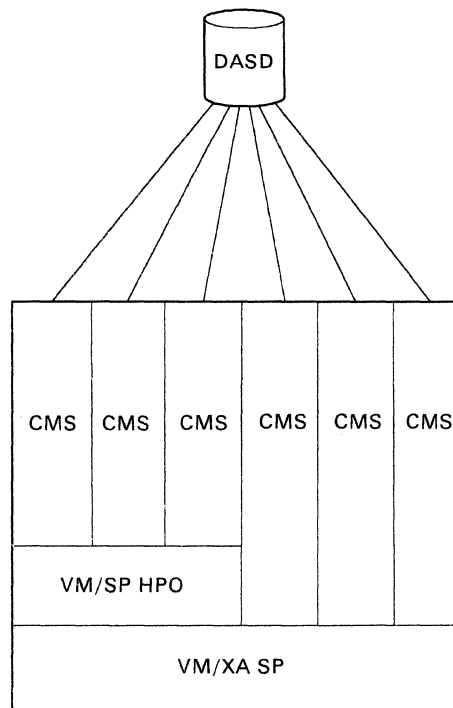


Figure 11. Sharing DASD without Using Virtual Reserve/Release

On the VM/SP HPO guest:

1. Define the DASD as a minidisk for one of the virtual machines, perhaps A, in the VM/SP HPO directory. Specify MW as the access mode on the MDISK statement.
2. Code the LINK statement for the remaining virtual machines, B and C, in the VM/SP HPO directory. Specify RR as the access mode.

On the VM/XA SP system:

1. Define the DASD where the minidisk resides on the RDEVICE macro in HCPRIO and on the SYSCPVOL or SYSUVOL macro in HCPSYS.
2. Code the MDISK statement in VM/SP HPO's directory entry in the VM/XA SP directory. Do not append a V to the primary access mode. For example:

```
MDISK 197 3350 000 400 WORKPK MW GANDALF
```
3. Code the LINK statement in X, Y, and Z's directory entry. For example:

```
LINK HPO 197 197 R
```
4. Specify that the DASD will not be shared with another operating system. The default setting of the SHARED option of the RDEVICE macro (SHARED=NO) takes care of this for you.

Now, virtual machines running in the VM/SP HPO virtual machine may have read access to the same information as virtual machines running on VM/XA SP.

How Do I Share Data among Virtual Machines and Other Systems?

To share data among multiple virtual machines running under VM/XA SP and other systems, use concurrent virtual and real reserve/release support. You can only use this, however, if the virtual machines that are sharing the data support reserve/release. In the example shown in Figure 12, the MVS virtual machines running under VM/XA SP can share DASD with the MVS virtual machine running under VM/SP HPO in this manner. The CMS virtual machines cannot share DASD because CMS does not support virtual and real reserve/release concurrently. You have to replicate the data for the CMS users or physically attach the DASD and give write access to only one system.

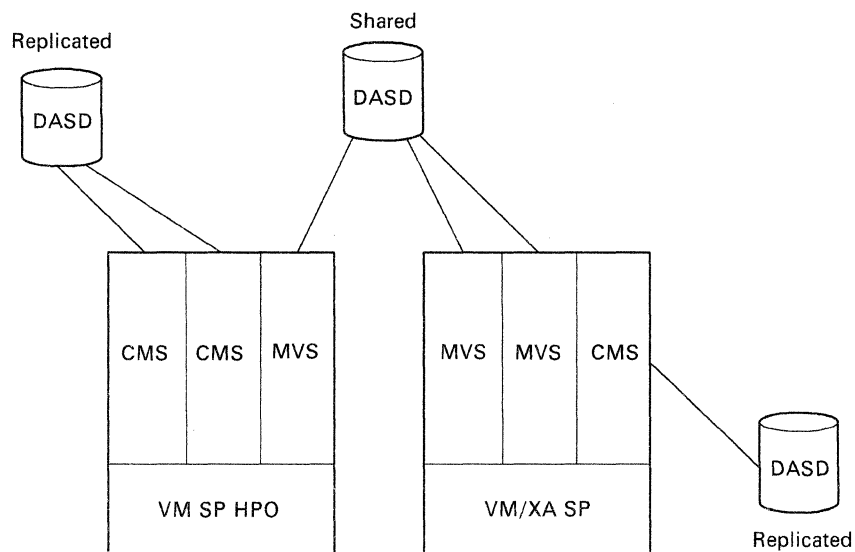


Figure 12. Sharing DASD between Virtual Machines on Multiple Systems

Concurrent virtual and real reserve/release support can be invoked either during system generation or at any time while the system is running.

Do the following to invoke concurrent virtual and real reserve/release while generating the system:

1. Ensure that the operating system running under VM/XA SP and the operating system with which you are sharing the DASD both support reserve/release CCWs.
2. Define the DASD as a shareable full-pack minidisk. To do this, use the MDISK statement in the directory.

To define the DASD as a full-pack minidisk, the starting cylinder number must be zero and the number of cylinders must equal or exceed the number of cylinders on the real device. To define the DASD as virtually shareable, include the "V" in the mode definition. For example:

```
MDISK 327 3380 000 885 MVS003 MWV
```

- Define the DASD as being shareable between multiple real and virtual systems by specifying the SHARED=YES option on the RDEVICE statement in HCPRIO ASSEMBLE. For example:

```
RDEVICE DEVNO=0327,DEVTYPE=3380,SHARED=YES
```

Note: The default for the RDEVICE SHARED operand is NO. Therefore, this support is not automatically invoked.

V = R Recovery

If the system terminates due to a hard abend or a machine check, CP attempts to restart with the V=R virtual machine "intact." VM/XA SP V=R recovery differs from that in VM/SP HPO. In VM/XA SP, CP restores the V=R user's current I/O configuration rather than, as in VM/SP HPO, the I/O configuration defined in the V=R user's directory entry. This means that the V=R user recovers the reserves and links to all the dedicated devices and full-pack minidisks to which it is linked at the time of the crash.

Restriction

You cannot use concurrent virtual and real reserve/release support with VM/SP HPO if you generate VM/SP HPO devices with alternate paths. **The definition of alternate paths in DMKRIO and the use of hardware-supported reserve/release are mutually exclusive.** (Alternate paths are supported differently in VM/XA SP; they are supported in the hardware rather than the software.)

Minidisk Caching Consideration

To provide virtual machines with fast access to data on minidisks, VM/XA SP supports the caching in Expanded Storage of the most recently used data blocks from non-full-pack minidisks. However, to guarantee data integrity, minidisk caching should be disabled for any minidisk that is shared between two systems when one or both systems have write access to the minidisk.

In VM/SP HPO, the default is for minidisks not to use cache. But in VM/XA SP, the default is for minidisks to use cache. To disable caching for an individual minidisk, specify the NOMDC parameter on its MINIOPT directory control statement. To disable caching for all minidisks, issue the command `RETAIN XSTORE MDC OFF`. (If you use this command you should place it in the `AUTOLOG1 PROFILE`.)

How Do I Share Data between CMS Users on Multiple Systems?

VM/XA SP software does not allow you to share data on a DASD volume between CMSs running on multiple systems.

With VM/SP HPO, you can use VM/Inter-System Facilities (VM/ISF) to share access to minidisks among CMS users on different systems as if they were all on the same system. While converting to VM/XA SP, you might consider using this to provide shared minidisk access between CMS users on a native VM/SP HPO system and CMS users running on a VM/SP HPO guest on VM/XA SP. However, you cannot use VM/ISF to provide shared minidisk access between CMS users running on VM/SP HPO and CMS users running native on VM/XA SP. In this case, you must replicate the data for the VM/XA SP CMS users or physically attach the DASD and allow write access from one system only. As mentioned previously, if you physically attach the DASD, you must ensure that multiple systems do not have write access. There is no software protection.

If you decide to replicate data, you must move or copy data as you move users to VM/XA SP. This is easier to do if you have groups of users that work independently of other groups. In this case, you can move the data from one DASD to another as you move the group without having to keep a copy of the data for users that are still running on VM/SP HPO.

The problem arises when you have multiple groups of users that rely on the same data and not all the users can be migrated to VM/XA SP at the same time. For example, if your purchasing, inventory control, and personnel departments all use the same data bases and the personnel department cannot be migrated to VM/XA SP because they require unsupported function, you would need to manually update two copies of the data bases. This would be an impossible task if the information is updated frequently or by several groups or if the information is critical. In this case, you would need to keep the data base on the VM/SP HPO systems so personnel could access it and give two user IDs to the purchasing and inventory groups so they could work on VM/XA SP but access VM/SP HPO when they needed the shared data.

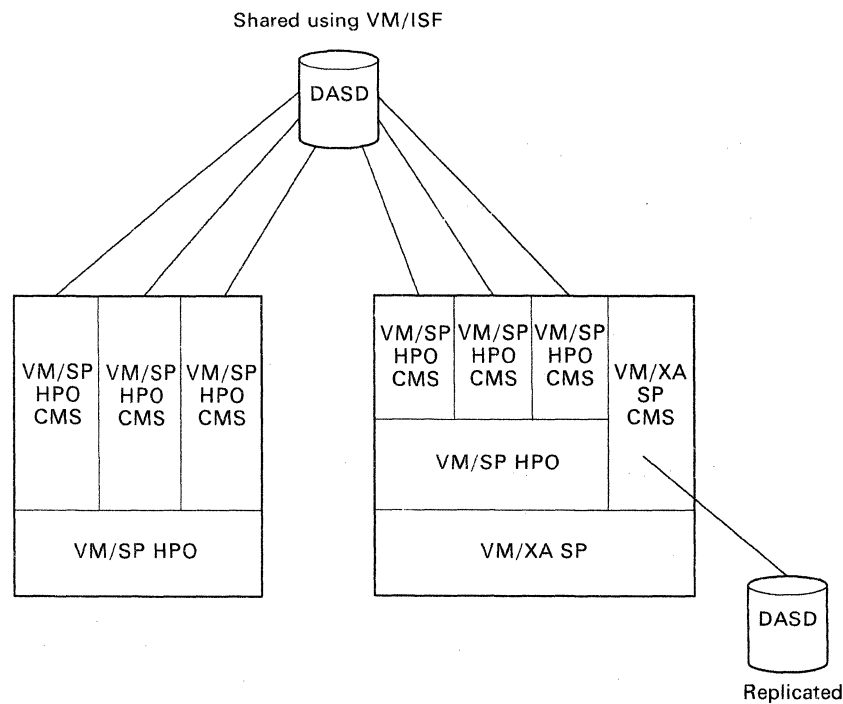


Figure 13. Sharing and Replicating DASD for CMS Virtual Machines

What Should I Do with the User Directory?

You cannot use the same object directory for your VM/SP HPO and VM/XA SP systems because they are incompatible. So, you must either:

- Have one source directory and issue either the **DIRECT** command or the **DIRECTXA** command with the **MIXED** option depending on which object directory you want online. **DIRECT** will bring the 370 directory online. **DIRECTXA** will bring the 370-XA directory online. Put the VM/SP HPO object directory on any VM/SP HPO CP-owned volume, and the VM/XA SP object directory on any VM/XA SP CP-owned volume.

- Keep two copies of the source directory. If you do this, you will have to manually update the directories to ensure that changes made to one directory are reflected in the other.

To provide a back-off plan for CMS users, you may want to keep the users that are targeted to go to VM/XA SP in both the VM/XA SP and VM/SP HPO directory (either the VM/SP HPO guest or the separate VM/SP HPO system) until you are convinced that the users will not need to back off.

Refer to “Converting the User Directory” on page 49 for a complete discussion of converting your VM/SP HPO directory for use on VM/XA SP.

Placing the User Directory on a CP-Owned Volume

VM/XA SP allows you to place the user directory (that is, the output of the DIRECTXA command, also called the “object directory”) on any CP-owned volume. Because the system queries the user directory when the system needs to validate a user ID (for instance, when a user logs on or issues a LINK command), the DASD volume on which the user directory resides gets a lot of activity. Place the user directory on a fast device such as a DASD attached to a 3880-23 control unit.

What Should I Do with Data Bases?

Since VM/XA SP does not support TSAF and APPC/VM, your VM/SP HPO systems cannot share data bases with a VM/XA SP system. If you have a large group that uses a data base such as SQL or APL, you will either have to (1) move all the users to VM/XA SP at once along with the SQL data base or (2) keep the data base on the VM/SP HPO and maintain two user IDs so users system can log on to VM/SP HPO to access the SQL data base.

What Should I Consider in a Back-Off Plan?

When planning your migration to VM/XA SP, you must also plan how you will back off if you run into a problem. You will need two types of back off plans: one for system problems and one for virtual machine problems.

The system back off plan is needed when you run into a problem with VM/XA SP, such as an abend from which you cannot recover. In this case, you will need to be able to quickly re-IPL a VM/SP HPO system.

The virtual machine back off plan is needed when a user or group of users cannot run on VM/XA SP (for example, if application programs will not operate on VM/XA SP CMS). In this case, you will need to be able to quickly move the user or group of users to a VM/SP HPO system.

Once you determine your back off plan, negotiate back off criteria with your end users. Publish the approved plan.

Backing Off because of System Problems

If you run into a problem with VM/XA SP that forces you to back off and you have not yet exploited VM/XA SP-only functions or migrated CMS users, the back off will not impact your end users. If, on the other hand, you run into a problem and have to back off after you have migrated CMS users, you will greatly impact these users. Once users convert their applications to run on the VM/XA SP CMS, they may not be able to run these applications on the VM/SP HPO CMS. Therefore, you should not migrate users to VM/XA SP until you are satisfied with its reliability.

Throughout the conversion effort, you should maintain your VM/SP HPO system residence (SYSRES) volume and CP-owned packs. Then, if you need to back off, you can easily do so. Plan to build a small, one-pack VM/XA SP system. Once you have fully tested VM/XA SP, you can generate a larger system.

If you must back off from VM/XA SP and IPL a VM/SP HPO system, do the following:

1. SPTAPE DUMP spool files.
2. If you have not maintained your VM/SP HPO CP-owned DASD, reformat cylinder 0 and reallocate enough CP-owned DASD to bring up VM/SP HPO. (The allocation maps are different between VM/SP HPO and VM/XA SP. Refer to Table 9 on page 52 for a comparison of allocation options.)

Since you cannot reformat and reallocate paging and spooling packs to which you are currently attached, you must:

- Shut down the system
 - Re-IPL it with the CP-owned DASD (that you plan to reformat) offline
 - Attach the DASD to a virtual machine
 - Reformat cylinder 0 and reallocate.
3. If you have not maintained a separate directory on the VM/SP HPO SYSRES pack, redirect the directory using the DIRECT command so it can be used on the VM/SP HPO system.
 4. Shutdown the VM/XA SP system.
 5. Re-IML the processor to System/370 mode.
 6. IPL VM/SP HPO.
 7. If necessary, reformat cylinder 0 and reallocate the remainder of your VM/SP HPO CP-owned DASD. Either re-IPL or physically attach the DASD to the system.
 8. SPTAPE LOAD spool files.
 9. Enable terminals.

Format/Allocate

When you convert to VM/XA SP from VM/SP HPO, you must reformat cylinder 0 and reallocate the CP-owned DASD for VM/XA SP use. When backing off from VM/XA SP to VM/SP HPO, you must reformat cylinder 0 and reallocate the CP-owned DASD for VM/SP HPO use.

If you back off from your VM/XA SP system and IPL your VM/SP HPO 4.2 or 5 system without reformatting cylinder 0 or reallocating the DASD, VM/SP HPO will not issue an error message informing you that the DASD is incorrectly formatted or allocated. Instead, the system will come up with the DASD offline. If you try to

attach the DASD to your system using the ATTACH command, the DASD will be attached, *but it will not be CP-owned*. If you reformat cylinder 0 and reallocate the DASD, you can successfully attach the DASD to the system and it will be CP-owned.

When you are ready to go back to the VM/XA SP system, load the CPFMTXA module from the VM/XA SP starter system onto your VM/SP HPO system. You can then reformat cylinder 0 and reallocate DASD (except for 3880-G21s) to VM/XA SP format. (If you have any 3880-G21s, you have to wait until VM/XA SP is running again to reformat and reallocate them. You cannot do this while running on VM/SP HPO.)

Directory Concerns

Prior to backing off, issue the DIRECT command to bring the VM/SP HPO directory online. If you do not do this, you have to use the VM/SP HPO stand-alone directory function in order to IPL VM/SP HPO.

SPTAPE

You must SPTAPE DUMP the spool files so you can restore them to your VM/SP HPO system.

Backing Off Individual Users because of Problems with Application Programs

Once the system is stable, you will begin to migrate CMS users. To prepare for a possible back off, either dual-path the code or keep copies of the System/370 versions of applications.

Directory Concerns

If a user or group of users has problems running applications on VM/XA SP CMS, you will need to back off these users to VM/SP HPO. To plan for this, keep a directory entry in a VM/SP HPO system for each VM/XA SP user until you are satisfied that the users are running smoothly. You can use either a VM/SP HPO guest or a separate VM/SP HPO system as the back off system. This will be extra work for you but will cause the least impact for the end users if they run into problems.

If you are using two source directories, you must remember to reflect changes made in one directory to the other directory.

SPTAPE

You must SPTAPE the user's or group of users' spool files and restore them to the VM/SP HPO system.

One Customer's Experience

One customer reports the following conversion scenario.

The customer had a VM/SP HPO Release 4.2 system supporting several hundred users who used a variety of engineering, scientific, and office applications. A small but very important group required the capabilities of 370-XA for their applications. The customer decided to have all the applications support all users in 370-XA mode (and none in System/370 mode), with some applications in the 370-XA toleration stage (24-bit) and the rest in the 370-XA exploitation stage (31-bit). This was to avoid having end users re-IPL CMS between mode changes.

VM/SP HPO Conversion

The customer then installed VM/SP HPO Release 4.2 as a preferred guest on VM/XA SP. Dedicated DASD and Expanded Storage are now used to maintain performance levels. There is one shared DASD between VM/XA SP and the VM/SP HPO guest.

The customer divided the VM/SP HPO users into three groups based on their application use: planners and administrators in one group, engineering and scientific application users in the second group, and program developers in the third group. As 370-XA capable applications are announced by IBM and others, the customer will analyze each group and plan the move to 370-XA CMS when their application set is complete (that is, able to run in 370-XA mode). This should result in a gradual and orderly transition expected to be completed in about 12 months.

Chapter 3. Installation and Service

The installation procedure for VM/XA SP is much like the EXEC-driven procedure you used in VM/SP HPO. There are only minor procedural differences.

You should install your VM/XA SP system by using the starter system. You could instead start with your existing VM/SP HPO system, but this is a more difficult procedure than using the starter system. Refer to *VM/XA SP Installation and Service* for instructions on using the starter system.

This chapter provides a checklist of items to keep in mind when installing VM/XA SP under an existing VM/SP HPO system.

Installing Assembler H Version 2 Licensed Program

Before generating the CP nucleus, you must install Assembler H Version 2 Licensed Program. Refer to *VM/XA SP Installation and Service* for details.

Converting System Generation Files

Before generating the CP nucleus, you must convert system generation files.

Converting DMKSYS to HCPSYS

In VM/XA SP, you use HCPSYS to define many of your installation's operating characteristics. Table 5 summarizes the differences between DMKSYS and HCPSYS. Refer to *VM/XA SP Planning and Administration* for a complete discussion of HCPSYS ASSEMBLE.

VM/SP HPO DMKSYS	VM/XA SP HCPSYS	Description of Change Introduced by VM/XA SP
SYSOWN	SYSCPVOL	No change.
SYSXSTOR	-----	Not supported. Expanded Storage is handled differently in VM/XA SP than it is in VM/SP HPO. You allocate it to users using the XSTORE directory control statement. There is no system generation macro to define it to CP.
SYSPAG	-----	Not supported. You allocate CP-owned DASD for paging using CP or CMS commands (CPFORMAT or CPFMTXA). You do not have to further define these DASD volumes, as you do in VM/SP HPO, using a system generation macro.
SYSRES	SYSRES	SYSLR, SYSERR, and SYSSPL (SYSSPL is VM/SP HPO Release 5 only) are not supported. Also, not all VM/SP HPO device types are supported.

Table 5 (Page 2 of 3). Comparison of DMKSYS and HCPSYS		
VM/SP HPO DMKSYS	VM/XA SP HCPSYS	Description of Change Introduced by VM/XA SP
SYSMON	-----	Not supported. In VM/XA SP, you specify all monitor collection parameters while the system is running using the MONITOR command.
SYSJRL	-----	Not supported. Journaling is handled differently in VM/XA SP; it is handled by RACF rather than by a system generation macro.
SYSCOR	SYSSTORE	AP, FREE, MP, PRIME, and RSSIZE are not supported. The number of digits that you specify for the existing operands is different. RIO370, VRFREE, and VRSIZE are new operands.
SYSOPR	SYSOPR	In VM/XA SP, SYSDUMP is a separate HCPSYS macro rather than an operand on the SYSOPR macro.
-----	SYSDUMP	Performs the same function as the SYSDUMP operand on the VM/SP HPO SYSOPR macro.
-----	SYSEREP	New in VM/XA SP. It identifies the user ID of the virtual machine that receives error records.
SYSACNT	SYSACNT	USERID is the only supported operand. This is the user ID of the virtual machine to receive the records.
SYSTIME	SYSTIME	Basically the same. In some cases, the time zone differential, coded on the ZONE operand, must be entered in a slightly different manner.
SYSFORM	SYSFORM	An additional operand, DEFDRDR, is supported.
SYSPCLAS	SYSPCLAS	No change.
SYSID	SYSID	No change.
SYSMIH	-----	The missing interrupt handler is handled differently in VM/XA SP. You do not define the time interval using a system generation macro.
SYSFCN	SYSFCN	The PRIV operand is not supported.
-----	SYSUVOL	New in VM/XA SP. It provides a list of user DASD volumes which, if online, will be automatically attached to the system at initialization time.
-----	SYSMAXU	New in VM/XA SP. It specifies the user log on limit.

Table 5 (Page 3 of 3). Comparison of DMKSYS and HCPSYS

VM/SP HPO DMKSYS	VM/XA SP HCPSYS	Description of Change Introduced by VM/XA SP
SYSLOCS	SYSEND	Changed for VM/XA SP. SYSEND, like SYSLOCS, must be the last macro specified. SYSEND, however, merely signifies the end while SYSLOCS generates internal pointer variables in addition to signifying the end.

To help convert your DMKSYS statements to HCPSYS, use either the COMPSCAN SAMPEXEC or FILECONV SAMPEXEC. These are sample EXECs that are shipped on the product tape.

COMPSCAN SAMPEXEC flags incompatible statements. This gives you an estimate of how much work is required.

FILECONV SAMPEXEC converts a VM/SP HPO file to a VM/XA SP file. For example, when converting DMKSYS to HCPSYS, you can use FILECONV along with the CONVSYS SAMPCMDs file to change SYSOWN to SYSCPVOL, to change SYSLOCS to SYSEND, to delete SYSXSTOR and SYSPAG (the tool actually comments out unsupported statements), and so on. FILECONV flags statements that require your judgement.

Refer to Appendix A, "Conversion Tools" on page 277 for a complete discussion of the COMPSCAN or FILECONV sample EXECs.

Converting DMKRIO to HCPRIO

In VM/XA SP, you use HCPRIO to define your installation's real I/O configuration.

HCPRIO has two macro instructions: RDEVICE and RIOGEN. Like VM/SP HPO, the RDEVICE macro defines each real I/O device or group of I/O devices and the RIOGEN macro defines the primary and alternate system consoles and completes the real I/O definition. (That is, RIOGEN must appear as the last macro instruction before the END statement.)

Table 6 summarizes the differences between DMKRIO and HCPRIO.

Table 6 (Page 1 of 2). Comparison of DMKRIO and HCPRIO

VM/SP HPO DMKRIO	VM/XA SP HCPRIO	Description of Change Introduced by VM/XA SP
CLUSTER	-----	Not supported because binary synchronous communication lines are not supported by native communication support. If specified, this macro produces a message saying that it is not supported.
TERMINAL	-----	Not supported because binary synchronous communication lines are not supported by native communication support. If specified, this macro produces a message saying that it is not supported.

Table 6 (Page 2 of 2). Comparison of DMKRIO and HCPRIO		
VM/SP HPO DMKRIO	VM/XA SP HCPRIO	Description of Change Introduced by VM/XA SP
RDEVICE	RDEVICE	The ALTCU, CLUSTER, CPTYPE, and DPMSIZE operands are not supported. You define device types using the DEVNO operand rather than the ADDRESS operand. Not all VM/SP HPO device types are supported on the DEVTYPE operand. The device classes coded on the CLASS operand are different. The FCB CHARS, and IMAGE operands are maintained for compatibility purposes only. In VM/XA SP, IBM-supplied FCBs and UCSs are shipped in image libraries. Or you can generate your own FCBs and UCSs using the IMAGELIB and IMAGEMOD commands.
RCTLUNIT	----	Not supported. You do not need to specify alternate control units. The hardware handles this. If specified, this macro produces a message saying that it is not supported.
RCHANNEL	----	Not supported. You do not need to specify alternate channels. The hardware handles this. If specified, this macro produces a message saying that it is not supported.
RIOGEN	RIOGEN	The SRF operand is not supported.

To help convert your DMKRIO statements to HCPRIO, use COMPSCAN SAMPEXEC. COMPSCAN flags the control statements that VM/XA SP doesn't support. Refer to Appendix A, "Conversion Tools" on page 277 for a complete discussion of the use and syntax.

If you have remote clusters configured on your VM/SP HPO system on the CLUSTER and TERMINAL control statements, you will need to reconfigure. Since VM/XA SP does not support binary synchronous communication lines, you must set them up through VM/Pass-Through. To do this, code the RDEVICE statement for the binary synchronous line address and then attach it to VM/Pass-Through. Define the terminals to VM/Pass-Through in VM/Pass-Through's configuration file.

As mentioned in the planning section, you may want to change your I/O configuration to take advantage of the architectural differences.

Converting DMKSNT

VM/XA SP does not have an equivalent system definition file for the systems name table. Instead, you generate saved systems, saved segments, and image libraries using CP commands. As a result, converting DMKSNT statements to the equivalent VM/XA SP commands (see Table 7 on page 49) is an administrative task rather than an installation task. This is discussed in "Managing Saved Segments" on page 61.

Table 7. Defining Saved Systems, Saved Segments, and Image Libraries	
VM/SP HPO DMKSNT Macros	VM/XA SP Equivalent
NAMESYS	DEFSYS and DEFSEG commands.
NAMENCP	Not supported.
NAME3800	IMAGELIB and IMAGEMOD commands.
NAMELANG (VM/SP HPO Release 5 only)	NAMELANG is not supported. However, the function is now in the CMS LANGGEN command.

Converting the User Directory

Table 8 summarizes the differences between the VM/XA SP directory and the VM/SP HPO directory.

Table 8 (Page 1 of 3). New and Changed User Directory Control Statements		
VM/SP HPO	VM/XA SP	Description of Change Introduced by VM/XA SP
DIRECTORY	DIRECTORY	Not all VM/SP HPO device types are supported.
USER	USER	Uses different reserved user IDs. In addition to the password, VM/XA SP has NOLOG and NOPASS. In VM/SP HPO, you can define up to eight classes. In VM/XA SP, you can define as many as will fit on the line. If you want to define even more, use the CLASS statement.
OPTION	OPTION	AFFINITY, BMX, ECMODE, ISAM, MAXDEV, PMA, REALTIMER, STFIRST, SVCACCL, SVCOFF, VMSAVE, XMEM, and 370E are VM/SP HPO Release 4.2 and 5 options that are not supported. COMSRV and VCUNOSHER are VM/SP HPO Release 5 options that are not supported. On the VIRTUAL parameter, VM/XA SP accepts FIXED in addition to REAL. DEDICATE/NODEDICATE, SVMSTAT, QUICKDSP, and TODENABLE are new options. CONCEAL is a new option for VM/SP HPO Release 4.2 users.
ACCOUNT	ACCOUNT	VM/XA SP allows multiple account cards.
CONSOLE	CONSOLE	Device types 1052 and 3210 are not supported.
IPL	IPL	No change.

Table 8 (Page 2 of 3). New and Changed User Directory Control Statements		
VM/SP HPO	VM/XA SP	Description of Change Introduced by VM/XA SP
SPECIAL	SPECIAL	Not all VM/SP HPO device types are supported. CTCA requires a user ID in the directory.
DEDICATE	DEDICATE	NETWORK, resource, and 3330V are not supported. NOASSIGN is a new option.
LINK	LINK	No change.
MDISK	MDISK	Not all VM/SP HPO device types are supported.
SPOOL	SPOOL	No change.
IUCV	IUCV	Resource id, a VM/SP HPO Release 5 option, is not supported. Not all CP system services are supported.
ACIGROUP	ACIGROUP	No change.
INCLUDE	INCLUDE	No change.
CLASS	CLASS	No change.
PROFILE	PROFILE	No change.
SCREEN	SCREEN	No change.
----	AUTOLOG or XAUTOLOG	You can AUTOLOG in two ways in VM/XA SP: by using the AUTOLOG or XAUTOLOG directory control statement or by issuing the AUTOLOG or XAUTOLOG command. In VM/SP HPO, you cannot define AUTOLOG in the directory.
----	CPU	New in VM/XA SP.
----	DASDOPT	New in VM/XA SP.
----	MACHINE	New in VM/XA SP.
----	MINIOPT	New in VM/XA SP. One of the MINIOPT parameters, MDC, specifies whether a minidisk may use cache. The default is to use it. In VM/SP HPO, the system default is for minidisks not to use cache.
----	NAMESAVE	New in VM/XA SP.
----	NOPDATA	New in VM/XA SP.
----	SHARE	New in VM/XA SP.
----	SPOOLFILE	New in VM/XA SP.

Table 8 (Page 3 of 3). New and Changed User Directory Control Statements

VM/SP HPO	VM/XA SP	Description of Change Introduced by VM/XA SP
-----	XSTORE	In VM/SP HPO, Expanded Storage is used by CP and is generated on the SYSPAG or SYSXSTOR macro. In VM/XA SP, Expanded Storage is used by CP and by virtual machines. You use the XSTORE directory control statement to dedicate some or all of Expanded Storage to a virtual machine.

The following steps describe how to convert the directory and bring it online:

1. You can use COMPSCAN SAMPEXEC along with COMPSCAN SAMPLIST to flag control statements that are incompatible. Refer to Appendix A, "Conversion Tools" on page 277 for a complete discussion of the use and syntax of COMPSCAN.

Using the COMPSCAN output as a guide, convert the unsupported directory control statements.

2. Update the label in the directory so it matches the label of your SYSRES pack.
3. Bring the directory online by issuing the CMS class A, B, or C DIRECTXA command.

If you have completely converted the directory file so it no longer contains VM/SP HPO control statements that are not supported in VM/XA SP, enter:

```
directxa spdirect
```

If, on the other hand, you still have VM/SP HPO control statements in the directory, issue the DIRECTXA command with the MIXED option:

```
directxa spdirect (mixed)
```

When you use the MIXED option, DIRECTXA sends you an error message regarding unsupported control statements, but ignores most of them and brings the directory online. If you have the VM Directory Maintenance Program (DIRMAINT), you can set up a MIXED=YES option so that DIRMAINT will use the MIXED option when issuing DIRECTXA.

4. In the empty spaces in the following table, write down the minidisk information of the directory source file, the CMS system disk, and the XASRES volume. If you have a problem loading (IPLing) VM/XA SP, you will need to know these.

DASD	Starting Cylinder	Number of Cylinders Allocated	Volume Serial Number
Directory Source File			
CMS System Disk			
XASRES Volume			

Putting the VM/XA SP Stand-Alone Dump Utility on Tape or DASD

Refer to *VM/XA SP Planning and Administration* for instructions on how to do this. If the stand-alone dump utility is on tape, you should know where the tape is. If it is on DASD, you should know which volume.

Since VM/XA SP stores dumps in system data files, you cannot transport them from your VM/XA SP system to your VM/SP HPO system. If you have a problem and want to back off to VM/SP HPO, you will need the stand-alone dump facility to examine the problem.

Loading the VM/XA SP Nucleus

In VM/SP HPO, the maximum virtual machine size you can have is 16Mb. Since you have to allow 3Mb of virtual storage for the nucleus, this means that the maximum V=R size that you can generate when creating a VM/XA SP nucleus in a VM/SP HPO virtual machine is 13Mb.

If you load the VM/XA SP nucleus to tape rather than spool it to your reader, you will not be constrained by the 16Mb virtual machine storage size.

Refer to *VM/XA SP Installation and Service* and to the *VM/XA SP Program Directory* for the step-by-step procedures.

Preparing the CP-Owned DASD

You must reallocate, but not reformat, your paging and spooling packs, except for cylinder 0, which you must reformat.

There is no stand-alone Format/Allocate program in VM/XA SP as there is in VM/SP HPO. Instead, you use a CP or CMS command. In CP, you enter: CPFORMAT; in CMS, you enter CPFMTXA.

In order to use CPFORMAT, your virtual machine must be a System/370 mode machine. When CPFORMAT executes, it resets your virtual machine and clears virtual storage. This means that, after issuing the CPFORMAT command, you must re-IPL any system (such as CMS) that was running in your virtual machine.

CPFMTXA (a CMS module) provides the same function as CPFORMAT but does not reset your virtual machine. You can load the CPFMTXA module from the VM/XA SP starter system tape onto your VM/SP HPO system to reformat and reallocate DASD for use on your VM/XA SP system.

The table below compares the VM/SP HPO and VM/XA SP options for allocation space. You should not allocate cylinder 0 as TDSK.

Table 9 (Page 1 of 2). Allocation Options		
VM/SP HPO	VM/XA SP	Description of Change Introduced by VM/XA SP
DRCT	DRCT	No change.

Table 9 (Page 2 of 2). Allocation Options

VM/SP HPO	VM/XA SP	Description of Change Introduced by VM/XA SP
PAGE	PAGE	In VM/SP HPO, you use the PAGE area only for preferred paging; you use TEMP for all other paging activity. In VM/XA SP, you use PAGE for all paging activity; you use SPOL only for the overflow paging.
PERM	PERM	No change.
TEMP	SPOL	In VM/XA SP, you use SPOL for spooling and overflow paging activity (and also for dump space).
DUMP	SPOL	In VM/XA SP, you use SPOL for dump space in addition to spooling and paging activity.
OVRD	-----	Override files are stored as system data files in VM/XA SP rather than on DASD. Therefore, the OVRD allocation is unsupported.
TDSK	TDSK	No change.
END	END	No change.

If You Are Building VM/XA SP for the First Time

As mentioned in the planning chapter, it is recommended that you build a small, one-pack VM/XA SP system first. Then, when you have familiarized yourself with VM/XA SP, you can build a larger system.

When building a one-pack system, ensure that you have the following areas allocated on the pack:

- The directory area
- A spooling area which, in this case, may be used for paging as well.

If You Are Ready to Move Your VM/SP HPO Production to a VM/XA SP System

If you have tested VM/XA SP and are ready to move your VM/SP HPO production to a VM/XA SP system, you may want to use some of the same CP-owned DASD. We recommend that you maintain a sufficient number of CP-owned DASDs in System/370 mode so that, if necessary, you can quickly back off. However, you may want or need to use some of the same DASDs. To do this, you must reallocate, but not reformat, your paging and spooling packs, except for cylinder 0, which you must reformat. You do not need to reformat cylinder 0 and reallocate DASD that are not CP-owned. They can be used in the same format on VM/XA SP.

Since you cannot reformat and reallocate paging and spooling packs to which you are currently attached, you must:

1. Shut down the system.
2. Re-IPL it with the CP-owned DASD that you plan to reformat offline.
3. Attach the DASD to a virtual machine.
4. Reformat cylinder 0 and reallocate.

To save time, you may want to write an EXEC that reformats cylinder 0 and reallocates the CP-owned DASD for use with VM/XA SP.

Migrating Spool Files

You can migrate **spool files** from your VM/SP HPO system to your VM/XA SP system using the CP SPTAPE command. You cannot migrate **system files** from VM/SP HPO to VM/XA SP. The VM/XA SP SPTAPE command ignores such files. System files include:

- Files created by the VM/SP HPO ACNT, CPTRAP, and MONITOR commands
- VM/XA SP named saved systems, saved segments, image libraries, and UCR files
- Virtual machine dumps (output from the VMDUMP command), CP abend dumps, and CP stand-alone dumps from either VM/SP HPO or VM/XA SP
- System trace files.

In addition, if you move a spool file that originated on a VM/SP HPO system to a VM/XA SP system, it loses those file attributes that do not have VM/XA SP equivalents. Therefore, if you move the same file back to the VM/SP HPO system, it will not be identical to the original file.

SPTAPE processing in VM/SP HPO Release 4.2 does not provide multivolume tape support. This means that you must keep track of the spool files that you are dumping to tape. CP will not prompt you to mount another tape when the first tape is full. As a result, you must keep track of the spool files that are being dumped so you know where to begin dumping when you start a new tape reel. One way you can do this is to write an EXEC that orders the spool files in the system unit record devices. Since the spool files are uniquely numbered in the VM/SP HPO 4.2 system, you can order the system queue by spoolid, form, or class. (In the VM/XA SP system, you cannot order the system queue by spoolid.) Then, when one tape is filled during SPTAPE dump processing, you can mount another tape and rerun the EXEC, beginning with the last spool file that was reported.

SPTAPE DUMP processing was enhanced in VM/SP HPO Release 5 to include limited multivolume tape support. If all the spool files being dumped cannot fit on a single tape, CP prompts you to mount another tape. Once the tape is mounted, SPTAPE processing continues.

VM/XA SP provides the same multivolume tape support as VM/SP HPO Release 5.

Table 10 summarizes SPTAPE multivolume support.

Table 10 (Page 1 of 2). Summary of SPTAPE Multivolume Support	
Licensed Program	SPTAPE Multivolume Support
VM/SP HPO Release 4.2 or VM/XA SP Release 1	No multivolume tape support. The tape runs until the end and then tape processing stops with an error. The partial spool file is erased at the end so that there is no problem when loading the files. CP does this by backing up the tape and placing a tape mark at the end of the last complete file.

Table 10 (Page 2 of 2). Summary of SPTAPE Multivolume Support	
Licensed Program	SPTAPE Multivolume Support
VM/SP HPO Release 5 or VM/XA SP Release 2	Provides limited multivolume tape support. The tape runs until the end. At the end, CP prompts you to mount a new tape.

The amount of time that SPTAPE processing takes depends directly on the number of spool file records in your system. For example, it will take you roughly twice as long to SPTAPE dump 50000 records as it will to dump 25000 records.

To get a rough estimate of how long it will take to dump the spool files in your system, do the following:

1. Measure how long it takes to dump a small number, such as 1000 records.
2. Determine how many spool file records you have in the system.
3. Multiply the number of spool file records in your system by the amount of time it takes per record.

For example, suppose you find that it takes about 80 seconds for you to dump 1000 records, or .08 seconds per record. Now assume that you have 110000 spool file records in your system. By multiplying 110000 by .08, you find that it will take 8800 seconds, or almost 2-1/2 hours to dump all the spool files in your system. This number is not exact, but it gives you an idea of how much time to allot.

You can decrease the amount of actual time it takes if you attach several tape drives and dump spool files from several virtual machines at once. Or you may consider dumping spool files over several nights.

Setting Password Suppression

In VM/SP HPO, you set and change logon password suppression by using the SYSJRL macro during system installation. In VM/XA SP, you set and change logon password suppression by using the SET PASSWORD command when the system is running, and you query the setting by using the QUERY PASSWORD command.

In VM/SP HPO, you set and change logon password suppression for the LOGON, LINK, and AUTOLOG commands as a group. In VM/XA SP, you issue SET PASSWORD and QUERY PASSWORD for the LOGON, LINK, and AUTOLOG commands individually.

Re-IMLing the Processor to 370-XA Mode

Before you IPL VM/XA SP, you must re-IML the processor.

As mentioned previously, you can use the same IOCP files (IOCDS). However, to take advantage of the XA architecture, you will most likely want to redefine your I/O and recreate IOCP files.

IPLing VM/XA SP with a Cold Start

What If I Can't IPL Because of a Problem with the User Directory?

You will not be able to IPL VM/XA SP if you did not redirect the user directory for VM/XA SP prior to shutting down VM/SP HPO or if there is a problem with the VM/XA SP directory. (This may also be the case if you do not update the directory after applying service to HCPDIR.) Since VM/XA SP does not support a stand-alone directory function, you must do the following:

1. IPL using the NODIRECT option. This will log on the primary system operator. The system operator is authorized to perform all the tasks that he or she normally performs, but is not able to link to other virtual machines' minidisks.
2. Use the DEF MDISK command to obtain access to the minidisks containing the directory source file, the CMS system disk, and the XA SYSRES volume.
3. IPL CMS.
4. Issue the ACCESS command to access the minidisk that contains the directory source file.
5. Issue the DIRECTXA command.
6. Re-IPL the system without the NODIRECT option.

Refer to *VM/XA SP Real System Operation* for a complete step-by-step procedure.

What If I Forgot to Reformat Cylinder 0 and Reallocate CP-Owned Packs?

If you forgot to reformat cylinder 0 and reallocate your CP-owned DASD (a DASD is CP-owned if the label is defined in the SYSCPVOL list in HCPSYS), you will not receive an error message telling you that the DASD is formatted or allocated incorrectly. The DASD will be brought up online but will not be CP-owned (even if some or all of the DASD is allocated as PERM).

If you issue a command to attach the DASD, such as:

```
CP ATT 453 SYSTEM SPECX5
```

You will receive the following error message:

```
HCPATS128E DASD 0453 ERROR READING ALLOCATION RECORD
```

However, after reformatting cylinder 0 and reallocating the pack, you will be able to attach the pack to the system.

If the DASD is not CP-owned, you do not need to reformat cylinder 0 and reallocate. You may use the DASD in the same format as you did on VM/SP HPO.

Installing the Printer Image Library

VM/XA SP handles the printer image library differently than VM/SP HPO. See Table 11 on page 57.

Table 11. Differences Installing the Printer Image Library	
VM/SP HPO	VM/XA SP
You need an image library for 3800 printers. You do not need an image library for impact printers.	You need an image library for both 3800 printers and impact printers.
After creating or updating image libraries, you must re-IPL the system.	You can create or update image libraries dynamically under CMS; you do not need to re-IPL.
Uses assemble files: DMKFCB ASSEMBLE DMKUCS ASSEMBLE DMKUCB ASSEMBLE DMKUCC ASSEMBLE DMKPIA ASSEMBLE DMKPIB ASSEMBLE.	Uses image libraries: IMAGxxxx IMG where xxxx is the printer name. Sample files are provided on the product tape for creating image libraries. You create image libraries for: <ul style="list-style-type: none"> • 3800 printers using text decks and control files • Impact printers using assemble files, text decks, and control files.
For manipulating image libraries, use the GENIMAGE, IMAGELIB, and IMAGEMOD commands, and the NAME3800 macro.	For manipulating image libraries, use the GENIMAGE, IMAGELIB, IMAGEMOD, QUERY IMG, and PURGE IMG commands.

Installing CMS and Other Saved Segments

In separate DCSSs or packed in segment spaces, you can install HELP, CMSINST, CMSBAM, CMSDOS, CMSVSAM, and CMSAMS. You can use the SAMPNSS EXEC to define these saved segments. See *VM/XA SP Features Summary* for the command and EXECs you can use to load and save them, and for a sample layout of CMS virtual storage when all of the CMS saved segments are generated.

You should also define a segment to contain EXECs and the System Product Editor.

Save CMS as a named saved system, in both 370 mode and 370-XA mode, at default addresses.

Back up the CMS named saved systems on tape. Because CP uses system spooling space to store named saved systems and because there is always the potential that you will not be able to recover spooling space after a CP abnormal termination, you should always keep backup copies of named saved systems on tape. The CP SPTAPE command enables you to do this. If you IPL VM/XA SP with a cold start, named saved systems are not purged.

Applying Service to the System

The service procedure used in VM/XA SP is conceptually the same as the procedure used in VM/SP HPO but is more automated and gives you more control over the changes that are being made. For a complete description of the service procedure, read *VM/XA SP Installation and Service*. A summary of differences follows.

Differences Applying Corrective Service

As in VM/SP HPO, you use VMFPLC2 and VMFZAP. The only difference is that if you are replacing code (rather than manually updating it) and the code applies to the nucleus, you use the patch facility rather than VMFZAP. You continue to use VMFZAP for replacing code that does not apply to the nucleus.

Differences Applying Preventive Service (PUT)

The procedure is more automated:

- In addition to the source or object code to be updated, you use many files to apply PUT service.

Most of the files used in VM/XA SP are the same as in VM/SP HPO. These include PUT document, memo-to-users, control file, auxiliary control files, update files, source update files, text decks (these now include prerequisites and corequisites for this service), load list, and load map.

In addition, there are many new or changed files. These include patch update files, update shells, text shells, product parameter file (this replaces the product EXEC), PTF parts list, apply list, exclude list, receive exception log, apply exception log, build exception log, and receive history log.
- There is a new recommended procedure for how to apply service. In VM/XA SP, IBM recommends that you apply service to alternate disks rather than to your current system. Once the system is stabilized, you merge the alternate disks into your current disks and copy your new system. The alternate disks are then free for the next service updates.
- VM/XA SP uses object code service procedures for some modules in CP.
- New EXECs (actually delivered on the VM/XA SP product tape) replace VMSERV functions. VMSERV is retained for compatibility; however, you cannot use it to apply service to VM/XA SP. You can use VMSERV for other products, but you should use the VMFREC EXEC instead.

The new EXECs are VMFREC, VMFAPPLY, and VMFBLD. These EXECs require information supplied by a CMS file called the product parameter file. This file contains the following:

- Control information, such as the name of the main and auxiliary control files to be used and the verification functions to be performed while service is applied. The name of the user exit EXEC that is called at the end of each service function is also supplied in this section.
- The minidisks to be used for (1) holding source and object code, IBM-supplied service files, and user-supplied service files, (2) performing updates, and (3) regenerating the nucleus.
- The EXECs needed to update each part of the component.

The VMFREC EXEC receives service from the PUT and creates a service process data base. The VMFREC INFO command maps the PUT and receives

the PUT documentation. The VMFREC 5664308 CP or VMFREC 5664308 CMS command loads the service files onto the minidisks specified in the product parameter file. Any errors that arise from the VMFREC EXEC are logged in a receive exception log on the installer's A-disk.

The VMFAPPLY EXEC builds the auxiliary control files that are used to apply updates to source and object code. The auxiliary control files are built in accordance with the apply list and, optionally, the exclude list for the component. The apply list is a list of the program temporary fixes (PTFs) that are to be applied to the component. The exclude list is a list of the PTFs that are not to be applied to the component, even though they are listed in the apply list.

When invoking the VMFAPPLY EXEC, the installer specifies the number of the product (5664308 for VM/XA SP), the name of the component, and the file type of the auxiliary control files that are to be built. Options can be specified that control whether or not the exclude list is used, errors are logged, and checking is performed.

The VMFAPPLY EXEC creates or edits the necessary auxiliary control files and, if appropriate, invokes the VMFAPNLS EXEC to create auxiliary control files for national language support. The new auxiliary control files are used for source code files when the source code files are assembled via the VMFHASM EXEC.

After service has been received and applied, and source code files have been reassembled, the VMFBLD EXEC is used to generate a new nucleus for the specified component. Corequisite and prerequisite checking is done automatically based on information in the AUX files.

The method used to apply service depends on whether the code to be serviced has been supplied as source code or object code. These methods are used automatically by the EXECs already discussed.

For a complete description of the preventive service procedures, read *VM/XA SP Installation and Service*.

Differences Building the System

The build process is virtually the same. You continue to use the VMFMAC, UTILITY, VMFHASM, and CMSGEND EXECs. There are a few differences:

- The VMFBLD EXEC replaces the SPGEN EXEC
- The dump viewing facility replaces IPCS.



Chapter 4. Administration

Now that you have installed the system, you are faced with the administration task. In some cases, you can perform administrative functions in the same manner that you did in VM/SP HPO; in other cases, you must completely alter your procedure. The following tasks have changed and are discussed in this chapter:

- Managing saved segments
- Restructuring user classes
- Managing system performance
- Setting up the programmable operator
- Setting up service virtual machines.

Managing Saved Segments

Using CP Commands to Define Saved Segments

In VM/XA SP, you manage shared storage while the system is running rather than when you generate it. So, instead of using DMKSNT macros, you use commands. Use:

- The CP class E DEFSEG command to generate saved segments and create segment spaces. It replaces the NAMESYS macro.
- The CP class E SAVESEG command to save the segment and make it active.
- The CP class E QUERY NSS command to determine the characteristics of a saved segment.
- The CP class E PURGE NSS command to purge unwanted files that contain saved segments.
- The CMS SEGMENT command, SEGMENT macro, or DIAGNOSE code X'64' to access the saved segment from a virtual machine.

Converting DMKSNT Macros to DEFSEG Commands

Suppose that you have the following entry for the DMKSNT:

```
NAMESYS SYSNAME=SFMASS00

SYSPGCT=144,
SYSPGNM=(2128-2271),
SYSHRSG=(133,134,135,136,137,138,139,140,141),
SYSVOL=valid,
SYSSTRT=(40,07),
SYSSIZE=576K,
VSYRES=IGNORE
VSYADR=IGNORE
```


To translate the information in this entry to definitions for the DEFSEG command, follow the steps in this list. It will show you how to obtain the equivalent DEFSEG command for the above DMKSNT entry.

The equivalent command for the preceding entry is:

```
DEFSEG SFMASS00 800-88F SR
```

1. Extract the name on the SYSNAME parameter to use as *segname* on the DEFSEG command. This is the name given to the segment. In the DMKSNT entry, this is entered as:

```
SYSNAME=SFMASS00
```

In VM/XA SP, this same segment name is entered as:

```
DEFSEG SFMASS00
```

2. Convert the decimal value of SYSPGCT to hexadecimal. We recommend that you use a hexadecimal calculator or conversion table to make the hexadecimal conversions.

The result tells you how many pages the program needs (in hexadecimal).

In the example, the result would be X'90', meaning that the program requires X'90' (4K) pages of storage. If all pages were in the same segment, the page range would be X'0' to X'8F' within the chosen segment. Be sure to count PAGE 0 as the first page. In the DMKSNT entry, this is entered as:

```
SYSPGCT=144
```

In VM/XA SP, X'90', pages are required. The page range may be X'0' to X'8F' within the chosen segment.

3. Divide the decimal value of SYSPGCT by 16.

The result tells you how many 64K segments the program needs in VM/SP HPO.

In the example, the result would be 9, meaning that the program requires nine 64K-segments. In the DMKSNT entry:

```
SYSPGCT=144
```

To convert this for VM/XA SP:

```
144 divided by 16 equals 9
```

The program needs 9 (64K) segments. This information is used later in the DEFSEG command definition.

4. Convert both decimal values of the SYSPGNM parameter to hexadecimal values.

Use the hexadecimal values to define the starting and ending pages and relative location of the segment in VM/SP HPO.

In the example shown, 2128 is X'850'. The likely place to locate this program might be to start it on page X'00' in segment 8. (If you accepted the default location of segment 8 for CMSVSAM, this new segment will overlay CMSVSAM.) Round *down* to the nearest segment boundary. The ending page

is X'8DF' (X'850' plus X'8F' pages). Count page 0 as the first page. In the DMKSNT entry, this is entered as:

SYSPGNM=(2128-2271)

Converting the values to be used in VM/XA SP:

2128 = X'850' 2271 = X'8DF'.

In VM/XA SP, this is entered as:

DEFSEG SFMASS00 800

(You will use the ending page value later in the DEFSEG command definition.)

5. Look for the SYSHRSG parameter. If present, all the 64K segments listed are to be shared by users. The first letter of the *mode* operand will be S. Count the number of segments listed singly or within a segment range. Compare the count to the result of SYSPGCT.

If the count equals the result of SYSPGCT, all storage is shared. When the count is less than the result of SYSPGCT, you must figure out which pages and how many pages of storage must be put in an exclusive segment or segments. The first letter of the *mode* operand is an E.

Another way to determine the first letter of the *mode* operand is to multiply the beginning segment number by 16 (the number of pages in a 64K segment) and then multiply the ending segment number by 16 and add 15 (pages 0-15 of the last segment). Compare the two results to the decimal values for SYSPGNM:

- When your results are the same as the values in SYSPGNM, all segments are shared.
- When your results do not match the values in SYSPGNM, the segments *outside* your results are exclusive.

In the example, there are nine segments listed as shared; 9 is the result of dividing SYSPGCT by 16, so all segments defined for SFMASS00 will be shared. In the DMKSNT entry, this is entered as:

**SYSHRSG=(133,134,135,136,
137,138,139,140,141)**

To convert this to be used in VM/XA SP:

9 segments
 $133 \times 16 = 2128$
 $141 \times 16 = 2256 + 15 = 2271$

In VM/XA SP, the equivalent statement is:

DEFSEG SFMASS00 800-88F Sm

The 'm' in the above example is the second letter of the mode operand (either R, E, or N). This will be discussed below.

If the example had SYSHRSG=(133,134,135,136,137,138), six segments would be shared; the remaining three segments would be exclusive and would have to be placed in the next 1Mb segment. Each segment of SYSHRSG represents X'0' to X'F' pages, so the shared portion would be the first X'60' pages (pages X'0' to X'5F') of the lower segment, and X'30' pages would be the first pages in the next segment (pages X'0' to X'2F'). The page range might be X'800' to X'85F' for shared code and X'900' to X'92F' for the exclusive code. In the DMKSNT entry, this is entered as:

SYSHRSG=(133,134,135,136,137,138)

To convert this for use in VM/XA SP:

6 segments
 $133 \times 16 = 2128$
 $138 \times 16 = 2208 + 15 = 2223$

In VM/XA SP, the equivalent statement is:

DEFSEG SFMASS00 800-85F Sm 900-92F Em

6. Look for the PROTECT parameter. When PROTECT=ON or when the parameter is missing (the default is ON), the second letter of the *mode* operand will be R (for read-only). When PROTECT=OFF, the second letter of the *mode* operand will be W (for read/write access). All exclusive segments should have W as the second letter. In the DMKSNT entry:

The PROTECT parameter is missing

For VM/XA SP, this means that all pages are shared read-only. In VM/XA SP, the equivalent statement is:

DEFSEG SFMASS00 800-88F SR

In the preceding example with both shared and exclusive segments, you would assign R to the shared segment because there was no PROTECT parameter, but W to the exclusive segment. In the DMKSNT entry:

The PROTECT parameter is missing

For VM/XA SP, shared pages are read-only and exclusive pages are read/write.

In VM/XA SP, the equivalent statement is:

DEFSEG SFMASS00 800-85F SR 900-92F EW

7. Look for the RCVID operand. If present, add the RSTD operand to the DEFSEG command. When you want to restrict access to the program, you might want to add the RSTD operand. You would also want to add the RSTD operand when a person will load the segment using DIAGNOSE code X'64' with the E function code. Access to a restricted segment requires that the user have directory authorization via the NAMESAVE directory statement. If you want to restrict access to the program in the example, you would add RSTD to the DEFSEG command. Suppose the following were entered in the DMKSNT entry:

RCVID=userid

In VM/XA SP, the equivalent statement would be:

DEFSEG SFMASS00 800-88F SR RSTD

8. The following parameters of the DMKSNT entry are not applicable to a DEFSEG command in VM/XA SP: SYSVOL, SYSSTRT, SYSSIZE, VSYSRES, VSYSADR, SYSCYL, SYSBLOK, USERID, and SAVESEG.

Saving a CMS File Directory in a Saved Segment

The procedure for saving a CMS file directory in a saved segment using the CMS SAVEFD command is slightly different in VM/XA SP than in VM/SP HPO.

In VM/SP HPO, the procedure is:

1. Define the segment in the system through an entry in DMKSNT.
2. The upper limit of virtual storage of the class E user who is saving the DCSS must be lower than the starting address of the segment. Issue the DEFINE

STORAGE command with a value that is less than the starting address of the segment location.

3. Issue IPL CMS.
4. Issue SAVEFD INIT.
5. Issue SAVEFD SAVE.

In VM/XA SP, the procedure is:

1. Define the segment in the system using a DEFSEG command. If the directory is in a member saved segment, define all the members of the segment space.
2. Include a NAMESAVE entry in the directory of the class E user who is saving the saved segment.
3. This user's virtual storage upper limit must be greater than the ending address of the segment location. Issue the DEFINE STORAGE command with a value that is greater than the ending address of the segment location.
4. Issue SAVESEG segname. If the directory is in a member saved segment, make sure that you save all members of the segment space.
5. Reissue the DEFSEG command. If the file directory is in a member saved segment:
 - Redefine the directory to be saved with page ranges
 - Redefine the other members with the SAMERANGE operand.
6. Now the virtual storage of the user who is saving the saved segment must be lower than the starting address of the segment. Issue the DEFINE STORAGE command with a value that is less than the starting address of the segment location.
7. Issue IPL CMS.
8. Issue SAVEFD INIT.
9. Issue SAVEFD SAVE.

Using Segments in Virtual Machines

In VM/SP HPO, a virtual machine user can use a program in a saved segment only when the segment is outside his or her address space. For example, a licensed program such as PROFS might be loaded into a segment starting at 6 Mb. VM/SP HPO CMS users of virtual machines with storage greater than 6 Mb cannot load or use PROFS. Users of the virtual machines would risk overlaying their storage. This is why the saved segments are called discontinuous.

In VM/XA SP CMS, a user of any size virtual machine can use programs loaded into any saved segment as long as the user defines a "hole" for the program in his or her address space. The SEGMENT command and macro instruction make segment definition and management possible for virtual machine users and application programs.

Restructuring User Classes

In VM/XA SP, as in VM/SP HPO, if you want to give a CP command, DIAGNOSE code, or system function a class definition that is different than the IBM-defined class, you must create a class override file.

The format for the class override file (CMS source file), the syntax of the OVERRIDE command, and the way the OVERRIDE command works is different in VM/XA SP than in VM/SP HPO. In addition, the internal user class restructure file is kept in a system data file in VM/XA SP rather than, as in VM/SP HPO, in the OVRD space allocated on the same volume as the directory. System data files reside in spool space, but, unlike reader, printer, and punch files that also reside in spool space, they are not destroyed by a cold start.

In addition, there are differences among the individual commands with respect to function, invocation, response, and privilege class. Before you convert your VM/SP HPO class override file to the VM/XA SP class override file, you should review "VM/SP HPO and VM/XA SP Command Compatibility" on page 105 for each command to verify that the command still exists, that the privilege class is the same, and that you still want to override the command in the same manner in VM/XA SP as you did in VM/SP HPO.

Note that Diagnostic CCW commands require class F authority in VM/XA SP.

The Class Override File for VM/SP HPO

The class override file consists of one DESTINATION control statement (giving the location of the CP-owned volume that contains the internal override file) followed by an OVERRIDE control statement for each command or DIAGNOSE code whose IBM-defined privilege class is to be overridden.

VM/SP HPO commands, DIAGNOSE codes, and system functions have an IBM-defined **type** or multiple types. This is what you indicate on the TYPE parameter. Commands, DIAGNOSE codes, and system functions also have a **class**, which you can modify. You assign this using the CLASS parameter.

Figure 14 is an example of a VM/SP HPO class override file. In the example, notice that the CHANGE command has a TYPE=S version and a TYPE=G version. The TYPE attribute is used to distinguish between the two versions.

```

Destination cuu devtype volser
*
*
*
*
ACNT      TYPE=O   CLASS=D
ADSTOP    TYPE=G   CLASS=IJK
ATTN      TYPE=G   CLASS=IJK
AUTOLOG   TYPE=O   CLASS=FGI
CHANGE    TYPE=S   CLASS=FG
CHANGE    TYPE=G   CLASS=IJKL
    
```

Figure 14. Example of a VM/SP HPO Class Override File

Note: In VM/SP HPO the first control statement in the class override file is a destination control statement. This is not required in VM/XA SP because there are no OVRD cylinders.

The Class Override File for VM/XA SP

The VM/XA SP class override file consists of an **OVERRIDE** control statement for each command, **DIAGNOSE** code, or system function whose IBM-defined privilege class is to be overridden. It does not have a **DESTINATION** control statement. This is because the VM/XA SP internal user class restructure file is kept in a system data file.

Unlike VM/SP HPO, VM/XA SP commands, **DIAGNOSE** codes, and system functions are not associated with a user's group function. As a result, there is no **TYPE** attribute. VM/XA SP commands, **DIAGNOSE** codes, and system functions do have an IBM-defined class. You redefine this class using the **NEWCLASS** attribute. Refer to *VM/XA SP Planning and Administration* for examples.

Some VM/XA SP commands and system functions have more than one IBM-defined user class. To distinguish between the different classes, you must use the **IBMCLASS** attribute. For commands that have only one IBM-defined user class, you may use the **IBMCLASS** attribute, but you are not required to use it.

Figure 15 is an example of a VM/XA SP class override file. In the example, note that the **ADSTOP** command was deleted because it is not supported in VM/XA SP. The **ACNT** command has only one IBM-defined class; thus, you can code the **IBMCLASS** attribute but it is not required. The **CHANGE** command, on the other hand, has multiple versions; thus, you must code the **IBMCLASS** attribute to distinguish between the versions.

```

*
*
*
*
ACNT      NEWCLASS=D
ATTN      NEWCLASS=HI  IBMCLASS=G
AUTOLOG   NEWCLASS=P   IBMCLASS=A
CHANGE    NEWCLASS=EF  IBMCLASS=D
CHANGE    NEWCLASS=HI  IBMCLASS=G
    
```

Figure 15. Example of a VM/XA SP Class Override File

Comparison of the VM/SP HPO and VM/XA SP Override Files

Table 12 (Page 1 of 2). Comparison of the VM/SP HPO and VM/XA SP Override Files		
VM/SP HPO Parameter	VM/XA SP Equivalent	Compatibility Notes
DEST	-----	No equivalent statement.
CLASS	NEWCLASS	

Table 12 (Page 2 of 2). Comparison of the VM/SP HPO and VM/XA SP Override Files		
VM/SP HPO Parameter	VM/XA SP Equivalent	Compatibility Notes
TYPE	IBMCLASS	<p>IBMCLASS means the IBM-defined user class. It is used somewhat differently than TYPE.</p> <p>In VM/SP HPO, you use TYPE when the command you are overriding has multiple privilege classes <i>and</i> when the command functions differently between those classes. If the command functions the same way between all the classes, you do not need to code the TYPE operand.</p> <p>In VM/XA SP, you <i>must</i> use IBMCLASS when the command has multiple privilege classes whether or not the command functions differently between those classes. You can code only one of these classes on each IBMCLASS operand. If the command has only one privilege class, you may use IBMCLASS, but you are not required to use it.</p> <p>In VM/XA SP, you use IBMCLASS only to define what is changing from the IBM default. In VM/SP HPO, you use TYPE to indicate both the default and what is changing.</p> <p>In VM/SP HPO, TYPE identifies a user's group function: O, R, P, S, A, C, or G. In VM/XA SP, IBMCLASS identifies the IBM-defined command class: A, B, C, D, E, F, or G.</p>

Comparison of the VM/SP HPO and VM/XA SP OVERRIDE Commands

In VM/SP HPO, the OVERRIDE command is a CMS module. When you issue OVERRIDE, the override file is written out to the CP-owned pack where the OVRD space is allocated. In order to use OVERRIDE, you must have:

- Access to the CMS module
- Write-access to the CP-owned pack where the OVRD space is allocated.

Like VM/SP HPO, the VM/XA SP OVERRIDE command is a CMS module. However, it operates differently. When you issue the VM/XA SP OVERRIDE command, DIAGNOSE code X'C4' is invoked. DIAGNOSE code X'C4' writes the override file to the system data file. In order to use OVERRIDE, you must have:

- Access to the CMS module
- Privilege class A, B, or C (because these privilege classes have access to DIAGNOSE code X'C4').

The basic syntax of the VM/XA SP OVERRIDE command is the same as VM/SP HPO, although the options differ. The syntax is:

OVERRIDE	fn fm ft [(options
----------	--------------------

Where filename (fn) filemode (fm) filetype (ft) indicates the class override file.

Table 13 compares the options:

VM/SP HPO Option	VM/XA SP Equivalent	Compatibility Notes
EDIT	VALIDATE EDIT	VALIDATE (or the synonym EDIT) provides equivalent function to VM/SP HPO's EDIT option. It verifies that the control statements in the class override file have the correct syntax.
FREE	CLEAR FREE	CLEAR (or the synonym FREE) provides equivalent function to VM/SP HPO's FREE option. It specifies that the command privilege classes should return to the IBM-defined privilege classes.
-----	DEFER	DEFER specifies that the new class structure should take effect after the next system IPL. This is the default. VM/SP HPO does not give you the option of DEFER or IMMEDIATE. In all cases in VM/SP HPO, the new class structure takes place after the next system IPL.
-----	IMMEDIATE	New in VM/XA SP. IMMEDIATE specifies that the new class structure should take effect right away.

Converting Your VM/SP HPO Class Override File

To restructure user classes in VM/XA SP, you must:

1. Create the class override file as shown in Figure 15 on page 67. You may decide to modify your VM/SP HPO class override file for your VM/XA SP system. In this case, you can use the FILECONV SAMPEXEC and the CONVUCR SAMPCMDS files that are provided on the VM/XA SP product tape.

Refer to Appendix A, "Conversion Tools" on page 277 for a complete discussion of the FILECONV sample EXEC.

If you use the FILECONV sample EXEC, you should still look at "VM/SP HPO and VM/XA SP Command Compatibility" on page 105 to ensure that you want to use the VM/XA SP command in the same manner that you used the VM/SP HPO command.

Once you convert your VM/SP HPO override file, determine whether you want to override any new VM/XA SP commands. If so, add these to the file.

2. Issue the **OVERRIDE** command with the **VALIDATE** option to verify the syntax of the class override file. In VM/SP HPO the **EDIT** option had the same function, and **EDIT** is an accepted synonym for **VALIDATE** in VM/XA SP.
3. Issue the **OVERRIDE** command with one of these options:
 - **IMMEDIATE** causes your user-defined class structure to take effect immediately.
 - **DEFER** causes your user-defined class structure to take effect at the next system IPL. This is the default option for the **OVERRIDE** command.
4. To reset your class structure to the IBM-defined classes, issue the **OVERRIDE** command with the **CLEAR** option. This command takes effect at the next system IPL. In VM/SP HPO the **FREE** option had the same function, and **FREE** is an accepted synonym for **CLEAR** in VM/XA SP.
5. Issue **DIRECTXA** to redirect the directory.

Querying or Purging User Class Restructure Files

Since VM/XA SP user class restructure files are kept in system data files rather than on CP-owned DASDs, you must handle them differently.

VM/XA SP provides two commands so you can query and purge user class restructure files: **QUERY UCR** and **PURGE UCR**.

Refer to *VM/XA SP Planning and Administration* for a complete explanation of the user class restructure function in VM/XA SP.

Managing System Performance

The VM/XA SP Scheduler

Although the VM/XA SP scheduler incorporates some of the same concepts as the VM/SP HPO scheduler, it has a completely different design. The following list highlights a few of the differences and similarities. To understand how the VM/XA SP scheduler works, refer to the *VM/XA SP Features Summary*.

- Like VM/SP HPO, the VM/XA SP scheduler places users in lists:
 - The dormant list (does not exist in VM/SP HPO)
 - The eligible list
 - The dispatch list (called the run list in VM/SP HPO)
 - The dispatch vector or run list (called the dispatch list or true run list in VM/SP HPO).
- Like VM/SP HPO, the VM/XA SP scheduler classifies virtual machines in transaction classes. However, the VM/XA SP scheduler moves users from one transaction class to another based on real elapsed time rather than processor time. Like VM/SP HPO, the following transaction classes are used:
 - E1, Q1** are users with short-running transactions.
 - E2, Q2** are users with medium-running transactions.
 - E3, Q3** are users with long-running transactions.

In addition, the VM/XA SP scheduler classifies some users as **E0, Q0**. These users do not wait in the eligible list but go directly into the dispatch list.

- Like VM/SP HPO, VM/XA SP uses the concepts of an interactive storage buffer and interactive bias. In VM/XA SP, these concepts extend not only to storage but also to paging devices and to the multiprogramming level in general.

VM/XA SP Tuning Commands

The different scheduler design significantly changes the externals for the CP commands that control the way the system allocates resources.

The VM/XA SP SET SRM command has the following operands:

- IABIAS specifies the new interactive bias to take effect. The interactive bias causes users doing trivial transactions to receive better service than their scheduling share would otherwise entitle them to receive.
- DSPBUF specifies the dispatch buffer to take effect. The dispatch buffer sets a limit on the number of users in each transaction class who are allowed in the dispatch list.
- DSPSLICE is the new size, in milliseconds, of the dispatching minor time slice. This is the amount of processor time a virtual machine may consume before re-examination by the scheduler.
- LDUBUF partitions the commitment of the system's paging resources when choosing users to move from the eligible list to the dispatch list. The result is a mechanism that controls paging capacity based on the transaction class of a user.
- STORBUF partitions the scheduler's view of main storage when choosing users to move from the eligible to dispatch lists. The result is a mechanism that controls use of main storage based on the transaction class of a user.

Refer to the *VM/XA SP CP Command Reference* for a complete description of the SET SRM command, to the *VM/XA SP Features Summary* for a discussion of the the design and use of the scheduler, and to *VM/XA SP Planning and Administration* for a discussion of tuning controls.

Because the VM/XA SP scheduler differs from the VM/SP HPO scheduler, there is no one-to-one correlation between the tuning commands of the two systems. In some cases, however, the intent or use of commands does correlate. Table 14 presents VM/SP HPO and VM/XA SP commands that serve a similar purpose.

Table 14 (Page 1 of 3). Comparative Uses of VM/SP HPO and VM/XA SP Tuning Commands	
If You Use This VM/SP HPO Command:	You Might Consider Using This VM/XA SP Command:
SET PRIORITY	SET SHARE userid RELATIVE (or SHARE RELATIVE directory control statement) Although the implementation is different, SHARE RELATIVE performs a similar function to SET PRIORITY in that it controls the amount of service the user receives in comparison to other users.

Table 14 (Page 2 of 3). Comparative Uses of VM/SP HPO and VM/XA SP Tuning Commands	
If You Use This VM/SP HPO Command:	You Might Consider Using This VM/XA SP Command:
SET FAVOR %	<p>SET SHARE userid ABSOLUTE (or SHARE ABSOLUTE directory control statement)</p> <p>Although the implementation is different, SHARE ABSOLUTE performs a similar function to SET FAVOR % in that it controls the amount of resources virtual machines receive. As is recommended with the SET FAVOR % command in VM/SP HPO, you should use SHARE ABSOLUTE with discretion to avoid having the total shares exceed 100%. This would cause the scheduler to attempt to deliver more resources than actually exist.</p>
SET FAVOR	<p>SET QUICKDSP</p> <p>SET QUICKDSP is like SET FAVOR in that it allows the specified virtual machine to bypass the eligible list and go directly into the dispatch list. The SET QUICKDSP user is classified Q0. Like the SET FAVORED user in VM/SP HPO, the dispatch priority is not improved.</p> <p>In VM/SP HPO, there is no way to reserve storage for the SET FAVORED user and, as a result, storage can be overallocated if you use SET FAVOR too often. In VM/XA SP, you can use the SET SRM STORBUF command to reserve storage for the SET QUICKDSP users.</p>
SET SRM IB	<p>SET SRM IABIAS</p> <p>Although the implementation is completely different, the intent of the VM/XA SP interactive bias is the same as the VM/SP HPO interactive shift bias: to give good response time to trivial transactions that only require a small fraction of a second of processing to complete.</p>
SET SRM DSPSLICE	<p>SET SRM DSPSLICE</p> <p>As in VM/SP HPO, the DSPSLICE is the size, in milliseconds, of the dispatching minor timeslice.</p>
SET RESERVE	<p>SET RESERVED</p> <p>As in VM/SP HPO, the VM/XA SP SET RESERVED command keeps a specified number of pages resident in real storage at all times for a particular user.</p>

Table 14 (Page 3 of 3). Comparative Uses of VM/SP HPO and VM/XA SP Tuning Commands	
If You Use This VM/SP HPO Command:	You Might Consider Using This VM/XA SP Command:
SPMODE	<p>DEDICATE</p> <p>If you have a multiprocessor configuration but are running in uniprocessor mode, the VM/SP HPO SPMODE command allows you to grant the sole use of the other processor to the MVS V=R virtual machine. The VM/XA SP DEDICATE command is similar in that it allows you to grant the sole use of a real processor to a virtual machine.</p>
SET SRM Ibuff	<p>SET SRM STORBUF</p> <p>Although the implementation is different, the intent of the VM/XA SP SET SRM STORBUF command is similar to the intent of the VM/SP HPO SET SRM Ibuff command: it is used to reserve (or buffer) storage for users based on their transaction class.</p> <p>In the VM/SP HPO command, you set aside an area of storage (called the interactive buffer) to be used by interactive users (class 1 and first-time class 2 users) only. The remainder is used by all users. You also define the time after which an interactive user's working set pages are no longer part of this interactive buffer. This means that, after the specified period of time, if there are not enough interactive users, VM/SP HPO will use the interactive buffer for noninteractive users.</p> <p>In the VM/XA SP command, you have control over the amount of storage that each class of user can use, not just the interactive user. You can define an area of storage to be used only by class 1 users, a second area to be used only by class 1 and 2 users, and a third area to be used by class 1, 2, and 3 users. If you do not allocate 100%, the remainder is used only for Q0 users (SET QUICKDSP users). If there are no Q0 users, the remainder is used to keep pages of dormant users.</p> <p>Unlike the VM/SP HPO SET SRM Ibuff command, you do not define the time after which a user's working set pages are no longer part of the defined storage buffer. Thus, CP does not override your definitions. This gives you more control but means that you must be more careful in how you define the storage buffer. Note that this control allows you to overcommit or undercommit storage. There is no implied top boundary fixed at 100% as in VM/SP HPO. In VM/XA SP, the top boundary is set as one of the three operands of this command and may be set larger or smaller than 100%.</p>

The following VM/XA SP commands have no equivalent function in VM/SP HPO:

SET SRM DSPBUF
 SET SRM LDUBUF.

Due to the differences in the VM/XA SP scheduler and paging algorithms, the following VM/SP HPO commands have no equivalent function in VM/XA SP:

SET MINWS
 SET PAGING
 SET QDROP OFF
 SET SRM MAXPP
 SET SRM MAXWSS
 SET SRM MINNUMSS
 SET SRM PB
 SET SRM PCI
 SET SRM PGFULL
 SET SRM PGMTLIM
 SET SRM PREPAGE
 SET SRM SWPQTIME (VM/SP HPO Release 4.2 only).

Tuning the VM/XA SP System

Table 15 presents different problems you may face at your installation and the appropriate tuning controls (CP commands) that apply to VM/XA SP. For details on tuning the VM/XA SP system, refer to *VM/XA SP Planning and Administration*. For the syntax of the VM/XA SP commands, refer to the *VM/XA SP CP Command Reference*.

The controls for each environment are listed in approximate order of importance although, in some environments, the order of importance is difficult to predict.

Table 15 (Page 1 of 2). Summary of Tuning Controls for VM/XA SP	
Situation	Appropriate Tuning Controls for VM/XA SP
Processor-constrained environment	1. UNDEDICATE 2. SET SRM DSPBUF 3. SET SRM IABIAS
Storage-constrained environment	1. SET SRM STORBUF 2. SET RESERVED
Paging-constrained environment	1. SET SRM LDUBUF 2. SET RESERVED
I/O-constrained environment	1. SET SRM DSPBUF 2. SET SRM DSPSLICE 3. SET SRM IABIAS
Need improved performance for a production guest	1. SET SHARE 2. V = R 3. SET QUICKDSP 4. SET RESERVED 5. DEDICATE

Table 15 (Page 2 of 2). Summary of Tuning Controls for VM/XA SP

Situation	Appropriate Tuning Controls for VM/XA SP
Need improved performance for a service virtual machine	<ol style="list-style-type: none"> 1. SET QUICKDSP 2. SET SHARE 3. V=F 4. SET SRM STORBUF 5. SET RESERVED

Guidelines for Converting Your VM/SP HPO Paging and Swapping

Convert all the paging and swapping space defined in your VM/SP HPO system to paging space. Once you begin to exploit VM/XA SP capability, the load on the paging subsystem will increase. At this point, you will need to increase the amount of DASD allocated. We recommend that you allocate about two to four times the amount of DASD space that is normally in use by all the logged-on virtual machines in the system.

Put CP-owned devices on separate channels from devices used by V=R and V=F guests. Put CP-owned devices on separate control units from devices used by V=R guests.

Dedicate the paging devices to VM/XA SP. Do not share the paging devices with TDISK or SPOL space. TDISK space should be isolated because it is frequently reformatted and could cause contention with paging. Spool space can be intermixed but it's advisable that you separate it. Do not combine paging and spooling unless your paging and spooling rates are below 20 pages per second. You can combine spooling and minidisk I/O on the same control unit.

Refer to *VM/XA SP Planning and Administration* for information and recommendations on planning for real and auxiliary storage.

The VM/XA SP Monitor

The SYSMON macro, used in VM/SP HPO to specify monitor collection parameters, does not exist in VM/XA SP. In VM/XA SP, all collection parameters are controlled by the MONITOR command. This eliminates the need for updating HCPSYS, reassembling, and re-IPLing the system whenever you want to change monitoring parameters.

The MONITOR command has been expanded in VM/XA SP to allow an increased selectivity in monitoring; that is, users or devices can be monitored on an individual basis. The data categories for monitoring are called domains rather than classes.

There are eight data domains: SYSTEM, MONITOR, USER, I/O, SEEKS, SCHEDULER, STORAGE, and PROCESSOR. The SYSTEM domain has been designed to include enough overall system performance data such that other domains do not have to be enabled unless problems are suspected.

Another difference between the VM/SP HPO and VM/XA SP MONITOR commands is in the way that the enable commands work. In VM/SP HPO, each successive monitor enable command overrides the previous one. In VM/XA SP, on the other hand, each successive monitor enable command builds on the previous command. This means that the enabling of data is cumulative in VM/XA SP.

The VM/SP HPO MONITOR DISPLAY command is replaced by the VM/XA SP QUERY MONITOR command. In addition, VM/XA SP provides a SET MONDATA command to control the collection of terminal input/output data for security reasons.

Unlike the VM/SP HPO monitor, which places monitor data in a spool file, the VM/XA SP monitor places data in a saved segment. You must define and save the saved segment before you can start collecting monitor data. Once you save the saved segment, a user can load it and issue an IUCV CONNECT to the *MONITOR CP system service. The *MONITOR system service will notify the virtual machine when there is data to be processed.

Only one virtual machine can establish a connection to *MONITOR. Once the connection is established, the MONITOR START command can be issued by any privileged user ID to obtain system performance data. Other parameters of the MONITOR command can be issued at any time by any privileged user.

To establish a MONITOR saved segment and start generation of MONITOR data:

1. Create a segment for MONITOR using the DEFSEG command. The saved segment must be at least 8 pages.
2. Save the segment for MONITOR using the SAVESEG command.
3. Access the MONITOR saved segment from a virtual machine by issuing the CMS SEGMENT command, SEGMENT macro, or DIAGNOSE code X'64'.
4. Establish IUCV communication with *MONITOR.
5. Issue MONITOR commands to set up and start collecting system monitor data.

VM/XA SP provides a sample program called MONWRITE which writes the raw monitor data to disk or tape. Refer to *VM/XA SP CMS Command Reference* for a discussion of the sample program.

For more information about the VM/XA SP monitor, see the *VM/XA SP Features Summary*, *VM/XA SP Planning and Administration*, and *VM/XA SP CP Programming Services*.

Start Interpretive-Execution Assist Consideration

For System/370 preferred virtual machines, the start interpretive-execution assist is available only for I/O devices that have virtual addresses less than or equal to hex FFF.

Setting Up the Programmable Operator

You should update the programmable operator routing table and action routines so they are sensitive to the changes in the CP interfaces:

- There are command changes. Refer to "VM/SP HPO and VM/XA SP Command Compatibility" on page 105.
- There are message changes. In VM/SP HPO, message numbers have three digits; in VM/XA SP, message numbers have four digits. Some messages that use only one line in VM/SP HPO use more than one line in VM/XA SP. In some cases, multiple VM/SP HPO messages are replaced by one VM/XA SP

message. Refer to “VM/SP HPO and VM/XA SP Message Compatibility” on page 127 for details.

The programmable operator works the same way in VM/XA SP as it does in VM/SP HPO.

Setting Up Service Virtual Machines

Setting Up Virtual Machines for Accounting and Error Recording

In VM/SP HPO, EREP and accounting data are collected in spool files. In VM/XA SP, EREP and accounting data are collected by service virtual machines. Don't forget to clean off the minidisks from time to time. Also, VM/XA SP does not support record types 4, 5, and 6 for accounting data.

Journaling is not supported in VM/XA SP. Similar function is provided by RACF.

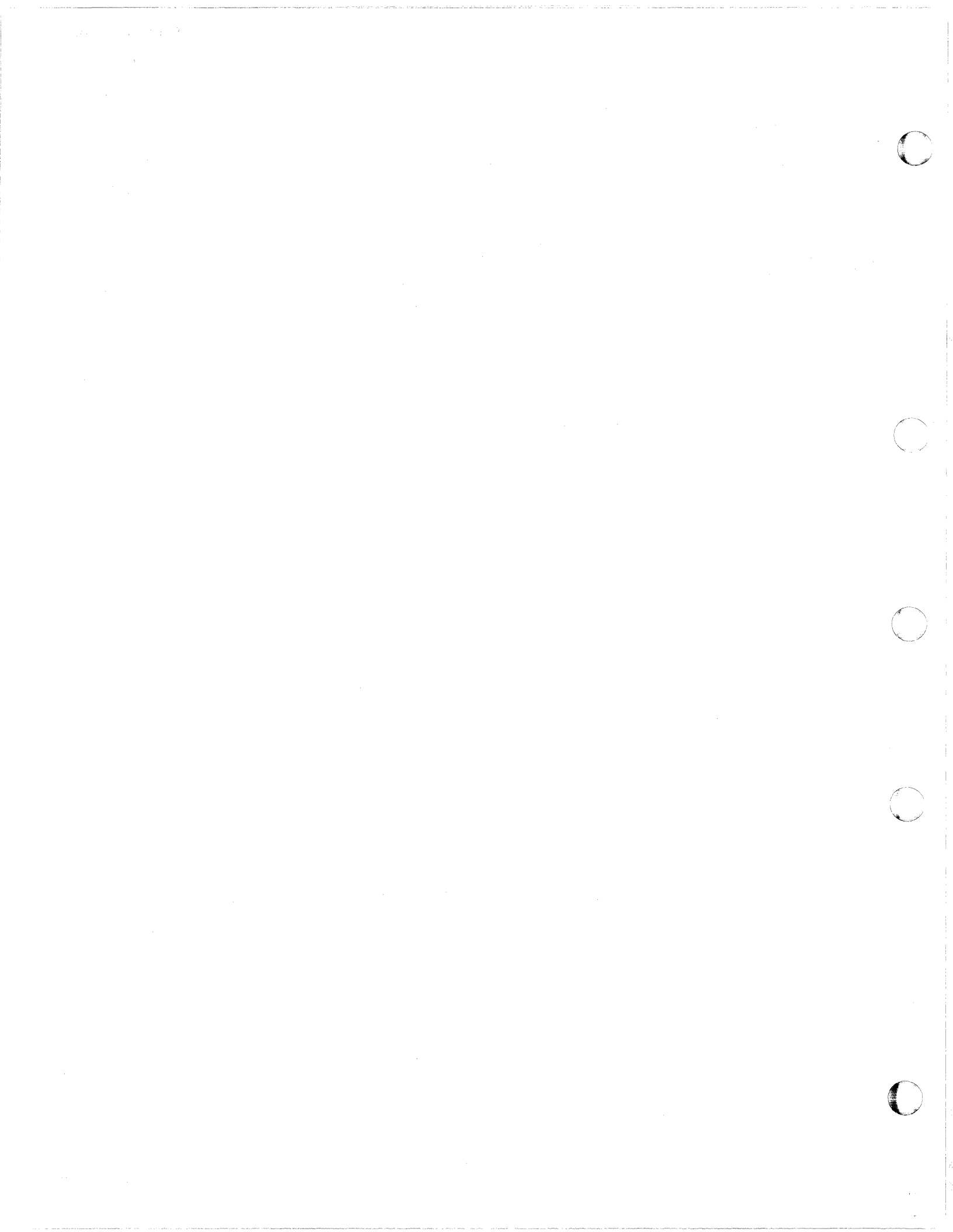
Setting Up a Virtual Machine for CMS Batch

The VM/XA SP batch machine differs from the VM/SP HPO batch machine in the way that it times jobs.

The VM/SP HPO batch machine limits job execution time based on the virtual processor time the job has consumed. Virtual processor time includes only the time when the virtual machine is executing.

The VM/XA SP batch machine limits job execution based on the elapsed time the job has consumed. Elapsed time includes all the time since the job was first dispatched. This means that it includes both the time when the virtual machine is executing and when the virtual machine is waiting between time slices. This difference comes about through simulation of the MVS/XA STIMER REAL macro by the VM/XA SP batch machine.

Because of the differences, you should increase the BATLIMIT limits for VM/XA SP. Leaving the limit the same would effectively cut a job off sooner on VM/XA SP than on VM/SP HPO (five seconds of virtual processor time takes longer than five seconds of elapsed time unless the virtual machine has the processor 100% of the time).



Chapter 5. Real System Operation

Real system operation tasks include bringing up the system, starting and stopping the system, running the system (this consists of controlling processors, controlling I/O, and managing data files), shutting down the system, and running utility programs.

For conversion from VM/SP HPO, differences in CP externals such as CP commands and messages affect real system operations. For example, VM/SP HPO uses QUERY PSTOR for Expanded Storage, while VM/XA SP uses QUERY XSTORE.

This chapter summarizes tasks that you may have to do differently in VM/XA SP. Refer to *VM/XA SP Real System Operation* for details on the operating procedures and to the *VM/XA SP CP Command Reference* for the syntax of CP commands.

Differences Starting the System

VM/SP HPO provides four kinds of starts: warm, checkpoint, force, and cold. These starts can be modified by specifying DRAIN or SHUTDOWN. The VM/SP HPO prompt is:

```
Start ((WARM|CKPT|FORCE|COLD) (DRAIN))|(SHUTDOWN)
```

VM/XA SP provides three kinds of starts: warm, force, and cold. These starts can be modified by specifying DRAIN, DISABLE, NODIRECT, or SHUTDOWN. The VM/XA SP prompt is:

```
Start ((COLD|WARM|FORCE) (DRAIN) (DISABLE) (NODIRECT))|(SHUTDOWN)
```

When you IPL VM/SP HPO with a WARM start and an error occurs, VM/SP HPO sends a message to the operator before going into a wait state, but VM/XA SP goes into a wait state without sending a message to the operator.

Cold starts are the same in both systems.

In VM/SP HPO, you use a checkpoint start when there are I/O errors or invalid data in the warm start area; you use a force start when there are I/O errors or invalid data in the checkpoint area. In VM/XA SP, you use a force start in both cases.

As in VM/SP HPO, you use DRAIN to suspend spooling activity to unit record devices and SHUTDOWN to cancel the process of bringing up the system. In addition, in VM/XA SP you can use DISABLE to keep displays from being enabled and NODIRECT to bring up the system without a user directory. The NODIRECT option is provided in VM/XA SP because there is no stand-alone directory program. In this case, CP starts the system without trying to access the user directory. Once the system is up, you can recover the user directory.

During initialization, if the same volume ID resides at more than one device address, VM/SP HPO varies online the device at the lowest address but VM/XA SP varies online the device that is sensed first. In both cases, the devices at the other addresses are varied offline.

Differences Making Expanded Storage Available

In VM/SP HPO, you make Expanded Storage (called Paging Storage) available for use by CP by allocating an Expanded Storage area on the SYSPAG or the SYSXSTOR macro.

In VM/XA SP, Expanded Storage is available for use by CP automatically. To retain some or all of Expanded Storage for CP's exclusive use, issue the **RETAIN XSTORE** command. CP uses Expanded Storage for paging and CMS minidisk caching.

If you do not retain all of it for CP's exclusive use, you can make the remainder of Expanded Storage available for use by virtual machines. You do this by issuing the **ATTACH XSTORE** command. To remove Expanded Storage from a virtual machine, issue the **DETACH XSTORE** command. To dedicate a real Expanded Storage partition to a virtual machine, use the **XSTORE** directory control statement.

Differences in Real System Operation Commands

Table 16 lists VM/SP HPO commands that are used in real system operation and that have differences in VM/XA SP. Refer to "VM/SP HPO and VM/XA SP Command Compatibility" on page 105 for descriptions of the differences.

Table 16 (Page 1 of 2). VM/SP HPO Real System Operation Commands with Differences in VM/XA SP	
VM/SP HPO Command	Task
ACNT	Create accounting records for logged-on users.
ATTACH	Attach a device to a user or to the system.
BACKSPAC	Restart or reposition the current output on a real punch or printer.
CACHE	Find out and change a DASD's caching status.
CHANGE	Alter external attributes of a spool file.
DETACH	Remove a device from a user or from the system.
DISABLE	Disable display devices.
DRAIN	Stop spooling operations on real unit record devices.
ENABLE	Enable display devices.
FLUSH	Halt the current output file on a specified real unit record device.
FORCE	Force a user to log off the system.
HALT	Terminate the active channel program on a real device.
INDICATE LOAD	Find out which processors are active.
LOADBUF	Load a real UCS or FCB buffer with a specified image.
LOCK or UNLOCK	Lock or release pages in storage.

Table 16 (Page 2 of 2). VM/SP HPO Real System Operation Commands with Differences in VM/XA SP	
VM/SP HPO Command	Task
ORDER	Change the processing order of your spool files.
PURGE	Purge spool files.
QUERY DUMP	Display information about devices assigned to receive CP abends.
QUERY FILES	Obtain a count of spool files.
QUERY MITIME	Determine the time interval settings for the missing interrupt detector.
QUERY PROCESSR	Display the online processors and find out how CP is using them.
QUERY PSTOR	Determine the amount of expanded storage that is assigned.
QUERY <i>raddr</i>	Find out a device's status.
QUERY RDR or QUERY PRT or QUERY PUN	Display information about spool files.
QUERY SYSTEM	Check the usage of system volumes.
QUERY UR	Display real addresses of unit record devices.
QUERY VECTOR USERS	List the Vector Facility users.
REPEAT	Repeat printing or punching of the current spool output file.
SET DUMP AUTO	Set up the system abend dump environment.
SET LOGMSG	Change the system log message.
SET MITIME	Change the time interval for which a device checks missing interrupts.
SHUTDOWN	Shut down the system.
SPTAPE	Save to or restore from tape spool files or system data files.
TRANSFER	Send or retrieve files from another user's virtual reader, printer, or punch queue.
VARY OFFLINE PROCESSR or VARY ONLINE PROCESSR	Change the availability of processors to the system.
VARY ONLINE	Vary a device online.
WARNING	Warn users of an impending shutdown.

Comparison of VM/SP HPO and VM/XA SP Utility Programs

VM/SP HPO provides more utility programs than VM/XA SP. The table below compares VM/SP HPO utility programs and the equivalent function in VM/XA SP.

VM/SP HPO Utility Program	Equivalent Function in VM/XA SP
Directory	There is no stand-alone directory program in VM/XA SP. As a result, you cannot recover the directory without a running system. You must bring up the VM/XA SP system with the NODIRECT option and proceed to recover the directory.
Format/Allocate	There is no stand-alone Format/Allocate program in VM/XA SP. You must have a running VM/XA SP system to format and allocate DASD in 370-XA mode. Use the CP CPFORMAT command or the CMS CPFMTXA command.
Dump	As in VM/SP HPO there is a stand-alone dump utility program in VM/XA SP. If CP is unable to create an abend dump, this program allows you to dump all of the VM/XA SP system.
DASD dump restore	<p>VM/XA SP provides two versions of the DASD dump restore program:</p> <ul style="list-style-type: none"> • One version, DDRXA, is a stand-alone program that can be run either on a real 370-XA processor or in a 370-XA virtual machine • The other version, the System/370 DDR program, is a CMS facility that can be run only under CMS in a System/370 virtual machine. <p>In most cases, you can use either DDRXA or System/370 DDR. There are certain situations, however, when you must use a particular version. Refer to <i>VM/XA SP Real System Operation</i> for more details.</p>
Device Support Facilities	VM/XA SP supports the Device Support Facilities program.

Miscellaneous Operational Differences between VM/SP HPO and VM/XA SP

The processor alarm sounds more often with VM/XA SP than with VM/SP HPO. For example, when you shut down the system and it goes into a wait state, the alarm sounds.

VM/XA SP records soft and hard CP abend dumps. A soft abend dump is always written to a system data file. You define the recipient user ID of the system data file at system generation time. A hard abend dump is written to printer, tape, or DASD. You define the dump device using the SET DUMP command.

Message Compatibility

See “VM/SP HPO and VM/XA SP Message Compatibility” on page 127.



Chapter 6. Virtual Machine Operation

Virtual machine operation tasks include those tasks that allow you to run operating systems in virtual machines.

For conversion from VM/SP HPO, differences in CP externals such as CP commands and messages affect virtual machine operations. For instance, the ATTACH command in VM/XA SP differs from the ATTACH command in VM/SP HPO.

Changes to CMS may change virtual machine operations. For instance, a user must load one CMS named saved system for System/370 mode and another for 370-XA mode.

This chapter summarizes tasks that you may have to perform differently in VM/XA SP. Refer to *VM/XA SP Virtual Machine Operation* for information on virtual machine tasks and to *VM/XA SP CP Command Reference* for syntax of CP commands.

Differences Logging On

In VM/SP HPO Release 4.2, you must clear the logo on a 3270-type terminal before entering your user ID (and password) or a command.

In VM/SP HPO Release 5, you can enter your user ID, password, and a command on the logo panel on a 3270-type terminal when the logo panel fits entirely on one screen. If the logo panel does not fit, you must first press ENTER.

In VM/XA SP, you enter your user ID on the logo panel on a 3270-type terminal unless the terminal is connected to VTAM, in which case you must press ENTER first. You then enter your password on the next panel.

The VM/XA SP logo is different from the VM/SP HPO logo.

The VM/SP HPO response has three digits for the number of users and three characters for the device address. The VM/XA SP response has five digits for the number of users and five characters for the device address.

If you enter incorrect information on the logo screen, in VM/SP HPO you receive a prompting message, but in VM/XA SP you receive an error message.

Differences in Virtual Machine Operation Commands

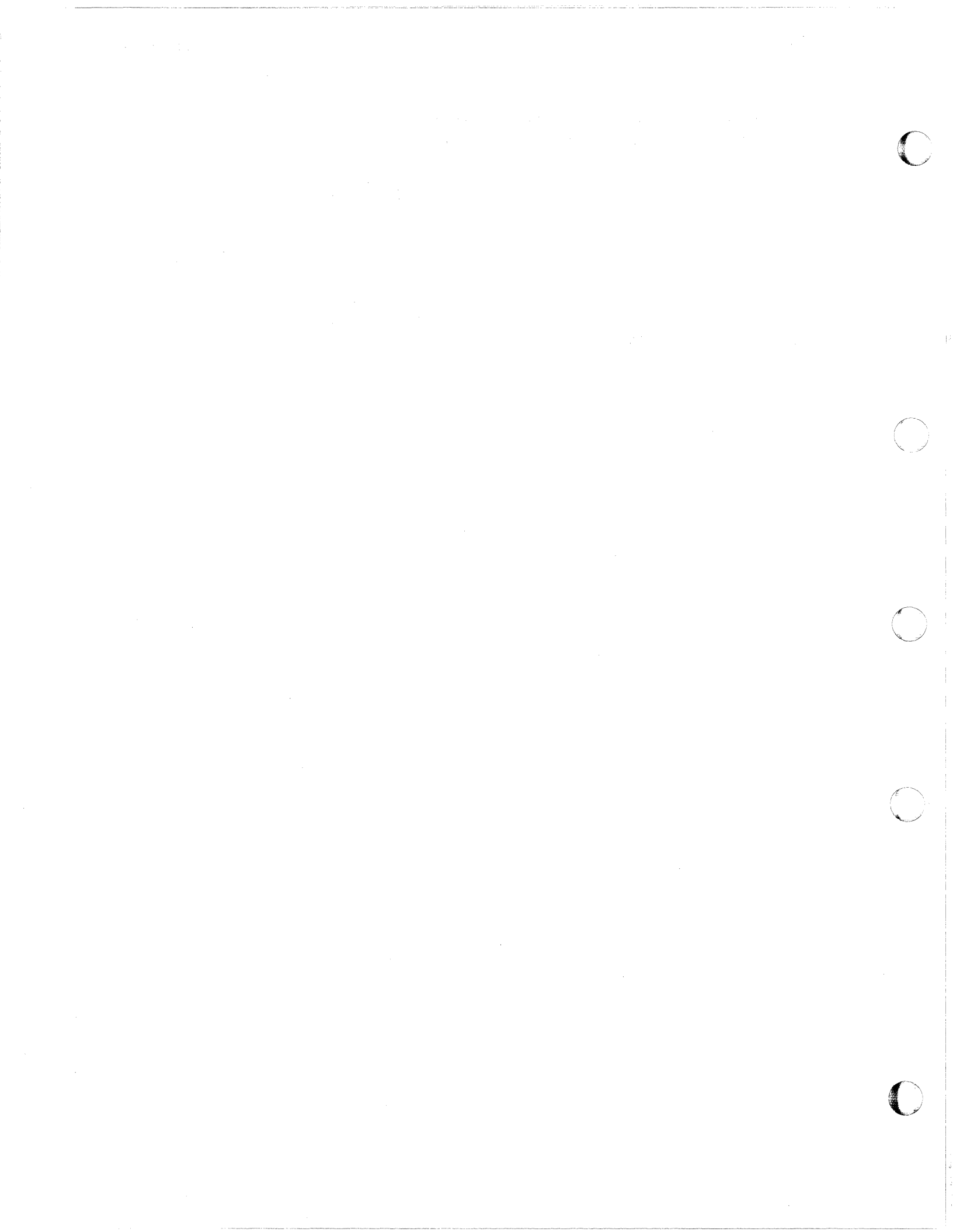
Table 17 on page 86 lists VM/SP HPO commands that are used in virtual machine operation and that have differences in VM/XA SP. Refer to "VM/SP HPO and VM/XA SP Command Compatibility" on page 105 for descriptions of the differences.

Table 17 (Page 1 of 2). VM/SP HPO Virtual Machine Operation Commands with Differences in VM/XA SP	
VM/SP HPO Command	Task
ADSTOP	Halt the execution of a virtual machine at a virtual instruction address.
BEGIN	Resume execution.
CLOSE	Terminate spooling activity.
COMMANDS or QUERY COMMANDS	Display the commands and DIAGNOSE codes that you are authorized to use.
DEFINE	Define devices for your virtual machine.
DEFINE CTCA	Couple two virtual machines.
DEFINE STORAGE	Define virtual storage size.
DETACH CTCA	Detach a virtual channel-to-channel adapter.
DETACH <i>vdev</i>	Detach a DASD, minidisk, or temporary disk from your virtual machine.
DIAL	Dial 3270 displays.
DISCONNECT	Disconnect from the system.
DISPLAY	Display virtual machine components.
DISPLAY REGISTERS or DUMP REGISTERS	Display or dump virtual machine registers.
DISPLAY VECTOR	Display Vector Facility registers.
DUMP	Dump virtual machine components.
DUMP VECTOR	Dump Vector Facility registers.
EXTERNAL	Simulate an external interrupt.
IPL	Load (IPL) your operating system.
LINK	Link to other users' minidisks.
LOGOFF or LOGOUT	Log off.
MESSAGE	Send a message.
ORDER	Change the processing order of your spool files.
PER	Trace program events.
PURGE	Purge spool files.
QUERY FILES	Obtain a count of your spool files.
QUERY NAMES	Display the user IDs of others logged on.
QUERY RDR or QUERY PRT or QUERY PUN	Display information about your spool files.
QUERY SET	Check your virtual machine's architecture mode.
QUERY TRAP	Display information about a trace trap.
QUERY USERS	Display the number of logged-on users.

Table 17 (Page 2 of 2). VM/SP HPO Virtual Machine Operation Commands with Differences in VM/XA SP	
VM/SP HPO Command	Task
QUERY VIRTUAL ALL	Display the status of a virtual machine's I/O.
QUERY VIRTUAL CONSOLE	Check the device type of a virtual console.
QUERY VIRTUAL DEVICE	Display the status of a virtual device.
QUERY VIRTUAL STORAGE	Check virtual storage size.
QUERY VIRTUAL UR	Determine if unit record devices are spooled.
SET CONCEAL	Activate and deactivate the protected application environment.
SET PF nn COPY	Copy your 3270 display screen to a printer.
SET RUN	Set the RUN mode.
SPOOL	Change spool options and send output to other users.
STORE	Store data into virtual machine storage.
STORE REGISTERS	Store data into virtual machine registers.
STORE VECTOR	Store Vector Facility registers.
SYSTEM	Clear storage.
TAG QUERY	Associate descriptive information with spool files.
TERMINAL	Define console characteristics.
TRACE	Trace system interrupts.
VMDUMP	Dump pages of your virtual machine's storage.

Message Compatibility

See "VM/SP HPO and VM/XA SP Message Compatibility" on page 127.



Chapter 7. Application End Use

Application end use tasks include logging on to the system, running applications, and responding to system messages.

Differences exist between VM/SP HPO and VM/XA SP CP externals. Some CP commands have command response differences. For instance, VM/XA SP has a different screen logo and slightly different log on procedures.

Differences Logging On

See “Differences Logging On” on page 85.

Differences in Application End Use Commands

Table 18 lists VM/SP HPO commands that are used in application end use and that have differences in VM/XA SP. Refer to “VM/SP HPO and VM/XA SP Command Compatibility” on page 105 for descriptions of the differences.

Table 18. VM/SP HPO Application End Use Commands with Differences in VM/XA SP	
VM/SP HPO Command	Task
*	Include comments on your console sheet or your display screen.
DISCONNECT	Disconnect from the system.
IPL	Load (IPL) your operating system.
LOGOFF or LOGOUT	Log off.
MESSAGE	Send a message.
QUERY NAMES	Display the user IDs of others logged on.
QUERY RDR or QUERY PRT or QUERY PUN	Display information about your spool files.

Message Compatibility

See “VM/SP HPO and VM/XA SP Message Compatibility” on page 127.



Chapter 8. Application Programming

Application programming tasks include program development and program debugging.

Architecture Differences

The CMS component of VM/XA SP has an interface to both System/370 architecture and 370-XA architecture. When CMS runs in a System/370 virtual machine, it provides an interface to System/370 architecture. When CMS runs in a 370-XA virtual machine, it provides an interface to 370-XA architecture.

The major architectural differences are:

- Program status words for each architecture are different.
- Addressing increases from 24 bits for System/370 to 31 bits for 370-XA.
- I/O handling for each architecture has unique instructions and routing abilities.
- There are new and changed assembler language instructions for 370-XA.

For more information, see *VM/XA SP CMS Application Program Development Guide*.

Summary of Compatibility

The CMS component of VM/XA SP is, in general, upwardly compatible with the CMS component in VM/SP HPO Release 5. Except for the DEBUG command and other items discussed below, all VM/XA SP CMS commands are compatible. There are new CMS commands that invoke new function and there are enhanced commands to invoke enhanced function. The enhanced commands are upwardly compatible. CMS macros in VM/XA SP are upwardly compatible and CMS external control blocks are compatible.

In general, if your application program uses standard CMS interfaces (for example, if it does not manipulate PSWs or depend on CMS internal control blocks) and does not depend on CP command and DIAGNOSE code invocations or responses, you may need to recompile or reassemble the program before running it on CMS in System/370 mode. For higher-level languages that VM/XA SP supports, programs are source and object code compatible.

Conversion Stages

While the conversion effort varies from installation to installation, there are three basic stages, or levels, of conversion to VM/XA SP CMS:

Stage	Virtual Machine Mode	Addressing Mode	Conversion Effort
System/370 compatibility	System/370	24-bit	Least effort. Your application programs run as they do now, but they run only in System/370 mode.

Stage	Virtual Machine Mode	Addressing Mode	Conversion Effort
370-XA toleration	370-XA	24-bit	More effort because of architectural differences between System/370 and 370-XA (such as PSWs, assembler instructions, and I/O). However, your programs cannot support 31-bit addressing.
370-XA exploitation	370-XA	31-bit	Most effort. Like 370-XA toleration, 370-XA exploitation requires you to adapt your programs to 370-XA architecture. In addition, your programs can support 31-bit addressing.

Note: When converting your CMS application programs, IBM encourages you to bypass the System/370 compatibility stage and go directly to the 370-XA toleration stage or, if possible, to the 370-XA exploitation stage. However, before you accept this as your plan, consider that all your regularly used programs should run in the same virtual machine mode (that is, 370-XA mode) so that users do not have to re-IPL CMS when going from program to program.

The primary reasons for the IBM recommendation to convert directly to 370-XA toleration or, if possible, to 370-XA exploitation are:

- The more conversions you perform, the more time and effort you will probably spend. Converting three times (to System/370 compatibility, then to 370-XA toleration, and then to 370-XA exploitation) will probably require more time and effort than converting once (directly to 370-XA exploitation).
- CMS supports bimodal addressing. This allows programs running in 370-XA mode virtual machines to execute in 24-bit addressing mode, 31-bit addressing mode, or a combination of both. Therefore:
 - The same CMS used to run programs under 370-XA toleration can be used to run programs under 370-XA exploitation.
 - 370-XA toleration allows programs that require 24-bit addressing to run using a 370-XA mode virtual machine rather than a System/370 mode virtual machine. Therefore, end users need not be inconvenienced by having to know which mode their applications require (System/370 mode or 370-XA mode), and they do not have to re-IPL CMS when going back and forth between System/370 mode and 370-XA mode to accomplish their work.

See *VM/XA SP CMS Application Program Conversion Guide* for details about bimodal addressing.

- 370-XA exploitation allows you to move programs above the 16Mb line so that you can optimize the use of storage below the line. This is especially helpful for programs that require more addressing capability and storage than 24-bit addressing allows.
- To relieve real storage constraints, CMS programs can use shared segments to share code and data. To relieve virtual storage constraints, CMS programs in discontinuous saved segments (DCSSs) can exploit extended addressing.

An application program or licensed program in the 370-XA exploitation stage, as long as it satisfies all criteria for DCSS candidacy, can be put into a DCSS above the 16Mb line. This frees an equivalent space below the line for private code.

An application program or licensed program in the 370-XA toleration stage, as long as it satisfies all criteria for DCSS candidacy, can be put into a DCSS below the 16Mb line but within the address range of a larger 370-XA mode virtual machine, callable from an application program or licensed program running under 370-XA exploitation.

Certain kinds of programs need not be converted. They may continue to run in System/370 mode in a processor that is capable of 370-XA mode. Such programs include:

- Programs that run in server machines but that have 370-XA mode application interfaces
- Programs that serve a single user
- Programs with a limited purpose, such as system setup.
- Programs that cannot run under 370-XA exploitation should, at a minimum, run under 370-XA toleration to facilitate program calling and exchange of data addresses within the same CMS virtual machine. These programs should be written in such a way as to isolate them from the underlying architecture.

If you do not convert directly to 370-XA mode, and you have some programs that run in System/370 mode and some that run in 370-XA mode, you can simplify mode changing by writing EXECs. Each EXEC would change the virtual machine mode prior to invoking an application program.

Conversion Checklist

- Commands.

There may be incompatibilities between VM/SP HPO and VM/XA SP CP commands that your program uses. To help you determine differences, IBM provides a sample EXEC called COMPSCAN SAMPEXEC, which flags commands and other keywords that might need to be changed. See Appendix A, "Conversion Tools" on page 277 for more information about COMPSCAN. See "VM/SP HPO and VM/XA SP Command Compatibility" on page 105 for command comparisons.

- DIAGNOSE codes.

There may be incompatibilities between VM/SP HPO and VM/XA SP DIAGNOSE codes that your program uses. For instance, if your application program uses DIAGNOSE X'00' to determine the release level of CP, you must examine the program's use of the licensed program bit map and change it, if necessary, to recognize VM/XA SP. You can use the sample EXEC COMPSCAN SAMPEXEC to determine differences. See Appendix A, "Conversion Tools" on page 277 for more information about COMPSCAN. See "VM/SP HPO and VM/XA SP DIAGNOSE Code Compatibility" on page 124 for DIAGNOSE code comparisons.

- Messages and return codes.

There may be incompatibilities between VM/SP HPO and VM/XA SP messages and return codes that your program uses:

- VM/XA SP has four-digit message numbers; therefore, some command invocations now result in four-digit return codes. You should examine applications that depend on 10-character message header lengths or three-digit control program command return codes. Systems using programmed operator facilities must examine their routing tables for any changes necessary.
- Action indicators on VM/XA SP CP messages may not be the same as the corresponding message in VM/SP HPO, even though the message number may be the same.
- The nonzero return code and accompanying message that VM/XA SP returns for errors may not be the same as the nonzero return code that VM/SP HPO returns for corresponding errors.

See “VM/SP HPO and VM/XA SP Message Compatibility” on page 127 for message comparisons.

You might consider modularizing calls to CP interfaces to ease migrations to future releases of VM/XA SP.

- Privilege classes for some VM/XA SP CP commands and DIAGNOSE codes may not be the same as the corresponding CP commands in VM/SP HPO.
- Some CMS applications rely on CP support that is not provided in VM/XA SP. For example, VM/XA SP does not support the transparent services access facility (TSAF).
- VM/XA SP supports DOS simulation in a System/370 mode virtual machine only.
- VM/XA SP supports VSE/VSAM functions supplied by the VM/SP Release 5 CMS in a System/370 mode virtual machine only.
- VM/XA SP supports the EDIT command in a System/370 mode virtual machine only. The system product editor (XEDIT) runs in System/370 mode and in 370-XA mode with 24-bit addressing.
- Programs that are architecture-specific (for example, programs that manipulate PSWs or issue I/O assembler instructions) require modifications to execute in CMS 370-XA mode virtual machines. The applications should continue to execute in CMS System/370 mode virtual machines.
- The improved usability that the VM/XA SP implementation of saved segments provides may cause some differences in the installation procedures for licensed programs.
- VM/XA SP does not support EXECs and editor macros in a saved segment above the 16Mb line. EXEC, EXEC 2, and REXX programs may reside only below the 16Mb line.
- Particularly sensitive to the conversion are programs that “steal PSWs” or field external interrupts.
- In VM/XA SP, leading zeros are suppressed more often than in VM/SP HPO.
- Your program should adhere to the CMS programming interface. The CMS programming interface is divided into three groups: the preferred interface

group, the CMS compatibility group, and the OS/MVS and DOS/VSE group. For more information, see the *VM/XA SP CMS Application Program Conversion Guide*.

- CMS must be IPLed in either System/370 mode or 370-XA mode. You can write dual-path application programs and EXECs, which follow one path for System/370 mode and a different path for 370-XA mode, or you can write a different version for each architecture. In the latter case you should give both versions the same name to minimize end-user confusion. You can do this with the NUCXLOAD command of CMS, using the form NUCXLOAD *name fn*, where *name* is the same in both environments and *fn* is the unique System/370 or 370-XA version.

For additional conversion checklists, see *VM/XA SP CMS Application Program Conversion Guide*.



Chapter 9. Diagnosis

Diagnosis tasks include isolating, describing, reporting, and correcting failures in the VM/XA SP and guest operating systems.

For conversion from VM/SP HPO, differences in CP externals such as CP commands and messages affect diagnosis tasks. For instance, VM/XA SP uses the SET CPTRACE command rather than CPTRAP for specifying which trace entries are to be recorded in the system trace tables.

VM/XA SP uses the dump viewing facility rather than IPCS for viewing dumps. There are differences in the naming of dumps and in symptom record handling for non-CP dumps.

The Error Recording Facility

As in VM/SP HPO, VM/XA SP CP error recovery modules create EREP records when I/O and machine errors occur. But unlike VM/SP HPO, you use the CMS CPEREPXA command (not the CMS CPEREP command) to format and print the EREP record (kept in a CMS file).

In VM/XA SP, you can use the RECORDING command to change processing parameters that control the recording of EREP records.

An operating system executing in a virtual machine can either use its own error recording facilities or have CP handle error recording. Use the VM/XA SP SET SVC76 command to specify which one.

VM/XA SP does not provide the *LOGREC system service.

The Dump Viewing Facility

The dump viewing facility is a component of VM/XA SP that runs under CMS in System/370 mode. Using the dump viewing facility, you can:

- Interactively display dump data from CP abend dumps, CP stand-alone dumps, and virtual machine dumps (especially CMS, GCS, VM/Pass-Through, RSCSV2, and RSCSV2 virtual machine dumps).
- Format and print summary information from CP abend dumps, CP stand-alone dumps, and virtual machine dumps.
- Process CP trace table data stored on tape, or process CP trace table data, data trace data, I/O trace data, and guest trace data stored in system trace files. Specifically, you can:
 - Load CP trace table data from tape or DASD
 - Load data trace, I/O trace, and guest trace data from DASD
 - View and format CP trace table data
 - View and format data trace, I/O trace, and guest trace data
 - Merge CP trace table, data trace, I/O trace, and guest trace data
 - Print CP trace table, data trace, I/O trace, or guest trace data.

The dump viewing facility does not support the problem reporting and management function found in IPCS.

Comparison of IPCS and Dump Viewing Facility Commands

Table 19. Comparison of IPCS and Dump Viewing Facility Commands		
IPCS Command	Dump Viewing Facility Command	Differences
APAR	-----	The dump viewing facility does not support problem reporting and management.
DUMPSCAN	DUMPSCAN	The syntax is different, the dump viewing facility uses the XEDIT interface for display management, and some of the subcommands have functional differences. See Table 20 on page 99 for subcommand differences.
IPCSDUMP	-----	The dump viewing facility does not support problem reporting and management. However, the CMS DUMpload command has some of the functions of IPCSDUMP.
MAP	MAP	The syntax is different.
PRB	-----	The dump viewing facility does not support problem reporting and management.
PROB	-----	The dump viewing facility does not support problem reporting and management.
PRTDUMP	PRTDUMP	The syntax is different.
STAT	-----	The dump viewing facility does not support problem reporting and management.
-----	ADDMAP	Use this command to append the compressed module map to the CMS file containing the dump processed by the CMS DUMpload command.
-----	TRACERED	This dump viewing facility command is an equivalent of the VM/SP HPO TRAPRED facility.

Comparison of IPCS and Dump Viewing Facility DUMPSCAN Subcommands

Table 20 (Page 1 of 3). Comparison of IPCS and Dump Viewing Facility DUMPSCAN Subcommands		
IPCS DUMPSCAN Subcommand	Dump Viewing Facility DUMPSCAN Subcommand	Differences
Reuse	Null line	None.
?	?	The dump viewing facility ? subcommand is not limited to displaying the last DUMPSCAN subcommand executed, but displays the last command or subcommand executed of any type, DUMPSCAN or not.
+ and -	+ and -	None.
&name	&name	None.
AREGS	-----	Not supported by the dump viewing facility.
ARIOBLOK	-----	Not supported by the dump viewing facility.
C	CREGS	The dump viewing facility supports CP, stand-alone, and virtual machine dumps, and allows you to specify a processor address.
CHAIN	CHAIN	The syntax is different and the dump viewing facility has more functions.
CMS	CMS	The dump viewing facility can execute CMS commands from the DUMPSCAN command line.
CMSPOINT	CMSPOINT	None.
CORTABLE	FRAMETBL	The dump viewing facility has enhanced capabilities for invocation and displaying by frame table address.
DISPLAY	DISPLAY	The dump viewing facility has enhanced offset and indirect addressing displays, but does not display previous lines.
DOSPOINT	DOSPOINT	None.
DUMPID	DUMPID	None.
END	END	None.
FDISPLAY	-----	Not supported by the dump viewing facility.
G	GREGS	The dump viewing facility lets you specify a processor address.
HELP	HELP	The dump viewing facility does not give help for messages.
HX	HX	None.
IPCSMAP	-----	Not supported by the dump viewing facility.
IUCV	IUCV	None.

Table 20 (Page 2 of 3). Comparison of IPCS and Dump Viewing Facility DUMPSCAN Subcommands		
IPCS DUMPSCAN Subcommand	Dump Viewing Facility DUMPSCAN Subcommand	Differences
LOCATE (UP)	LOCATE (UP)	None.
MAPA	FINDMOD	FINDMOD combines the functions of MAPA and MAPN.
MAPN	FINDMOD	FINDMOD combines the functions of MAPA and MAPN.
MREGS	-----	Not supported by the dump viewing facility.
MRIOBLOK	-----	Not supported by the dump viewing facility.
OSPOINT	OSPOINT	None.
PRINT	PRINT	None.
QUIT	QUIT	None.
REGS	REGS	The dump viewing facility lets you specify a processor address, and displays control and floating-point registers for virtual machine dumps.
RIOBLOK	RIOBLOK	The dump viewing facility RIOBLOK subcommand may be invoked with logical device or real device addresses in addition to device numbers.
SCROLL	FORWARD	FORWARD does not have operands and can be used with FINDMOD and LOCATE.
SCROLL U	BACKWARD	BACKWARD does not have operands and can be used with FINDMOD and LOCATE.
SYMP	SYMPTOM	The dump viewing facility does not support symptom string extraction for virtual machine dumps.
TACTIVE	TACTIVE	None.
TLOADL	TLOADL	None.
TRACE	TRACE	The dump viewing facility TRACE subcommand merges trace tables from multiple processors, does not support the SCROLL and SCROLLU operands, and is not supported for VM dumps.
TSAB	TSAB	None.
USERMAP	-----	Not supported by the dump viewing facility.

Table 20 (Page 3 of 3). Comparison of IPCS and Dump Viewing Facility DUMPSCAN Subcommands		
IPCS DUMPSCAN Subcommand	Dump Viewing Facility DUMPSCAN Subcommand	Differences
VIQBLOK	VIQBLOK	The dump viewing facility VIQBLOK subcommand may be invoked with virtual subchannel or virtual device addresses in addition to virtual device numbers.
VMBLOK	VMDBK	The dump viewing facility does not have the SYSSPOOL operand, and VMDBK may be invoked with storage addresses or individual VMDBK fields.
VMLOADL	VMLOADL	None.
-----	BLOCK	This subcommand formats control blocks within a dump.
-----	CPU	This subcommand displays the processor address and the prefix register value for each processor in the dump.
-----	FINDUSER	This subcommand determines the CP module flow for a hung virtual machine.
-----	SCAN	This subcommand processes a PF key assignment or a command string from the system product interpreter.
-----	SELECT	This subcommand selects trace table entries for display.
-----	SNAPLIST	This subcommand displays a summary snaplist in a soft abend dump.
-----	VREG	This subcommand displays the contents of a specific vector register or a designated number of vector elements if that information is available in a virtual machine dump.
-----	VPAIR	This subcommand displays the contents of a specific even/odd pair of vector registers or a designated number of vector elements.
-----	VSTAT	This subcommand displays status information about the Vector Facility for any processor in a virtual machine dump.
-----	XEDIT	This subcommand causes the dump viewing facility to pass the command line to XEDIT for execution.

Dump Processing in VM/XA SP

VM/XA SP records soft and hard CP abend dumps:

- A soft abend dump is always written to a soft abend dump file on the reader queue. You define the recipient user ID of the soft abend dump file during system generation.
- A hard abend dump is written to printer, tape, or DASD. You define the dump device using the SET DUMP command.

In VM/XA SP, dumps include a control block identifier.

In VM/XA SP, you can use the CMS DUMPLOAD command to load a dump into a CMS dump file for use by the dump viewing facility, and to print a dump from a CMS dump file in the same format as a system abend dump.

Requirements for Dump Space

When VM/XA SP writes hard abend dumps to DASD, it requires contiguous space. You should be aware that the larger storage sizes in VM/XA SP require more space. You might consider dedicating a tape drive as the dump device so you do not need contiguous space on DASD.

VM/XA SP Stand-Alone Dump Utility

VM/XA SP provides a stand-alone dump utility program. You should store this program on tape or DASD. If the stand-alone dump utility is on tape, you should know where the tape is. If it is on DASD, you should know which volume.

Since VM/XA SP stores dumps in system data files, you cannot transport dumps from your VM/XA SP system to your VM/SP HPO system. If you have a problem and want to back off to VM/SP HPO, you will need the stand-alone dump facility to examine the problem.

VM/XA SP CP Trace Tables

The number and type of trace table entries differs in VM/XA SP.

For soft abend dumps, the dump contains the trace tables for the failing processor. For hard abend dumps, the dump contains the CP trace tables of all processors.

VM/XA SP CP trace events are time-stamped to allow comparison of events happening currently on more than one processor. TRSAVE sends data to a system data file or to tape rather than to a CPTRAP spool file as in VM/SP HPO.

Differences in Diagnosis Commands

Table 21 on page 103 lists VM/SP HPO commands that are used in diagnosis and that have differences in VM/XA SP. Refer to "VM/SP HPO and VM/XA SP Command Compatibility" on page 105 for descriptions of the differences.

Table 21. VM/SP HPO Diagnosis Commands with Differences in VM/XA SP	
VM/SP HPO Command	Task
CPTRAP	Collect information for problem determination.
DCP	Display the contents of real storage locations at the terminal.
DMCP	Print the contents of real storage locations on your virtual spooled printer.
LOCATE	Display the address of CP control blocks or of a module.
SET MODE	Set the error recording mode for system recovery (soft) machine checks.
STCP	Change the contents of real storage.
TRAPRED	Access the CPTRAP file.
VMDUMP	Dump pages of your virtual machine's storage.

Message Compatibility

See "VM/SP HPO and VM/XA SP Message Compatibility" on page 127.



Chapter 10. VM/SP HPO and VM/XA SP Compatibility Tables

This chapter summarizes compatibility information for CP commands, DIAGNOSE codes, and messages.

VM/SP HPO and VM/XA SP Command Compatibility

Table 22 contains compatibility information for VM/SP HPO commands. The compatibility categories are:

- **Compatible** with VM/XA SP. The command exists in both systems and has equivalent syntax, responses, and functions.
- **Upwardly compatible** with VM/XA SP. The command exists in both systems but there are differences in syntax, responses, or functions. Invocations and applications using the VM/SP HPO command syntax should continue to execute unchanged.
- **Incompatible** with VM/XA SP. The command exists in both systems but differences in syntax, responses, or functions may cause some invocations or applications using the previous syntax to execute incorrectly or not to execute at all.

If you see "----" in a column, that means a corresponding command is nonexistent.

VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
* (Any)	* (Any)	Upwardly compatible. VM/XA SP does not require a blank after the * and does not allow the privilege class to be changed.
#CP (Any)	#CP (Any)	Compatible.
ACNT (A)	ACNT (A)	Incompatible. VM/XA SP ACNT accepts but ignores CLOSE if specified, supports a SYSTEM operand, and does not send a response that accounting has been done.
ADSTOP (G)	TRACE (G)	ADSTOP is a VM/SP HPO-only command. TRACE performs a similar function.
ATTACH CHANNEL (B)	----	VM/SP HPO only.
ATTACH <i>raddr</i> (B)	ATTACH <i>rdev</i> (B)	Incompatible. VM/XA SP ATTACH <i>rdev</i> allows attachment of XSTORE, does not allow attachment of a 3330V, limits the range of devices attached to 256, does not accept A instead of AS, accepts access mode for a tape device, and runs asynchronously if issued on behalf of another user.

Table 22 (Page 2 of 20). VM/SP HPO and VM/XA SP Command Compatibility

VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
ATTN (G)	ATTN (G)	Compatible.
AUTOLOG (A, B)	AUTOLOG (A, B)	Compatible.
BACKSPAC (D)	BACKSPACE (D)	Incompatible. VM/XA SP BACKSPACE (or BACKWARD) does not allow logical printers and provides a one-line response instead of a two-line response.
BEGIN (G)	BEGIN (G)	Upwardly compatible. VM/XA SP has additional operands: * and CPU.
CACHE (B)	ATTACH (B) SET CACHE (B) QUERY CACHE (B)	CACHE is a VM/SP HPO-only command. ATTACH replaces CACHE OWN, SET CACHE replaces CACHE ON, and QUERY CACHE replaces CACHE QUERY. (QUERY CACHE 0000-FFFF replaces CACHE QUERY ALL.)
CHANGE (D, G)	CHANGE (D, G)	Incompatible. VM/XA SP CHANGE has additional operands (TO/FROM, KEEP/NOKEEP, and MSG/NOMSG), truncates the name operand to 16 characters, does not support the DEST and UNCONV operands, sets DIST to the value in the directory when * is specified, includes the number of records and KEEP setting in the response, includes the new spool ID in the response if the file is changed to another user, allows a seven-digit response, and, for VM/SP HPO Release 4.2, does not allow users to specify SYSTEM and <i>spoolid</i> on the same command line.
CLOSE (G)	CLOSE (G)	Incompatible. VM/XA SP CLOSE has additional operands (TO/FROM, KEEP/NOKEEP, and MSG/NOMSG), truncates the name operand to 16 characters, does not support the DEST and UNCONV operands, sets DIST to the value in the directory when * is specified, includes the number of records and KEEP setting in the response, and includes the new spool ID in the response if the file is closed to another user.

Table 22 (Page 3 of 20). VM/SP HPO and VM/XA SP Command Compatibility		
VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
COMMANDS (Any)	COMMANDS (Any) QUERY COMMANDS (Any)	Incompatible. VM/XA SP COMMANDS (or the synonym QUERY COMMANDS) allows specification of a particular command, allows commands up to 12 characters long (VM/SP HPO commands may be up to 8 characters long), and does not include * in the list of commands.
COUPLE (G)	COUPLE (G)	Incompatible. The VM/XA SP COUPLE response contains CTCA, COUPLED, and DROPPED instead of CTC, COUPLE, and DROP.
CP (Any)	CP (Any)	Compatible.
CPTRAP (C)	SET CPTRACE (A, C) TRSOURCE (A, C, E) TRSAVE (A, C, E)	<p>CPTRAP is a VM/SP HPO-only command. In VM/XA SP, the SET CPTRACE, TRSOURCE, and TRSAVE commands provide the same functions, plus more.</p> <p>In VM/SP HPO, CPTRAP traces and records CP events and virtual machine events. In VM/XA SP, SET CPTRACE traces CP events, TRSAVE records CP events, TRSOURCE traces virtual machine events, and TRSAVE records virtual machine events.</p> <p>In addition to the functions in CPTRAP, the VM/XA SP commands provide:</p> <ul style="list-style-type: none"> • Two new trace types, I/O and data • The ability to collect data in multiple trace files, not just a single trace file • The ability to record CP trace data to tape, not just to DASD • The ability to define, enable, disable, and drop traces.
DCP (C, E)	DISPLAY H (C, E)	DCP is a VM/SP HPO-only command. DISPLAY H replaces it.
DEFINE (A, B, G)	DEFINE (A, G) REDEFINE (G)	Incompatible. VM/XA SP DEFINE does not allow all VM/SP HPO operands and does not accept A instead of AS. In VM/XA SP, you can use either DEFINE or REDEFINE to change a virtual device number. The virtual device number is four digits.
DEFINE CHANNELS (G)	----	VM/SP HPO only.

Table 22 (Page 4 of 20). VM/SP HPO and VM/XA SP Command Compatibility		
VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
DEFINE CONSOLE (G)	DEFINE CONSOLE (G)	Upwardly compatible. VM/XA SP DEFINE CONSOLE supports an additional option: the virtual console device type (3215 or 3270).
DEFINE CTCA (G)	DEFINE CTCA (G)	Incompatible. VM/XA SP DEFINE CTCA requires the user ID of the virtual machine being coupled.
DEFINE GRAF (G)	DEFINE GRAF (G)	Incompatible. VM/XA SP only supports a device type of 3270.
DEFINE LINE (G)	----	VM/SP HPO only.
DEFINE PRT (G)	DEFINE PRT (G)	Compatible.
DEFINE PUN (G)	DEFINE PUN (G)	Compatible.
DEFINE RDR (G)	DEFINE RDR (G)	Compatible.
DEFINE STORAGE (G)	DEFINE STORAGE (G)	Incompatible. VM/XA SP DEFINE STORAGE allows larger storage sizes, allows specifications in megabyte increments, has an additional response (STORAGE CLEARED - SYSTEM RESET), and does not allow the preferred virtual machine user to define storage larger than the contiguous storage within the V = R area.
DEFINE SYSVIRT (A, B)	----	VM/SP HPO only.
DEFINE TFB-512 (G)	----	VM/SP HPO only.
DEFINE TIMER (G)	----	VM/SP HPO only.
DEFINE T2305 T3330 T3340 (G)	DEFINE T2305 T3330 T3340 (G)	Compatible.
DEFINE T2314 T2319 T3310 T3370 (G)	----	VM/SP HPO only.
DEFINE T3350 T3375 T3380 (G)	DEFINE T3350 T3375 T3380 (G)	Compatible.

Table 22 (Page 5 of 20). VM/SP HPO and VM/XA SP Command Compatibility		
VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
DEFINE 1403 2501 2540R 2540P (G)	DEFINE 1403 2501 2540R 2540P (G)	Compatible.
DEFINE 1443 3088 3262 3289E (G)	----	VM/SP HPO only.
DEFINE 3203 3211 3505 3525 3800 (G)	DEFINE 3203 3211 3505 3525 3800 (G)	Compatible.
DETACH CHANNEL (B, G)	----	VM/SP HPO only.
DETACH <i>raddr</i> (B)	DETACH <i>rdev</i> (B)	Incompatible. VM/XA SP DETACH <i>rdev</i> does not allow the UNLOAD and LEAVE operands, issues a different response line from VM/SP HPO for each device detached, runs asynchronously if issued on behalf of another user, limits the range of devices detached to 256, accepts FR instead of From, and includes the user's virtual device address in the response.
DETACH <i>vaddr</i> (G)	DETACH <i>vdev</i> (G)	Incompatible. VM/XA SP DETACH <i>vdev</i> may be invoked during an I/O trace and issues a separate response line for each device detached.
DETACH <i>vaddr</i> (CTCA) (G)	DETACH <i>vdev</i> (CTCA) (G)	Incompatible. The VM/XA SP DETACH <i>vdev</i> (CTCA) response contains CTCA and DROPPED instead of CTC and DROP.
DIAL (Any)	DIAL (Any)	Incompatible. The VM/XA SP DIAL response has five digits for the number of users.
DISABLE (A, B)	DISABLE (A, B, F)	Incompatible. VM/XA SP DISABLE does not stop processing if it encounters an invalid device number. The VM/XA SP command does not issue a response for a return code of 0.
DISABLE SNA (A, B)	DISABLE SNA (A, B, F)	Compatible.
DISCONN (Any)	DISCONNECT (Any)	Incompatible. The VM/XA SP DISCONNECT response has five digits for the number of users.

Table 22 (Page 6 of 20). VM/SP HPO and VM/XA SP Command Compatibility

VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
DISPLAY (G)	DISPLAY (C, E, G)	Upwardly compatible. VM/XA SP DISPLAY has an upwardly compatible syntax for larger storage sizes and more levels of storage. VM/XA SP DISPLAY has an upwardly compatible response in that it always shows storage keys, displays storage as hexadecimal words (you can see the EBCDIC translation by using the T option), shows 4-byte addresses with the storage type indicator in front, includes one blank between the address and KEY in the response, displays all 16 CRs (VM/SP HPO displays only one CR when running with ECMODE off), and issues the message SUPPRESSED LINE(S) SAME AS ABOVE only if the span is greater than hex 100 bytes.
DISPLAY CAW (G)	DISPLAY CAW (G)	Compatible.
DISPLAY CSW (G)	DISPLAY CSW (G)	Compatible.
DISPLAY PSW (G)	DISPLAY PSW (G)	Compatible.
DISPLAY REGISTERS (G)	DISPLAY REGISTERS (G)	Incompatible. The VM/XA SP DISPLAY REGISTERS response contains CR instead of ECR for control registers.
DISPLAY VECTOR (G)	DISPLAY VECTOR (G)	Incompatible. VM/XA SP checks the command for proper syntax prior to checking whether the Vector Facility is available.
DMCP (C, E)	DUMP H (C, E)	DMCP is a VM/SP HPO-only command. DUMP H replaces it.
DRAIN (D)	DRAIN (D)	Incompatible. VM/XA SP DRAIN does not support logical printers and the response provides more detail (two lines) concerning the printer being drained.

VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
DUMP (G)	DUMP (C, E, G)	Upwardly compatible. VM/XA SP DUMP has an upwardly compatible syntax for larger storage sizes and more levels of storage. VM/XA SP DUMP has an upwardly compatible response in that it always shows storage keys, includes translation to EBCDIC, shows 4-byte addresses with the storage type indicator in front, includes one blank between the address and KEY in the response, displays all 16 CRs (VM/SP HPO displays only one CR when running with ECMODE off), dumps subchannel information blocks (SCHIBs) when in 370-XA mode, dumps all vector information when a Vector Facility is defined, does not always include GPRs, CRs, FPRs, and PSWs when DUMP is issued, does not provide vector registers or PSW as a default, issues the message SUPPRESSED LINE(S) SAME AS ABOVE only if the span is greater than hex 100 bytes.
DUMP REGISTERS (G)	DUMP REGISTERS (G)	Incompatible. The VM/XA SP DUMP REGISTERS response contains CR instead of ECR for control registers.
DUMP VECTOR (G)	DUMP VECTOR (G)	Incompatible. VM/XA SP checks the command for proper syntax prior to checking whether the Vector Facility is available.
ECHO (G)	ECHO (G)	Incompatible. The response is different.
ENABLE (A, B)	ENABLE (A, B, F)	Incompatible. VM/XA SP ENABLE does not stop processing if it encounters an invalid device number, does not issue a response for a return code of 0, and does not allow the SNA operand to be combined with other operands on the command line.
EXTERNAL (G)	EXTERNAL (G)	Incompatible. VM/XA SP EXTERNAL has upwardly compatible syntax, allowing users to specify the type of external interrupt.
FLUSH (D)	FLUSH (D)	Incompatible. VM/XA SP FLUSH does not allow logical printers and provides information about the file being flushed rather than the printer being flushed.
FORCE (A)	FORCE (A)	Incompatible. The VM/XA SP FORCE response shows whether a user ID or the system issued the FORCE.
FREE (B, D)	FREE (D)	Upwardly compatible. VM/XA SP FREE allows an additional option: <i>userid</i> LOGON.

VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
FREE PRT (D)	FREE PRT (D)	Compatible.
FREE PUN (D)	FREE PUN (D)	Compatible.
HALT <i>raddr</i> (A)	HALT <i>rdev</i> (A)	Incompatible. VM/XA SP HALT <i>rdev</i> shows whether or not the system initiated the halt.
HOLD PRT (D)	HOLD PRT (D)	Compatible.
HOLD PUN (D)	HOLD PUN (D)	Compatible.
INDICATE (A, E, G)	INDICATE (B, C, E, G)	Incompatible. VM/XA SP INDICATE has a different response and does not support the FAVORED operand. Instead of INDICATE FAVORED, use QUERY SHARE (similar to INDICATE FAVORED with a percent) or QUERY QUICKDSP (similar to INDICATE FAVORED without a percent). INDICATE LOAD in VM/XA SP has these differences: <ul style="list-style-type: none"> • The response has five digits for the number of users. • AVGPROC represents the average processor utilization percentage for all processors combined, not including dedicated processors. • PROC represents the percentage of time that the system is running on the indicated processor, regardless of whether the processor is dedicated.
IPL (G)	IPL (G)	Incompatible. VM/XA SP IPL does not allow the PMA or PMAV operands.
LINK (G)	LINK (G)	Incompatible. VM/XA SP LINK must have vdev's as base exposures for multiple exposure devices and gives access to all exposures, and the response has five digits for the number of users.
LOADBUF (D)	LOADBUF (D)	Incompatible. VM/XA SP LOADBUF allows specification of FOLD/NOFOLD independent of UCS or FCB options.
LOADVFCB (G)	LOADVFCB (G)	Compatible.
LOCATE (C, E)	LOCATE (C, E)	Incompatible. VM/XA SP LOCATE syntax allows the user to specify a CP symbol to be located, and the response returns different control blocks.

Table 22 (Page 9 of 20). VM/SP HPO and VM/XA SP Command Compatibility		
VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
LOCK (A)	LOCK (A)	Incompatible. VM/XA SP LOCK allows locking a page with a CP system symbol, and issues an error message if an attempt is made to lock nonpageable storage.
LOGOFF LOGOUT (Any)	LOGOFF LOGOUT (Any)	Incompatible. The VM/XA SP LOGOFF response has five digits for the number of users.
LOGON LOGIN (Any)	LOGON LOGIN (Any)	Incompatible. The VM/XA SP LOGON response has five digits for the number of users and five characters for the device address.
MESSAGE (A, B, Any)	MESSAGE (A, B, Any)	Incompatible. VM/XA SP MESSAGE displays a time stamp and message on the same line.
MIGRATE (A)	----	VM/SP HPO only.
MONITOR (A, E)	MONITOR (A, E)	Incompatible. VM/XA SP MONITOR uses different commands, produces different data records, and has different collection mechanisms.
MSGNOH (A, B)	MSGNOH (B)	Compatible.
NETWORK (A, B)	----	VM/SP HPO only. VM/Pass-Through Facility commands as well as the CCLOAD and CCDUMP utilities provide equivalent functions.
NOTREADY (G)	NOTREADY (G)	Compatible.
ORDER (D, G)	ORDER (D, G)	Incompatible. VM/XA SP ORDER allows a seven-digit response, does not allow the DEST operand, and, for VM/SP HPO Release 4.2, does not allow the specification of SYSTEM and <i>userid</i> by class D users.
PER (A, B, C, D, E, F, G)	PER (G) TRACE (G)	Incompatible. VM/XA SP PER is an alias for TRACE, has invocation, response, and functional differences including no equivalent for MASK without DATA, and provides certain equivalent functions with different operands: <ul style="list-style-type: none"> • SAVE is provided by GOTO and APPEND. • GET is provided by GOTO and APPEND. • END CURRENT is provided by applying CLEAR to the active trace set. • END <i>ident</i> is provided by DELETE. • END <i>set</i> is provided by CLEAR. • END <i>tratype</i> has the same result achieved by deleting each trap separately. • GUESTR is provided by NODAT. • GUESTV is provided by DAT.

Table 22 (Page 10 of 20). VM/SP HPO and VM/XA SP Command Compatibility		
VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
PURGE (D, G)	PURGE (D, G)	Incompatible. VM/XA SP PURGE does not allow the DEST and FORCE operands, does not allow specification of ALL for device type (uses UR instead), does not have a default of ALL for selection criteria, allows a seven-digit response, and, for VM/SP HPO Release 4.2, does not allow the specification of SYSTEM and <i>userid</i> by class D users.
QUERY AFFINITY (A, E)	----	VM/SP HPO only.
QUERY ALL (B)	QUERY ALL (D)	Incompatible. VM/XA SP QUERY ALL displays real device information in numeric order, not by type and class.
QUERY <i>ccu</i> (B)	QUERY <i>devno</i> (B)	Incompatible. VM/XA SP QUERY <i>devno</i> does not allow logical printers and the response does not include DEST information for unit record devices.
QUERY CHANNELS (G)	----	VM/SP HPO only.
QUERY CPASSIST (A, E)	----	VM/SP HPO only.
QUERY CPLEVEL (A, B, C, D, E, F, G)	QUERY CPLEVEL (G)	Compatible.
QUERY CPTRAP (C)	QUERY CPTRACE (A, C) QUERY TRSOURCE (A, C, E, G) QUERY TRSAVE (A, C, E, G)	QUERY CPTRAP is a VM/SP HPO-only command. In VM/XA SP, the QUERY CPTRACE, QUERY TRSOURCE, and QUERY TRSAVE commands provide the same functions, plus more.
QUERY CPUID (G)	QUERY CPUID (G)	Compatible.
QUERY DASD <i>valid</i> (B)	QUERY DASD <i>valid</i> (B)	Compatible.
QUERY DUMP (B)	QUERY DUMP (B)	Incompatible. VM/XA SP QUERY DUMP can return a printer as a dump unit, has no TEMP or DUMP fields, and has additional fields in the response.
QUERY FILES (D, G)	QUERY FILES (D, G)	Incompatible. VM/XA SP QUERY FILES does not allow the DEST operand, allows a seven-digit response, and, for VM/SP HPO Release 4.2, does not allow the specification of SYSTEM and <i>userid</i> by class D users.
QUERY GRAF (B)	QUERY GRAF (B)	Compatible.

VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
QUERY HOLD (D)	QUERY HOLD (B, D)	Incompatible. VM/XA SP QUERY HOLD allows a seven-digit response.
QUERY JOURNAL (A, E)	----	VM/SP HPO only.
QUERY LINES (B)	----	VM/SP HPO only.
QUERY LINKS (G)	QUERY LINKS (G)	Compatible.
QUERY LOGMSG (A, B, C, D, E, F, G)	QUERY LOGMSG (A, B, C, D, E, F, G)	Upwardly compatible. VM/XA SP QUERY LOGMSG issues a message if no LOGMSG exists, and the class B response includes line numbers.
QUERY MITIME (B)	QUERY MITIME (A, B)	Incompatible. VM/XA SP QUERY MITIME displays each device or class of devices on a single line.
QUERY NAMES (A, B, C, D, E, F, G)	QUERY NAMES (A, B, C, D, E, F, G)	Incompatible. The VM/XA SP QUERY NAMES response contains LOGN instead of LOGO and contains LOGL instead of LOGOL.
QUERY PAGING (A, E)	----	VM/SP HPO only.
QUERY PER (A, B, C, D, E, F, G)	QUERY TRACE (G) QUERY PER (G)	Incompatible VM/XA SP QUERY TRACE (or the synonym QUERY PER) displays the settings of all operands, not just those explicitly entered.
QUERY PF (G)	QUERY PF (G)	Compatible.
QUERY PRIORITY (A, E)	----	VM/SP HPO only.
QUERY PROCESSR (A, B, C, E, G)	QUERY PROCESSORS QUERY PROCESSR (A, B, C, E)	Upwardly compatible. The VM/XA SP command has PROCESSORS spelled out fully (although it will accept PROCESSR) and has an upwardly compatible response for more than two processors. Also, the VM/XA SP command indicates whether a processor is the MASTER, an ALTERNATE, or a DEDICATED processor.

Table 22 (Page 12 of 20). VM/SP HPO and VM/XA SP Command Compatibility		
VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
QUERY PRT (D, G)	QUERY PRT (D, G)	Incompatible. In VM/XA SP, the command has an upwardly compatible syntax for operands not available in VM/SP HPO (EXP, XFER, AVAIL), has an upwardly compatible response for the operands KEEP and MESSAGE when ALL is not used, displays the names of open files in the response, indicates page copies by an asterisk in the copy count rather than with the FLASH name, does not support the DEST and PSF operands, and, for VM/SP HPO Release 4.2, does not allow the specification of SYSTEM and <i>userid</i> by class D users.
QUERY PSTORE (A, B)	QUERY XSTORE (B)	QUERY PSTORE is a VM/SP HPO-only command. QUERY XSTORE has the same function but a different response.
QUERY PUN (D, G)	QUERY PUN (D, G)	Incompatible. See notes for QUERY PRT.
QUERY QDROP (A, E)	----	VM/SP HPO only.
QUERY <i>raddr</i> (B)	QUERY <i>rdev</i> (B)	Incompatible. VM/XA SP provides real device information in numerical order by device address, adds the STATUS operand, which is functionally equivalent to VM/SP HPO's QUERY STATUS command, and displays SYSTEM or a user ID for the class B response, depending on whether a device has been started for a user or for the system.
QUERY RDR (D, G)	QUERY RDR (D, G)	Incompatible. See notes for QUERY PRT.
QUERY RESERVE (A, E)	QUERY RESERVE (A, E)	Compatible.
QUERY SASSIST (A, E)	----	VM/SP HPO only.
QUERY SCREEN (G)	QUERY SCREEN (G)	Compatible.
QUERY SECUSER (G)	QUERY SECUSER (G)	Compatible.
QUERY SET (G)	QUERY SET (G)	Upwardly compatible. The VM/XA SP response includes System/370 and 370-XA modes. The following VM/XA SP responses appear for compatibility purposes and are not settable, as they are in VM/SP HPO: ACNT OFF, ISAM OFF, ECMODE ON, ASSIST OFF, VMSAVE OFF, 370E OFF, STBYPASS OFF, STMULTI OFF, AFFINITY NONE, and SVCACCL OFF.

VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
QUERY SPMODE (A, G)	---	VM/SP HPO only.
QUERY SRM (A, E)	QUERY SRM (A, E)	Incompatible. The responses are different.
QUERY STATUS (B)	QUERY <i>rdev</i> STATUS (B)	QUERY STATUS is a VM/SP HPO-only command. QUERY <i>rdev</i> STATUS performs the identical function.
QUERY SYSTEM (B)	QUERY SYSTEM (B)	Incompatible. VM/XA SP QUERY SYSTEM has an upwardly compatible syntax and upwardly compatible response, but the function is incompatible. The VM/XA SP command displays the current user access to a system DASD volume.
QUERY TAPES (B)	QUERY TAPES (B)	Compatible.
QUERY TDSK (B)	QUERY TDSK (B)	Compatible.
QUERY TERMINAL (G)	QUERY TERMINAL (G)	Incompatible. Only VM/XA SP settings are displayed at the end of the response.
QUERY TIME (G)	QUERY TIME (G)	Compatible.
QUERY UR (D)	QUERY UR (B)	Incompatible. VM/XA SP QUERY UR does not allow logical printers, and the response does not include DEST information.
QUERY USERID (A, B, C, D, E, F, G)	QUERY USERID (G)	Compatible.
QUERY <i>userid</i>	QUERY <i>userid</i>	Compatible.
QUERY USERS (A, B, C, D, E, F, G)	QUERY USERS (Any)	Incompatible. VM/XA SP QUERY USERS displays five digits for the number of users.
QUERY <i>vaddr</i> (G)	QUERY <i>vdev</i> (G)	Incompatible. VM/XA SP QUERY <i>vdev</i> does not allow the DEST operand.
QUERY VECTOR (B)	QUERY VECTOR (A, B, C, E) INDICATE VECTOR (C, E)	Incompatible. The VM/XA SP QUERY VECTOR response lists only user IDs and the number of users; the other information can be found using VM/XA SP INDICATE VECTOR.
QUERY VIRTUAL ALL (G)	QUERY VIRTUAL ALL (G)	Incompatible. VM/XA SP QUERY VIRTUAL ALL does not display CHANNELS and DEST information and has additional responses.
QUERY VIRTUAL CONSOLE (G)	QUERY VIRTUAL CONSOLE (G)	Incompatible. The response is different.

Table 22 (Page 14 of 20). VM/SP HPO and VM/XA SP Command Compatibility		
VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
QUERY VIRTUAL DASD (G)	QUERY VIRTUAL DASD (G)	Upwardly compatible response.
QUERY VIRTUAL GRAF (G)	QUERY VIRTUAL GRAF (G)	Incompatible. The responses are different.
QUERY VIRTUAL STORAGE (G)	QUERY VIRTUAL STORAGE (G)	Incompatible. VM/XA SP QUERY VIRTUAL STORAGE displays larger storage sizes and displays sizes in megabyte increments.
QUERY VIRTUAL TAPES (G)	QUERY VIRTUAL TAPES (G)	Compatible.
QUERY VIRTUAL UR (G)	QUERY VIRTUAL UR (G)	Incompatible. The response is different.
QUERY VIRTUAL <i>vaddr</i> (G)	QUERY VIRTUAL <i>vdev</i> (G)	Incompatible. The responses are different.
QUERY VMSAVE (G)	---	VM/SP HPO only.
QUERY S370E (G)	---	VM/SP HPO only.
QVM (A)	---	VM/SP HPO only.
READY (G)	READY (G)	Compatible.
REPEAT (D)	REPEAT (D)	Incompatible. VM/XA SP REPEAT does not allow logical printers, does not provide the HOLD operand function, and has a different response.
REQUEST (G)	REQUEST (G)	Compatible.
RESET (G)	RESET (B, G)	Upwardly compatible.
REWIND (G)	REWIND (G)	Compatible.
SAVESYS (E)	SAVESYS (E)	Incompatible. VM/XA SP SAVESYS function is different and VM/XA SP issues a message instead of a response.
SCREEN (G)	SCREEN (G)	Compatible.

Table 22 (Page 15 of 20). VM/SP HPO and VM/XA SP Command Compatibility		
VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
SEND (G)	SEND (G)	Compatible.
SET ACNT (G)	----	VM/SP HPO only.
SET AFFINITY (A, G)	----	VM/SP HPO only.
SET ASSIST (G)	----	VM/SP HPO only.
SET AUTOPOLL (G)	SET AUTOPOLL (G)	Compatible.
SET CONCEAL (G)	SET CONCEAL (G)	Incompatible. VM/XA SP SET CONCEAL OFF resets the break key to the last key specified on the TERMINAL BRKKEY command rather than to PA1.
SET CPASSIST (A)	----	VM/SP HPO only.
SET CPCONIO (G)	SET CPCONIO (G)	Compatible.
SET CPUID (G)	SET CPUID (G)	Compatible.
SET DUMP (B)	SET DUMP (B)	Incompatible. VM/XA SP SET DUMP does not allow the AUTO operand (use SET DUMP DASD or SET DUMP rdev instead) and does return a response. VM/XA SP dumps are in a different format and are incompatible with VM/SP HPO dumps.
SET ECMODE (G)	----	VM/SP HPO only.
SET EMSG (G)	SET EMSG (G)	Compatible.
SET FAVORED (A)	SET SHARE (A) SET QUICKDSP (A)	SET FAVORED is a VM/SP HPO-only command. SET SHARE is similar to SET FAVORED with a percent. SET QUICKDSP is similar to SET FAVORED without a percent.
SET IMSG (G)	SET IMSG (G)	Compatible.
SET ISAM (G)	----	VM/SP HPO only.
SET JOURNAL (A)	----	VM/SP HPO only.
SET LINEDIT (G)	SET LINEDIT (G)	Compatible.

VM/SP HPO Conversion

Table 22 (Page 16 of 20). VM/SP HPO and VM/XA SP Command Compatibility		
VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
SET LOGMSG (B)	SET LOGMSG (B)	Incompatible. VM/XA SP SET LOGMSG has a limit of 50 lines of log message data.
SET MIH (G)	SET MIH (G)	Compatible.
SET MINWS (E)	----	VM/SP HPO only.
SET MITIME (B)	SET MITIME (A, B)	Incompatible. VM/XA SP SET MITIME has upwardly compatible syntax, allows setting by device address as well as class, and returns a blank response.
SET MODE (F)	SET MODE (A, F)	Incompatible. VM/XA SP SET MODE does not require the CPU operand, has a different response, and gives a response to SET MODE RETRY QUIET.
SET MSG (G)	SET MSG (G)	Compatible.
SET NOTRANS (G)	SET NOTRANS (G)	Compatible.
SET PAGEX (G)	SET PAGEX (G)	Compatible.
SET PAGING <i>nn</i> (E)	----	VM/SP HPO only.
SET PF nn IMMED (G)	SET PF nn IMMED (G)	Compatible.
SET PF nn DELAYED (G)	SET PF nn DELAYED (G)	Compatible.
SET PF nn COPY (G)	SET PF nn COPY (G)	Incompatible. VM/XA SP SET PF COPY requires specification of the printer address.
SET PF nn RETRIEVE (G)	SET PF nn RETRIEVE (G)	Upwardly compatible. VM/SP HPO clears the RETRIEVE buffer after a disconnect. VM/XA SP saves the RETRIEVE buffer after a disconnect; however, you can use the CLEAR operand to clear the buffer at any time.
SET PF nn TAB (G)	SET PF nn TAB (G)	Compatible.
SET PRIORITY (A)	SET SHARE (A)	VM/SP HPO only. The SET SHARE command provides similar functions but is not compatible with the VM/SP HPO SET PRIORITY <i>userid nn</i> and SET FAVORED <i>nnn</i> commands.
SET QDROP (A)	----	VM/SP HPO only.

Table 22 (Page 17 of 20). VM/SP HPO and VM/XA SP Command Compatibility		
VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
SET RECORD (F)	SET RECORD (F)	Compatible.
SET RESERVE (A)	SET RESERVED (A)	Compatible.
SET RUN (G)	SET RUN (G)	Incompatible. VM/XA SP SET RUN never forces RUN off for a disabled VM, a disabled VM with RUN set on displays RUNNING, and RUN is forced off when a user is tracing.
SET SASSIST (A)	----	VM/SP HPO only.
SET SMSG (G)	SET SMSG (G)	Compatible.
SET SRM (E)	SET SRM (A)	Incompatible. The syntax is different.
SET STBYPASS (G)	----	VM/SP HPO only.
SET STMULTI (G)	----	VM/SP HPO only.
SET TIMER (G)	SET TIMER (G)	Compatible.
SET VMCONIO (G)	SET VMCONIO (G)	Compatible.
SET VMSAVE (G)	----	VM/SP HPO only.
SET WNG (G)	SET WNG (G)	Compatible.
SET S370E (A, G)	----	VM/SP HPO only.
SHUTDOWN (A)	SHUTDOWN (A)	Incompatible. VM/XA SP SHUTDOWN does not allow the REIPL <i>raddr</i> operand and displays an additional response indicating that shutdown has started.
SLEEP (G)	SLEEP (Any)	Incompatible. VM/XA SP SLEEP is not terminated upon reconnection and supports the ATTN operand, which allows you to be notified if attention terminates the SLEEP.
SMSG (G)	SMSG (G)	Compatible.
SPACE (D)	SPACE (D)	Incompatible. VM/XA SP SPACE does not allow logical printers and does have a response.

Table 22 (Page 18 of 20). VM/SP HPO and VM/XA SP Command Compatibility		
VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
SPMODE (A)	----	VM/SP HPO only.
SPOOL (G)	SPOOL (G)	Incompatible. VM/XA SP SPOOL does not allow the DEST operand, sets DIST to the value in the directory for DIST *, has a minimum truncation of NOT for NOTERM, accepts SPOOL PRT CLOSE PURGE and closes and purges the file, includes the number of records and the KEEP setting in the response, always displays responses whenever a file is closed, sets the distribution code (when DIST is specified) for all files created on the device to the code specified, does not put a file into user hold following CONT or HOLD, truncates a name identification to 16 characters, allows you to specify additional operands (KEEP/NOKEEP and MSG/NOMSG), and changes a reader in KEEP status to HOLD after reading.
SPTAPE (D)	SPTAPE (D, E)	Incompatible. VM/XA SP SPTAPE gives a final completion response when the total operation is complete, does not allow the DEST operand, has no extended attribute buffer support, does not support the convert setting or hex 5A CCW content, and, for VM/SP HPO Release 4.2 users, requires a user ID if you specify one or more spool IDs. Also, in VM/XA SP, you may dump, load, and scan files using a user ID as the selection criterion, dump and load files using up to eight classes as selection criteria, and dump and load NSS, UCR, IMG, message repository, and system trace files.
START (D)	START (D)	Incompatible. VM/XA SP START has a SEP operand, does not allow imbedded LOAD FCB CCWs, does not accept the FILEFCB and CFILEFCB operands, does not allow the DEST operand, does not allow logical printers, and has a different response.
STCP (C)	STORE H (C)	STCP is a VM/SP HPO-only command. STORE H replaces it.
STORE (G)	STORE (C, G)	Upwardly compatible. VM/XA SP STORE has upwardly compatible syntax for larger storage sizes and more levels of storage.
STORE CAW (G)	STORE CAW (G)	Compatible.
STORE CSW (G)	STORE CSW (G)	Compatible.

Table 22 (Page 19 of 20). VM/SP HPO and VM/XA SP Command Compatibility		
VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
STORE PSW (G)	STORE PSW (G)	Compatible.
STORE REGISTERS (G)	STORE REGISTERS (G)	Incompatible. VM/XA SP STORE REGISTERS does not allow storing into odd-numbered floating-point registers.
STORE STATUS (G)	STORE STATUS	Compatible.
STORE VECTOR (G)	STORE VECTOR (G)	Incompatible. VM/XA SP checks the command for proper syntax prior to checking whether the Vector Facility is available.
SYSTEM (G)	SYSTEM (G)	Incompatible. VM/XA SP SYSTEM clears registers and resets I/O for the CLEAR operand. Also, VM/XA SP supports an additional operand: STORE STATUS.
TAG DEV (G)	TAG DEV (G)	Compatible.
TAG FILE (G)	TAG FILE (G)	Compatible.
TAG QUERY (G)	TAG QUERY (G)	Incompatible. VM/XA SP TAG QUERY issues TAG BLANK instead of TAG MISSING if the file did not contain a tag because it was either a file from the real card reader or an output file generated prior to VM/370 Release 2 PLC 11.
TERMINAL (G)	TERMINAL (G)	Incompatible. VM/XA SP TERMINAL allows you to set OFF the SCRNSAVE option (an error message results whenever it is set on) and does not support the BRKKEY operand in line mode.
TRACE (G)	TRACE (G)	Incompatible. VM/XA SP TRACE stops running after the instruction executes, displays only those branch instructions that are in the range of branches being traced, and, if the count exceeds the maximum value, does not display a per-branch count reset to one. Also, VM/XA SP supports additional operands and options including many from VM/SP HPO's PER command.
TRANSFER (D, G)	TRANSFER (D, G)	Incompatible. VM/XA SP TRANSFER does not allow the DEST operand, allows files created on any device to be transferred to any other device, has a different response, and, for VM/SP HPO Release 4.2, does not allow the specification of SYSTEM and <i>userid</i> by class D users.

Table 22 (Page 20 of 20). VM/SP HPO and VM/XA SP Command Compatibility		
VM/SP HPO Commands and Privilege Classes	Corresponding VM/XA SP Commands and Privilege Classes	Notes
UNLOCK (A)	UNLOCK (A)	Upwardly compatible. VM/XA SP UNLOCK allows unlocking pages with CP system symbols.
VARY OFFLINE (B)	VARY OFFLINE (B)	Incompatible. VM/XA SP VARY OFF does not allow logical printers and limits the range of devices varied to 256.
VARY ONLINE (B)	VARY ONLINE (B)	Incompatible. VM/XA SP VARY ON does not allow logical printers and limits the range of devices varied to 256.
VARY OFFLINE PROCESSR (B)	VARY OFFLINE PROCESSOR (B)	Incompatible. VM/XA SP VARY OFFLINE PROCESSOR allows PROCESSOR to be spelled out fully and does not provide function for the FORCE, VPHY, and VLOG operands.
VARY <i>raddr</i> (B)	VARY <i>rdev</i> (B)	Upwardly compatible. VM/XA SP VARY <i>rdev</i> displays the number of devices varied on at the end of the response.
VMDUMP (G)	VMDUMP (G)	Upwardly compatible.
WARNING (A, B)	WARNING (A, B, C)	Incompatible. VM/XA SP WARNING displays the time and message on the same line.

Asynchronous Commands

Be careful using asynchronous commands because control could return to the issuer of the command before processing of the command completes. For example, when an operator issues the ATTACH command on behalf of another user, the attachment does not take place immediately; it occurs just prior to the other user being dispatched. In VM/XA SP, three commands are asynchronous: ATTACH, DETACH, and XAUTOLOG. (XAUTOLOG can also be used synchronously.) In VM/SP HPO, the ATTACH and DETACH commands are synchronous, and the XAUTOLOG command does not exist.

VM/SP HPO and VM/XA SP DIAGNOSE Code Compatibility

Table 23 on page 125 contains compatibility information for VM/SP HPO DIAGNOSE codes. The compatibility categories are:

- **Compatible** with VM/XA SP. The DIAGNOSE code exists in both systems and has equivalent syntax, responses, and functions.
- **Upwardly compatible** with VM/XA SP. The DIAGNOSE code exists in both systems but there are differences in syntax, responses, or functions. Invocations and applications using the VM/SP HPO syntax should continue to execute unchanged.
- **Incompatible** with VM/XA SP. The DIAGNOSE code exists in both systems but differences in syntax, responses (including additional return codes for existing

functions), or functions may cause some invocations or applications using the previous syntax to execute incorrectly or not to execute at all.

Refer to *VM/XA SP CP Programming Services* for complete descriptions of all DIAGNOSE codes.

VM/SP HPO DIAGNOSE Code	Compatibility Notes
X'00' - Store Extended ID	Incompatible. VM/XA SP returns a different system name and a different bit map.
X'04' - Examine Real Storage	Compatible.
X'08' - Virtual Console Function	Compatible.
X'0C' - Pseudo Timer	Compatible.
X'10' - Release Pages	Compatible.
X'14' - Input Spool File Manipulation	Incompatible. VM/XA SP does not provide extended attribute buffer support. Also, the format of the block that is returned may be different.
X'18' - Standard DASD I/O	Incompatible. VM/XA SP issues return code 7 for different CCW problems.
X'1C' - Clear Error Recording	VM/SP HPO only.
X'20' - General I/O	Incompatible. VM/XA SP returns only sense bytes 0 and 1 in Ry for return code 13. Also, VM/XA SP provides 0's for sense bytes 2 and 3.
X'24' - Device Type, Features	Incompatible. VM/XA SP gives same control block fields, but doesn't provide all bits from VDEVSTAT and VDEVFLAG.
X'28' - Channel Program Modification	Incompatible. VM/XA SP provides an additional return code.
X'2C' - DASD Start of LOGREC	VM/SP HPO only.
X'30' - Read Page of LOGREC	VM/SP HPO only.
X'34' - Read Dump Spool File	Incompatible. A VM/XA SP dump file has a different format.
X'38' - Read System Symbols	VM/SP HPO only.
X'3C' - Directory	Incompatible. VM/XA SP provides an additional return code.
X'40' - Clean-Up after IPL	Upwardly compatible. VM/XA SP provides two clean-up routines after IPL.
X'48' - Issue SVC76 Second Level	Upwardly compatible. VM/XA SP treats this as a NO-OP. The equivalent VM/XA SP function is provided by the CP command SET SVC76.
X'4C' - Generate Accounting Records	Compatible.
X'50' - Save 370x Image	VM/SP HPO only.
X'54' - Control the Function of PA2	Compatible.

VM/SP HPO Conversion

Table 23 (Page 2 of 3). VM/SP HPO and VM/XA SP DIAGNOSE Code Compatibility	
VM/SP HPO DIAGNOSE Code	Compatibility Notes
X'58' - 3270 Virtual Console Interface	Incompatible. Differences in sequences of VM/SP HPO and VM/XA SP channel programs make these DIAGNOSE codes functionally inconsistent.
X'5C' - Error Message Editing	Upwardly compatible. VM/XA SP uses four-digit message numbers for numbers over 999. Also, VM/XA SP returns a length of 11 for a four-digit number and will allow for variable length headers.
X'60' - Determine Virtual Storage Size	Upwardly compatible. The VM/XA SP response can be greater than 16Mb.
X'64' - Named Saved Segments	Incompatible. VM/XA SP provides three new options: FINDSKEL, FINDSPACE, and FINDSEGA. VM/XA SP provides additional return codes for condition code 2. Also, VM/XA SP does not use return code 179.
X'68' - VMCF	Compatible.
X'6C' - Shadow Table Maintenance	VM/SP HPO only.
X'70' - Activating TOD Clock Accounting	Compatible.
X'74' - 3800 Named System	Incompatible. VM/XA SP has a new condition code and new return codes.
X'78' - MSS Communications	VM/SP HPO only.
X'7C' - Logical Device Support	Incompatible. VM/XA SP has a limit of eight virtual machines that can create logical devices, and allows four-digit virtual device addresses.
X'80' - MSSFCALL	Compatible.
X'84' - Directory Update	Upwardly compatible. In VM/XA SP, the ACCOUNT field can accept eight account numbers, the PRIORITY field is accepted and ignored, VM/SP HPO-only options in the OPTIONS field are ignored, the MDISK field has an additional format that supports four-digit device addresses, and there are several new return codes associated with new functions.
X'8C' - Access Device Dependent Information	Incompatible. VM/XA SP may return a protection exception where VM/SP HPO does not.
X'94' - VMDUMP Function	Incompatible. VM/XA SP has additional operands.
X'98' - Real Channel Program Support	Upwardly compatible. VM/XA SP supports real channel programs in 24-bit or 31-bit addressing mode in System/370 or 370-XA mode virtual machines.
X'A0' - Retrieve a Group Name	Upwardly compatible. VM/XA SP provides additional code to check for the presence of RACF.
X'B0' - Access Information Saved for Protected Application Users	Incompatible. VM/XA SP has additional error codes.
X'B4' - Virtual Printer External Attribute Buffer Manipulation	VM/SP HPO only.

Table 23 (Page 3 of 3). VM/SP HPO and VM/XA SP DIAGNOSE Code Compatibility	
VM/SP HPO DIAGNOSE Code	Compatibility Notes
X'B8' - Spool File External Attribute Buffer Manipulation	VM/SP HPO only.
X'BC' - Open a Spool File	Compatible.
X'C8' - NLS Set	Incompatible. VM/XA SP has different return codes.
X'CC' - NLS Save	Incompatible. VM/XA SP has different return codes.
X'D0' - 3480 Tape Volume Serial Support	Compatible.
X'D4' - Alternate Userid	Compatible.
X'D8' - Query Spool File	Upwardly compatible. VM/XA SP has an additional code (0004) that allows access to spool file blocks that are in VM/XA format.

VM/XA SP-Only DIAGNOSE Codes

X'44' - Voluntary Time Slice End

X'90' - Read Symbol Table

X'A4' - DASD I/O for System/370 or 370-XA

X'A8' - General I/O for System/370 or 370-XA

X'C4' - Handle Class Override Data for User Class Restructure (UCR)

X'E0' - System Trace File Interface

X'E4' - Return Minidisk Real Device Information.

VM/SP HPO and VM/XA SP Message Compatibility

Table 24 on page 128 compares VM/SP HPO and VM/XA SP messages. Messages listed are:

- Upwardly compatible messages. The message number exists in both systems but the text of the messages differs. Applications using the VM/SP HPO message should continue to execute unchanged.
- Incompatible messages. The message number exists in both systems but differences between message texts may cause applications that depend on message texts to execute incorrectly or not to execute at all.
- VM/SP HPO-only messages.

Messages *not* listed are:

- Compatible messages. The message number exists in both systems and has the same message text.
- VM/XA SP-only messages.

VM/SP HPO Conversion

For VM/SP HPO-only messages, the message text is from VM/SP HPO Release 5. For upwardly compatible and incompatible messages, if a message text differs between VM/SP HPO Release 4.2 and VM/SP HPO Release 5, the release level is indicated. Otherwise, the indication "VM/SP HPO" means the message texts in VM/SP HPO Release 4.2 and VM/SP HPO Release 5 are the same (with the exception, of course, that VM/SP HPO Release 5 uses uppercase and lowercase letters).

Table 24 (Page 1 of 19). VM/SP HPO and VM/XA SP Message Compatibility

No.	Code	Text, or System and Text
009	IC	VM/SP HPO: INVALID RANGE - <i>range</i> (addresses are padded and "." or ":" is changed to "-") VM/XA SP: Invalid range - <i>range</i> (what was entered on the command)
014	HO	Tape <i>raddr</i> dump tape capacity exceeded
015	HO	Command not valid before LOGON: <i>command</i>
016	HO	TAG invalid for specified file type
017	HO	Insufficient screen space - clear screen and redial
021	IC	VM/SP HPO 4.2: RADDR MISSING OR INVALID [<i>raddr</i>] VM/SP HPO 5: Real device address missing or invalid [<i>raddr</i>] VM/XA SP: A real device number was not supplied or it is invalid.
022	IC	VM/SP HPO 4.2: VADDR MISSING OR INVALID VM/SP HPO 5: Virtual device address missing or invalid VM/XA SP: A virtual device number was not supplied or it was invalid.
024	IC	VM/SP HPO: {CYLS BLKS FORM NUMBER} missing or invalid VM/XA SP: Cylinders missing or invalid
027	HO	Spoolid missing or invalid
029	HO	Filename and/or filetype missing or invalid
032	HO	Distcode missing or invalid
034	HO	Channel missing or invalid
037	HO	Tape <i>raddr</i> invalid for SPTAPE command
038	IC	VM/SP HPO: Parameter <i>parameter</i> for option <i>option</i> missing or invalid VM/XA SP: Parameter for <i>option</i> option missing or invalid - <i>parameter</i>
040	IC	VM/SP HPO 4.2: DEV <i>raddr</i> DOES NOT EXIST VM/SP HPO 5: Device <i>raddr</i> does not exist (up to four spaces for address) VM/XA SP: Device { <i>rdev</i> <i>vdev</i> <i>ldev</i> } does not exist
046	IC	VM/SP HPO 4.2: (DEV <i>rid</i> <i>devtype</i> <i>raddr</i> <i>volid</i>) OFFLINE VM/SP HPO 5: (Device <i>rid</i> <i>devtype</i> <i>rdev</i>) OFFLINE VM/XA SP: <i>type</i> <i>rdev</i> offline
048	HO	Channel <i>x</i> does not exist
051	HO	Maximum virtual devices exceeded in directory
053	IC	VM/SP HPO: <i>userid</i> not in CP directory (blanks are not suppressed in the user ID) VM/XA SP: [XAUTOLOG failed for <i>userid</i> .] <i>userid</i> not in CP directory

UC = upwardly compatible, IC = incompatible, HO = VM/SP HPO only.
Not listed: compatible messages and VM/XA SP-only messages.

Table 24 (Page 2 of 19). VM/SP HPO and VM/XA SP Message Compatibility

No.	Code	Text, or System and Text
058	IC	VM/SP HPO: CTC <i>vaddr</i> busy on <i>userid</i> VM/XA SP: CTCA <i>vdev</i> busy on <i>userid</i>
059	UC	VM/SP HPO: AUTOLOG failed for <i>userid</i> - <i>message</i> VM/XA SP: {XAUTOLOG AUTOLOG} failed for <i>userid</i> - {IPL missing IPL failed accounting errors incorrect password}
062	HO	ECMODE not set on
063	HO	Shadow table bypass; not set
064	HO	Shadow table bypass; reset
065	HO	Highest allowable high-water mark value is <i>xxxxxk</i>
066	HO	STMULTI option CSEG reset
069	HO	Incomplete recovery; 'SYSTEM RESTART' or 'BEGIN'
070	HO	Device not available - MSS devices allocated
071	HO	Device not available - MSS cannot be accessed
072	HO	Device not available - <i>raddr</i> not proper type
073	HO	MSS device not available - MSS error
074	HO	Missing interrupt - device <i>vaddr</i>
075	HO	Device <i>valid</i> is not available
076	HO	The <i>valid</i> parameter is invalid
077	HO	Invalid request for device <i>nnn</i>
078	HO	MSS mount proceeding for volume <i>valid</i>
079	HO	CP command via central server is not possible
080	HO	No preallocated VMSAVE area
081	HO	VMSAVE area already in use, must use SET command
082	HO	More than one VMSAVE area allocated, must specify area name
083	HO	VMSAVE area does not contain valid saved system
084	HO	VARY failed, device <i>rdev</i> busy or reserved
085	HO	VARY failed, fatal I/O error - device <i>raddr</i>
086	HO	I/O error on DASD
087	HO	Device <i>vaddr</i> is in the process of being reset
089	HO	Device <i>vaddr</i> is in the process of being detached
093	HO	VM/SP HPO 4.2: DEV <i>vaddr</i> NOT DEFINED; ERROR IN CP DIRECTORY VM/SP HPO 5: Device <i>vdev</i> not defined; error in CP directory
094	UC	VM/SP HPO: Storage exceeds allowed maximum VM/XA SP: Storage exceeds allowed maximum of <i>nnn</i> MEG

UC = upwardly compatible, IC = incompatible, HO = VM/SP HPO only.
Not listed: compatible messages and VM/XA SP-only messages.

VM/SP HPO Conversion

Table 24 (Page 3 of 19). VM/SP HPO and VM/XA SP Message Compatibility

No.	Code	Text, or System and Text
095	IC	VM/SP HPO 4.2: DEV <i>vaddr</i> NOT DEFINED; INSUFFICIENT FREE STORAGE VM/SP HPO 5: Device <i>vaddr</i> not defined; insufficient free storage VM/XA SP: Device <i>vdev</i> is not defined because the maximum number of devices is already defined.
096	HO	Device <i>vaddr</i> not defined; device type not allowed
097	HO	Device <i>vdev2</i> not defined; device <i>vdev1</i> as active I/O
098	HO	Device <i>rid</i> mode switch not possible
099	HO	VARY failed, environmental data device <i>raddr</i>
116	HO	userid <i>xxx</i> not linked; CP directory in use
119	HO	Userid <i>vaddr</i> not linked; insufficient free storage
129	HO	Channel <i>x</i> devices in use
130	HO	Channel <i>x</i> not attached to userid
131	HO	Insufficient free storage available for {attach/logon} request
132	HO	Channel <i>x</i> already defined by <i>userid</i>
133	HO	DASD <i>raddr</i> not ready
134	HO	<i>type raddr</i> not attached; channel <i>x</i> dedicated
135	HO	<i>type vaddr</i> not detached; channel <i>x</i> dedicated
136	HO	Device <i>addr</i> not {defined varied}; channel <i>x</i> dedicated
137	HO	DASD <i>vaddr</i> not linked; channel <i>x</i> dedicated
138	HO	Channel <i>x</i> not attached; insufficient free storage
139	HO	DASD <i>raddr</i> not {linked attached}; 3330V not accepted as system volume
140	IC	VM/SP HPO: <i>devtype (rdev ldev)</i> attached to userid (up to four spaces for address) VM/XA SP: <i>type {rdev ldev}</i> attached to <i>userid</i>
144	HO	<i>type vaddr</i> RESET BY <i>userid</i>
145	HO	USERID <i>userid</i> AT <i>rdev</i> WITH INVALID {LINK LOGON} PASSWORD NO <i>nnnn</i> HAS VIOLATED THE LIMIT OF <i>limit</i> [A = <i>userid</i>]
147	HO	Channel <i>x</i> not attached; alternate paths defined
149	HO	DEVICE PATH <i>rdev</i> PRESENTED CC = 3 ON I/O REQUEST
151	HO	DASD <i>vaddr</i> not attached; busy persists, IOBSTAT = <i>xx</i> , IOBCSW + 4 = <i>yyyy</i>
154	HO	Device <i>raddr</i> VARY failed, VARY in process
156	HO	<i>raddr1 raddr2 raddr3</i> subsystem devices not available
157	HO	'CLUSTER=' parameter missing from RDEVICE macro - device <i>raddr</i>
158	HO	UCS image name mismatch; image name loaded is <i>xxxxx</i>
159	HO	SPMODE on - cannot unlock Virtual = Real
161	HO	Shared page <i>hexloc</i> altered by <i>userid</i>

UC = upwardly compatible, IC = incompatible, HO = VM/SP HPO only.
Not listed: compatible messages and VM/XA SP-only messages.

Table 24 (Page 4 of 19). VM/SP HPO and VM/XA SP Message Compatibility

No.	Code	Text, or System and Text
162	HO	Invalid ECR <i>x-hexdata</i>
165	HO	Page <i>hexloc</i> not locked; shared page
166	HO	Changed shared page not written to auxiliary storage
168	HO	STATUS operand requires ECMODE
169	HO	VARY not performed, device <i>raddr</i> not ready
170	UC	VM/SP HPO: System <i>name</i> exceeds storage VM/XA SP: System <i>name</i> exceeds storage size; { <i>nnnnnnnnK nnnM</i> } required
171	HO	System <i>name</i> valid <i>valid</i> not mounted
172	HO	System <i>name</i> DASD <i>vaddr</i> - incompatible SYSRES
173	HO	System <i>name</i> requires DASD <i>vaddr</i>
174	IC	VM/SP HPO: Paging error - {I/O address exception}: {checkpoint area invalidated command terminated IPL failed page not locked command complete no dump created} VM/XA SP: Paging I/O error; IPL failed
175	HO	{RESERVE <i>name</i> } already in use by <i>userid</i>
176	HO	Virtual = Real area in use by { <i>userid</i> system}
177	IC	VM/SP HPO: Parameter exceeds <i>nn</i> characters VM/XA SP: Your PARM data exceeds the limit of <i>nn</i> characters. Correct your data string and reissue the IPL command.
178	HO	System <i>name</i> exceeds available DASD space
179	HO	System <i>name</i> valid <i>valid</i> not CP-owned
180	IC	VM/SP HPO: PER trace not in effect VM/XA SP: Trace not in effect
181	HO	Shared system <i>name</i> replaced with non-shared copy
182	HO	PER trace is active
183	HO	VM assist not active
184	HO	VM assist not available [on processor <i>proc xx</i>]
185	HO	CP assist level <i>nnnn</i> not supported; CP assist disabled
186	HO	CP assist not available
187	HO	Timer assist not available
188	HO	Specified processor unavailable
189	HO	AFFINITY not set, system in uniprocessor mode
190	HO	No AFFINITY specified in directory
191	HO	{Processor Vector} <i>nn</i> does not exist
192	HO	VARY {PROCESSOR VECTOR} command failed

UC = upwardly compatible, IC = incompatible, HO = VM/SP HPO only.
Not listed: compatible messages and VM/XA SP-only messages.

Table 24 (Page 5 of 19). VM/SP HPO and VM/XA SP Message Compatibility

No.	Code	Text, or System and Text
193	HO	{PROCESSOR VECTOR} <i>nn</i> ONLINE
194	HO	{PROCESSOR VECTOR} <i>nn</i> OFFLINE
195	HO	370E FEATURE UNAVAILABLE ON PROCESSOR <i>nn</i>
198	HO	LAST PATH TO DEVICE <i>raddr</i> ON PROCESSOR <i>nn</i>
199	HO	Command rejected; device <i>raddr</i> pending offline
201	HO	Virtual = Real area not available; damaged pages
202	IC	VM/SP HPO 5: Virtual = real area not available; insufficient storage VM/XA SP: Virtual = {Real Fixed} area not available; insufficient storage
203	IC	VM/SP HPO 4.2: V = R AREA REQUIRES IPL BY DEVICE ADDRESS VM/SP HPO 5: Virtual = Real area requires IPL by device address VM/XA SP: Virtual = {Real Fixed} area requires IPL by device number
208	HO	Printer <i>rid</i> not enabled
210	HO	SWAPAGE class is dependent on swap
211	HO	MONITOR TAPE is already active
212	HO	MONITOR is not active
213	HO	MONITOR CPTRACE is already active
214	HO	MONITOR CPTRACE is not active
215	HO	Monitor active, DASTAP cannot be enabled dynamically
216	HO	SYSPROF class is dependent on schedule and DASTAP
217	HO	MONITOR TAPE not started, no class enabled
218	HO	Monitor not stopped, outstanding I/O
219	HO	End of monitor tape, monitor stopped by system
220	HO	Error on monitor tape, monitor stopped by system
221	HO	MONITOR to spool is already active
222	HO	TIME parameter specifies invalid time
223	HO	Start time must precede stop time
224	HO	Limit must be between 10 and 50000
225	HO	Invalid monitor userid specified, MONITOR not enabled
226	HO	'FOR' value spans midnight - command invalid
227	HO	'FOR' option invalid with AUTODISK off
228	HO	'FOR' option invalid with MONITOR on
229	HO	User of monitor does not exist
230	IC	VM/SP HPO: IPL SIO ERROR VM/XA SP: IPL {SIO SSCH} ERROR

UC = upwardly compatible, IC = incompatible, HO = VM/SP HPO only.
Not listed: compatible messages and VM/XA SP-only messages.

Table 24 (Page 6 of 19). VM/SP HPO and VM/XA SP Message Compatibility

No.	Code	Text, or System and Text
231	IC	VM/SP HPO: IPL TIO ERROR VM/XA SP: IPL {TIO TSCH} ERROR
232	IC	VM/SP HPO: IPL UNIT ERROR; CSW <i>csw</i> SNS <i>sense</i> VM/XA SP: IPL UNIT ERROR, {CSW = <i>csw</i> IRB = <i>irb</i> }, SNS = <i>sense</i>
235	HO	Device <i>raddr</i> varied online; unable to establish a path group id for channel path(s) <i>raddr</i>
236	HO	Device <i>raddr</i> VARY failed; unable to establish a path group id for device
237	HO	Device <i>raddr</i> VARY failed; device cannot be assigned
238	HO	Device <i>raddr</i> varied offline; unassign failed
239	HO	Printer <i>raddr</i> drained; possible FCB-forms mismatch
240	IC	VM/SP HPO 4.2: PRT XXX, FCB-FORMS MISMATCH, FILEID <i>nnnn</i> (HELD PURGED) VM/SP HPO 5: Printer (<i>rdev</i>), FCB-forms mismatch; user(<i>userid</i>) spoolid (<i>spoolid</i>) (held purged) VM/XA SP: The form length mounted on printer <i>rdev</i> does not match the length described by the FCB <i>fc</i> b.
241	IC	VM/SP HPO 4.2: PRT <i>xxx</i> , INVALID LOAD MODULE <i>mmmm</i> SPECIFIED, FILE <i>nnnn</i> (held purged) VM/SP HPO 5: Printer (<i>rdev</i>), invalid load module <i>mmmm</i> specified, user(<i>userid</i>) spoolid(<i>spoolid</i>) (held purged) VM/XA SP: An undefined load image <i>imagename</i> was specified for printer <i>rdev</i> .
242	HO	Printer <i>raddr</i> (3800), intervention required, status code <i>cc</i>
243	HO	FLASH missing or invalid
244	HO	Image library missing or invalid
245	HO	CHARS missing or invalid
246	HO	FCB missing or invalid
247	IC	VM/SP HPO: 3800 NAMED SYSTEM <i>image3800</i> CREATED VM/XA SP: NAMED IMAGE <i>imagename</i> CREATED
250	HO	370E feature is not available [on processor <i>xx</i>]
251	HO	370E feature {not active now disabled}
252	HO	Printer <i>raddr</i> , user <i>userid</i> spoolid <i>nnnn</i> queued and held
253	HO	MODIFY missing or invalid
255	IC	VM/SP HPO: Printer <i>raddr</i> ; page buffer destroyed, backup page count = <i>nnnn</i> VM/XA SP: PRINTER <i>rdev</i> ; PAGE BUFFER DESTROYED, BACKUP PAGE COUNT = <i>nnnn</i>
256	HO	INSUFFICIENT VIRTUAL STORAGE
257	HO	RESIDUAL BYTE COUNT = <i>nnnnnnnn</i> (HEX)
258	HO	All 3800 data checks will be reflected
268	HO	XMEM feature not available

UC = upwardly compatible, IC = incompatible, HO = VM/SP HPO only.

Not listed: compatible messages and VM/XA SP-only messages.

VM/SP HPO Conversion

Table 24 (Page 7 of 19). VM/SP HPO and VM/XA SP Message Compatibility

No.	Code	Text, or System and Text
269	HO	XMEM feature not active
270	IC	VM/SP HPO 4.2: PRT <i>nnn</i> TOO MANY WCGM'S NEEDED FOR "CHARS", FILE <i>nnnn</i> (HELD PURGED) VM/SP HPO 5: Printer <i>raddr</i> too many WCGM's needed for 'CHARS', user <i>userid</i> spoolid <i>nnnn</i> {held purged} VM/XA SP: The character sets specified for the printer <i>rdev</i> required more writable character generation modules than were available.
272	HO	Printer <i>raddr</i> , 3800 IML occurred
273	HO	DETACH rejected; virtual machine tracing I/O
274	HO	<i>raddr</i> has a mounted volume; MSS task not available to demount it
275	HO	<i>raddr</i> already SYSVIRT
276	HO	<i>raddr</i> not a 3330V
277	HO	Error demounting volume <i>raddr</i>
278	HO	Device <i>raddr</i> not a DASD
279	HO	DASD <i>raddr</i> not a VUA
280	HO	<i>raddr</i> already virtual
281	HO	MSS volume <i>raddr</i> not linked; demount in process, retry
285	HO	<i>userid</i> logging on, try again later
286	HO	<i>userid</i> logging off, try again later
287	HO	Printer <i>raddr</i> ; page buffer destroyed, backup page count = <i>nnnn</i>
288	HO	LOGON from the initial screen was unsuccessful
290	HO	PMA guest given control due to code <i>cde</i> CP disabled WAIT
291	HO	Command rejected; {PMA SPMODE VECTOR} in use
292	HO	PMA feature not available/enabled; rc = <i>rc[-ddd]</i>
293	HO	Command rejected; <i>vaddr</i> violates PMA restriction
301	HO	Requested file is not a CPTRAP file
302	HO	I/O error on 00C - {device address invalid device type invalid device busy, not ready, or real paging error on spool}
303	HO	00C reader file not locatable
304	HO	CPTRAP is stopping, no input allowed
305	HO	CPTRAP/TRAPRED SELECTIVITY RESET
306	HO	CPTRAP is already active
307	HO	CPTRAP {CP virtual} <i>cccc</i> interface data ignored
308	HO	CPTRAP data lost
309	HO	Operand ignored; select table full

UC = upwardly compatible, IC = incompatible, HO = VM/SP HPO only.
Not listed: compatible messages and VM/XA SP-only messages.

Table 24 (Page 8 of 19). VM/SP HPO and VM/XA SP Message Compatibility

No.	Code	Text, or System and Text
311	HO	Maximum number of trace elements exceeded
312	HO	More than {8 RANGES 1 PASS 1 STEP} specified on a command line
313	HO	PER failure - code <i>n</i>
314	HO	PER failure - code <i>n</i> , userid <i>userid</i>
316	HO	Command rejected; LOGMSG/DUMP being processed
317	HO	CPTRAP terminated due to I/O error
318	HO	Cache not available - already owned
320	IC	VM/SP HPO: Subsystem processing error - fault code = <i>code</i> - <i>raddr/ss-xx-xx</i> VM/XA SP: DASD <i>rdev</i> SUBSYSTEM PROCESSING ERROR - FAULT CODE = <i>code</i> - <i>ss-XX-XX</i>
321	IC	VM/SP HPO: Subsystem storage equipment check - fault code = <i>code</i> - <i>raddr/ss-xx-xx</i> VM/XA SP: DASD <i>rdev</i> SUBSYSTEM STORAGE EQUIPMENT CHECK - FAULT CODE = <i>code</i> - <i>ss-XX-XX</i>
322	IC	VM/SP HPO: Subsystem storage availability threshold crossed - <i>raddr/ss-xx-xx</i> VM/XA SP: DASD <i>rdev</i> SUBSYSTEM STORAGE AVAILABILITY THRESHOLD CROSSED- <i>ss-XX-XX</i>
323	IC	VM/SP HPO: Subsystem storage is unusable - fault code = <i>code</i> - <i>raddr/ss-xx-xx</i> VM/XA SP: DASD <i>rdev</i> SUBSYSTEM STORAGE IS UNUSABLE - FAULT CODE = <i>code-ss-XX-XX</i>
324	IC	VM/SP HPO: Subsystem storage must be initialized - fault code = <i>code</i> - <i>raddr/ss-xx-xx</i> VM/XA SP: DASD <i>rdev</i> SUBSYSTEM STORAGE MUST BE INITIALIZED - FAULT CODE = <i>code</i> - <i>ss-XX-XX</i>
325	IC	VM/SP HPO: Storage director communication failure - fault code = <i>code</i> - <i>raddr/ss-xx-xx</i> VM/XA SP: DASD <i>rdev</i> STORAGE DIRECTOR COMMUNICATION FAILED - FAULT CODE = <i>code-ss-XX-XX</i>
326	IC	VM/SP HPO: Track format not supported for paging device - fault code = <i>code</i> - <i>raddr/ss-xx-xx</i> VM/XA SP: PRT <i>rdev</i> TRACK FORMAT NOT SUPPORTED FOR PAGING - <i>ss-XX-XX</i>
327	HO	Reset write inhibit switch on paging device- <i>raddr</i>
328	HO	<i>raddr1 raddr2 raddr3 raddr4</i> improperly genned; varied offline
329	HO	<i>raddr</i> improperly genned, device cannot be used as SYSOWN
330	HO	<i>message</i> ; mismatched device types at address <i>rdev</i>
331	HO	<i>vaddr</i> not <i>process</i> - use a <i>vcutype</i> VCU instead
333	HO	Soft error logging complete for subsystem storage - fault code = <i>code</i> - <i>raddr/ss-xx-xx</i>
334	HO	Soft error logging complete for controller - fault code = <i>code</i> - <i>raddr/ss-xx-xx</i>
335	HO	Soft error logging complete for device - fault code = <i>code</i> - <i>raddr/ss-xx-xx</i>

UC = upwardly compatible, IC = incompatible, HO = VM/SP HPO only.
Not listed: compatible messages and VM/XA SP-only messages.

Table 24 (Page 9 of 19). VM/SP HPO and VM/XA SP Message Compatibility

No.	Code	Text, or System and Text
337	HO	Caching terminated - fault code = <i>code - raddr/ss-xx-xx</i>
338	IC	VM/SP HPO: Caching reinitialized - fault code = <i>code raddr/ss-xx-xx</i> VM/XA SP: DASD <i>rdev</i> CACHING REINITIATED- <i>ss-XX-XX</i>
340	HO	Area type <i>type</i> truncated for CP owned volume <i>valid</i>
341	HO	Area type <i>type</i> defaulted for CP owned volume <i>valid</i>
342	HO	Spool file exists in page area for CP owned volume <i>valid</i>
343	HO	SWSIZE too large for CP owned volume <i>valid</i>
344	HO	CP owned volume <i>valid</i> invalid type
345	HO	No devices sysgenned/online <i>raddr</i>
350	HO	DASD <i>raddr</i> SYSRES VOLID NOT <i>valid</i>
353	UC	VM/SP HPO: SYSRES DEVICE TYPE INVALID VM/XA SP: Sysres device type invalid or device <i>rdev</i> not operational
400	IC	VM/SP HPO: System {temp space checkpoint area} full VM/XA SP: All {paging spooling} space is in use.
411	HO	CP ENTERED; TRANSLATION EXCEPTION, WHILE IN NON-EC MODE
414	HO	PAGING STORAGE ERROR OCCURRED WHILE ATTEMPTING RECOVERY FROM A SYSSPOOL PAGING ERROR
420	HO	No SVCACCL specified in directory
424	HO	Reader file spool error; file unchanged
425	HO	I/O error on spool device during accounting
426	HO	{Reader Tape} <i>raddr</i> system spool space full; file purged
430	HO	{Console Printer Punch} <i>vaddr</i> fatal I/O error; now offline, file held
432	IC	VM/SP HPO 4.2: RDR <i>raddr</i> ID CARD; <i>userid</i> NOT IN CP DIRECTORY VM/SP HPO 5: Reader <i>raddr</i> ID card; <i>userid</i> not in CP directory VM/XA SP: The ID card for reader <i>rdev</i> is invalid because <i>userid</i> is not in the CP directory.
434	HO	Reader <i>raddr</i> fatal I/O error; file purged
435	IC	VM/SP HPO: Paging error writing saved system VM/XA SP: [{SAVESYS SAVESEG} command was not completed because a paging I/O error occurred while writing a page.] or [{DEFSYS DEFSEG} command processing cannot complete because a paging I/O error occurred while writing a page.]
436	HO	INTERRUPT PENDING. TO PROCEED TYPE YES, TO END TYPE NO
437	HO	System paging space not available, IPL terminated
438	HO	Device is not available for ATTACH
441	HO	Not accepted; previous backspace still being processed
442	HO	Paging storage for [paging swapping] = <i>xxK yyy%</i> are not usable

UC = upwardly compatible, IC = incompatible, HO = VM/SP HPO only.
Not listed: compatible messages and VM/XA SP-only messages.

Table 24 (Page 10 of 19). VM/SP HPO and VM/XA SP Message Compatibility

No.	Code	Text, or System and Text
443	HO	Paging storage increment <i>nnn</i> is not usable
444	HO	<i>nn</i> additional paging storage increments are not usable
454	HO	{Line <i>raddr</i> Device <i>rid</i> } disabled
455	HO	Line <i>raddr</i> not operational; {CC=3 command reject}
456	HO	CP entered; <i>name</i> - shared page <i>hexloc</i> altered
457	HO	Terminal SCRNSAVE unsuccessful
458	HO	A condition was detected that should not occur; line <i>xxx</i> will be disabled
460	HO	CTLR <i>raddr</i> {load dump} failed; program check
461	HO	CTLR <i>raddr</i> IPL NOT REQUIRED; ENTER 'YES' TO CONTINUE
462	HO	CTLR <i>raddr</i> unit check; IPL required
463	HO	CTLR <i>raddr</i> unit check; restart in progress
464	HO	CTLR <i>raddr</i> CC=3; press 3705 'LOAD' button
465	HO	LINE TRACE TERMINATED DUE TO ERROR
466	HO	CTLR <i>raddr</i> IN BUFFER SLOWDOWN MODE
467	HO	CTLR <i>raddr</i> emulator lines in use by system
468	HO	CTLR <i>raddr</i> communications scanner failure
469	HO	CTLR <i>raddr</i> {load dump} failed; temp space not available
470	HO	CTLR <i>raddr</i> {load dump} failed; paging I/O error
471	HO	CTLR <i>raddr</i> {load dump} failed; unrecoverable I/O error
472	HO	Paging storage allocated for <i>ttttttt</i> = <i>mmmm</i> megabytes
473	HO	Paging storage starting increment <i>xxxx</i> for type <i>ttttttt</i> is greater than maximum increment in the system
474	HO	Paging storage ending increment <i>xxxx</i> for type <i>ttttttt</i> is greater than maximum increment and is defaulted
476	HO	System {directory overrides} loaded from volume <i>raddr</i>
500	IC	VM/SP HPO: <i>type raddr devname</i> CMD REJECT CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> [{BBCCHH = <i>bbcchh</i> BLOCK = <i>nnnnnn</i> }] VM/XA SP: <i>type rdev</i> AN OPERATION WAS TERMINATED BECAUSE A COMMAND REJECT ERROR OCCURRED
501	IC	VM/SP HPO: <i>type raddr devname</i> INT REQ {CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> {BBCCHH = <i>bbcchh</i> BLOCK = <i>nnnnnn</i> } VM/XA SP: <i>type rdev</i> REQUIRES OPERATOR INTERVENTION
502	IC	VM/SP HPO: <i>type raddr devname</i> BUSOUT CK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> [{BBCCHH = <i>bbcchh</i> BLOCK = <i>nnnnnn</i> }] VM/XA SP: GRAF <i>rdev</i> A BUS OUT PARITY CHECK OCCURRED

UC = upwardly compatible, IC = incompatible, HO = VM/SP HPO only.

Not listed: compatible messages and VM/XA SP-only messages.

VM/SP HPO Conversion

Table 24 (Page 11 of 19). VM/SP HPO and VM/XA SP Message Compatibility

No.	Code	Text, or System and Text
503	IC	VM/SP HPO: <i>type raddr devname</i> EQUIP CK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> [{BBCCHH = <i>bbcchh</i> BLOCK = <i>nnnnnn</i> }] VM/XA SP: <i>type rdev</i> AN EQUIPMENT CHECK OCCURRED
504	IC	VM/SP HPO: <i>type raddr devname</i> DATA CK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> [{BBCCHH = <i>bbcchh</i> BLOCK = <i>nnnnnn</i> }] VM/XA SP: <i>type rdev</i> AN UNRECOVERABLE DATA CHECK OCCURRED
505	IC	VM/SP HPO: <i>type raddr devname</i> OVERRUN CK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> [{BBCCHH = <i>bbcchh</i> BLOCK = <i>nnnnnn</i> }] VM/XA SP: <i>type rdev</i> AN OPERATION WAS TERMINATED BECAUSE A DEVICE DEFERRED ACCESS OCCURRED
506	IC	VM/SP HPO: DASD <i>raddr devname</i> TRKCOND CK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> BBCCHH = <i>bbcchh</i> VM/XA SP: DASD <i>rdev</i> TRKCOND CK CMD = <i>cm</i> SNS = <i>sense</i> [IRB = <i>irb</i> USERID = <i>userid</i>] [BBCCHH = <i>bbcchh</i>]
507	IC	VM/SP HPO: DASD <i>raddr devname</i> SEEK CK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> BBCCHH = <i>bbcchh</i> VM/XA SP: DASD <i>rdev</i> SEEK CK CMD = <i>cm</i> SNS = <i>sense</i> [IRB = <i>irb</i> USERID = <i>userid</i>] [BBCCHH = <i>bbcchh</i>]
508	IC	VM/SP HPO: <i>type raddr devname</i> PERM ERROR CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> [BBCCHH = <i>bbcchh</i>] VM/XA SP: {DASD PRT PUN RDR} <i>rdev</i> PERM ERROR CMD = <i>cm</i> SNS = <i>sense</i> [IRB = <i>irb</i> USERID = <i>userid</i>] [BBCCHH = <i>bbcchh</i>]
509	IC	VM/SP HPO: DASD <i>raddr devname</i> TRKOVERUN CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> BBCCHH = <i>bbcchh</i> VM/XA SP: DASD <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE THE TRACK CAPACITY WAS EXCEEDED
510	IC	VM/SP HPO: TAPE <i>raddr devname</i> CONVERT CK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> CONVERT CK CMD = <i>cm</i> SNS = <i>sense</i> [IRB = <i>irb</i> USERID = <i>userid</i>]
511	HO	TAPE <i>raddr devname</i> COMPAT CK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i>
512	IC	VM/SP HPO: TAPE <i>raddr devname</i> LOAD POINT CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> LOAD POINT CMD = <i>cm</i> SNS = <i>sense</i> [IRB = <i>irb</i> USERID = <i>userid</i>]
513	IC	VM/SP HPO: <i>type raddr devname</i> FILE PROT CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> [{BBCCHH = <i>bbcchh</i> BLOCK = <i>nnnnnn</i> }] VM/XA SP: DASD <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE A FILE PROTECT ERROR OCCURRED
514	HO	<i>type raddr devname</i> ADDMRK CK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> BBCCHH = <i>bbcchh</i>
516	IC	VM/SP HPO: <i>type raddr devname</i> BAD SENSE CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> [BBCCHH = <i>bbcchh</i> BLOCK <i>nnnnnn</i>] VM/XA SP: <i>type rdev</i> A UNIT CHECK WITH NO SENSE DATA OCCURRED

UC = upwardly compatible, IC = incompatible, HO = VM/SP HPO only.
 Not listed: compatible messages and VM/XA SP-only messages.

Table 24 (Page 12 of 19). VM/SP HPO and VM/XA SP Message Compatibility

No.	Code	Text, or System and Text
517	IC	VM/SP HPO: <i>type raddr devname</i> NOT/KNOWN CMD = <i>cm</i> SNS = <i>sense</i> USERID = <i>userid</i> VM/XA SP: <i>type rdev</i> AN OPERATION WAS TERMINATED BECAUSE AN UNRECOGNIZED ERROR OCCURRED
518	IC	VM/SP HPO: TAPE <i>raddr devname</i> RECV ERROR CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> [BBCCHH = <i>bbcchh</i>] VM/XA SP: TAPE <i>rdev</i> AN ERROR OCCURRED WHILE TRYING TO RECOVER FROM A PREVIOUS ERROR
519	IC	VM/SP HPO: TAPE <i>raddr devname</i> PE BURST CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> PE BURST CMD = <i>cm</i> SNS = <i>sense</i> [IRB = <i>irb</i> USERID = <i>userid</i>]
520	IC	VM/SP HPO: <i>type raddr devname</i> CHAN ERROR CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> [BBCCHH = <i>bbcchh</i> BLOCK = <i>nnnnnn</i>] VM/XA SP: <i>type rdev</i> CHAN ERROR CMD = <i>cm</i> SNS = <i>sense</i> [IRB = <i>irb</i> USERID = <i>userid</i>] [BBCCHH = <i>bbcchh</i>]
521	IC	VM/SP HPO: <i>type raddr devname</i> NO DEVICE CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> [BBCCHH = <i>bbcchh</i> BLOCK = <i>nnnnnn</i>] VM/XA SP: <i>type rdev</i> has no available channel paths
522	HO	TAPE <i>raddr devname</i> ERASE CK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i>
523	HO	TAPE <i>raddr devname</i> CONTROL CK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i>
524	IC	VM/SP HPO: <i>type raddr devname</i> LOAD CHECK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: PRT <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE A LOAD CHECK OCCURRED
525	IC	VM/SP HPO: <i>type raddr devname</i> FORMAT CK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: {RDR PUN} <i>rdev</i> FORMAT CK CMD = <i>cm</i> SNS = <i>sense</i> [IRB = <i>irb</i> USERID = <i>userid</i>]
526	IC	VM/SP HPO: TAPE <i>raddr devname</i> DSE FAILED CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: <i>type rdev</i> AN OPERATION WAS TERMINATED BECAUSE A DATA SECURITY ERASE (DSE) CHECK OCCURRED
527	HO	<i>type raddr devname</i> LOST DATA CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i>
528	HO	<i>type raddr devname</i> TIMEOUT CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i>
529	IC	VM/SP HPO: <i>type raddr devname</i> PARITY CK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: PRT <i>rdev</i> BUFFER PARITY ERROR OCCURRED
530	IC	VM/SP HPO: GRAF <i>raddr devname</i> UNIT SPEC CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: GRAF <i>rdev</i> A UNIT SPECIFICATION OCCURRED

UC = upwardly compatible, IC = incompatible, HO = VM/SP HPO only.
Not listed: compatible messages and VM/XA SP-only messages.

Table 24 (Page 13 of 19). VM/SP HPO and VM/XA SP Message Compatibility

No.	Code	Text, or System and Text
531	IC	VM/SP HPO: GRAF <i>raddr devname</i> CNTRL CHECK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: GRAF <i>rdev</i> A CONTROL CHECK OCCURRED
532	IC	VM/SP HPO: GRAF <i>raddr devname</i> OP CHECK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: GRAF <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE AN OPERATION CHECK OCCURRED
533	HO	DASD <i>raddr devname</i> CHECK DATA CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> BLOCK = <i>nnnnnn</i>
534	HO	DASD <i>raddr devname</i> BKSIZ EX CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> BLOCK = <i>nnnnnn</i>
535	HO	DASD <i>raddr devname</i> WRT INHIBT CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> BLOCK = <i>nnnnnn</i>
536	IC	VM/SP HPO: <i>raddr devname</i> reports disabled interface; fault code = <i>code</i> ; notify CE VM/XA SP: <i>rdev devname</i> REPORTS DISABLED INTERFACE - FAULT CODE = <i>cccc</i>
538	HO	<i>type raddr devname</i> PROG ERROR CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i>
539	HO	TAPE <i>raddr devname</i> BOT FAIL CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i>
540	HO	PRT <i>raddr devname</i> MAINT REQ CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i>
546	HO	Interruption {cleared pending}; {device control unit} <i>raddr</i> , CSW <i>csw</i> , userid <i>userid</i>
547	HO	Missing interrupt monitoring not available
550	HO	Error recording area 90 percent full; run CPEREP
551	HO	Error recording area full; run CPEREP
552	HO	Formatting error recording area
553	HO	Error recording area cleared; user <i>userid</i>
558	HO	Unrecoverable I/O error; error recording disabled
559	HO	SRF <i>vaddr</i> not accessible: frames not on error cylinders
560	HO	Errors on SRF <i>vaddr</i> : frames not on error cylinders
561	HO	More than 50 MCH or CCH frames were read from SRF <i>vaddr</i>
580	IC	VM/SP HPO: TAPE <i>rdev devname</i> NO ERR SNS CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> A SENSE COMMAND WAS ISSUED WITH NO OUTSTANDING UNIT CHECK
581	IC	VM/SP HPO: TAPE <i>rdev devname</i> DISPLAY CK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE A LOAD DISPLAY CHECK OCCURRED

UC = upwardly compatible, IC = incompatible, HO = VM/SP HPO only.
Not listed: compatible messages and VM/XA SP-only messages.

Table 24 (Page 14 of 19). VM/SP HPO and VM/XA SP Message Compatibility

No.	Code	Text, or System and Text
582	IC	VM/SP HPO: TAPE <i>rdev devname</i> WRITEIC CK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE A WRITE ID MARK CHECK OCCURRED
583	HO	TAPE <i>raddr devname</i> WRITEID CK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i>
584	IC	VM/SP HPO: TAPE <i>rdev devname</i> NOT CAPABL CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE A CAPABILITY CHECK OCCURRED
585	IC	VM/SP HPO: TAPE <i>rdev devname</i> TAPE VOID CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE A TAPE VOID CHECK OCCURRED
586	IC	VM/SP HPO: TAPE <i>rdev devname</i> TENSION CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE OF A LOSS OF TENSION ON THE TAPE
587	IC	VM/SP HPO: TAPE <i>rdev devname</i> LENGTH CK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE A TAPE LENGTH ERROR OCCURRED
588	IC	VM/SP HPO: TAPE <i>rdev devname</i> BKW AT BOT CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE THE PHYSICAL END OF TAPE WAS ENCOUNTERED
589	IC	VM/SP HPO: TAPE <i>rdev devname</i> PHYS EOT CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE THE BEGINNING OF THE TAPE WAS ENCOUNTERED
590	HO	TAPE <i>raddr devname</i> UNLOAD ERR CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i>
591	IC	VM/SP HPO: TAPE <i>rdev devname</i> NO RECORD CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE DESIRED BLOCK WAS NOT FOUND
592	IC	VM/SP HPO: TAPE <i>rdev devname</i> DRIV ASGND CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE THE DRIVE IS ASSIGNED ELSEWHERE
593	IC	VM/SP HPO: TAPE <i>rdev devname</i> DRIV OFFLN CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE THE DRIVE IS OFFLINE

UC = upwardly compatible, IC = incompatible, HO = VM/SP HPO only.

Not listed: compatible messages and VM/XA SP-only messages.

VM/SP HPO Conversion

Table 24 (Page 15 of 19). VM/SP HPO and VM/XA SP Message Compatibility

No.	Code	Text, or System and Text
594	IC	VM/SP HPO: TAPE <i>rdev devname</i> CU CK1 CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> A CONTROL UNIT CHECK ONE ERROR OCCURRED
595	IC	VM/SP HPO: TAPE <i>rdev devname</i> CU ERP CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE A CONTROL UNIT ERP FAILURE OCCURRED
596	IC	VM/SP HPO: TAPE <i>rdev devname</i> CU INCOMPA CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE THE CONTROL UNIT AND DRIVE ARE INCOMPATIBLE
597	IC	VM/SP HPO: TAPE <i>rdev devname</i> RD OPP CK CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE A READ OPPOSITE CHECK OCCURRED
598	IC	VM/SP HPO: TAPE <i>rdev devname</i> BLK ID SEQ CMD = <i>cm</i> SNS = <i>sense</i> CSW = <i>csw</i> USERID = <i>userid</i> VM/XA SP: TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE OF AN INVALID BLOCK ID SEQUENCE
601	IC	VM/SP HPO: CHANNEL CONTROL CHECK DEV <i>raddr</i> ; USER <i>userid</i> VM/XA SP: <i>type rdev</i> A CHANNEL CONTROL CHECK OCCURRED
602	IC	VM/SP HPO: INTERFACE CONTROL CHECK DEV <i>raddr</i> ; USER <i>userid</i> VM/XA SP: <i>type rdev</i> AN INTERFACE CONTROL CHECK OCCURRED
603	UC	VM/SP HPO: CHANNEL ERROR VM/XA SP: CHANNEL ERROR; RESTART SYSTEM
605	HO	CHANNEL CHECK RECORDING FAILURE
609	HO	MACHINE CHECK; PROCESSOR CONTROLLER DAMAGE <i>cpuid</i>
610	IC	VM/SP HPO: MACHINE CHECK; SUPERVISOR DAMAGE <i>cpuid</i> VM/XA SP: CHECK-STOP ON CPU <i>nm</i>
611	HO	MACHINE CHECK; SYSTEM INTEGRITY LOST <i>cpuid</i>
612	HO	MACHINE CHECK; TIMING FACILITIES DAMAGE
613	HO	SOFT MACHINE CHECK RECORDING DISABLED <i>cpuid</i>
614	HO	MACHINE CHECK; DAMAGED PAGE NOW DELETED <i>cpuid</i>
615	HO	MACHINE CHECK RECORDING FAILURE <i>cpuid</i>
616	HO	MACHINE CHECK; USER <i>userid</i> TERMINATED (<i>cpuid</i> F <i>cpuid</i> (OFFLINE ERROR <i>n</i>))
617	HO	MACHINE CHECK; BUFFER OR DLAT DAMAGE <i>cpuid</i>
618	HO	{INSTRUCTION RETRY MAIN STORAGE} NOW IN {RECORD QUIET} <i>cpuid</i>
619	HO	MACHINE CHECK; OPERATION TERMINATED { <i>cpuid</i> VF <i>cpuid</i> }

UC = upwardly compatible, IC = incompatible, HO = VM/SP HPO only.

Not listed: compatible messages and VM/XA SP-only messages.

Table 24 (Page 16 of 19). VM/SP HPO and VM/XA SP Message Compatibility

No.	Code	Text, or System and Text
620	HO	MACHINE CHECK; ATTACHED PROCESSOR NOT BEING USED
621	HO	MACHINE CHECK; AFFINITY SET OFF
622	HO	MACHINE CHECK; MULTIPLE CHANNEL ERRORS
623	HO	CHANNEL SET CONNECTED TO PROCESSOR <i>nn</i>
624	HO	MACHINE CHECK; EXTERNAL DAMAGE
625	HO	ALTERNATE PROCESSOR RECOVERY SUCCESSFUL; PROCESSOR <i>nn</i> OFFLINE
627	HO	MACHINE CHECK; STORAGE DEGRADATION FOR <i>userid</i>
628	HO	DEGRADATION; CP WILL TRY RECOVERY IN 1 MINUTE
629	HO	SOFT MACHINE CHECK REPORTING NOW ENABLED
704	IC	VM/SP HPO 4.2: DEV <i>rdev</i> NOT OPERATIONAL VM/XA SP: DEVICE { <i>rdev vdev</i> } NOT OPERATIONAL
705	IC	VM/SP HPO: [I/O error <i>addr</i> CSW = <i>csw</i> sense = <i>sense</i> input = <i>bbcchh</i> output = <i>bbcchh nnnnnn</i> CCW = <i>ccw</i>] or [I/O error RESID = <i>resid</i> SENSE = <i>sense</i> LINE = <i>addr</i>] VM/XA SP: I/O ERROR <i>rdev vdev</i> IRB <i>irb</i> SNS <i>sense</i> [INPUT <i>bbcchh</i> OUTPUT <i>bbcchh</i>] CCW <i>ccw</i>
706	HO	Line <i>addr</i> not enabled
707	HO	MACHINE CHECK
710	IC	VM/SP HPO: DEV <i>raddr</i> INTERVENTION REQUIRED VM/XA SP: DEVICE { <i>rdev vdev</i> } INTERVENTION REQUIRED
718	UC	VM/SP HPO: OUTPUT UNIT IS FILE PROTECTED VM/XA SP: OUTPUT UNIT IS FILE PROTECTED – TAPE { <i>rdev vdev</i> }
719	HO	INVALID FILENAME OR FILE NOT FOUND
720	HO	ERROR IN { <i>routine nnnnnn</i> }
725	IC	VM/SP HPO: DASD INPUT DEVICE WAS(IS) LARGER THAN OUTPUT DEVICE DO YOU WISH TO CONTINUE? RESPOND YES NO OR REREAD: VM/XA SP: SOURCE DASD DEVICE WAS (IS) LARGER THAN OUTPUT DEVICE. DO YOU WISH TO CONTINUE? RESPOND YES OR NO:
727	HO	FLAGGED TRK <i>xxxxxxxxxxxx</i> HAS NO PROPER ALTERNATE; SKIPPING THIS TRACK
730	HO	DEV <i>raddr</i> NOT OPERATIONAL OR NOT READY
732	HO	MACHINE CHECK
734	HO	TYPE OR CYL INVALID
735	HO	FATAL DASD I/O ERROR. CSW = <i>csw</i>
736	HO	IO ERROR <i>raddr</i> {CCHHR = <i>cchhr</i> BLOCK = <i>nnnnnn</i> } SENSE = <i>sense</i>

UC = upwardly compatible, IC = incompatible, HO = VM/SP HPO only.

Not listed: compatible messages and VM/XA SP-only messages.

Table 24 (Page 17 of 19). VM/SP HPO and VM/XA SP Message Compatibility

No.	Code	Text, or System and Text
737	HO	INVALID OPERAND
738	HO	DEVICE <i>raddr</i> INTERVENTION REQUIRED
739	HO	FLAGGED PRIMARY TRACK HAS NO ALTERNATE ASSIGNED, IO ERROR FOLLOWS
740	HO	PACK MOUNTED IS 3340-35, NOT 3340-70. MOUNT ANOTHER OR RESPECIFY
741	HO	DEVICE <i>raddr</i> IS <i>zzzz</i> , NOT <i>xxxx-nm</i> AS SPECIFIED RESPECIFY OR NOTIFY SYSTEM SUPPORT
744	HO	I/O ERROR <i>raddr</i> CODE = E4 CSW = <i>csw</i> , READ, M44A
747	HO	<i>message</i> , please re-enter this command
753	UC	VM/SP HPO: OPERAND MISSING VM/XA SP: OPERAND MISSING [FOLLOWING PROFILE <i>profname</i> USER <i>userid</i>]
754	HO	DEV <i>raddr</i> NOT OPERATIONAL
755	HO	I/O ERROR <i>raddr</i> CSW <i>csw</i> SENSE <i>sense</i>
757	HO	MACHINE CHECK
758	UC	VM/SP HPO: DUPLICATE UNIT DEFINITION VM/XA SP: DUPLICATE {CONSOLE UNIT} DEFINITION FOLLOWING {PROFILE <i>profname</i> USER <i>userid</i> }
765	UC	VM/SP HPO: INVALID CLASS DEFINITION VM/XA SP: INVALID CLASS DEFINITION - <i>class</i>
766	HO	DUPLICATE CLASS DEFINITION
768	HO	FOR <i>userid</i> - MOVE <i>vaddr</i> TO A <i>vcutype</i> VCU
769	HO	Incomplete machine - tell your system administrator
780	HO	Maximum password attempts exceeded, try again later
786	HO	Store exceeded maximum element
800	HO	Command rejected, other virtual machines logged on
801	HO	Free storage page is not available
802	HO	Command rejected, devices not dedicated
803	HO	Command rejected, spool devices not drained
804	HO	Single processor mode ON rejected - <i>error condition</i>
805	HO	Single processor mode OFF rejected
806	HO	Command rejected, virtual address not equal to real address
807	HO	Command rejected, VM/370 attached processor mode
808	HO	SINGLE PROCESSOR MODE ACTIVE
809	HO	Command rejected, TRACE/ADSTOP/CCW translation in effect

UC = upwardly compatible, IC = incompatible, HO = VM/SP HPO only.

Not listed: compatible messages and VM/XA SP-only messages.

Table 24 (Page 18 of 19). VM/SP HPO and VM/XA SP Message Compatibility

No.	Code	Text, or System and Text
812	HO	[SCLP MSSF] RESPONSE CODE TO VARY [CP VECTOR] {ON OFF} IS <i>nnnn</i>
850	IC	VM/SP HPO: UNABLE TO READ DUMP FROM READER VM/XA SP: UNABLE TO READ DUMP
851	HO	TEM DUMP FILES ALREADY EXIST
861	HO	DUMP FILE <i>filename</i> NOT FOUND
864	HO	PAGE REFERENCED NOT AVAILABLE WHILE EDITING <i>xxxxxxxx</i>
899	HO	REWIND NOT PERFORMED
900	HO	SYSTEM RECOVERY FAILURE; PROGRAM CHECK
901	HO	SYSTEM RECOVERY FAILURE; MACHINE CHECK
902	IC	VM/SP HPO: SYSTEM RECOVERY FAILURE; FATAL I/O ERROR {NUCLEUS WARM} AREA VM/XA SP: [System recovery failure; fatal I/O error] or [SYSTEM RECOVERY FAILURE; FATAL I/O ERROR]
903	HO	System recovery failure; valid <i>valid</i> allocation error {cylinder <i>cylinder</i> page <i>page</i> }
905	HO	SYSTEM DUMP FAILURE; PROGRAM CHECK
906	HO	SYSTEM DUMP FAILURE; MACHINE CHECK
907	HO	SYSTEM DUMP FAILURE; FATAL I/O ERROR
908	IC	VM/SP HPO: SYSTEM FAILURE; CODE - <i>code</i> ; PROCESSOR <i>nn</i> VM/XA SP: SYSTEM FAILURE ON CPU <i>nnnn</i> , CODE - <i>code</i>
909	IC	VM/SP HPO: SYSTEM DUMP DEVICE NOT READY VM/XA SP: SYSTEM DUMP DEVICE <i>dev</i> NOT READY
910	HO	SYSTEM RECOVERY FAILURE; INVALID WARM START AREA
911	HO	SYSTEM RECOVERY FAILURE; WARM START AREA FULL
913	HO	CP-owned valid <i>xxxxxx</i> invalid for 3330V
914	HO	Trace table is smaller than requested
915	HO	Permanent I/O error on checkpoint area
916	HO	Error allocating spool file buffers
917	HO	Checkpoint area invalid; clear storage and cold start
918	HO	SYSTEM DUMP FAILURE; STATUS NOT STORED FOR ABENDING PROCESSOR
919	HO	Checkpoint area is invalid; checkpointing terminated
920	HO	No warm start data; checkpoint start for retry
921	HO	System recovery failure; unrecoverable I/O error
922	HO	System recovery failure; invalid spooling data
923	HO	Failing storage frame at location <i>rstor</i>

UC = upwardly compatible, IC = incompatible, HO = VM/SP HPO only.
Not listed: compatible messages and VM/XA SP-only messages.

VM/SP HPO Conversion

Table 24 (Page 19 of 19). VM/SP HPO and VM/XA SP Message Compatibility

No.	Code	Text, or System and Text
924	HO	xxxx additional failing storage frames exist
925	HO	System auto dump reallocated to DASD <i>raddr</i>
927	HO	Storage allocation has been altered. FREE or TRACE was too large
928	HO	Permanent I/O error in warm start data area
944	HO	Error allocating {console reader printer punch} file user <i>userid</i> spoolid <i>nnnn</i> <i>savestate</i> <i>savetime</i>
950	HO	Operator not logged on; explicit LOGON required
951	IC	VM/SP HPO: CP <i>valid valid</i> not mounted VM/XA SP: {CP USER} VOLID <i>valid</i> NOT MOUNTED
952	IC	VM/SP HPO: <i>nnnnn</i> K system storage VM/XA SP: <i>nnnn</i> M SYSTEM STORAGE
953	IC	VM/SP HPO: Unable to allocate system auto dump VM/XA SP: CP is unable to allocate system DASD dump space.
954	IC	VM/SP HPO: DASD <i>raddr valid valid</i> not mounted; duplicate of DASD <i>raddr</i> VM/XA SP: DASD <i>nnnn</i> VOLID <i>vvvvvv</i> IS A DUPLICATE OF DASD <i>dddd</i>
956	HO	DASD <i>raddr</i> VOLID <i>valid</i> NOT MOUNTED; NOW OFFLINE
957	HO	STORAGE SIZE = <i>xxxxxx</i> K, NUCLEUS SIZE = <i>xxx</i> DYNAMIC PAGING SIZE = <i>xxxxxx</i> K, TRACE TABLE SIZE = <i>xxx</i> K, FREE STORAGE SIZE = <i>xxxx</i> K, VIRTUAL=REAL SIZE = <i>xxxxxx</i> K
958	HO	ATTACHED PROCESSOR NOW OPERATIONAL
959	HO	Attached processor not online
960	HO	System warm start data saved
962	HO	CP-owned DASD <i>raddr</i> <i>valid</i> ; <i>valid</i> invalid allocation record
963	HO	Second processor not online
964	HO	Processor <i>xx</i> IPLed; processor <i>yy</i> initialized
966	HO	Initialization complete
967	HO	Disconnect <i>userid</i> - system restarted { <i>mmmmnn</i> SHUTDOWN} and system console not VM operator console
968	HO	System shutdown requested
970	HO	TOD CLOCK SYNC CHECK RECEIVED
971	HO	System is {uniprocessor attached processor multiprocessor} generated
972	HO	NUCLEUS AREA IS TOO SMALL; IT IS NOT UPDATED. THIS NUCLEUS WOULD REQUIRE <i>nnnnnn</i> {CYLINDERS PAGES}
973	HO	No directory file on IPL volume <i>volume</i>
974	HO	No valid override file; using system defaults

UC = upwardly compatible, IC = incompatible, HO = VM/SP HPO only.
Not listed: compatible messages and VM/XA SP-only messages.

Part 2. Converting from VM/XA SF to VM/XA SP



Chapter 11. Overview: Systems Comparison

This chapter compares VM/XA SP to VM/XA SF by providing:

- A table summarizing compatibility
- Greater detail for key items in the table
- A list of new function.

Summary of Compatibility between VM/XA SF Release 2 and VM/XA SP

In general, VM/XA SP is upwardly compatible with VM/XA SF Release 2. Due to improvements in VM/XA SP's compatibility with VM/SP HPO, some VM/XA SP CP externals (commands, DIAGNOSE codes, and messages) may not be the same as those in VM/XA SF.

The CMS component in VM/XA SP is in general upwardly compatible with the CMS component in VM/SP Release 5. Since VM/XA SF Release 2 supports CMS at the VM/SP Release 4 level, you must evaluate changes between CMS at the Release 4 level and the Release 5 level. Refer to VM/SP Release 5 publications to make this evaluation. See *VM/XA SP CMS Application Program Conversion Guide* for information about converting your applications to the VM/XA SP level of CMS.

Table 25 shows a summary of the compatibility between VM/XA SP and VM/XA SF Release 2.

VM/XA SF Release 2 Item	VM/XA SP's Support of the Item
System/370 architecture	System/370 mode virtual machines are compatible with System/370 architecture.
User minidisks	Those minidisks that reside on VM/XA SP-supported devices can be used unchanged.
CMS commands	All VM/XA SP CMS commands are compatible with VM/SP Release 5 except the DEBUG command. There are new CMS commands that invoke new function and there are enhanced commands to invoke enhanced function. The enhanced commands are upwardly compatible with VM/SP Release 5.
CMS macros	CMS macros in VM/XA SP are upwardly compatible with VM/SP Release 5.
CMS external control blocks	CMS external control blocks in VM/XA SP are compatible with VM/SP Release 5.
Programs using 24-bit addressing	These programs continue to execute in virtual storage below 16Mb in System/370 or 370-XA mode virtual machines.
Programs written in high-level languages	For those languages that VM/XA SP supports, they are source-code compatible. You may need to recompile the programs.
OS simulation services	OS simulation is compatible with VM/SP Release 5 CMS. VM/XA SP adds MVS/XA macros.

Table 25 (Page 2 of 2). Summary of Compatibility between VM/XA SF Release 2 and VM/XA SP	
VM/XA SF Release 2 Item	VM/XA SP's Support of the Item
DOS/VSE simulation	DOS/VSE simulation is compatible with VM/SP Release 5 CMS.
Assembler application programs	<p>Assembler programs should execute without change. Exceptions could be programs that:</p> <ul style="list-style-type: none"> • Depend on internal CP or CMS structure or control blocks • Depend on functions that CP does not provide • Depend on incompatible CP externals • Depend on explicit System/370 architecture implementation. <p>See Chapter 18, "Application Programming" on page 203.</p>
EXECs written in CMS EXEC, EXEC 2, or REXX	Generally, these EXECs are upwardly compatible. However, EXECs that use CP commands or DIAGNOSE codes must be examined for compatibility. In particular, examine code that depends on CP return codes and responses. EXEC, EXEC 2, and REXX programs run only below the 16Mb line.
Installing CMS	Installing CMS on VM/XA SP is a similar, EXEC-driven procedure. CMS as a named saved system requires 2Mb of virtual storage.
Installing CP	Installing the VM/XA SP CP is compatible with installing VM/XA SF Release 2.
Installing user-written applications and licensed programs in shared storage	Installing user-written applications and licensed programs in VM/XA SP is similar to installing them in VM/XA SF Release 2. You can continue to implement saved segments as you did in VM/XA SF. VM/XA SP allows you to pack many programs or data areas into one saved segment.
Licensed programs	You can find a list of supported licensed programs in <i>VM/XA SP General Information</i> .
Devices	You can find a list of supported devices in <i>VM/XA SP General Information</i> .
Spool files	Programs that operate on spool files owned by another user must now refer to spool files by user ID and spool ID. CP spooling commands were enhanced for this support. You must use SPTAPE to transfer VM/XA SF spool files to VM/XA SP.
Networking facilities	VM/XA SP supports the GCS component, RSCS Version 2.2 or later, and SNA networking products such as ACF/VTAM 3.1.1 or later and NetView™ Release 1 or later.
User modifications to the system	You may have to rework any user modifications due to additional function added in VM/XA SP to the CCW translation function and the virtual interpretive-execution facility support code. These functions are object code only. Note that the Vector Facility support code is already object code only in VM/XA SF.

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Saved Segment Differences

For ease of conversion from VM/SP HPO, VM/XA SP adopts a shared segment packing scheme over and above the DCSS scheme already implemented in VM/XA SF. You can put one or more programs or data areas into a single segment. The new shared segment support:

- Allows a shared item to have page boundaries rather than segment (1Mb) boundaries
- Allows segment packing, that is, two or more items per shared segment
- Continues the VM/XA SF restriction that the 1Mb segment be either shared or exclusive
- Requires that you purge an existing named saved system (NSS) before you define a new one with the same name.

The new support adds *segment spaces* and *member saved segments* to the familiar DCSSs. Table 26 outlines the attributes of all three.

Table 26 (Page 1 of 2). Saved Segment Terminology		
DCSS	Segment Space	Member Saved Segment
Contains one or more megabytes of storage	Contains one or more megabytes of storage	Contains one or more megabytes of storage
Beginning address is rounded down to the nearest megabyte boundary	Beginning address is rounded down to the nearest megabyte boundary	Beginning address rounded down to a page boundary
Ending address is rounded up to the nearest megabyte boundary	Ending address is rounded up to the nearest megabyte boundary	Ending address is rounded up to the last byte in the member's last page
Minimum size is 1Mb, regardless of how many pages are defined; maximum is 999Mb	Minimum size is 1Mb, regardless of how many pages are defined; maximum is 999Mb	Minimum size is 4K, maximum is 999Mb
May span megabyte boundaries	May span megabyte boundaries	May span megabyte boundaries
May be saved by name with the SAVESEG command	May <i>not</i> be saved by name	May be saved by name with the SAVESEG command
May be loaded ² by name with DIAGNOSE X'64'	May be loaded ² by name with DIAGNOSE X'64'	May be loaded ² by name with DIAGNOSE X'64'
May be purged ² by name	May be purged ² by name	May be purged ² by name

² Loading and purging may instead be done with the CMS SEGMENT command or SEGMENT macro.

Table 26 (Page 2 of 2). Saved Segment Terminology

DCSS	Segment Space	Member Saved Segment
Contains a single shared item	Contains up to 64 member saved segments	Is associated with up to 64 segment spaces

You do not have to adopt segment packing on VM/XA SP, since VM/XA SP allows you to continue to define shared segments the way you did on VM/XA SF. In fact, IBM recommends that you avoid segment packing, since there is additional CP overhead involved when you use it. For programs that use 31-bit addresses, there is no need to pack segments because you can use virtual storage addresses up to 999Mb (the current maximum storage size of a virtual machine). CP does not fill in segment table entries between the highest virtual storage address of the virtual machine and the beginning of the shared segment, so no additional main storage is required for page tables.

After you have converted to VM/XA SP, if you find you need to use segment spaces, refer to *VM/XA SP Planning and Administration* for information about how to create and manage them.

The User Directory

VM/XA SP allows you to place the user directory (that is, the output of the DIRECTXA command, also called the "object directory") on any CP-owned volume. When CP initializes, it looks for a user directory on the system-residence volume first. If no user directory is there, CP follows the order of the list of CP-owned volumes on the SYSCPVOL macro instruction in its search for a user directory. CP selects the first directory it finds. If CP finds no user directory or an invalid user directory, CP logs on an operator to allow you to create a valid user directory.

The Resource Access Control Facility (RACF)

Though installing RACF on your system does not directly affect your immediate conversion to VM/XA SP from VM/XA SF, if you do install RACF take note of the following:

- You can operate RACF in defer mode. This means that although RACF does authority checks, it issues only warning messages. Access to the resource is granted based on regular VM/XA SP access checks. Defer mode eases your conversion during the period immediately after you install RACF.

After you have completed your conversion to RACF, you can operate RACF in full fail mode, which denies access to a resource when the RACF authority check fails. If an RACF authority check succeeds, a command completes execution with no change. If the RACF authority check fails, the command terminates with a message.

- End users are affected by RACF. For instance, RACF allows an end user to change the password during logon. Also, RACF does not immediately lock a user out of the system when the password expires.

The VM/XA SP Monitor and Monitor Writer Sample Program

The new system monitor does not directly affect your conversion to VM/XA SP. The following helps you plan for future use of the system monitor.

You can use the MONITOR command to control the VM/XA SP monitor, which is a standard function in CP. The monitor collects performance data during VM/XA SP operation and stores it in the form of monitor records in a saved segment that you must define. The monitor writer sample program runs in a CMS virtual machine and uses the *MONITOR IUCV system service to retrieve the records from the monitor saved segment and then stores them in a CMS file on disk or on tape. (Alternatively, you can write your own program to connect to *MONITOR and retrieve the records.) You must establish a program to read the generated file and perform data reduction on the performance data it contains.

For more information about the VM/XA SP monitor, see the *VM/XA SP Features Summary*, *VM/XA SP Planning and Administration*, and *VM/XA SP CP Programming Services*.

Block Paging

Block paging, an enhancement to VM/XA SF Release 2, is part of the VM/XA SP base. It is important to allocate as paging volumes two to four times the amount of DASD space assigned to all logged-on users on the system.

Note also that, as you grant more virtual storage to users, you put a strain on the paging subsystem.

Elimination of the Free Storage Area

VM/XA SP eliminates a separate main storage area for free storage. Instead, free storage blocks are allocated from the dynamic paging area. Note that you still need at least as much dynamic paging area as the sum of VM/XA SF's free storage area and dynamic paging area.

If you code the FREE parameter on the SYSSTORE macro in HCPSYS, an MNOTE is issued at assembly time and the parameter is ignored. This should not affect the system, since the dynamic paging area is automatically set to occupy the storage left unused by the V=R area, the V=R machine recovery area, the RIO370 area, and the CP-resident nucleus. So, if the sum of your other storage areas remains constant, your dynamic paging area should be sufficient.

Since you may be adding more users to your system, remember that each new user adds approximately four to five pages of free storage. Plan for your dynamic paging area accordingly.

The Spool File Limit and Spool Files

VM/XA SP allows each user up to 9999 spool files, essentially making the total number of spool files allowed in the system a function of the total system resources allocated to spooling.

The total number of files you can have in the system is determined by the size of the warm start area. Each DASD type can hold a specific number of pages per cylinder. For instance, a 3380 holds 150 pages per cylinder, allowing nearly 154 000 files. See *VM/XA SP Installation and Service* for the number of pages you can fit on a cylinder of a specific DASD type.

The total spooling space you need depends on the type of spool files you typically have. Small files such as PROFS notes typically use about two pages of DASD storage. Large files like listings, documents, and dumps require much more. Since trailing blanks are suppressed, "narrow" files of many lines require less space than "wide" files with right-hand margins, such as listings. Printer fonts are large and may consume space in environments that process sophisticated documents. A typical installation needs to allocate about 500 cylinders for spool space. See *VM/XA SP Planning and Administration* for details.

Your system operator receives a warning message when spooling space is nearly full. The operator can bring additional spooling volumes online if those volumes are defined on the SYSCPVOL macro and formatted with CPFORMAT. Otherwise, your operator should request that spool files be purged, processed, or put on tape with the SPTAPE command.

Because of the changes to the spool file system for VM/XA SP, you must perform a cold start of the system when bringing it up for the first time. You must process VM/XA SF spool files or use the SPTAPE command to preserve your VM/XA SF spool files.

CMS Extended Data Array Capability (CMS/EDAC)

VM/XA SP does not support the CMS/EDAC program. You do not have to make any changes to your application source code, but you will need the new version of the FORTRAN compiler and library to get the same functions that you had with CMS/EDAC.

General Changes to the Scheduler

The VM/XA SF scheduler managed only processor resources. The VM/XA SP scheduler manages storage and paging, as well, and improves the scheduling of processor resources.

VM/XA SP improves VM/XA SF's scheduling policies by introducing a working set size growth limit. This allows the scheduler to detect and control high storage consumers. In addition, VM/XA SP schedules work based on each user's resource requirement, the current system resource load, and each user's transaction characteristics.

VM/XA SP improves the relation between scheduling and real storage management, thereby decreasing the likelihood that thrashing will occur.

VM/XA SP improves the handling of interactive users by implementing multiple classes of users within the eligible list. VM/XA SP also uses interactive buffers for scheduled resources. An interactive buffer reserves some fraction of the system's resources for interactive transactions. You can tune the amount of reserved resources with the new VM/XA SP commands SET SRM STORBUF and SET SRM

LDUBUF. VM/XA SP preempts long-running work with interactive work in extreme cases of storage contention.

In VM/XA SF, a share is applied to processor resources. VM/XA SP creates shares for other resources as well, making ABSCPU (absolute CPU) an invalid type of SET SHARE option. VM/XA SP also improves the delivery of shares. VM/XA SF could not deliver shares whenever an eligible list formed, that is, whenever there was storage contention. VM/XA SP delivers shares both when an eligible list forms and when it does not.

VM/XA SP considers Expanded Storage in its scheduling algorithms and implements a "QUICKDSP" (quick dispatching) function. QUICKDSP satisfies virtual machines with critical response time requirements.

For an overview of the scheduler, see the *VM/XA SP Features Summary*. For information about how to tune your system, see *VM/XA SP Planning and Administration*. Chapter 14, "Administration" on page 181 discusses differences in command externals between the VM/XA SF and VM/XA SP schedulers.

Multiple Preferred Guests

VM/XA SP's support for multiple preferred guests allows you to support up to six preferred virtual machines for production work, enabling you to consolidate several operating systems on one processor or to migrate operating systems to the 370-XA architecture while doing production work. The support has several new functions, including:

- A new type of preferred virtual machine, the V=F machine
- Changes to dedicated processor support
- Changes to Expanded Storage support.

V = F Machine

The *V=F machine* is a new kind of preferred virtual machine. A V=F machine has a fixed, contiguous area of main storage, like a V=R machine, but, unlike a V=R machine, the storage area does not begin at page 0. The *V=R area* continues to be a single area that you specify at system generation time. CP allocates storage to V=R and V=F machines from the single V=R area as the machines log on.

Usually, you determine how much storage a preferred virtual machine gets through the user directory. You also can alter the storage size of preferred virtual machines dynamically with CP commands. When a preferred virtual machine logs on, CP checks the user directory for the size of storage the preferred virtual machine requires and then attempts to allocate a contiguous piece from the V=R area. Provided this contiguous piece is available, CP assigns this storage area to that preferred virtual machine. If a contiguous piece of the V=R area is not available, CP logs on the virtual machine as a V=V machine.

There are some differences between the storage that V=F machines get and the storage that the V=R machine gets. The V=R machine always gets the first megabyte of main storage, because it contains page 0. This means the storage for the V=R machine is allocated from the lowest storage address up. V=F machine storage is allocated from the highest available storage address in the V=R area down. If a V=R machine attempts to log on and page 0 is not available because another V=R machine is already logged on, CP attempts to log on the virtual machine as a V=F machine. If a V=F machine tries to log on and the only

sufficient storage available includes page 0, CP logs on the virtual machine as a V=V machine.

Changes to Dedicated Processor Support

You can now dedicate real processors and all or parts of Expanded Storage to any virtual machine on the system, V=V machines included. You can use directory control statements to control whether a virtual machine automatically gets a real processor dedicated to it at logon.

Changes to Expanded Storage Support

An enhancement to VM/XA SF allowed you to give CP and one virtual machine simultaneous access to Expanded Storage. VM/XA SP has this function in its base code. VM/XA SP, with the addition of support for multiple preferred guests, adds more to the Expanded Storage function.

VM/XA SP allows you to divide Expanded Storage into multiple partitions for CP and virtual machines. That means more than one virtual machine as well as CP can use parts of Expanded Storage simultaneously.

If you include Expanded Storage in a virtual machine configuration, CP attempts to allocate a contiguous part of Expanded Storage to the virtual machine when it logs on. If not enough Expanded Storage is available for that virtual machine, CP allocates the largest contiguous piece of Expanded Storage available.

Though Expanded Storage dedicated to a virtual machine must be contiguous, CP can have multiple pieces of Expanded Storage. If, for instance, a virtual machine with Expanded Storage logs off the system, that partition of Expanded Storage is available for CP's use.

The new Expanded Storage support:

- Has a size option on the ATTACH XSTORE command.
- Adds a MAP option to the QUERY XSTORE command. This option requests a display of a map showing how Expanded Storage is currently allocated.

The Effect of Multiple Preferred Guest Support

You should consider the effect of the new V=F support on your installation's resources. You should consider:

- Allocating a larger V=R region to accommodate V=F machines
- Identifying operating systems that are candidates for V=F machines
- Determining if real processors should be dedicated to one or more virtual processors in V=R, V=F, or V=V machines
- Determining which users should have Expanded Storage attached
- Determining how much Expanded Storage should be retained for CP's exclusive use
- Determining if you can merge V=R operating systems from other systems onto the single VM/XA SP system by putting them in V=F machines.

One consideration directly affects your conversion. In VM/XA SF, if two virtual machines with Expanded Storage in their directory entries logged on, only the first one to log on got Expanded Storage. In VM/XA SP, both virtual machines can get

Expanded Storage. This could cause a problem for configurations that implicitly retain Expanded Storage for CP use by never attaching all Expanded Storage to a virtual machine. You may need to issue the `RETAIN XSTORE` command to avoid having virtual machines take all of Expanded Storage when you want to leave some for CP.

New Allocation Map for 3380 Devices

An enhancement to VM/XA SF included support for new 3380 devices that require a larger allocation map. For all 3380 devices, the allocation map is now 4K rather than 1K. VM/XA SP includes this change in the base code. This could create a problem for you if you reallocate 3380 devices while on VM/XA SP and then have to back out to a VM/XA SF system without the enhancement for 3380 devices. You can prevent this problem in either of two ways:

- Make sure you install the enhancement for 3380 devices on your VM/XA SF system.
- Do not reallocate 3380 devices until you are sure you will not have to return to VM/XA SF.

Four-Digit Message Numbers

VM/XA SP has some messages with four-digit numbers in the message headers, thus allowing you to receive a message numbered up to 9999. For the sake of compatibility with VM/SP HPO and VM/XA SF, those messages that were previously three-digit continue to have the old message header format:

CCMMNNNA

New four-digit messages have the format:

CCMMNNNA

where:

CCC

is the component that issued the message.

MMM

is the module issuing the message.

NNN

NNNN

is the three- or four-digit number.

A

is the action indicator.

Some programs edit the error messages that they receive by using `DIAGNOSE` code `X'5C'`. The operation of `DIAGNOSE` code `X'5C'` remains the same as in VM/SP HPO for three-digit error messages. A new subfunction code has been added to `DIAGNOSE` code `X'5C'` for four-digit error messages.

See “Changed `DIAGNOSE` Codes” on page 207 for more information about `DIAGNOSE` code `X'5C'` and “VM/XA SF and VM/XA SP Message Compatibility” on page 218 for more information about message compatibility.

Object Code Only and New Service Procedures

Modules in VM/XA SP are available as follows:

- Some modules are available with machine-readable source code. For these modules, VM/XA SP uses new source service tools and procedures.
- Some modules are object code only; that is, source code and accompanying source materials such as logic documentation are not available. See Appendix C, "Object-Code-Only (OCO) and Limited-Distribution Modules" on page 291 for a list of these modules.
- Some modules have limited distribution; they are available as object code, and source code is available on microfiche. Thus, you have access to the source code but not in machine-readable form. See Appendix C, "Object-Code-Only (OCO) and Limited-Distribution Modules" on page 291 for a list of these modules.

For the latter two categories, new service procedures help you service those functions of the system. The primary method for servicing object code is by replacing the object module (also called the text file). You can also perform temporary fixes on object modules using patches applied by the system loader.

IBM has improved existing service tools for object code modules. The improvements make object code service similar to traditional VM source code service. Source code service procedures have also been improved. For more information on service, see "Differences Applying Service to the System" on page 179 and the *VM/XA SP Installation and Service* manual.

New Functions in VM/XA SP

New functions in VM/XA SP include:

- A high-capacity CMS environment based on the VM/SP Release 5 CMS that supports large numbers of interactive users and 24- or 31-bit addressing
- CMS functions such as DOS/VSE and OS/MVS simulation, RDRLIST, and SENDFILE
- Multiple preferred guests, provided you have the Processor Resource/Systems Manager (PR/SM) feature on your 3090 Model E processor
- New IUCV CP system services such as *BLOCKIO, *RPI, *MONITOR, *CCS, *SIGNAL, and discontinuous buffer support
- An increase of the spool file limit to 9999 spool files per user
- A system monitor
- The programmable operator facility
- The single console image facility (SCIF)
- The ability to change the command privilege class structure (UCR)
- The ability to place a user directory on any CP-owned volume
- System profiles (SYSPROF EXEC)
- A protected application environment (also called the protected end-user environment)

- Logged-on user limit changes
- Universal character sets and forms control buffers for impact printers held in image libraries, similar to 3800 image libraries
- First failure data capture for CMS
- Control block identifiers in free storage blocks
- Four-digit message numbers for some messages
- Increased command, DIAGNOSE code, and message compatibility with VM/SP HPO Release 5
- An improved system scheduler
- Use of the software last-translated address look-aside buffer
- Faster module linkage code paths
- Additional device support
- Shared segment packing
- The GCS component and SNA networking
- SPTAPE multivolume capability
- Enhanced diagnostic facilities
- Enhancements to the dump viewing facility
- Additional soft abend dump capability
- Expanded Storage caching capability for virtual machine logon, IPL, and CMS system minidisks
- Automatic deactivation of restricted passwords
- The capability to update the CP directory without having to rebuild it.



Chapter 12. Planning for Conversion

Developing a Conversion Plan

A conversion plan is the key to a successful conversion to VM/XA SP. Planning should begin early, ideally as soon as you make the decision to order VM/XA SP. To begin your plan, take inventory of your current system hardware and software, and then establish goals for what your new system environment will contain.

Planning for the conversion is the process of organizing the conversion project in such a way as to produce a new system that meets requirements set by your installation.

Key points you have to consider for conversion planning are:

1. **Develop a statement of purpose for your system conversion.**

The goals for conversion set boundaries on the conversion process and help you put a plan in place that meets your requirements.

2. **Understand the conversion requirements.**

These include:

- Technical requirements. What is the technical goal for the new system? For example, your goal might be to remove storage constraints for applications.
- Schedule. When do you expect the conversion to be complete? A conversion takes about the same amount of time as a release-to-release migration.
- Human resources. How many people do you need to perform the conversion? It is best to have one person coordinate the conversion. The number of other people involved varies from installation to installation and is based on the complexity of the system, the experience of the personnel, the number of applications, and many other factors. Remember to have backups for key people.
- Cost. What is the acceptable limit to the conversion expense?
- Workload. What is the maximum workload given current resources? Are additional resources needed?

3. **Establish or update your system technical inventory.**

You should begin your conversion with an accurate inventory of all the elements of your system. Make a list of:

- Hardware configuration. This should reflect what is already installed plus any hardware you plan to install or remove during the conversion time period.
- Software products. This should include all installed IBM and vendor programs that are used on your current system.
- Applications. You should make an inventory of all applications on your VM/XA SF system, especially those that use CP and CMS interfaces such as

CP commands, DIAGNOSE codes, messages, CP control blocks, CP macros, CMS macros, and CMS control blocks.

- System modifications. This should include any changes you have made to code provided by IBM. You may have to change these modifications.
- User-installed tools.

4. Determine which licensed programs, applications, and modifications are necessary and which ones can be replaced or eliminated.

To find out which programs are used and how often they are used, you can either survey your end users or set up an automated procedure. One way to automate the procedure is to add a statement to the beginning of each EXEC, program, or macro that sends a message using the *MSG IUCV system service to a service machine. The service machine will thus record the number of times an application is called.

- Refer to *VM/XA SP General Information* or contact your IBM representative for a list of IBM licensed programs supported by VM/XA SP. Determine if these programs offer sufficient functions for your production system. Determine the impact of the functions that are not supported. Order the correct level of the programs that you need, and order any prerequisites or corequisites if you do not already have them.
- Contact other software companies about non-IBM products.
- Determine the impact of converting necessary applications and modifications.

5. Identify specific users or groups of users who will benefit from converting to VM/XA SP and the order in which you will convert them.

Also, identify users who cannot convert to VM/XA SP because they require programs that are not supported. Plan what you will do with these users; for example, consider moving them to a system that is not yet targeted for conversion.

6. Evaluate your service agreements with your end users.

Can you negotiate for different reliability and availability criteria during the conversion period? Also, you may want to warn end users that availability means that the system is up, not that all applications are necessarily working.

7. Understand the impact of major items that are handled differently in VM/XA SP.

These items include:

- Scheduler changes
- Logged-on user limit changes
- Printer support changes
- Spool file limits and format changes.

These items, as well as other major differences between VM/XA SF and VM/XA SP, are discussed in Chapter 11, "Overview: Systems Comparison" on page 149.

8. Educate the staff about VM/XA SP.

Key personnel who need education are:

- *Planners*, who require information about what hardware and software is supported by VM/XA SP

- *Support Personnel*, who require information about new VM/XA SP system internals
- *System administrators*, who require information about new and changed procedures for controlling system resources
- *Application Programmers*, who require information about VM/XA SP application programming interfaces
- *End users*, who require information about VM/XA SP commands that are different from VM/XA SF. See Chapter 17, “Application End Use” on page 201 for a list of these commands.

Order an adequate supply of manuals. See “VM/XA System Product Publications” on page 305 for titles and order numbers.

For information about education that IBM offers, contact your IBM representative.

It is important that managers, support personnel, system administrators, application programmers, and end users understand the changes that will occur when your installation converts to VM/XA SP. An understanding of your installation’s goals, the benefits of VM/XA SP, and the changes required to convert to VM/XA SP will help your organization commit to the project.

9. Create a detailed conversion plan.

This plan should provide a detailed map of the activities and schedules needed to complete a successful conversion. Develop strategies for how you will approach the conversion. You must determine:

- Groups of work items that can be combined and managed together.
- A beginning and an end date for each work item.
- A reporting structure for managing the conversion process, that is, how each member of the conversion team reports progress to the person responsible for the entire conversion.
- A strategy for testing the new system during conversion and when the conversion is complete. Because you have a production VM/XA SF system operating during the conversion, the strategy you create must answer questions like:
 - How will I convert to VM/XA SP while running production on VM/XA SF at the same time?
 - How will I arrange networking during the conversion?
 - What is the best way to build and test VM/XA SP?

For guidance on some of these questions see “Conversion Strategies” on page 164.

10. Create a back off plan.

Determine back off criteria, plans, and schedules.

11. Understand how application programs need to be changed to run in VM/XA SP.

IBM provides a sample EXEC, called COMPSCAN SAMPEXEC, that can help you determine how much work you need to do to convert programs to run on VM/XA SP. For more information, see Chapter 18, “Application Programming” on page 203 and Appendix A, “Conversion Tools” on page 277.

12. Communicate.

Before converting, communicate the conversion plan to the users of your current system. During the conversion, communicate the status of the conversion to the users of your new system.

Inform your users of the justifications for the conversion, the benefits of the new system, the dates for the main tasks in your conversion plan, the system resources that will be unavailable at certain times, and what your users' role is in the conversion process (that is, testing their individual applications and EXECs).

Because much of the impact of the conversion is to applications and EXECs, you should involve application programmers in the conversion. They will have to check their applications and EXECs, recode them if changes are required, and test them. Involve end users, too, because the externals of some system functions may change. For instance, the logon procedure changes if you install RACF on the new system.

Some forms of communication are:

- Classroom education
- User service representatives
- A bulletin board facility or conferencing system, which could be implemented in several ways:
 - As read-only or help files that users can browse.
 - As a disconnected virtual machine to which users can submit questions and comments that are available for all to read and respond to. The questions and comments would reside in files, and users would link with read access to the minidisks containing these files. As users submit their questions or comments (updates), the disconnected virtual machine would append the updates to the appropriate file based upon file name or file type.

Conversion Strategies

This section gives you an outline of general procedures for conversion from VM/XA SF to VM/XA SP. For the most part, conversion from VM/XA SF Release 2 to VM/XA SP is like a release conversion, since VM/XA SP is so similar to VM/XA SF.

The strategy you adopt for conversion depends on the hardware resources you have available. If you have a test processor available, follow the procedure outlined in "Using Two Processors." If you do not have a test processor, follow the procedure outlined in "Using One Processor" on page 167. Remember that throughout the conversion your VM/XA SF system itself provides an excellent conversion tool, since you can install and do early testing of VM/XA SP on it.

Using Two Processors

You may be able to devote a processor complex to the task of converting VM/XA SF to VM/XA SP. This strategy assumes you have a test processor available or can balance your other production systems to free up a processor for test purposes. For ease of performing the testing, the test processor should have a network connection with your present VM/XA SF system. The network connection allows you to transfer files easily from the VM/XA SF system to VM/XA SP. This is important

especially for transferring applications to the new VM/XA SP system for testing. Figure 16 on page 166 depicts this conversion strategy as a series of phases. Here are the general steps:

1. Build the VM/XA SP system in a virtual machine on your VM/XA SF system. The *VM/XA SP Installation and Service* manual and the *VM/XA SP Program Directory* describe methods for building VM/XA SP. You may want to create a new VM/XA SF user ID for the VM/XA SP system. (For instance, create a user ID called MAINTSP.) Be sure to build VM/XA SP on its own system residence DASD. Do this by dedicating a full DASD pack to the virtual machine.

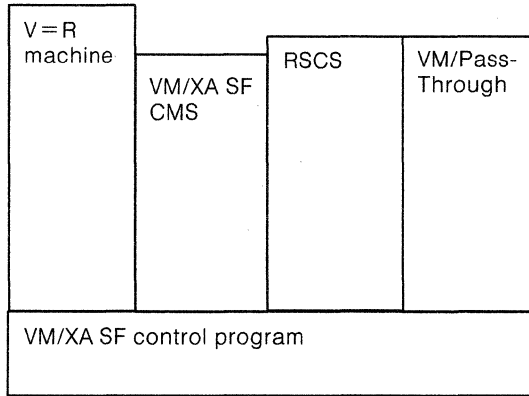
You may want to build a “one-pack system” (a minimum system), which is a complete VM/XA SP system on one DASD. Though you may not be able to run an entire production system with this one-pack system, you can use it to test an early version of VM/XA SP. Later, you can generate your production VM/XA SP system. If you do create a one-pack system, be sure to allocate all CP areas on the pack, including the directory area and the spooling area, which usually do not have to reside on the system residence volume. Since CP can use spooling areas for paging, you are not required to allocate a paging area.

2. Since you are replacing your VM/XA SF system with VM/XA SP, you probably want to duplicate the real I/O configuration file (HCPRIO), system definition file (HCPSYS), and user directory file. You can do this by simply copying those source files from VM/XA SF, modifying them if necessary, then building the VM/XA SP system.

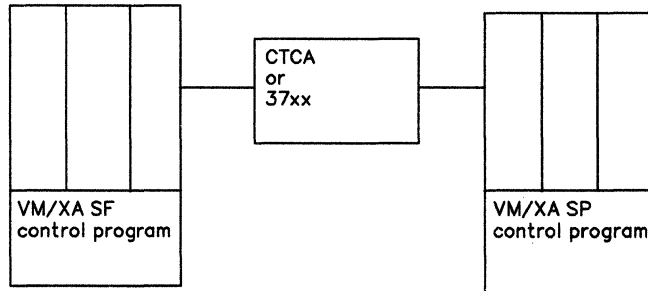
For more information about changes to these files, see Chapter 13, “Installation and Service” on page 177 and Chapter 14, “Administration” on page 181.

3. If you do work through remote 3270 access or plan on sending files across the network, modify the network node IDs of the VM/XA SP system. Create new node IDs for RSCS and VM/Pass-Through. This will be useful for sending files and accessing the VM/XA SP system running in the virtual machine. Build a virtual channel-to-channel adapter between the RSCS and VM/Pass-Through virtual machines on VM/XA SF and those on the VM/XA SP test system. Then you can pass files between systems or log on to VM/XA SP using remote display access. Later on, when VM/XA SP is running on the test processor, you can replace the virtual channel-to-channel adapter with a real one (or use 37xx connections) so the VM/XA SF and VM/XA SP systems can transfer files.
4. After you have tested the VM/XA SP system in a virtual machine and feel the system is stable, move VM/XA SP to the test processor. There are a few ways you can do this. For instance, you can use DDRXA to dump VM/XA SP to tape and transfer the VM/XA SP system to DASD connected to the test processor. Or you may be able to switch the VM/XA SP system residence DASD to the test processor physically.
5. Do a hardware load (IPL) of the VM/XA SP system on the test processor. Note that at this point there should be no end users who will log on the system. System support personnel will use the system first to test system-related programs and EXECs.
6. Bring up and test service virtual machines such as the accounting, error recording, and monitor machines.

Phase 1. Current VM/XA SF system



Phase 2. VM/XA SP on a test processor



Phase 3. New VM/XA SP system

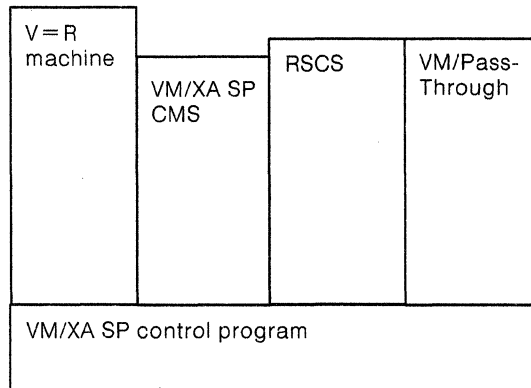


Figure 16. Converting from VM/XA SF to VM/XA SP Using Two Processors

7. Test applications such as IBM licensed programs, vendor programs, installation-written programs, and programming tools that your production system uses. You may need to have application programmers log on to the system to test these applications. If you have to modify your applications to run on VM/XA SP, be sure to keep the VM/XA SF version for back up purposes.

You may want to plan to convert applications in stages. You can begin with a representative sample of applications. After converting this sample, you can estimate the amount of time and effort it will take to complete all your application conversions.

For more information about applications, see Chapter 18, "Application Programming" on page 203.

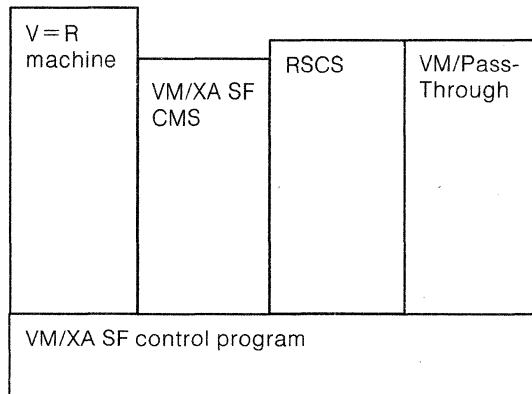
8. Once applications are tested, have a limited number of application end users actually run the applications to see if they function properly.
9. Once applications are thoroughly tested by end users, move the system to your production system. You must process all your VM/XA SF spool files or use the SPTAPE command to save your VM/XA SF spool files on tape before you shut down VM/XA SF. Then you can do a hardware load (IPL) of VM/XA SP and restore, using SPTAPE, any VM/XA SF spool files you saved on tape.
10. You may want to introduce the VM/XA SP system as your production system for limited periods, then return to the VM/XA SF system. For instance, you could bring up VM/XA SP during off-shift hours or weekends when there are a limited number of end users on the system. After these limited periods, return to VM/XA SF and evaluate the VM/XA SP system. When you are satisfied that VM/XA SP is ready for full production, bring up VM/XA SP during an off-shift or weekend and keep the system running during prime shift operations. When moving from VM/XA SP to VM/XA SF or vice versa, be sure to process all spool files or use the SPTAPE command to save and restore your spool files.
11. After you make the VM/XA SP system your production system, do not forget to change the node IDs for RSCS and VM/Pass-Through on the VM/XA SP system to match what you used for VM/XA SF.

Using One Processor

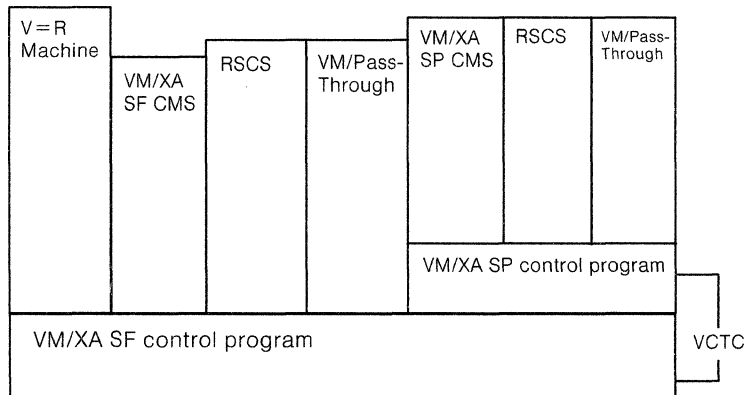
If you cannot devote a processor complex to testing VM/XA SP, you can bring up VM/XA SP on VM/XA SF and test it. This strategy allows you to install and test the CP component of VM/XA SP in a virtual machine. When you are satisfied that the CP component of VM/XA SP is stable, you can shut down VM/XA SF and bring up VM/XA SP.

Figure 17 on page 168 depicts this conversion strategy as a series of phases.

Phase 1. Current VM/XA SF system



Phase 2. Transitional system



Phase 3. New VM/XA SP system

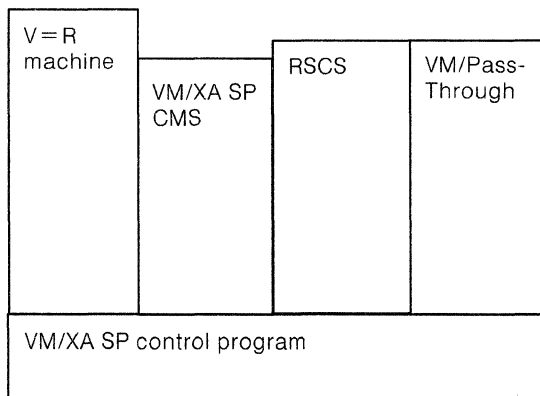


Figure 17. Converting VM/XA SF to VM/XA SP Using One Processor

1. Build the VM/XA SP system in a virtual machine on your VM/XA SF system. The *VM/XA SP Installation and Service* manual and the *VM/XA SP Program Directory* describe methods to build VM/XA SP. You may want to create a new VM/XA SF user ID for the VM/XA SP system. (For instance, create a user ID called MAINTSP.) Be sure to build VM/XA SP on its own system residence DASD. Do this by dedicating a full DASD pack to the virtual machine.

You may want to build a “one-pack system” (a minimum system), which is a complete VM/XA SP system on one DASD. Though you may not be able to run an entire production system with this one-pack system, you can use it to test an early version of VM/XA SP. Later, you can generate your full production VM/XA SP system. If you do create a one-pack system, be sure to allocate all CP areas on the pack, including the directory area and the spooling area, which usually do not have to reside on the system residence volume. Since CP can use spooling areas for paging, you are not required to allocate a paging area.

2. Since you are replacing your VM/XA SF system with VM/XA SP, you probably want to duplicate the real I/O configuration file (HCPRIO), system definition file (HCPSYS), and user directory file. You can do this by simply copying those source files from VM/XA SF, modifying them if necessary, then building the VM/XA SP system.

For more information about changes to these files, see Chapter 13, “Installation and Service” on page 177 and Chapter 14, “Administration” on page 181.

3. If you do work through remote 3270 access or plan on sending files across the network, modify the network node IDs of the VM/XA SP system. Create new node IDs for RSCS and VM/Pass-Through. This will be useful for sending files and accessing the VM/XA SP system running in the virtual machine. Build a virtual channel-to-channel adapter between the RSCS and VM/Pass-Through virtual machines on VM/XA SF and those on the VM/XA SP test system. Then you can pass files between systems or log onto VM/XA SP using remote display access.
4. Test the VM/XA SP CP. Make sure it functions the way your present VM/XA SF system does. You can install licensed programs and installation-created programs while the VM/XA SP CP is tested in a virtual machine. Note that you cannot have the best performance from VM/XA SP when it runs in a V=V test machine, but at this point only your support personnel should be logged onto VM/XA SP.
5. You may want to test some applications while VM/XA SP is running in a virtual machine. For instance, you may test a representative sample of your applications and evaluate how long it will take to convert all your applications.
6. While the VM/XA SP CP is running in a virtual machine, you may want to convert applications from the VM/XA SF CMS to the VM/XA SP CMS. In this way, there will be little interruption in service to end users when you shut down VM/XA SF and make VM/XA SP your production system.

You may want to plan to convert applications in stages. You can begin with a representative sample of applications. After converting this sample, you can estimate the amount of time and effort it will take to complete all your application conversions.

For more information about applications, see Chapter 18, “Application Programming” on page 203.

7. After testing the VM/XA SP CP, choose a good time to shut down the VM/XA SF system and bring up VM/XA SP. That time may be off-shift or on a weekend, when there may be some users on the system but not the entire user community. Bring up VM/XA SP during this time and test it for stability. You must process all your VM/XA SF spool files or use the SPTAPE command to save your VM/XA SF spool files on tape before you shut down VM/XA SF. Then you can do a hardware load (IPL) of VM/XA SP and restore, using SPTAPE, any VM/XA SF spool files you saved on tape.

8. When you are satisfied that the VM/XA SP CP component is stable, complete converting applications from the VM/XA SF CMS to the VM/XA SP CMS. If you had to modify your applications to run on VM/XA SP, be sure to keep the VM/XA SF version for back up purposes.
9. When you are satisfied that your VM/XA SP production system is stable, keep it running during prime shift hours with the entire user community. If you need to return to VM/XA SF, be sure to process all spool files or use the SPTAPE command to save spool files. Then when you bring up VM/XA SF, use SPTAPE to restore your spool files.
10. After you make the VM/XA SP system your production system, do not forget to change the node IDs for RSCS and VM/Pass-Through on the VM/XA SP system to match what you used for VM/XA SF.

For information about alternative conversion strategies that include the use of unsupported system environments, see Appendix B, "Alternative Conversion Strategies" on page 289.

What If I Have a Guest Operating System Running on VM/XA SF?

If you have a guest operating system, such as MVS, running on VM/XA SF, plan on moving it directly to VM/XA SP. You will get much better performance running the guest in a VM/XA SP virtual machine than you would if you ran the VM/XA SF system in a virtual machine and attempted to run your MVS guest in a virtual machine on VM/XA SF.

What about Sharing Data During the Conversion?

You may need to share data between VM/XA SF and VM/XA SP during the conversion. For instance, you may want to test a CMS application on VM/XA SP and use data that is maintained on VM/XA SF. Since CMS does not support reserve/release, you cannot benefit from VM/XA SP's concurrent virtual and real reserve/release. That is, you cannot have more than one CMS virtual machine writing to the same minidisk at the same time. For such a case, you can:

- Replicate the data. This may be suitable if the data does not change frequently and you have the DASD space to spare.
- Allow only one CMS virtual machine to write to the minidisk and all others to read from it but not write to it. This involves a data integrity exposure if one virtual machine is updating the minidisk while others are reading from it.

The way you allow CMS virtual machines on VM/XA SF to share data with CMS virtual machines on VM/XA SP depends on whether one operating system is the guest of another.

Case 1. For example, say you are running VM/XA SP as a guest of VM/XA SF and you want to share a minidisk between CMS virtual machines on both systems. Figure 18 on page 171 is a diagram showing the example.

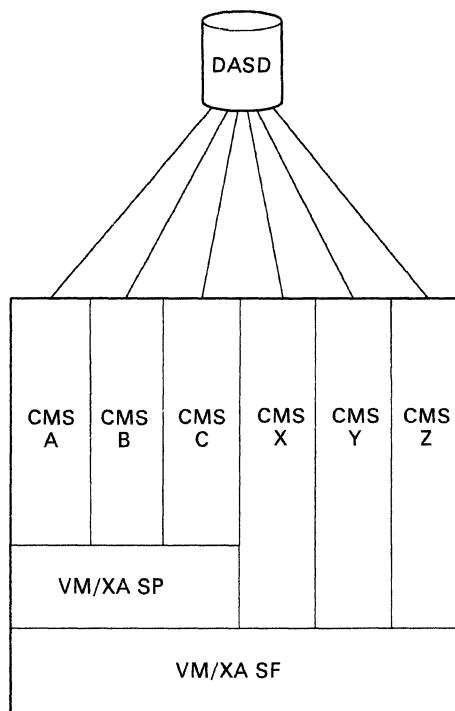


Figure 18. Sharing DASD between Multilevel CMS Virtual Machines

On the VM/XA SF system:

1. Give one CMS virtual machine on VM/XA SF write access to the minidisk, for instance, Z in the diagram. Use the MDISK user directory statement.
2. Give other CMS virtual machines on VM/XA SF (X and Y) read-only links to the minidisk. You can do this in two ways:
 - To define a link permanently, code a LINK statement for each virtual machine in its directory entry.
 - To define a link temporarily, use the LINK command.
3. Define a link from the minidisk in question to the virtual machine in which VM/XA SP is running. You can do this in two ways:
 - To define a link permanently, code a LINK statement for the virtual machine in its directory entry.
 - To define a link temporarily, use the LINK command.

Be sure to give VM/XA SP *read-only* access.

On the VM/XA SP system running in a virtual machine:

1. Code an RDEVICE macro in HCPRIO for the linked minidisk. Use VM/XA SP's minidisk address—remember, it appears as a real device address to the VM/XA SP CP.
2. Code the volume identifier for the linked minidisk on the SYSUVOL macro in HCPSYS. This identifies the volume to VM/XA SP as a volume with user minidisks.
3. Code an MDISK statement for one user ID on the VM/XA SP system, for instance, virtual machine A. Give A *read-only* access to the minidisk. This assures virtual machine A does not try to write to the minidisk.

4. Give other virtual machines (B and C) links to A's minidisk. You can do this in two ways:

- To define a link permanently, code a LINK statement for each virtual machine in its directory entry.
- To define a link temporarily, use the LINK command.

Case 2. Let us say you are running VM/XA SP and VM/XA SF systems on separate processors and you want to share a minidisk between CMS virtual machines on both systems. Figure 19 is a diagram showing the example.

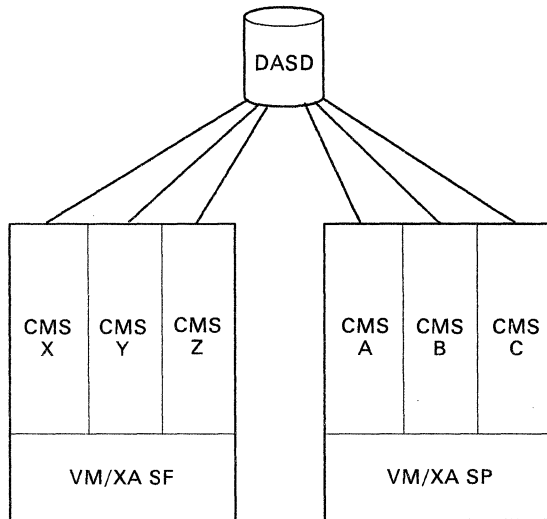


Figure 19. Sharing DASD between CMS Virtual Machines on Multiple Systems

This case assumes you can physically attach the DASD so both processors can access it.

On the VM/XA SF system:

1. Code an RDEVICE macro in HCPRIO for the DASD.
2. Code the volume ID for the DASD on the SYSUVOL macro in HCPSYS. This identifies the volume to VM/XA SF as a volume with user minidisks.
3. Code an MDISK statement for one user ID on the VM/XA SF system that has write access to the DASD. For instance, this user ID could be Z.
4. Give other virtual machines (X and Y) links to Z's minidisk. You can do this in two ways:
 - To define a link permanently, code a LINK statement for each virtual machine in its directory entry.
 - To define a link temporarily, use the LINK command.

On the VM/XA SP system:

1. Code an RDEVICE macro in HCPRIO for the DASD.
2. Code the volume ID for the DASD on the SYSUVOL macro in HCPSYS. This identifies the volume to VM/XA SP as a volume with user minidisks.

3. Code an MDISK statement for one user ID on the VM/XA SP system, for instance, virtual machine A. Give A *read-only* access to the minidisk. This ensures that virtual machine A can not write to the minidisk.
4. Give other virtual machines, B and C, links to A's minidisk. You can do this in two ways:
 - To define a link permanently, code a LINK statement for each virtual machine in its directory entry.
 - To define a link temporarily, use the LINK command.

How Do I Use VM/Pass-Through to Connect Virtual Machines?

Using VM/Pass-Through, you can attach terminals to several VM operating systems. These operating systems can be on the same processor or on different processors. You achieve this by dialing local 3270s to a VM/Pass-Through service machine on one system using the DIAL command and then connecting to a VM/Pass-Through service machine on a second system. As a result, a virtual machine user who is connected to the first system can log on to the second system.

From the end user's point of view:

1. The user finds a terminal with a local VM logo. The user types DIAL PVM.
2. VM/Pass-Through responds by displaying a panel with a number of potential nodes. The user selects the VM/XA SP target node.
3. When the VM/XA SP logo appears, the user can log on and during the session appears to be logically attached to the second system.

The connection between VM/Pass-Through and virtual machines is achieved through CP's *logical device support facility* (LDSF). Within the same system, you can connect two VM/Pass-Through service machines using a virtual CTCA as shown in Figure 20.

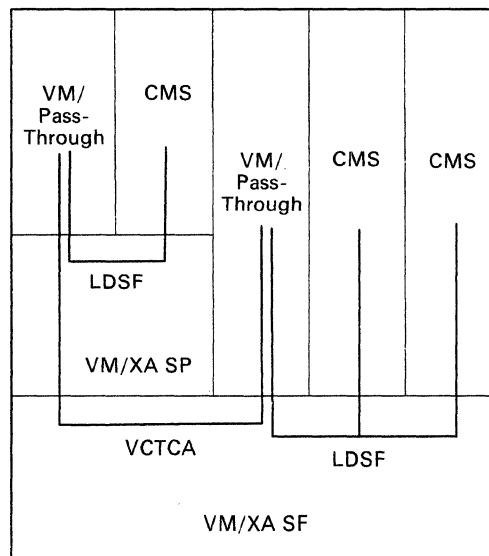


Figure 20. Using VM/Pass-Through to Connect Virtual Machines on One System

You can make the connection between two VM/Pass-Through service machines on separate processors by using a real CTCA or telecommunication controllers, as shown in Figure 21 on page 174.

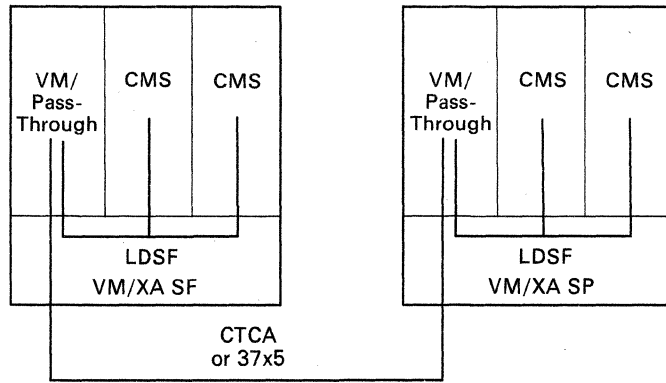


Figure 21. Using VM/Pass-Through to Connect Virtual Machines on Two Systems

Because of a restriction in the logical device support facility, the VM/Pass-Through service machine can only support up to 512 virtual machines. If you have more than 512 users on either your VM/XA SF or VM/XA SP system, you will need more than one VM/Pass-Through service machine on that system.

VM/Pass-Through Release 3 incorporates the VM/XA Migration Aid Remote 3270 Display Option. If you have VM/Pass-Through Release 3, you no longer need the Remote 3270 Display Option licensed program.

How Do I Use RSCS to Communicate between Virtual Machines?

Using the Remote Spooling Communications Subsystem (RSCS) Networking licensed program, virtual machines can communicate with other virtual machines either on the same system or on separate VM systems.

RSCS Version 2 requires the group control system (GCS), a component of VM/XA SP, and can communicate with RSCS Version 2 or with RSCS Version 1 via a virtual or real channel-to-channel adapter (CTCA). Over an SNA network, RSCS Version 2 can communicate with RSCS Version 2 but not with RSCS Version 1.

Figure 22 shows RSCS Version 2 running in a virtual machine on VM/XA SP and connected through a virtual channel-to-channel adapter to an RSCS Version 1 virtual machine running on VM/XA SF.

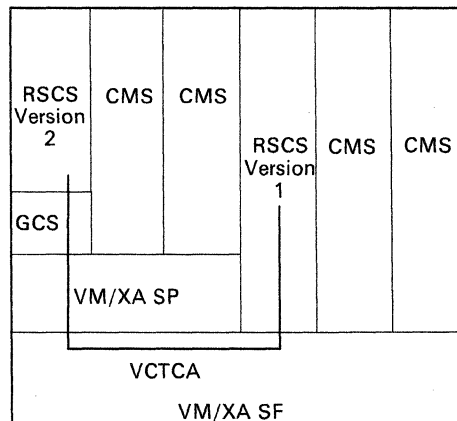


Figure 22. Connections between Multilevel RSCS Virtual Machines

Figure 23 on page 175 shows two RSCS virtual machines, each running on separate processors, using a real CTCA adapter to access each other.

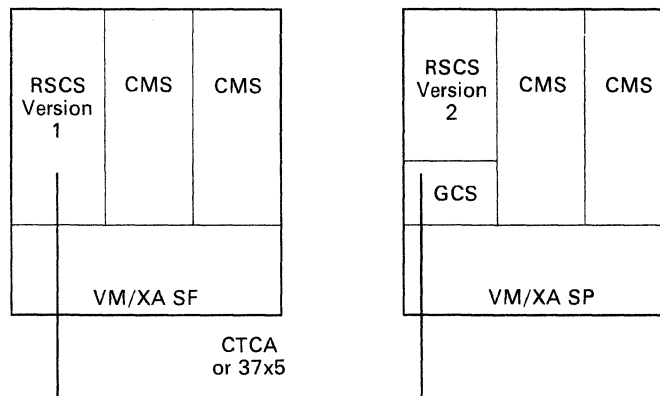


Figure 23. Two RSCS Virtual Machines on Separate Processors

What Should I Consider in My Back-Off Plans?

When planning your migration to VM/XA SP, you must also plan how you will back off if you run into a problem. You will need two types of back-off plans: one for system problems and one for virtual machine problems.

You need the system back-off plan when you run into a problem with VM/XA SP, such as an abend from which you cannot recover. In this case, you will need to be able to quickly re-IPL a VM/XA SF system.

You need the virtual machine back-off plan when a user or group of users cannot run on VM/XA SP, for example, if application programs will not operate on the VM/XA SP CMS. In this case, you must quickly move the user or group of users to a VM/XA SF system.

Once you determine your back-off plan, negotiate back-off criteria with your end users. Publish the approved plan.

Backing Off because of System Problems

If you run into a problem with VM/XA SP that forces you to back off and you have not yet exploited VM/XA SP-only functions or migrated CMS users, the back off will only affect system availability. If, on the other hand, you run into a problem and have to back off after you have migrated CMS users, you will greatly affect these users. Once users convert their applications to run on the VM/XA SP CMS, they may not be able to run these applications on the VM/XA SF CMS. One solution is to duplicate the VM/XA SF versions of the applications and use those versions. In general, however, you should not migrate users to VM/XA SP until you are satisfied with its reliability.

Throughout the conversion effort, you should maintain your VM/XA SF system residence volume and CP-owned packs. Then, if you need to back off, you can easily do so. Plan to build a small, one-pack VM/XA SP system. Once you have fully tested VM/XA SP, you can generate a larger system.

If you must back off from VM/XA SP and IPL a VM/XA SF system and you have maintained the VM/XA SF system residence volume and CP-owned packs, do the following:

1. SPTAPE DUMP VM/XA SP spool files.
2. Shut down the VM/XA SP system.
3. IPL VM/XA SF.
4. SPTAPE LOAD VM/XA SP spool files onto VM/XA SF.

The important step here is to use SPTAPE to ensure that you do not lose spool files. You must SPTAPE DUMP the spool files so that you can restore them to your VM/XA SF system.

The VM/XA SP SPTAPE command dumps files in VM/XA SF format; therefore, you do not need to worry about the differences in spool file format between VM/XA SF and VM/XA SP.

Let us assume you run into a problem that prevents you from using SPTAPE. For instance, VM/XA SP abends and you cannot recover. In such a case, you can bring up VM/XA SF, diagnose the VM/XA SP problem in a virtual machine, and fix the problem on VM/XA SP. Then you can shut down VM/XA SF, reload (IPL) VM/XA SP with a warm start, and recover without losing spool files.

Backing Off Individual Users because of Problems with Application Programs

Once the system is stable, you will begin to convert CMS users. To prepare for a possible back off, either rewrite programs to execute in either architectural mode or keep copies of the System/370 versions of applications. To back off, do the following:

1. SPTAPE DUMP VM/XA SP spool files.
2. Shut down the VM/XA SP system.
3. IPL VM/XA SF.
4. SPTAPE LOAD VM/XA SP spool files onto VM/XA SF.

You must SPTAPE the user's or group of users' spool files and restore them to the VM/XA SF system.

Chapter 13. Installation and Service

Installation and service tasks include tailoring system generation files, generating the system, and applying service to the system.

You should install your VM/XA SP system by using the starter system. You could instead start with your existing VM/XA SF system, but this is a more difficult procedure than using the starter system. *VM/XA SP Installation and Service* includes a procedure for installing VM/XA SP in a virtual machine on a VM/XA SF system as well as the procedure for installing VM/XA SP on a separate processor.

Differences Defining Real I/O

Defining I/O for the 370-XA Channel Subsystem

You can use the same IOCP files for VM/XA SP that you used for VM/XA SF.

Defining Printers

Because universal character sets and forms control buffers for impact printers are now installed in image libraries, VM/XA SP deletes HCPFCB, HCPUCC, HCPUCB, and HCPUCS. This means you have to use the IMAGELIB command to install universal character sets and forms control buffers for impact printers.

VM/XA SP adds a new version of the FCB macro for the extended 4248 forms control buffers (FCBs). If the new features of the 4248 printer are not needed, you do not need to recode the macro.

The RDEVICE macro now recognizes the 3262, 4245, and 4248 printers. The IMAGE operand now supports all impact printers, including the 1403, 3203, and 3211. You do not need to recode the RDEVICE macros for impact printers unless you have a custom image library for the device. IBM supplies standard FCBs and character sets for all printers and the RDEVICE macro uses the IBM-supplied names as a default. For instance, the 1403 printer has the default image library IMAG1403 and the 4248 has IMAG4248.

The UCSI macro creates a 12-byte header record that the LOADBUF and START commands use to load the printer buffer. The macro is a combination of the UCB, UCC, and UCS macros. These latter macros are maintained for compatibility.

The UCSICCW macro creates a CCW string to print the buffer load image when an operator specifies the VERify option on the LOADBUF command. The macro is a combination of the UCBCCW, UCCCCW, and UCSCCW macros. These latter macros are maintained for compatibility.

Defining Spooling

The total number of files you can have in the system is determined by the size of the warm start area. Each DASD type can hold a specific number of pages per cylinder. For instance, a 3380 holds 150 pages per cylinder, allowing nearly 154 000 files. See *VM/XA SP Installation and Service* for the number of pages you can fit on a cylinder of a specific DASD type.

The total spooling space you need depends on the type of spool files you typically have. Small files such as PROFS notes typically use about two pages of DASD

storage. Large files like listings and documents require much more. Since trailing blanks are suppressed, "narrow" files of many lines require less space than "wide" files with right-hand margins, such as listings. Printer fonts are large and may consume space in environments that process sophisticated documents.

Your system operator will receive a warning message when spooling space is nearly full. The operator can bring additional spooling volumes online if those volumes are defined on the SYSOWN macro. Otherwise, your operator should request that spool files be purged, processed, or put on tape with the SPTAPE command.

Differences Defining Main Storage

Defining Free Storage

VM/XA SP does not allocate a free storage area, so, if you continue to code the FREE parameter on the SYSSTORE macro in HCPSYS, an MNOTE is issued at assembly time and the parameter is ignored. You still need a dynamic paging area that is equal to the total of the VM/XA SF free storage area and the VM/XA SF dynamic paging area. Continuing to code the FREE parameter should not affect the system, since the dynamic paging area is automatically set to the storage not used by the V=R area, the V=R machine recovery area, the RIO370 area, and the CP-resident nucleus. Therefore, if your other storage areas remain constant, your dynamic paging area should be sufficient.

Differences Defining Saved Systems

Installing CMS

If you want to support CMS as a named saved system in both System/370 and 370-XA mode, you must create two CMS named saved systems: one for System/370 mode and one for 370-XA mode.

The VM/XA SP CMS requires 2Mb of virtual storage when installed as an NSS.

Differences Loading (IPLing) the New System

Saving Spool Files

Changes to the spool file system require you to do a cold start when you bring up VM/XA SP for the very first time. You must process VM/XA SF spool files or save them using the SPTAPE command.

The User Directory

VM/XA SP allows you to place a user directory on any CP-owned DASD volume. A CP-owned volume is any disk that is designated as owned by the system; for example, the CP system-residence volume (SYSRES), or any disk that contains CP paging, spooling, temporary, or directory disk space. You create a list of CP-owned volumes on the SYSCPVOL macro instruction in the system control file (HCPSYS ASSEMBLE) at system generation time.

When CP initializes, it looks for a user directory on the system-residence volume first. If no user directory is there, CP follows the order of the list of CP-owned volumes on the SYSCPVOL macro instruction in its search for a user directory. CP

selects the first directory it finds. If CP finds no user directory, or if CP finds an invalid user directory, CP logs on an operator to allow you to create a valid user directory.

For more information about user directory changes, see “Differences Managing User Access” on page 181.

Differences Applying Service to the System

The preventive service process has changed since VM/XA SF.

The program update tape (PUT) no longer includes AUX files for VM/XA SP service. There are new files on the PUT that the service process uses. These files include patch update files, update shells, text shells, a product parameter file, a PTF parts list, an apply list, and an exclude list.

You cannot use VMSERV for VM/XA SP, although the EXEC has been retained for compatibility. New EXECs (actually delivered on the VM/XA SP product tape) replace VMSERV functions and the product service EXEC. You can use VMSERV for other products, but for VM/XA SP you must use the VMFREC EXEC instead.

The new EXECs are VMFREC, VMFAPPLY, and VMFBLD. These EXECs require information supplied by a CMS file called the product parameter file. This file contains the following:

- Control information, such as the name of the main and auxiliary control files to be used and the verification functions to be performed while service is applied. The name of the user exit EXEC that is called at the beginning and end of each service function is also supplied in this section.
- The minidisks to be used for (1) holding source and object code, IBM-supplied service files, and user-supplied service files, (2) performing updates, and (3) regenerating the nucleus.
- The EXECs needed to update each part of the component.

The VMFREC EXEC receives service from the PUT and creates a service process data base. The VMFREC INFO command maps the PUT and receives the PUT documentation. The VMFREC 5664308 CP or VMFREC 5664308 CMS command loads the service files onto the minidisks specified in the product parameter file. Any errors that arise from the VMFREC EXEC are logged in a receive exception log on the installer’s A-disk. VMFREC also creates a receive history log, which contains a list of all CMS files received from the PUT.

The VMFAPPLY EXEC builds the auxiliary control files that are used to apply updates to source and object code. The auxiliary control files are built in accordance with the apply list and, optionally, the exclude list for the component. The apply list is a list of the program temporary fixes (PTFs) that are to be applied to the component. The exclude list is a list of the PTFs that are not to be applied to the component, even though they are listed in the apply list.

When invoking the VMFAPPLY EXEC, the installer specifies the number of the product (5664308 for VM/XA SP), the name of the component, and the filetype of the auxiliary control files that are to be built. Options can be specified that control whether or not the exclude list is used, errors are logged, and checking is performed.

The VMFAPPLY EXEC creates or edits the necessary auxiliary control files and, if appropriate, invokes the VMFAPNLS EXEC to create auxiliary control files for national language support. The new auxiliary control files are used for source code files when the source code files are assembled via the VMFHASM EXEC.

After service has been received and applied, and source code files have been re-assembled, the VMFBLD EXEC is used to generate a new nucleus for the specified component. Corequisite and prerequisite checking is done automatically based on information in the AUX files.

The method used to apply service depends on whether the code to be serviced has been supplied as source code or object code. These methods are used automatically by the EXECs already discussed.

The changes to the preventive service procedures are significant, so you should read *VM/XA SP Installation and Service* to get acquainted with them.

Message Compatibility

See "VM/XA SF and VM/XA SP Message Compatibility" on page 218.

New Functions That Do Not Affect Conversion

The following new functions in VM/XA SP do not directly affect your conversion unless you decide to use them. To exploit these functions, be sure to read the other publications in the VM/XA SP library. The new functions include:

- The SYSFCN macro, which defines the privilege classes for certain CP internal functions
- The MODEL parameter on the RDEVICE macro for 3270 displays, which is now optional
- New device support
- The PARMREGS option on the DEFSYS command
- The group control system (GCS), a component that allows you to implement a native SNA communication network or run RSCS Version 2
- An enhancement to the DIRECTXA command and the directory build process that provides automatic deactivation of restricted passwords (ADRP).

Chapter 14. Administration

Administration tasks include managing user access to the system, managing system resources, and managing system performance.

Some CP externals used in administration differ between VM/XA SP and VM/XA SF.

Differences Managing User Access

Changes to the DIRECTXA Command

The syntax of the DIRECTXA command is unchanged. However, the command now brings the directory online if and only if one of the following is true:

1. The new directory is on the same volume as the directory CP found at initialization time. In VM/XA SF this volume had to be the system residence volume.
2. DIRECTXA has not yet found a directory and the new directory is on a CP-owned volume.

The privilege class D QUERY ALLOC command responds with "ACTIVE" for the volume on which the currently active directory resides.

For more information about the user directory and CP initialization, see "Differences Loading (IPLing) the New System" on page 178 and "Differences Bringing Up the System" on page 187.

Setting the Spool File Limit for Users

The SPOOLFILE user directory control statement is optional, but if you do not code one for a user the maximum number of spool files for that user is 9999.

Issuing Diagnostic CCW Commands

In VM/XA SP, Diagnostic CCW commands require class F authority.

Differences Managing System Data Files

Saving and Purging Saved Segments

Only one available (class A or R) saved segment with a particular name may exist at a given time. If any class A or R saved segment already exists with the same name as the one being saved, and there are no virtual machine users associated with the saved segment, then the old copy of the saved segment is purged and the new one is made available.

Note that the SPTAPE LOAD command can load an additional version of a system data file with the same name and class as one already in existence. This can cause unexpected results because CP uses whichever one it encounters first. In such a situation you should purge one of the system data files.

If there are users associated with the old copy of a saved segment and the saved segment is a CP DCSS, the SAVESEG command is not accepted. A CP DCSS is a

CP system service DCSS and its page ranges are defined with the SC page descriptor code.

If there are users associated with the old copy and the saved segment is *not* a CP DCSS, the old copy is marked as pending purge, and the new copy is saved.

If you try to purge a saved segment with the PURGE NSS command while users are still associated with it, the saved segment is marked as class P, pending purge. For such a saved segment:

- You *cannot* save a new copy of a CP DCSS.
- You can save a new copy of a *non*-CP DCSS.

Displaying Information about System Data Files

The QUERY NSS MAP command responds with new information about:

- The range of registers in which parameters are passed to the virtual machine during the IPL (via PARMREGS)
- For NSS files only, whether the VMGROUP attribute was specified on the DEFSYS command when the named saved system was created (VMGROUP).

The QUERY NSS MAP command also responds with new types for the system data file:

- CPNSS, to indicate a CP system service NSS
- CPDCSS, to indicate a CP system service DCSS
- DCSS-M, to indicate a member of a segment space
- DCSS-S, to indicate a segment space for which members were defined.

The QUERY NSS command responds with the OWNERID as *NSS and displays the originator (ORIGINID) of the file.

The QUERY IMG command responds with the OWNERID as *IMG and displays the originator (ORIGINID) of the file.

The privilege class A, B, and C QUERY SDF command responds with the number of user class restructure (UCR) files. The privilege class A, C, D, E, and G QUERY SDF command responds with the number of system trace (TRF) files.

Differences Managing Resource Usage

Finding the Size of Main Storage

The privilege class B command, QUERY STORAGE, now has a response like that in VM/SP HPO:

STORAGE = nnnnM

or

STORAGE = nnnnnnnK

The size of main storage is calculated as the minimum of system-generated storage and configured main storage.

The new QUERY FRAMES command returns information previously displayed by the VM/XA SF QUERY STORAGE command.

Differences Managing System Performance

Displaying the Contention for Storage and Processor Use

The INDICATE LOAD command gives some additional data and the output of all data is reformatted. For the privilege class E user, INDICATE LOAD displays the eligible list classes (E1, E2, and E3) and users in the dispatch list (Q0, Q1, Q2, and Q3). The command displays system-wide information in its own block. Information relating to individual processors and their vector processors are in sets of two per line. The command now includes EXPAN and STEAL information to be compatible with VM/SP HPO. PROC replaces CPU for VM/SP HPO compatibility.

Displaying Active Users

INDICATE QUEUES gives information about whether the virtual machine is virtual MP, the processor number, the virtual machine's eligible list class, and dispatch list class.

Controlling the System Scheduler

You can no longer query or set shares for a user on the QUERY SRM command or SET SRM command. Use the QUERY SHARE or SET SHARE commands instead. Note also that ABSCPU is not a valid option for shares on the system.

For general information on the scheduler, see "General Changes to the Scheduler" on page 154.

Start Interpretive-Execution Assist Consideration

For System/370 preferred virtual machines, the start interpretive-execution assist is available only for I/O devices that have virtual addresses less than or equal to hex FFF.

Changed User Exit

You can add your own accounting routine to the system through the IBM-supplied module, HCPACU. The routine can perform additional functions when a virtual machine logs on or off, when an authorized user issues accounting commands, or when system initialization or termination invokes a CP checkpoint routine.

Message Compatibility

See "VM/XA SF and VM/XA SP Message Compatibility" on page 218.

New Functions That Do Not Affect Conversion

The following new functions in VM/XA SP do not directly affect your conversion unless you decide to use them. To exploit these functions, be sure to read the other publications in the VM/XA SP library.

- New CP system services on the IUCV user directory control statement:
 - *BLOCKIO
 - *CCS
 - *MONITOR
 - *RPI
 - *SIGNAL.
- New externals for the protected application environment:
 - The PARM option on the IPL user directory control statement and command
 - The CONCEAL option on the OPTION user directory control statement.
- New externals for changing privilege classes:
 - Use of the CMS class override file
 - The OVERRIDE command
 - The CLASS user directory control statement
 - Coding an asterisk in place of the privilege class on the USER user directory control statement when coding new classes
 - The new DIAGNOSE code X'C4'
 - The new PURGE UCR command, which allows you to purge user class restructure (UCR) files
 - The new QUERY UCR command, which allows you to display detailed information about one or more user class restructure (UCR) files.
- The new QUERY FRAMES command.
- The new externals for the scheduler:
 - The QUICKDSP option on the OPTION user directory control statement
 - The QUERY QUICKDSP and SET QUICKDSP commands
 - The QUERY SHARE and SET SHARE commands.
 - The QUERY SRM ALL command, which responds with a summary of the current system-wide scheduler settings
 - The QUERY/SET SRM LDUBUF commands, which refer to the commitment of system paging
 - The QUERY/SET SRM STORBUF commands, which refer to the scheduler's policy in allocating storage
 - The QUERY/SET SRM DSPBUF commands, which refer to the scheduler's policy for limiting the number of users allowed in the dispatch list for each transaction class.

- The new programming interfaces for the RACF licensed program:
 - The ACIGROUP user directory control statement, which allows you to identify users and resources as members of a group to the RACF licensed program
 - DIAGNOSE X'A0', which retrieves the access control group name and determines whether ACI program is installed.
- New externals for the VM/XA SP monitor:
 - The MONITOR command and the monitor writer sample program which lets you control the selection, collection, and reporting of data from the system
 - The QUERY MONITOR command, which lets you display the current profile information for the system monitor
 - The use of the page descriptor code of SC on the DEFSEG and DEFSYS commands, which establishes CP writable pages that are shared by a virtual machine in read-only access
 - A new option on the OPTION user directory control statement, SVMSTAT, that allows you to distinguish between statistics taken for service virtual machines and end user virtual machines
 - The SET MONDATA command, which allows you to determine whether the monitor places input and output from user displays in terminal event records
 - The QUERY MONDATA command, which allows you to find out whether the monitor is placing input and output from user displays in terminal event records.
- New externals for multiple preferred guest support:
 - DEDICATE/NODEDICATE options on the OPTION user directory control statement, which specify whether a real processor is dedicated to a V=R or V=F machine at logon
 - DEDICATE/NODEDICATE options on the CPU user directory control statement, which specify whether a real processor is dedicated to a virtual machine at logon
- A new parameter (MDC/NOMDC) on the MINIOPT directory control statement that specifies whether a minidisk is to use Expanded Storage cache
- The group control system (GCS), a component that allows you to implement a native SNA communication network or run RSCS Version 2.



Chapter 15. Real System Operation

Real system operation tasks include starting and stopping the system, controlling processors, controlling I/O, managing data files, and running utility programs.

For conversion from VM/XA SF, some CP commands are changed due to VM/XA SP's increased compatibility with VM/SP HPO.

Differences Bringing Up the System

Saving Spool Files

Changes to the spool file system require you to perform a cold start when bringing up VM/XA SP for the very first time. You must process VM/XA SF spool files or save them using the SPTAPE command.

The User Directory

When CP initializes, it looks for a user directory on the system-residence volume first. If no user directory is there, CP follows the order of the list of CP-owned volumes on the SYSCPVOL macro instruction in its search for a user directory. CP selects the first directory it finds. If CP finds no user directory, or if CP finds an invalid user directory, CP logs on an operator to allow you to create a valid user directory.

The privilege class D QUERY ALLOC command now responds with ACTIVE for the volume on which the currently active directory resides.

Setting up the System Abend Dump Environment

The privilege class B SET DUMP command now has a V=R option that allows you to specify that the entire V=R area and CP storage should be dumped in the event of a system abend. The response to the SET DUMP command includes the V=R setting, if set.

The QUERY DUMP command response includes the V=R setting, if it is set.

Differences Controlling I/O

Controlling the Missing Interrupt Handler

The SET MITIME command allows you to specify multiple device classes with a single command invocation. The GRAF operand on SET MITIME replaces DISPLAY. DISPLAY is not accepted.

QUERY MITIME uses GRAF rather than DISPLAY in its response.

Differences Controlling Printers

Finding out a Printer's Status

The response to the QUERY UR command for impact printers adds a third line which includes the image library, character set, and forms control buffer (FCB) being used, with the exception of the 1403 printer models that do not have the universal character set feature installed. For those printers, VM/XA SP does not display the third line of the response.

Starting Printers

The START command allows the specification of an image library, FCB, and character set for impact printers. The operator may now specify the FCB and character set to be loaded and start impact printers with a START command alone, rather than with three commands (LOADBUF FCB, LOADBUF UCS, and START). The operator now has the same command set to operate all spooling printers.

Note: The CHARS option is not valid for 1403 printers without the universal character set (UCS) feature, 4245 printers, and 4248 printers.

For impact printers only, START accepts a new FOLD/NOFOLD option, which controls whether lowercase characters are translated (folded) into uppercase characters for output. This option corresponds to the FOLD/NOFOLD option on the LOADBUF command.

For the sake of compatibility with existing impact printer terminology, UNFOLD is accepted as the equivalent of NOFOLD.

For 3211 printers only, the START command accepts a new INDEX option, corresponding to the existing INDEX option on the LOADBUF command.

The response to the START command for impact printers adds a third line which includes the image library, character set, and forms control buffer (FCB) being used, with the exception of the 1403 printer models that do not have the universal character set feature installed. For those printers, VM/XA SP does not display the third line of the response.

Setting Character Sets and Spacing for Impact Printers

The LOADBUF command is obsolete since the START command allows an operator to specify the FCB and character set and to start an impact printer with one command. The LOADBUF command is maintained for the sake of compatibility.

Draining Impact Printers

The response to the DRAIN command for impact printers adds a third line which includes the image library, character set, and forms control buffer (FCB) being used, with the exception of the 1403 printer models that do not have the universal character set feature installed. For those printers, VM/XA SP does not display the third line of the response.

Differences Controlling Displays

Clearing Pending Interrupts for a Display

The RESET command responds with the keyword GRAF rather than DISPLAY:

```
GRAF vdev RESET
```

Querying Displays

The privilege class B QUERY command accepts only GRAF for real display devices. DISPLAY is no longer accepted.

Attaching Displays

The privilege class B ATTACH command responds with the keyword GRAF rather than DISPLAY.

Differences Controlling DASD

Finding out about User Access to a System-Owned DASD

The privilege class B QUERY SYSTEM command now has the response:

```
userid vdev mode
```

where:

- userid** identifies the user who has a link to a minidisk on the system-owned DASD.
- vdev** is the virtual address by which the user refers to the minidisk.
- mode** Is the type of access the user has: either R/O, R/W, or nnn for the number of cylinders of temporary disk space allocated.

Displaying Currently-Defined Temporary Disk Space

The privilege class B QUERY SYSTEM TDSK command:

- No longer provides what used to be the first line of the VM/XA SF response
- Uses a number (*nnnn*) for a TDISK cylinder count instead of *Tnnnn* as in VM/XA SF.

Differences Controlling Spooled Output

Changing the External Attributes of Spool Files

Changes to the spool file limit function make a spool ID unique by user. Thus, the privilege class D CHANGE command no longer allows the spoolid option with the SYSTEM keyword.

Responses to the CHANGE command with the TO option include the new spool ID given to the file after it is changed.

The response that indicates the number of files changed by the CHANGE command now allows a number up to seven digits.

Changing the Order of Spool Files on a Queue

Changes to the spool file limit function make a spool ID unique by user. Thus, the privilege class D ORDER command no longer allows the *spoolid* option with the SYSTEM keyword.

The response that indicates the number of files ordered by the ORDER command now allows a number up to seven digits.

Purging Spool Files

Changes to the spool file limit function make a spool ID unique by user. Thus, the privilege class D PURGE command no longer allows the *spoolid* option with the SYSTEM keyword. The response that indicates the number of files purged by the PURGE command now allows a number up to seven digits.

Finding Out the Count of Reader, Printer, and Punch Spool Files

Changes to the spool file limit function make a spool ID unique by user. Thus, the privilege class D QUERY FILES command no longer allows the *spoolid* option with the SYSTEM keyword.

The response to the privilege class D QUERY FILES command allows a number up to seven digits.

Finding out Detailed Information about a Spool File

Changes to the spool file limit function make a spool ID unique by user. Thus, the privilege class D QUERY RDR/PRT/PUN command no longer allows the *spoolid* option with the SYSTEM keyword.

Sending and Retrieving Spool Files to and from Another User

Changes to the spool file limit function make a spool ID unique by user. Thus, the privilege class D TRANSFER command no longer allows the *spoolid* option with the SYSTEM keyword.

Responses to the TRANSFER command with the TO option include the new spool ID given to the file after it is changed.

Differences Communicating with Users and CP

Creating and Changing the System Log Message

NULL is no longer the default for SET LOGMSG nn. Instead, you are put in the CP READ state to allow you to enter a line of text or NULL.

Logging On Another Virtual Machine

The VM/XA SF AUTOLOG command is changed to XAUTOLOG in VM/XA SP. XAUTOLOG has additional operands.

VM/XA SF issues message 050E when you specify an incorrect password. VM/XA SP issues message 050E when you specify an incorrect password and XAUTOLOG executes asynchronously, but issues message 6054E when you specify an incorrect password and XAUTOLOG executes synchronously. (XAUTOLOG executes synchronously when you specify the SYNCH option.)

The primary system operator can no longer log on a user unless the operator has privilege class A or B.

For compatibility with VM/SP HPO, AUTOLOG still exists in VM/XA SP; however, it has less function than XAUTOLOG.

Finding Out Which Users Are in Logon Hold Status

You must use the class B QUERY HOLD LOG command to find out which users have logon hold in effect.

Differences Shutting Down the System

A privilege class A user other than the primary system operator can issue SHUTDOWN. In such a case, the response SYSTEM SHUTDOWN STARTED goes to both the invoker and the primary system operator.

Message Compatibility

See “VM/XA SF and VM/XA SP Message Compatibility” on page 218.

New Functions That Do Not Affect Conversion

The following new functions in VM/XA SP do not directly affect your conversion unless you decide to use them. To exploit these functions, be sure to read the other publications in the VM/XA SP library.

- The SPTAPE command, which now supports saving and restoring user class restructure (UCR) files
- The PURGE UR command, which allows you to purge all spool files associated with a unit record device that match the selection criteria specified (ALL, CLASS, FORM, spool ID)
- The privilege class D QUERY MAXSPOOL command, which allows you to display the spool file limit for the system or for any individual user
- The QUERY XSTORE MAP command, which displays a map showing how Expanded Storage is currently allocated
- The QUERY TDSK command, which displays information about temporary disks
- The QUERY/SET MAXUSERS commands, which allow you to control the number of users who can log on the system
- The QUERY TRF command, which displays the names of system trace files that are available
- The SPTAPE DUMP *rdev* TRF ALL command, which dumps system trace files to a tape
- The SPTAPE LOAD *rdev* TRF ALL command, which loads system trace files from a tape
- The COMPACT option of the OUTPUT statement of the DDRXA program, which compresses output when writing to a tape
- The MDC operand of the RETAIN XSTORE command, which specifies whether parameters controlling the use of Expanded Storage as a cache for CMS minidisks are being changed

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- The group control system (GCS), a component that allows you to implement a native SNA communication network or run RSCS Version 2.

Chapter 16. Virtual Machine Operation

Virtual machine operation tasks include those tasks that allow you to run operating systems in virtual machines.

For conversion from VM/XA SF, increased compatibility with VM/SP HPO causes some differences in CP externals such as commands and command responses.

Differences Controlling Virtual Devices

Detaching Virtual Devices

The DETACH command's response for a multiple exposure device is now compatible with VM/SP HPO:

```
vdev pagedev1 pagedev2 pagedev3 DETACHED
```

where:

vdev is the base virtual device number of the multiple-exposure device.

pagedev1

pagedev2

pagedev3 are the virtual paging device numbers of the multiple-exposure device.

Note the keyword DASD does not appear in the response.

Differences Controlling Printers

Setting Spacing for a Virtual Printer

The LOADVFCB command includes an optional IMAGE specification and supports the 3262, 4245, and 4248 printers. If you do not specify the IMAGE option, the command uses the default image library for the device type. The default image library is IMAGxxxx, where xxxx is the device type. For example, the 1403 has a default image library called IMAG1403.

Differences Controlling Reader, Printer, and Punch Files

Changing the External Attributes of Spool Files

Responses to the privilege class G CHANGE command with the TO option include the new spool ID given to the file after it is changed.

The response that indicates the number of files changed by the CHANGE command now allows a number up to seven digits.

Changing the Order of Spool Files on a Queue

The response that indicates the number of files ordered by the privilege class G ORDER command now allows a number up to seven digits.

Purging Spool Files

The response that indicates the number of files purged by the privilege class G PURGE command now allows a number up to seven digits.

Sending and Retrieving Spool Files to and from a User

The response that indicates the number of files changed by the privilege class G TRANSFER command now allows a number up to seven digits.

Querying Spool Files

The response to the QUERY RDR/PRT/PUN command has changed. Use QUERY RDR/PRT/PUN ALL instead.

Differences Controlling Tapes

Rewinding Tapes

The privilege class G REWIND command has two new responses. When the rewind operation is pending, you receive:

REWIND NOT PERFORMED

When the rewind operation is started, you receive:

REWIND COMPLETE

Differences Controlling Your Display

Clearing Pending Interrupts for a Display

The RESET command responds with the keyword GRAF rather than DISPLAY.

GRAF vdev RESET

where:

vdev is the virtual device number of the display.

Defining Displays

The privilege class G DEFINE command accepts only GRAF for displays. DISPLAY is no longer accepted.

Detaching Displays

The privilege class G DETACH VIRTUAL DEVICE command uses GRAF rather than DISPLAY in its response when the device detached is a display.

Logically Connecting Your Display to Another Operating System in a Virtual Machine

The privilege class ANY DIAL command responses now omit *type rdev* from their beginning. For example, the response you get when the logical connection is made is:

DIALED TO *userid vdev*

where:

- userid** is the user identification of the virtual machine that is running the operating system.
- vdev** is the virtual device number of the dialed connection.

Displaying the Status of Your Virtual Displays

The privilege class G QUERY VIRTUAL command accepts only GRAF. It no longer accepts DISPLAY. The response also uses the keyword GRAF.

Displaying the Status of Your Virtual Console

The privilege class G QUERY VIRTUAL CONSOLE provides information compatible with VM/SP HPO. It does not display such data as EOF, OPEN, and KEEP.

Controlling the Settings for Your Virtual Console Environment

The privilege class G TERMINAL command no longer supports the LINEDIT, MSG, WNG, EMSG, and IMSG options.

Displaying the Current Settings for Your Virtual Console Environment

The privilege class G QUERY TERMINAL response now displays BRKKEY PF01, ..., PF09 rather than BRKKEY PF1, ..., PF9.

Differences Communicating with Users and CP

Displaying a List of Logged-On Users

The response to QUERY NAMES now displays:

- A disconnected user as DSC rather than DISC
- The invoking user ID as the last in the list rather than the first.

Stopping Your Virtual Machine for a Specified Period of Time

The SLEEP command no longer automatically issues a nonzero return code if the sleep period is prematurely ended by the attention key. Rather, you must issue a new option on the SLEEP command, ATTN. This option indicates that if the SLEEP command with a time interval was issued, the return code should indicate whether the SLEEP command ended because the time interval expired (RC = 0) or because an attention was signaled (RC = 1457).

Displaying the Number of Logged-On Users

The QUERY USERS command now displays a disconnected user as DSC rather than DISC.

Displaying the Status of a User ID

The response to QUERY *userid* now displays a disconnected user as DSC rather than DISC.

Displaying the Settings of Your PF Keys

The privilege class G QUERY PF command no longer displays saved lines under the line indicating the PF key that is set to RETRIEVE. You no longer receive the response ALL PFS UNDEFINED when there are no PF keys defined. Rather, you receive PFnn UNDEFINED for each key.

Setting Your Account Number

SET ACNT continues to be unsupported as it was in VM/XA SF. However, VM/XA SP responds with an error message informing you the command option is not supported. As in VM/XA SF, substitute SET ACCOUNT.

Differences Determining System Response

Determining System Storage and Processor Use

The privilege class G INDICATE LOAD command gives additional data and the output of all data is reformatted.

Differences Controlling Virtual Machine Storage and Registers

Storing Data in Virtual Machine Storage

The default for the STORE GUEST STORAGE command is now guest real storage rather than guest logical storage.

Displaying and Dumping Virtual Machine Storage

The DISPLAY STORAGE and DUMP STORAGE commands now have guest real storage as the default.

DISPLAY STORAGE and DUMP STORAGE allow default values for the starting or ending storage addresses.

DISPLAY STORAGE and DUMP STORAGE now round the starting address for all translated output to a hex 10 boundary. If you do not specify a length, the hex 10 bytes are displayed or dumped.

Displaying and Dumping Registers

The responses to the DISPLAY REGISTERS and DUMP REGISTERS commands use GPR n rather than Gn for general registers, CR n rather than Xn for control registers, and FPR n instead of Yn for floating point registers.

Differences Running Guest Operating Systems

Loading (IPLing) an Operating System

The privilege class G IPL command has changes for the PARM option. The string you insert into the virtual machine's registers is delimited by a byte of binary zeros. If you load (IPL) a named saved system, the command fills your virtual machine registers with the parameter string in the order specified on the PARMREGS option on the DEFSYS command.

Loading (IPLing) CMS

Changes to CMS may change virtual machine operations. For instance, a user must load one CMS named saved system for System/370 mode and another for 370-XA mode.

Setting the Virtual Console Mode

A virtual machine reset no longer resets the terminal console mode established by the `TERMINAL CONMODE` command. In VM/XA SF, a typical strategy was to define an MVS user ID with terminal console mode set to 3270 in the user directory. This virtual machine could load (IPL) CMS at logon because CMS automatically sets its console to 3215, the console mode it requires. CMS was used to manage the virtual machine prior to loading MVS. When MVS was loaded (IPL), the resulting virtual machine reset also reset the terminal console mode to the value in the directory (3270). Thus, the 3270 console setting required by MVS was automatically established.

Since VM/XA SP no longer resets the terminal console mode to 3270 when the virtual machine is reset, loading MVS after CMS results in a disabled wait state 1010. To avoid this, enter `TERMINAL CONSOLE 3270` prior to loading (IPL) MVS.

Differences Managing the Virtual Processing Environment

Finding Out Settings for Your Virtual Machine

The `QUERY SET` command responds with an indication of whether the protected application environment is active or not.

Differences Tracing Programs

Using the TRACE Command

The response to `QUERY TRACE` includes information about the `TRACE COUNT`, when active, and the `DATA` option of instruction traps.

The `TRACE` command has added functions:

- The `DATA` option on the `TRACE INSTR` command, which specifies a string of data to compare to the instruction data
- The `TRACE COUNT` command, which counts trace events
- The traceback table function, which keeps track of the last six successful branch instructions, and the `TRACE TABLE` command to display the traceback table
- The `TRACE APPEND` command, which combines trace traps from two sets into one set
- The `RANGE` keyword, which is a synonym for `FROM` when specifying address ranges
- The `BOTH` option, which is a synonym for `PRINTER` and `TERMINAL` when specifying the destination of trace output.

Message Compatibility

See “VM/XA SF and VM/XA SP Message Compatibility” on page 218.

New Functions That Do Not Affect Conversion

The following new functions in VM/XA SP do not directly affect your conversion unless you decide to use them. To exploit these functions, be sure to read the other publications in the VM/XA SP library. These functions are:

- The STORE STATUS command, an alias for SYSTEM STORE STATUS
- The QUERY PER command, an alias for QUERY TRACE
- The PER command, an alias for TRACE
- The QUERY VIRTUAL PRINTER and QUERY VIRTUAL UR command responses, which display information about new device types 3262, 4245, and 4248
- The DEFINE command, which now allows you to:
 - Define 3262, 4245, and 4248 devices.
 - Issue VM/SP HPO operands. Those operands not supported by VM/XA SP result in an error message.
 - Define a 3800 printer with the DEFINE PRINTER command.
- New and changed externals for the protected application environment:
 - The DEFINE CPU command, which cancels the protected application environment if you use the command to establish a virtual MP environment
 - The SET CONCEAL command, which activates or deactivates the protected application environment
 - The LOGON command with the NORUN option, which allows a user running in the protected application environment to disconnect and to log back on the system to issue CP commands otherwise not allowed by the protected application environment
 - The QUERY TERMINAL command, which now displays NONE for the BRKKEY setting when disabled by the protected application environment
 - The TERMINAL BRKKEY command, which reenables the BRKKEY while in the protected application environment.
- The COMMANDS and QUERY COMMANDS commands, which allow you to display commands and DIAGNOSE codes you can issue.
- The SPOOL command, which now has a SYSTEM option on the TO or FOR keywords that resets the attributes of the device to its defaults as set in your user directory entry
- The PURGE UR command, which allows you to purge all spool files associated with a unit record device that match the selection criteria specified (ALL, CLASS, FORM, spool ID)
- The privilege class G QUERY MAXSPOOL command, which allows you to display your spool file limit
- The DETACH command, which now accepts VM/SP HPO operands, though they are not supported by VM/XA SP
- New controls for your display:
 - The TERMINAL ASCIITBL command, which allows you to select the translation table that is used by your TTY terminal

- The **TERMINAL ATTN** command, which allows you to control the signaling of an attention interruption on your ASCII terminal
 - The **TERMINAL CNTL** command, which allows either CP or an application program to insert TTY line control characters for your TTY terminal
 - The **TERMINAL HILIGHT** command, which allows you to highlight the command redisplay line
 - The **TERMINAL PROMPT** command, which sets the prompting sequence to be used on a TTY device
 - The **TERMINAL SCROLL** command, which allows you to specify the number of scrolled lines on a 3101 display screen
 - The **TERMINAL TABCHAR** command, which allows you to set logical tab characters on display devices
 - The **TERMINAL TYPE** command, which allows you to define a device as a 3101 or as a TTY terminal
 - The **QUERY TERMINAL** command, which displays new settings for **TABCHAR** and **HILIGHT**, if you set them
 - The **SCREEN** command, which allows you to set or change the extended color and extended highlighting values
 - The **QUERY SCREEN** command, which allows you to display the extended color and extended highlighting values.
- The **BEGIN** command, which now allows a minimum abbreviation of **B** for all command options. In VM/XA SF this command allowed a minimum of **B** only for the ***** option
 - The **SET PF_{nn} SUBSTITU** command, which substitutes any “&n” (for example, &1) in the PF data with a token from the input area when the PF key is pressed
 - The **SET PF_{nn} NODISP** command, which specifies that the program function is executed when the PF key is pressed
 - The **SET PF_{nn} RETRIEVE CLEAR** command, which clears the **RETRIEVE** buffer if already in use
 - The **CMS SET AUTODUMP** command, which allows you to control the creation of a dump of the CMS nucleus (**DMSNUC**) in the event of an abnormal termination.



Chapter 17. Application End Use

Application end use tasks include logging on to the system, running applications, and responding to system messages.

Minor differences exist between VM/XA SF and VM/XA SP CP externals. Some CP commands have error message differences. For instance, the DIAL command responds with the VM/SP HPO response format.

Differences Connecting Your Display to Another System

Logically Connecting Your Display to Another Operating System in a Virtual Machine

The privilege class ANY DIAL command responses now omit *type rdev* from their responses. For example, the response you get when the logical connection is made is:

```
DIALED TO userid vdev
```

where:

userid is the user identification of the virtual machine that is running the operating system.

vdev is the virtual device number of the dialed connection.

Differences Communicating with Users and CP

Displaying a List of Logged-On Users

The response to QUERY NAMES now displays:

- A disconnected user as DSC rather than DISC
- The invoking user ID as the last in the list rather than the first.

Displaying the Number of Logged-On Users

The QUERY USERS command now displays a disconnected user as DSC rather than DISC.

Displaying the Status of a User ID

The response to QUERY *userid* now displays a disconnected user as DSC rather than DISC.

Displaying the Settings of Your PF Keys

The privilege class G QUERY PF command no longer displays saved lines under a PF key that is set to RETRIEVE.

Message Compatibility

See "VM/XA SF and VM/XA SP Message Compatibility" on page 218.

New Functions That Do Not Affect Conversion

The following new functions in VM/XA SP do not directly affect your conversion unless you decide to use them. To exploit these functions, be sure to read the other publications in the VM/XA SP library.

- The **COMMANDS** and **QUERY COMMANDS** commands, which allow you to display commands and **DIAGNOSE** codes you can issue
- The **BEGIN** command, which now allows a minimum abbreviation of **B** for all command options. In VM/XA SF this command allowed a minimum of **B** only for the ***** option.

Chapter 18. Application Programming

Application programming tasks include program development and program debugging.

Architecture Differences

The CMS component of VM/XA SP has an interface to both System/370 architecture and 370-XA architecture. When CMS runs in a System/370 virtual machine, it provides an interface to System/370 architecture. When CMS runs in a 370-XA virtual machine, it provides an interface to 370-XA architecture.

The major architectural differences are:

- Program status words for each architecture are different.
- Addressing increases from 24 bits for System/370 to 31 bits for 370-XA.
- I/O handling for each architecture has unique instructions and routing abilities.
- There are new and changed assembler language instructions for 370-XA.

For more information, see *VM/XA SP CMS Application Program Development Guide*.

Summary of Compatibility

The CMS component of VM/XA SP is generally compatible with the CMS component in VM/SP Release 5. Since VM/XA SF Release 2 supports a CMS component that is equivalent to the CMS component in VM/SP Release 4, you must evaluate changes to CMS between VM/SP Release 4 and Release 5. Refer to VM/SP Release 5 publications to make this evaluation. With the exceptions noted below, all VM/XA SP CMS commands are compatible with VM/SP Release 5. There are new CMS commands that invoke new function and there are enhanced commands to invoke enhanced function. The enhanced commands are upwardly compatible with the VM/SP Release 5 CMS. CMS macros in VM/XA SP are upwardly compatible, and CMS external control blocks are compatible with the VM/SP Release 5 CMS.

In general, if your application program uses standard CMS interfaces (for example, if it does not manipulate PSWs or depend on CMS internal control blocks) and does not depend on CP command and DIAGNOSE code invocations or responses, you should not need to recompile or reassemble the program before running it on CMS in System/370 mode. For higher-level languages that VM/XA SP supports, programs are source and object code compatible.

Conversion Stages

While the conversion effort varies from installation to installation, there are three basic stages, or levels, of conversion to VM/XA SP CMS:

Stage	Virtual Machine Mode	Addressing Mode	Conversion Effort
System/370 compatibility	System/370	24-bit	Least effort. Your application programs run as they do now, but they run only in System/370 mode.
370-XA toleration	370-XA	24-bit	More effort because of architectural differences between System/370 and 370-XA (such as PSWs, assembler instructions, and I/O). However, your programs cannot support 31-bit addressing.
370-XA exploitation	370-XA	31-bit	Most effort. Like 370-XA toleration, 370-XA exploitation requires you to adapt your programs to 370-XA architecture. In addition, your programs can support 31-bit addressing.

Note: When converting your CMS application programs, IBM encourages you to bypass the System/370 compatibility stage and go directly to the 370-XA toleration stage or, if possible, to the 370-XA exploitation stage. The reasons for this are:

- The more conversions you perform, the more time and effort you will probably spend. Converting three times (to System/370 compatibility, then to 370-XA toleration, and then to 370-XA exploitation) will probably require more time and effort than converting once (directly to 370-XA exploitation).
- CMS supports bimodal addressing. This allows programs running in 370-XA mode virtual machines to execute in 24-bit addressing mode, 31-bit addressing mode, or a combination of both. Therefore:
 - The same CMS used to run programs under 370-XA toleration can be used to run programs under 370-XA exploitation.
 - 370-XA toleration allows programs that require 24-bit addressing to run using a 370-XA mode virtual machine rather than a System/370 mode virtual machine. Therefore, end users need not be inconvenienced by having to know which mode their applications require (System/370 mode or 370-XA mode), and they do not have to re-IPL CMS when going back and forth between System/370 mode and 370-XA mode to accomplish their work.

See *VM/XA SP CMS Application Program Conversion Guide* for details about bimodal addressing.

- 370-XA exploitation allows you to move programs above the 16Mb line so that you can optimize the use of storage below the line. This is especially helpful for programs that require more addressing capability and storage than 24-bit addressing allows.

- To relieve real storage constraints, CMS programs can use shared segments to share code and data. To relieve virtual storage constraints, CMS programs in discontinuous saved segments (DCSSs) can exploit extended addressing.

An application program or licensed program in the 370-XA exploitation stage, as long as it satisfies all criteria for DCSS candidacy, can be put into a DCSS above the 16Mb line. This frees an equivalent space below the line for private code.

An application program or licensed program in the 370-XA toleration stage, as long as it satisfies all criteria for DCSS candidacy, can be put into a DCSS below the 16Mb line but within the address range of a larger 370-XA mode virtual machine, callable from an application program or licensed program running under 370-XA exploitation.

Certain kinds of programs need not be converted. They may continue to run in System/370 mode in a processor that is capable of 370-XA mode. Such programs include:

- Programs that run in server machines but that have 370-XA mode application interfaces
 - Programs that serve a single user
 - Programs with a limited purpose, such as system setup.
- Programs that cannot run under 370-XA exploitation should, at a minimum, run under 370-XA toleration to facilitate program calling and exchange of data addresses within the same CMS virtual machine. These programs should be written in such a way as to isolate them from the underlying architecture.

Conversion Checklist

- Commands.

The syntax of most command invocations remains upwardly compatible. The format of many command responses has changed, particularly for the QUERY and SPOOL commands. To help you determine differences, IBM provides a sample EXEC called COMPSCAN SAMPEXEC, which flags commands and other keywords that might need to be changed. See Appendix A, "Conversion Tools" on page 277 for more information about COMPSCAN. See "VM/XA SF and VM/XA SP Command Compatibility" on page 213 for command comparisons.

- DIAGNOSE codes.

Differences between the VM/XA SP CP and the VM/XA SF CP exist. Programs that use certain DIAGNOSE codes and/or CP commands may require modification. For instance, if your application program uses DIAGNOSE X'00' to determine the release level of CP, you must examine the program's use of the licensed program bit map and change it, if necessary, to recognize VM/XA SP. You can use the sample EXEC COMPSCAN SAMPEXEC to determine differences. See Appendix A, "Conversion Tools" on page 277 for more information about COMPSCAN.

- Messages and return codes.

The text of many messages has been improved for clarity and consistency. Approximately half of the 370-XA messages have changed message numbers. Return codes have also experienced extensive changes. Additionally, VM/XA SP has four-digit message numbers; therefore, some command invocations now

result in four-digit return codes. Applications that depend on 10-character message header lengths or 3-digit control program command return codes should be examined.

See “VM/XA SF and VM/XA SP Message Compatibility” on page 218 for message comparisons.

- Programs that operate on SPOOL files owned by another user must now refer to SPOOL files by user ID and spool ID. The CP SPOOL command is enhanced for this support.
- VM/XA SP supports DOS simulation in a System/370 mode virtual machine only.
- VM/XA SP supports the VSE/VSAM functions supplied by the VM/SP Release 5 CMS in a System/370 mode virtual machine only.
- VM/XA SP supports the EDIT command in a System/370 mode virtual machine only. The system product editor (XEDIT) runs in System/370 mode and in 370-XA mode with 24-bit addressing.
- EXECs are upwardly compatible. Exceptions are EXECs that use CP commands or DIAGNOSE codes, which must be examined for compatibility. EXEC, EXEC 2, and REXX programs run only below the 16Mb line.
- The CMS DEBUG command is not supported.
- Programs that are architecture-specific (for example, programs that manipulate PSWs or issue I/O assembler instructions) require modifications to execute in CMS 370-XA mode virtual machines. The applications should continue to execute in CMS System/370 mode virtual machines.
- CMS must be IPLed in either System/370 mode or 370-XA mode. You can write dual-path application programs and EXECs, which follow one path for System/370 mode and a different path for 370-XA mode, or you can write a different version for each architecture. In the latter case you should give both versions the same name to minimize end-user confusion. You can do this with the NUCXLOAD command of CMS, using the form NUCXLOAD *name fn*, where *name* is the same in both environments and *fn* is the unique System/370 or 370-XA version.
- For application programs that must run in a specific mode (either System/370 or 370-XA), you could write an EXEC to establish that mode automatically prior to invoking the application program.

Changed CP Commands

The response to the INDICATE USER command now separates general user information from virtual processor information.

Changed DIAGNOSE Codes

Store Extended-Identification Code (DIAGNOSE X'00')

A bit map is added for each release of VM/XA SP.

Virtual Console Function (DIAGNOSE X'08')

The XAUTOLOG command is added (to the LINK and AUTOLOG commands) as a command for which CP can request or reject password entry.

General I/O (DIAGNOSE X'20')

DIAGNOSE X'20' now supports dedicated unit record devices.

For entry values, register 5 contains the virtual device address and register 6 contains the channel address word (CAW).

A new condition code is issued, condition code 0, in which case register 15 contains return code 0, indicating that the I/O completed successfully.

CP Directory (DIAGNOSE X'3C')

The interface is unchanged. However, the DIAGNOSE now brings the directory online if and only if one of the following is true:

1. The new directory is on the same volume as the directory CP found at initialization time. In VM/XA SF, this volume had to be the system residence volume.
2. DIRECTXA has not yet found a directory and the new directory is on a CP-owned volume.

3270 Virtual Console Interface (DIAGNOSE X'58')

Operation code X'49', for line mode operation, is new.

Error Message Editing (DIAGNOSE X'5C')

The entry values are the Rx, Rx + 1, and Ry registers.

The Rx register contains the address of the first byte of the message to be edited.

If the subfunction code in the Ry register is X'40', the Rx register cannot be register 15.

Rx + 1 contains the length of the message header if the subfunction code is X'40'.

The Ry register now indicates:

- The subfunction code
- The length of the header (when applicable)
- The length of the message.

The high-order byte of the Ry register indicates the function requested:

- A value of X'00' indicates that a 10-byte message header is assumed. The actual contents of the message header are not checked.
- A value of X'40' indicates that the length of the message header is being passed to the routine. The actual contents of the message are not checked.

- A value of X'20' indicates that the length of the message header must be calculated. Diagnose X'5C' assumes that the message header runs up to but does not include the first blank. It also assumes the text begins at the location following the first blank.

Finding, Loading, and Purging a Discontiguous Saved Segment (DIAGNOSE X'64')

When issued for a saved segment that has been defined as a member saved segment, the LOAD and FINDSEG functions in DIAGNOSE X'64' return the beginning and ending addresses that are on a page boundary, not necessarily a segment boundary. In VM/XA SF, these functions, since they returned the beginning and ending addresses of DCSSs, returned addresses on segment boundaries. If your program has a dependency on a segment boundary, use the DEFSEG command to place the program on a segment boundary.

A change to DIAGNOSE X'64' prevents the use of the LOADNSHR subcode to load a CP DCSS in which one or more page ranges have the SC descriptor code.

Some exit error (condition code 2) return codes for DIAGNOSE X'64' have changed:

- The VM/XA SF return code 301, X'12D' (a System/370 guest is not allowed to load a saved segment beyond 16Mb) is now return code 1357, X'54D'.
- The VM/XA SF return code 303, X'12F' (the saved segment would overlay an existing segment) is now return code 1351, X'547'.
- The VM/XA SF return code 304, X'130' (unacceptable condition occurred) is now return code 1352, X'548'.

Saving and Loading a Named Saved Image File (DIAGNOSE X'74')

DIAGNOSE X'74' now issues a new return code, X'30', to indicate that the maximum number of system spool IDs has been exceeded. The DIAGNOSE instruction results in return code X'2C' when the maximum number of spoolids for system data files has been exceeded.

Message Compatibility

See "VM/XA SF and VM/XA SP Message Compatibility" on page 218.

New Functions That Do Not Affect Conversion

The following new functions in VM/XA SP do not directly affect your conversion unless you decide to use them. To exploit these functions, be sure to read the other publications in the VM/XA SP library.

- New functions on DIAGNOSE X'64':
 - The FINDSKEL function, which allows a program to install the code or data in the page areas defined in skeleton, class S, system data files.
 - The FINDSPACE function, which you can use to get the range associated with a segment space
 - A change to the LOADNSHR subcode that prevents you from loading a CP DCSS in which one or more page ranges have the SC descriptor code.

- DIAGNOSE X'04', which allows you to examine any page in main storage, including pages not owned by CP
- DIAGNOSE X'84', which allows you to replace certain data in any entry in the user directory
- DIAGNOSE X'70', a new time-of-day (TOD) clock accounting interface
- DIAGNOSE X'B0', which allows you to obtain diagnostic information about the cause of an automatic reload (IPL) of your virtual machine
- DIAGNOSE X'D4', which establishes an end user's user ID as the originator of spool files created while a worker machine is processing the end user's request
- DIAGNOSE X'D8', which reads spool file blocks on the system spool file queues
- DIAGNOSE X'E0', which allows the owner of a system trace file to read trace blocks sequentially from the file
- New IUCV CP system services:
 - The DASD block I/O system service (*BLOCKIO), which provides a virtual machine with device-independent access to its virtual count-key-data DASD
 - The CP system service (*CCS) that, in conjunction with the VTAM service machine, provides SNA console support
 - The monitor system service (*MONITOR), which allows a virtual machine to access system monitor data
 - The access verification system service (*RPI), which allows CP to communicate with the Resource Access Control Facility (RACF) service virtual machine when the RACF licensed program is installed
 - The CP system service (*SIGNAL) that allows virtual machines in a virtual machine group to signal each other.
- Additional parameters of the IUCV macro:
 - ANSLIST on the SEND and REPLY functions (to indicate whether the ANSBUF parameter contains an address or a list of addresses)
 - BUFLIST on the SEND and RECEIVE functions (to indicate whether the BUFFER parameter contains an address or a list of addresses)
 - CONTROL on the CONNECT function (to indicate whether the path is to be a control path) and on the DCLBFR function (to indicate whether the buffer is to be a control buffer).
- The Monitor Call class 10 instruction, which allows a virtual machine to pass to the control program a trace event record for recording in a system trace file.



Chapter 19. Diagnosis

Diagnosis tasks include isolating, describing, reporting, and correcting failures in VM/XA SP.

VM/XA SP introduces new and changed abend codes, new trace table entries, and minor changes to commands.

Changed Trace Table Entries

The following trace table entries have changed. See the *VM/XA SP CP Diagnosis Reference* for details.

- Add to dispatch list trace entry
- Drop from dispatch list trace entry
- Obtain free storage
- Obtain free storage extend frame
- Return free storage
- Return free storage extend frame.

Differences Tracing the Control Program

Two trace codes of the SET CPTRACE command have changed:

- F700—Return free storage extended frame
- F701—Obtain free storage extended frame.

The VM/XA SP TRSAVE command has more functions than the VM/XA SF TRSAVE command, and has different defaults.

Message Compatibility

See “VM/XA SF and VM/XA SP Message Compatibility” on page 218.

New Functions That Do Not Affect Conversion

The following new functions in VM/XA SP do not directly affect your conversion unless you decide to use them. To exploit these functions, be sure to read the other publications in the VM/XA SP library. These new functions include:

- Control block identifiers in free storage blocks help you find control blocks in a dump even if anchors or chains are not available.
- New trace table entries:
 - CCS ACCEPT
 - CCS PURGE
 - CCS RECEIVE
 - CCS REPLY
 - CCS SEND 1-way
 - CCS SEND 2-way
 - CCS SEVER
 - CCS logic error in CCS WEBBK

- CCS REPLY from VSM
 - CCS CONNECT for VSM
 - CCS SEVER from VSM
 - CCS message complete
 - CCS CONNECT for LU
 - CCS logic error in VSM WEBBK
 - CCS error in user environment
 - CCS soft abend VCX002
 - CCS ACCEPT error
 - CCS RECEIVE error
 - CCS REPLY error
 - CCS SEND 1-way error
 - CCS SEND 2-way error.
- The command TRSOURCE traces virtual machine events. The command QUERY TRSOURCE displays the status of virtual machine event traces.

Chapter 20. VM/XA SF and VM/XA SP Compatibility Tables

This chapter summarizes compatibility information for CP commands and messages.

VM/XA SF and VM/XA SP Command Compatibility

Table 27 contains compatibility information for VM/XA SF commands. The compatibility categories are:

- **Upwardly compatible** with VM/XA SP. The command exists in both systems but there are differences in syntax, responses, and functions. Invocations and applications using the VM/XA SF command syntax should continue to execute unchanged.
- **Incompatible** with VM/XA SP. The command exists in both systems but differences in syntax, responses, or functions may cause some invocations or applications using the previous syntax to execute incorrectly or not to execute at all.

Any VM/XA SF command not listed in the table has a **compatible** VM/XA SP command. The command exists in both systems and has equivalent syntax, responses, or functions.

All commands and responses that use DISP in VM/XA SF use GRAF in VM/XA SP.

VM/XA SF Commands	Corresponding VM/XA SP Commands	Notes
AUTOLOG	AUTOLOG	Incompatible. VM/XA SP AUTOLOG does not have keyword parameters. The primary system operator is no longer allowed to log on a user unless the operator has class A or B command privileges. Messages displayed for an incorrect password differ from VM/XA SF. A new command, XAUTOLOG, is upwardly compatible with AUTOLOG. In addition to the command name difference, it has additional operands.
CHANGE	CHANGE	Incompatible. In VM/XA SP, the new spool ID is provided on the response when the file is changed to another user ID. Class D users are not allowed to specify SYSTEM and <i>spoolid</i> .
CLOSE	CLOSE	Incompatible. In VM/XA SP, the response is different when the file is closed to another user ID, and the new spool ID is provided.
DEFINE DISPLAY	DEFINE GRAF	DEFINE DISPLAY is a VM/XA SF-only command. Use DEFINE GRAF instead.
DEFINE DISP	DEFINE GRAF	Incompatible. The VM/XA SP DEFINE GRAF response has GRAF instead of DISP.

Table 27 (Page 2 of 5). VM/XA SF and VM/XA SP Command Compatibility		
VM/XA SF Commands	Corresponding VM/XA SP Commands	Notes
DETACH <i>vdev</i>	DETACH <i>vdev</i>	Incompatible. The VM/XA SP DETACH response does not have DASD.
DIAL	DIAL	Incompatible. The VM/XA SP DIAL responses are different and <i>type rdev</i> is omitted from the beginning of responses.
DISPLAY	DISPLAY	Incompatible. VM/XA SP DISPLAY has a different default format and has different rounding boundaries (hex 10 for translated output and fullword for untranslated output).
DISPLAY GUEST STORAGE	DISPLAY GUEST STORAGE	Incompatible. By default, VM/XA SP DISPLAY GUEST STORAGE displays guest real storage rather than guest logical storage.
DISPLAY REGISTERS	DISPLAY REGISTERS	Incompatible. The VM/XA SP DISPLAY REGISTERS response has GPR instead of G, FPR instead of Y, and CR instead of X.
DRAIN	DRAIN	Incompatible. A third line appears in the response for impact printers other than the 1403.
DUMP	DUMP	Incompatible. VM/XA SP DUMP has a different default format and has different rounding boundaries (X'10' for translated output and fullword for untranslated output).
DUMP GUEST STORAGE	DUMP GUEST STORAGE	Incompatible. By default, VM/XA SP DUMP GUEST STORAGE dumps guest real storage rather than guest logical storage. VM/XA SP dumps registers and then status when any guest storage is dumped. VM/XA SF dumped registers and storage only when all guest storage was dumped.
DUMP REGISTERS	DUMP REGISTERS	Incompatible. The VM/XA SP DUMP REGISTERS response has GPR instead of G, FPR instead of Y, and CR instead of X.
FORCE	FORCE	Incompatible. The VM/XA SP FORCE response has GRAF instead of DISP and DSC instead of DISC.
INDICATE	INDICATE	Incompatible. The VM/XA SP INDICATE response is different.
ORDER	ORDER	Incompatible. The privilege class D ORDER command no longer allows the <i>spoolid</i> operand with the SYSTEM operand. Responses to the privilege class D and G ORDER command that indicate the number of files ordered now have up to a seven-digit number.
PURGE	PURGE	Incompatible. VM/XA SP PURGE does not allow class D users to specify SYSTEM or <i>spoolid</i> .

Table 27 (Page 3 of 5). VM/XA SF and VM/XA SP Command Compatibility		
VM/XA SF Commands	Corresponding VM/XA SP Commands	Notes
QUERY FILES	QUERY FILES	Incompatible. VM/XA SP QUERY FILES does not allow class D users to specify SYSTEM or <i>spoolid</i> .
QUERY HOLD	QUERY HOLD	Incompatible. VM/XA SP QUERY HOLD provides different information. You must specify the LOG operand to display users whose logon is in hold status.
QUERY IMG	QUERY IMG	Incompatible. The format of the response has changed.
QUERY LOGMSG	QUERY LOGMSG	Incompatible. VM/XA SP QUERY LOGMSG does not display a header line and issues a response if there is no log message data.
QUERY NAMES	QUERY NAMES	Incompatible. The VM/XA SP QUERY NAMES response has DSC instead of DISC.
QUERY NSS	QUERY NSS	Incompatible. The format of the response has changed.
QUERY NSS MAP	QUERY NSS MAP	Incompatible. The format of the response has changed.
QUERY PF _{nn}	QUERY PF _{nn}	Incompatible. VM/XA SP QUERY PF _{nn} does not display saved lines under a PF key that is set to RETRIEVE. Also, the command no longer responds with "ALL PFS UNDEFINED."
QUERY PRINTER ALL	QUERY PRINTER ALL	Incompatible. VM/XA SP QUERY PRINTER ALL does not allow class D users to specify SYSTEM or <i>spoolid</i> .
QUERY PUNCH ALL	QUERY PUNCH ALL	Incompatible. VM/XA SP QUERY PUNCH ALL does not allow class D users to specify SYSTEM or <i>spoolid</i> .
QUERY READER ALL	QUERY READER ALL	Incompatible. VM/XA SP QUERY READER ALL does not allow class D users to specify SYSTEM or <i>spoolid</i> .
QUERY REAL DEVICE	QUERY REAL DEVICE	Incompatible. VM/XA SP displays a third line for impact printers.
QUERY REAL STOR	QUERY REAL STOR QUERY FRAMES	Incompatible. The VM/XA SP QUERY REAL STOR response is different; it is similar to the VM/XA SF QUERY FRAMES response.
QUERY SDF	QUERY SDF	Incompatible. VM/XA SP QUERY SDF does not have the CLASS operand. The command responds with the number of UCR files.
QUERY SRM	QUERY SRM QUERY SHARE	Incompatible. VM/XA SP QUERY SRM does not have the USER <i>userid</i> operand; QUERY SHARE does instead.

Table 27 (Page 4 of 5). VM/XA SF and VM/XA SP Command Compatibility		
VM/XA SF Commands	Corresponding VM/XA SP Commands	Notes
QUERY SYSTEM	QUERY SYSTEM	Incompatible. The VM/XA SP QUERY SYSTEM responses are different.
QUERY TAG	QUERY TAG	Incompatible. The VM/XA SP QUERY TAG response is different.
QUERY TERMINAL	QUERY TERMINAL	Incompatible. The VM/XA SP QUERY TERMINAL response has "BRKKEY PF01, ..., PF09" instead of "BRKKEY PF1, ..., PF9."
QUERY UR ATTACH	QUERY UR ATTACH	Incompatible. The VM/XA SP QUERY UR ATTACH response has one space between the device name and device address.
QUERY VIRTUAL CONSOLE	QUERY VIRTUAL CONSOLE	Incompatible. The VM/XA SP QUERY VIRTUAL CONSOLE response is different.
QUERY VIRTUAL DASD	QUERY VIRTUAL DASD	Incompatible. The VM/XA SP QUERY VIRTUAL DASD response is different.
QUERY VIRTUAL DISPLAY	QUERY VIRTUAL GRAF	Incompatible. QUERY VIRTUAL DISPLAY is a VM/XA SF-only command. Use QUERY VIRTUAL GRAF instead. The VM/XA SP QUERY VIRTUAL GRAF response has GRAF instead of DISP.
QUERY VIRTUAL PRINTER	QUERY VIRTUAL PRINTER	Incompatible. The VM/XA SP QUERY VIRTUAL PRINTER response contains PRT rather than DEV.
QUERY VIRTUAL PUNCH	QUERY VIRTUAL PUNCH	Incompatible. The VM/XA SP QUERY VIRTUAL PUNCH response contains PUN rather than DEV.
QUERY VIRTUAL READER	QUERY VIRTUAL READER	Incompatible. The VM/XA SP QUERY VIRTUAL READER response contains RDR rather than DEV.
RESET	RESET	Incompatible. The VM/XA SP RESET response is different.
REWIND	REWIND	Incompatible. The VM/XA SP REWIND responses are different.
SAVESEG	SAVESEG	The addition of CP saved segments adds restrictions on the saving of saved segments (both CP and non-CP) with the same name.
SAVESYS	SAVESYS	The addition of CP saved segments adds restrictions on the saving of named saved systems (both CP and non-CP) with the same name.
SET ACNT	SET ACNT	Incompatible. Issuing SET ACNT in VM/XA SP results in a message stating that the command is not supported, instead of being treated as a NO-OP as in VM/XA SF.

VM/XA SF Commands	Corresponding VM/XA SP Commands	Notes
SET CCWTRAN	SET NOTRANS	SET CCWTRAN is a VM/XA SF-only command. Use SET NOTRANS instead.
SET MITIME DISPLAY	SET MITIME GRAF	SET MITIME DISPLAY is a VM/XA SF-only command. Use SET MITIME GRAF instead.
SET SRM SHARE	SET SHARE	Incompatible. SET SRM SHARE is replaced by SET SHARE. The ABSCPU option is invalid.
SHUTDOWN	SHUTDOWN	A privilege class A user other than the primary system operator can issue SHUTDOWN. In such a case, the response "SYSTEM SHUTDOWN STARTED" goes to both the invoker and the primary system operator.
SLEEP	SLEEP	Incompatible. VM/XA SP SLEEP always issues a return code of 0 when the command is valid, even if the user cancels the command before it finishes; VM/XA SF issues a return code of 2.
SPTAPE	SPTAPE	Incompatible. VM/XA SP SPTAPE requires a user ID to be specified with a spool ID.
START	START	Incompatible. You must specify NOSEP on each START command if you do not want separator pages printed. In VM/XA SF, NOSEP remained in effect until the SEP option was specified on another START command.
STORE GUEST STORAGE	STORE GUEST STORAGE	Incompatible. By default, VM/XA SP STORE GUEST STORAGE stores into guest real storage rather than guest logical storage.
TERMINAL	TERMINAL	Incompatible. VM/XA SP TERMINAL does not have these operands: LINEDIT, MSG, WNG, EMSG, and IMSG. A virtual machine reset no longer resets the value established by the TERMINAL CONMODE command.
TRANSFER	TRANSFER	Incompatible. The VM/XA SP TRANSFER response has the new spool ID. You cannot specify SYSTEM and the user ID on the same command line.
TRSAVE	TRSAVE	Incompatible. The defaults are different and the VM/XA SP TRSAVE command has more functions.

VM/XA SF and VM/XA SP Message Compatibility

Table 28 compares messages that are incompatible between VM/XA SF and VM/XA SP. Incompatible messages are those that have the same number in both systems but have different texts, which could cause applications that depend on message texts to execute incorrectly or not to execute at all.

VM/XA SF messages that are *not* listed in the table are:

- Compatible messages. The message number exists in both systems and has the same message text.
- VM/XA SF-only messages.
- VM/XA SP-only messages.

Table 28 (Page 1 of 17). VM/XA SF and VM/XA SP Incompatible Messages

No.	System	Text
0001	VM/XA SF VM/XA SP	?CP: <i>command</i> Unknown CP command: <i>command</i>
0002	VM/XA SF VM/XA SP	INVALID OPERAND <i>operand</i> Invalid operand - <i>operand</i>
0003	VM/XA SF VM/XA SP	INVALID OPTION <i>option</i> Invalid option - { <i>option</i> command contains extra option(s) starting with <i>option</i> }
0004	VM/XA SF VM/XA SP	INVALID HEXLOC <i>hexloc</i> Invalid hexloc - <i>hexloc</i>
0005	VM/XA SF VM/XA SP	INVALID HEXDATA <i>hexdata</i> Invalid hexdata - <i>hexdata</i>
0006	VM/XA SF VM/XA SP	INVALID DEVICE TYPE { <i>rdev</i> <i>vdev</i> <i>ldev</i> } [Invalid device type - { <i>rdev</i> <i>vdev</i> <i>ldev</i> }] or [INVALID DEVICE TYPE { <i>rdev</i> <i>vdev</i> <i>ldev</i> }]
0007	VM/XA SF VM/XA SP	INVALID USERID <i>userid</i> Invalid userid - <i>userid</i>
0008	VM/XA SF VM/XA SP	INVALID SPOOLID <i>spoolid</i> Invalid spoolid - <i>spoolid</i>
0009	VM/XA SF VM/XA SP	INVALID RANGE <i>range</i> Invalid range - <i>range</i>
0010	VM/XA SF VM/XA SP	INVALID REGISTER <i>register</i> Invalid register - <i>register</i>
0011	VM/XA SF VM/XA SP	INVALID DEVICE TYPE - <i>userid vdev</i> Invalid device type - <i>userid vdev</i>
0012	VM/XA SF VM/XA SP	INVALID PSW <i>psw</i> Invalid PSW - <i>psw</i>
0013	VM/XA SF VM/XA SP	CONFLICTING OPTION <i>option</i> Conflicting option - <i>option</i>
0018	VM/XA SF VM/XA SP	SPOOLID MISSING Spoolid missing

Table 28 (Page 2 of 17). VM/XA SF and VM/XA SP Incompatible Messages

No.	System	Text
0019	VM/XA SF VM/XA SP	COMMAND PROCESSOR NOT LOADED The system command processor is not loaded.
0020	VM/XA SF VM/XA SP	USERID MISSING Userid missing or invalid
0021	VM/XA SF VM/XA SP	RDEV MISSING OR INVALID A real device number was not supplied or it is invalid.
0022	VM/XA SF VM/XA SP	VDEV MISSING OR INVALID A virtual device number was not supplied or it was invalid.
0023	VM/XA SF VM/XA SP	VOLID MISSING OR INVALID VOLID missing or invalid
0024	VM/XA SF VM/XA SP	CYLINDERS MISSING OR INVALID Cylinders missing or invalid
0025	VM/XA SF VM/XA SP	STORAGE MISSING OR INVALID Storage missing or invalid
0026	VM/XA SF VM/XA SP	OPERAND MISSING OR INVALID Operand missing or invalid
0028	VM/XA SF VM/XA SP	CLASS MISSING OR INVALID Class missing or invalid
0030	VM/XA SF VM/XA SP	INVALID NUMBER FOR <i>option operand</i> Copies missing or invalid
0031	VM/XA SF VM/XA SP	OPTION MISSING Buffer missing or invalid; extended FCB not supported
0033	VM/XA SF VM/XA SP	HEXLOC MISSING OR INVALID Hexloc missing or invalid
0035	VM/XA SF VM/XA SP	DEVICE TYPE MISSING OR INVALID Device type missing or invalid
0036	VM/XA SF VM/XA SP	INDEX MISSING OR INVALID Index missing or invalid
0038	VM/XA SF VM/XA SP	FORMAT OPERAND MISSING Parameter for <i>option option</i> missing or invalid - <i>parameter</i>
0039	VM/XA SF VM/XA SP	<i>command</i> COMMAND FOR CPU <i>nn</i> INVALID; CPU IN CHECK-STOP STATE Processor address missing or invalid
0040	VM/XA SF VM/XA SP	DEVICE { <i>rdev vdev ldev</i> } DOES NOT EXIST Device { <i>rdev vdev ldev</i> } does not exist
0041	VM/XA SF VM/XA SP	LOGMSG <i>nn</i> DOES NOT EXIST Logmsg <i>nn</i> does not exist.
0042	VM/XA SF VM/XA SP	SPOOLID <i>nnnn</i> DOES NOT EXIST User <i>userid</i> spoolid <i>nnnn</i> does not exist
0043	VM/XA SF VM/XA SP	BUFFER <i>name</i> DOES NOT EXIST Buffer <i>buffer</i> does not exist

VM/XA SF Conversion

Table 28 (Page 3 of 17). VM/XA SF and VM/XA SP Incompatible Messages

No.	System	Text
0044	VM/XA SF VM/XA SP	SYSTEM <i>name</i> DOES NOT EXIST System { <i>name volume</i> } does not exist
0045	VM/XA SF VM/XA SP	<i>userid</i> NOT LOGGED ON <i>userid</i> not logged on
0046	VM/XA SF VM/XA SP	<i>type rdev</i> OFFLINE <i>type rdev</i> offline
0047	VM/XA SF VM/XA SP	<i>userid vdev</i> DOES NOT EXIST <i>userid vdev</i> does not exist
0049	VM/XA SF VM/XA SP	<i>type rdev</i> IN USE <i>type vdev</i> in use
0050	VM/XA SF VM/XA SP	PASSWORD INCORRECT LOGON unsuccessful--incorrect password
0052	VM/XA SF VM/XA SP	ERROR IN CP DIRECTORY [XAUTOLOG failed for <i>userid</i> .] Error in CP directory
0053	VM/XA SF VM/XA SP	<i>userid</i> NOT IN CP DIRECTORY [XAUTOLOG failed for <i>userid</i> .] <i>userid</i> not in CP directory
0054	VM/XA SF VM/XA SP	ALREADY LOGGED ON {DISP <i>rdev</i> DISP <i>ldev</i> DISC} [XAUTOLOG failed for <i>userid</i> .] Already logged on { <i>type vdev</i> LUNAME <i>vdev</i> disconnected}
0055	VM/XA SF VM/XA SP	LINE(S) NOT AVAILABLE ON <i>userid</i> Line(s) not available on <i>userid</i>
0056	VM/XA SF VM/XA SP	LINE <i>vdev</i> BUSY ON <i>userid</i> Line <i>vdev</i> busy on <i>userid</i>
0057	VM/XA SF VM/XA SP	<i>userid</i> NOT RECEIVING; {DISCONNECTED MSG OFF WNG OFF MSG OFF NOT AUTHORIZED QUIESCED MSG TOO LONG VMCF ERROR <i>nnnn</i> IUCV ERROR <i>nnnn</i> } VMCF ERROR <i>nnn</i> ; <i>userid</i> not receiving; <i>text</i>
0058	VM/XA SF VM/XA SP	CTCA <i>vdev</i> BUSY ON <i>userid</i> CTCA <i>vdev</i> busy on <i>userid</i>
0059	VM/XA SF VM/XA SP	AUTOLOG FAILED FOR - <i>userid</i> {XAUTOLOG AUTOLOG} failed for <i>userid</i> - {IPL missing IPL failed accounting errors incorrect password}
0060	VM/XA SF VM/XA SP	DUMP FAILED; VIRTUAL PRINTER UNAVAILABLE {Dump failed Printer output terminated}; virtual printer unavailable
0061	VM/XA SF VM/XA SP	DUMP FAILED; VIRTUAL PRINTER ERROR Dump failed; virtual printer error
0067	VM/XA SF VM/XA SP	DUMP FAILED; SPOOLING ERROR Command format not valid
0068	VM/XA SF VM/XA SP	INVALID FORMAT OPERAND - <i>vmtype</i> SEND command failed; <i>text</i>
0088	VM/XA SF VM/XA SP	INVALID COUNT FOR <i>option operand</i> An invalid number was supplied for {COPY FLASH} - <i>operand</i> .

Table 28 (Page 4 of 17). VM/XA SF and VM/XA SP Incompatible Messages

No.	System	Text
0090	VM/XA SF VM/XA SP	DEVICE <i>vdev</i> NOT DEFINED; DEVICE { <i>rdev</i> <i>volser</i> } NOT AVAILABLE Device <i>vaddr</i> not defined; device { <i>raddr</i> <i>volser</i> } not available
0091	VM/XA SF VM/XA SP	DASD <i>vdev</i> NOT DEFINED; TEMPORARY SPACE NOT AVAILABLE DASD <i>vdev</i> not defined; temp space not available
0092	VM/XA SF VM/XA SP	<i>type vdev</i> NOT DEFINED; <i>type vdev</i> ALREADY DEFINED DEVICE <i>vdev</i> NOT DEFINED; <i>device vdev</i> ALREADY DEFINED
0094	VM/XA SF VM/XA SP	STORAGE REQUESTED EXCEEDS ALLOWED MAXIMUM OF <i>nnn</i> MEG Storage exceeds allowed maximum of <i>nnn</i> MEG
0095	VM/XA SF VM/XA SP	DEVICE <i>vdev</i> NOT DEFINED; MAXIMUM NUMBER OF DEVICES ALREADY DEFINED Device <i>vaddr</i> not defined; insufficient free storage
0101	VM/XA SF VM/XA SP	DASD <i>vdev</i> FORCED R/O; R/O BY { <i>nnn</i> USERS <i>userid</i> } DASD <i>vdev</i> forced R/O; R/O by { <i>nnnn</i> users <i>userid</i> }
0102	VM/XA SF VM/XA SP	DASD <i>vdev</i> FORCED R/O; R/W BY { <i>nnn</i> USERS <i>userid</i> } Dasd <i>vaddr</i> forced R/O; R/W by { <i>nnnn</i> users <i>userid</i> }
0103	VM/XA SF VM/XA SP	DASD <i>vdev</i> FORCED R/O; R/W BY { <i>nnn</i> USERS <i>userid</i> }; R/O BY { <i>nnn</i> USERS <i>userid</i> } DASD <i>vdev</i> forced R/O; R/W by { <i>nnnnn</i> users <i>userid</i> }; R/O by { <i>nnnnn</i> users <i>userid</i> }
0104	VM/XA SF VM/XA SP	<i>userid vdev</i> NOT LINKED; R/O BY { <i>nnn</i> USERS <i>userid</i> } <i>userid vdev</i> not linked; R/O by { <i>nnnnn</i> users <i>userid</i> }
0105	VM/XA SF VM/XA SP	<i>userid vdev</i> NOT LINKED; R/W BY { <i>nnn</i> USERS <i>userid</i> } <i>userid vdev</i> not linked; R/W by { <i>nnnn</i> users <i>userid</i> }
0106	VM/XA SF VM/XA SP	<i>userid vdev</i> NOT LINKED; R/W BY { <i>nnn</i> USERS <i>userid</i> }; R/O BY { <i>nnn</i> USERS <i>userid</i> } <i>userid vdev</i> not linked; R/W by { <i>nnnnn</i> users <i>userid</i> }, R/O by { <i>nnnnn</i> users <i>userid</i> }
0107	VM/XA SF VM/XA SP	<i>userid vdev</i> NOT LINKED; NOT IN CP DIRECTORY <i>userid vdev</i> not linked; not in CP directory
0108	VM/XA SF VM/XA SP	<i>userid vdev</i> NOT LINKED; VOLID <i>valid</i> NOT MOUNTED <i>userid vdev</i> not linked; valid <i>valid</i> not mounted
0109	VM/XA SF VM/XA SP	<i>userid vdev</i> NOT LINKED; INVALID LINK DEVICE <i>userid vdev</i> not linked; invalid link device
0110	VM/XA SF VM/XA SP	<i>userid vdev</i> NOT LINKED; <i>type vdev</i> ALREADY DEFINED <i>userid vdev</i> not linked; <i>type vdev</i> already defined
0111	VM/XA SF VM/XA SP	<i>userid vdev</i> NOT LINKED; NO READ PASSWORD <i>userid vdev</i> not linked; no read password
0112	VM/XA SF VM/XA SP	<i>userid vdev</i> NOT LINKED; NO WRITE PASSWORD <i>userid vdev</i> not linked; no write password
0113	VM/XA SF VM/XA SP	<i>userid vdev</i> NOT LINKED; NO MULT PASSWORD <i>userid vdev</i> not linked; no multiple password
0114	VM/XA SF VM/XA SP	<i>userid vdev</i> NOT LINKED; PASSWORD INCORRECT <i>userid vdev</i> not linked; mode or password incorrect

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Table 28 (Page 5 of 17). VM/XA SF and VM/XA SP Incompatible Messages

No.	System	Text
0115	VM/XA SF VM/XA SP	LINK INVALID; EXCESSIVE INCORRECT PASSWORDS {LINK AUTOLOG XAUTOLOG} invalid; excessive incorrect passwords
0117	VM/XA SF VM/XA SP	<i>userid vdev</i> HAS NOT BEEN LINKED BECAUSE VOLUME <i>valid</i> IS NOT ON THE SPECIFIED TYPE OF DEVICE Userid <i>userid</i> not linked; valid <i>valid</i> conflict
0118	VM/XA SF VM/XA SP	<i>userid vdev</i> NOT LINKED; COMMAND FORMAT NOT VALID <i>userid vdev</i> not linked; command format not valid
0120	VM/XA SF VM/XA SP	<i>type {rdev ldev}</i> NOT ATTACHED; <i>userid vdev</i> ALREADY DEFINED <i>type {rdev ldev}</i> not attached; <i>userid vdev</i> already defined
0121	VM/XA SF VM/XA SP	<i>type {rdev ldev}</i> NOT ATTACHED TO <i>userid</i> <i>type {rdev ldev}</i> not attached to { <i>userid system</i> }
0122	VM/XA SF VM/XA SP	<i>type {rdev ldev}</i> ALREADY ATTACHED TO <i>userid</i> <i>type {rdev ldev}</i> already attached to <i>userid</i>
0123	VM/XA SF VM/XA SP	DASD <i>rdev</i> CP OWNED DASD <i>rdev</i> CP-owned
0124	VM/XA SF VM/XA SP	DASD <i>rdev</i> IN USE BY <i>nnnn</i> VIRTUAL DEVICE(S) DASD <i>rdev</i> in use by <i>nnnn</i> users
0125	VM/XA SF VM/XA SP	DASD <i>rdev</i> VOLID <i>valid</i> ALREADY ATTACHED TO SYSTEM DASD <i>rdev</i> volid <i>valid</i> already attached to system
0126	VM/XA SF VM/XA SP	DASD <i>rdev</i> ERROR READING VOLID DASD <i>rdev</i> error reading volid
0127	VM/XA SF VM/XA SP	DASD <i>rdev</i> VOLID <i>valid</i> DOES NOT MATCH DASD <i>rdev</i> volid <i>valid</i> does not match
0128	VM/XA SF VM/XA SP	DASD <i>rdev</i> ERROR READING ALLOCATION RECORD DASD <i>rdev</i> error reading allocation record
0140	VM/XA SF VM/XA SP	<i>type {rdev ldev}</i> ATTACHED TO <i>userid</i> <i>type {rdev ldev}</i> attached to <i>userid</i>
0141	VM/XA SF VM/XA SP	<i>type rdev</i> NOT ACTIVE <i>type rdev</i> not active
0142	VM/XA SF VM/XA SP	<i>type rdev</i> NOT DRAINED <i>type rdev</i> not drained
0143	VM/XA SF VM/XA SP	<i>type rdev</i> IN USE BY SYSTEM <i>type rdev</i> in use by system
0148	VM/XA SF VM/XA SP	<i>rdev</i> BUFFER LOAD <i>name</i> FAILED Printer <i>rdev</i> buffer load <i>name</i> failed
0152	VM/XA SF VM/XA SP	<i>userid vdev</i> HAS NOT BEEN LINKED BECAUSE IT IS NOT WITHIN CP VOLUME CYLINDER EXTENTS {PFCOPY PFTAB} not available
0153	VM/XA SF VM/XA SP	<i>userid vdev</i> HAS NOT BEEN LINKED BECAUSE IT WOULD OVERLAP SYSTEM <i>type</i> SPACE Device { <i>vdev RANGE</i> } exceeds maximum number of virtual devices

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No.	System	Text
0155	VM/XA SF	DEVICE <i>rdev</i> HAS NOT BEEN ATTACHED TO THE SYSTEM BECAUSE IT IS NOT A DASD DEVICE
	VM/XA SP	Device <i>rdev</i> has not been attached to the system because it is not a DASD device.
0160	VM/XA SF	HEXLOC <i>hexloc</i> EXCEEDS STORAGE
	VM/XA SP	Hexloc <i>hexloc</i> exceeds storage
0163	VM/XA SF	STORE EXCEEDS MAXIMUM REGISTER
	VM/XA SP	STORE exceeds maximum register
0164	VM/XA SF	HEXLOC <i>hexloc</i> NON-ADDRESSABLE STORAGE
	VM/XA SP	Hexloc <i>hexloc</i> non-addressable storage
0167	VM/XA SF	INVALID MASK FOR DATA RANGE SPECIFIED
	VM/XA SP	The mask is invalid for the specified data range.
0170	VM/XA SF	SYSTEM <i>name</i> EXCEEDS STORAGE SIZE; { <i>nnnK nnnM</i> } REQUIRED
	VM/XA SP	System <i>name</i> exceeds storage size; { <i>nnnnnnnnK nnnM</i> } required
0174	VM/XA SF	PAGING I/O ERROR; IPL FAILED
	VM/XA SP	Paging I/O error; IPL failed
0177	VM/XA SF	PARM EXCEEDS 64 CHARACTERS
	VM/XA SP	Your PARM data exceeds the limit of <i>nm</i> characters. Correct your data string and reissue the IPL command.
0180	VM/XA SF	TRACE NOT IN EFFECT
	VM/XA SP	Trace not in effect
0196	VM/XA SF	SHARED NOT SET {ON OFF} FOR <i>type rdev</i> ; NOT A SHARED DEVICE
	VM/XA SP	Secondary user not in CP directory
0197	VM/XA SF	SHARED NOT SET {ON OFF} FOR <i>type rdev</i> ; DOES NOT SUPPORT RESERVE/RELEASE
	VM/XA SP	Secondary user is not available
0200	VM/XA SF	VIRT = REAL AREA NOT AVAILABLE; IN USE BY { <i>userid</i> SYSTEM}
	VM/XA SP	Virtual = Real area not available; in use by { <i>userid nnnn user(s)</i> }
0202	VM/XA SF	VIRT = REAL AREA NOT AVAILABLE; INSUFFICIENT
	VM/XA SP	Virtual = {Real Fixed} area not available; insufficient storage
0203	VM/XA SF	V = R AREA REQUIRES IPL BY DEVICE NUMBER
	VM/XA SP	Virtual = {Real Fixed} area requires IPL by device number
0204	VM/XA SF	INVALID PAGE(S) SPECIFIED, V = R AREA
	VM/XA SP	Invalid page(s) specified - Virtual = Real area
0205	VM/XA SF	VIRT = REAL AREA NOT GENERATED
	VM/XA SP	The virtual = real area is not available because it was not generated.
0206	VM/XA SF	VIRT = REAL AREA NOT AVAILABLE; UNLOCKED
	VM/XA SP	Cannot connect to host virtual machine
0232	VM/XA SF	IPL UNIT ERROR; {CSW = <i>csw</i> IRB = <i>irb</i> }, SENSE = <i>sense</i>
	VM/XA SP	IPL UNIT ERROR, {CSW = <i>csw</i> IRB = <i>irb</i> }, SNS = <i>sense</i>
0240	VM/XA SF	PRT <i>rdev</i> FCB <i>fc</i> DOES NOT MATCH FORM LENGTH; FILE <i>spid</i> {HELD PURGED FLUSHED REQUEUED CLOSED}
	VM/XA SP	The form length mounted on printer <i>rdev</i> does not match the length described by the FCB <i>fc</i> .

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No.	System	Text
0241	VM/XA SF	PRT <i>rdev</i> UNDEFINED LOAD IMAGE <i>imagname</i> SPECIFIED; FILE <i>spid</i> {HELD PURGED REQUEUED CLOSED}
	VM/XA SP	An undefined load image <i>imagname</i> was specified for printer <i>rdev</i> .
0247	VM/XA SF	3800 NAMED IMAGE <i>imagname</i> CREATED
	VM/XA SP	NAMED IMAGE <i>imagname</i> CREATED
0255	VM/XA SF	PRT <i>rdev</i> WAS RESET AND <i>nnnn</i> PAGES WERE LOST
	VM/XA SP	PRINTER <i>rdev</i> ; PAGE BUFFER DESTROYED, BACKUP PAGE COUNT = <i>nnnn</i>
0259	VM/XA SF	<i>type rdev</i> REQUIRES OPERATOR INTERVENTION DUE TO A LINE OVERRUN CONDITION
	VM/XA SP	SIZE parameter missing or invalid
0260	VM/XA SF	COMMAND <i>command</i> ENDED DUE TO ERRORS
	VM/XA SP	{Command SPTAPE command <i>command</i> command} processing cannot complete due to errors.
0261	VM/XA SF	INVALID KEY <i>key</i>
	VM/XA SP	<i>key</i> is an invalid storage key.
0262	VM/XA SF	VIRTUAL CONSOLE NOT DEFINED
	VM/XA SP	The virtual console is not defined or is detached.
0263	VM/XA SF	TOO MANY OPERANDS IN COMMAND LINE
	VM/XA SP	Too many operands were supplied for this command.
0264	VM/XA SF	OPTION(S) IGNORED; <i>option(s)</i>
	VM/XA SP	One or more options are ignored during reconnect processing - <i>option(s)</i>
0266	VM/XA SF	ACCOUNT NUMBER MISSING OR INVALID
	VM/XA SP	An account number was not supplied or is invalid.
0267	VM/XA SF	SCHIB MISSING OR INVALID
	VM/XA SP	A subchannel number was not supplied or is invalid.
0270	VM/XA SF	ACCOUNTING ERROR
	VM/XA SP	The character sets specified for the printer <i>rdev</i> required more writable character generation modules than were available.
0289	VM/XA SF	DEVICE <i>vdev</i> NOT DEFINED; MAXIMUM NUMBER OF DEVICES ALREADY DEFINED
	VM/XA SP	{User Group} { <i>userid</i> <i>group</i> } already enabled by traceid <i>traceid</i> .
0295	VM/XA SF	INVALID PAGE(S) SPECIFIED, NOT CP PAGEABLE
	VM/XA SP	The specified pages cannot be locked or unlocked because they are not in the CP pageable area.
0298	VM/XA SF	TRAP LIMIT EXCEEDED; COMMAND REJECTED
	VM/XA SP	<i>userid vdev</i> not linked; request denied
0299	VM/XA SF	{ <i>SEGMENT</i> <i>SYSTEM</i> } NOT DEFINED; SKELETON ALREADY EXISTS.
	VM/XA SP	The {Named Saved System (NSS) saved segment} <i>name</i> could not be defined because a class S file with the same name already exists.
0300	VM/XA SF	SAVE REQUEST BEYOND VIRTUAL MACHINE SIZE
	VM/XA SP	Save request beyond virtual machine size

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No.	System	Text
0310	VM/XA SF VM/XA SP	DATE <i>date</i> INVALID; NOT CHANGED Date <i>date</i> invalid; not changed
0315	VM/XA SF VM/XA SP	INVALID MODE - MUST BE 370 THE CPFORMAT COMMAND REQUIRES THE VIRTUAL MACHINE TO BE IN 370 MODE.
0320	VM/XA SF VM/XA SP	ALTERNATE PROCESSOR INITIALIZATION UNSUCCESSFUL SUBSYSTEM PROCESSING ERROR - FAULT CODE = <i>code-raddr/ss-xx-xx</i>
0321	VM/XA SF VM/XA SP	PROCESSOR QUIESCED -- VARY OFFLINE DASD <i>rdev</i> SUBSYSTEM STORAGE EQUIPMENT CHECK - FAULT CODE = <i>code-ss-XX-XX</i>
0322	VM/XA SF VM/XA SP	FAILING PROCESSOR QUIESCED DASD <i>rdev</i> SUBSYSTEM STORAGE AVAILABILITY THRESHOLD CROSSED- <i>ss-XX-XX</i>
0323	VM/XA SF VM/XA SP	PROCESSOR QUIESCED FOR SYSTEM TERMINATION DASD <i>rdev</i> SUBSYSTEM STORAGE IS UNUSABLE - FAULT CODE = <i>code-ss-XX-XX</i>
0324	VM/XA SF VM/XA SP	NO SPECIFIC TRACE IN EFFECT DASD <i>rdev</i> SUBSYSTEM MUST BE INITIALIZED - FAULT CODE = <i>code-ss-XX-XX</i>
0325	VM/XA SF VM/XA SP	NO SPECIFIC TRACE IN EFFECT FOR DASD <i>rdev</i> STORAGE DIRECTOR COMMUNICATION FAILED - FAULT CODE = <i>code-ss-XX-XX</i>
0326	VM/XA SF VM/XA SP	XSTORE NOT AVAILABLE. ALREADY IN USE [BY USER- <i>userid</i>] DASD <i>rdev</i> TRACK FORMAT NOT SUPPORTED FOR PAGING - <i>ss-XX-XX</i>
0332	VM/XA SF VM/XA SP	CPU <i>nn</i> (BASE) IS NOT DETACHED Invalid control unit type - <i>rdev</i>
0339	VM/XA SF VM/XA SP	INVALID PAGE DESCRIPTOR CODE <i>invalid code</i> FOR RANGE <i>nnnnn-nnnnn</i> SEGM The command processing cannot complete because the page descriptor code <i>invalid-code</i> for the page range
0353	VM/XA SF VM/XA SP	SYSRES DEVICE <i>rdev</i> NOT FOUND Sysres device type invalid or device <i>rdev</i> not operational
0361	VM/XA SF VM/XA SP	DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE A TIME-OUT CONDITION OCCURRED. {XAUTOLOG failed for <i>userid</i> .} LOGOFF/FORCE pending for user <i>userid</i>
0362	VM/XA SF VM/XA SP	DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE THE SUBCHANNEL-ID IS INVALID. [Device <i>rdev</i> cannot be varied online because the subchannel-id is invalid.] or [DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE THE SUBCHANNEL-ID IS INVALID.]
0386	VM/XA SF VM/XA SP	DASD <i>vdev</i> IS READ ONLY FORMATTING CANNOT BE DONE ON DASD <i>vdev</i> BECAUSE IT IS READ-ONLY.

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No.	System	Text
0387	VM/XA SF	INVALID CONSOLE <i>vdev</i> FOR CPFORMAT -MUST BE A 3 DIGIT DEVICE ADDRESS
	VM/XA SP	THE CPFORMAT COMMAND REQUIRES A 3-DIGIT DEVICE NUMBER FOR THE VIRTUAL CONSOLE <i>vdev</i> .
0388	VM/XA SF	CPFORMAT CANNOT BE ISSUED BY A V=R USER
	VM/XA SP	CPFORMAT cannot be issued by a Virtual = {Real Fixed} user.
0389	VM/XA SF	CYLINDER RANGE TOO LARGE - DEVICE <i>vdev</i> HAS <i>nnn</i> CYLINDERS
	VM/XA SP	THE CYLINDER RANGE IS TOO LARGE BECAUSE DEVICE <i>vdev</i> HAS <i>nnnn</i> CYLINDERS.
0396	VM/XA SF	CPFORMAT TERMINATED
	VM/XA SP	THE CPFORMAT COMMAND PROCESSING DID NOT COMPLETE.
0400	VM/XA SF	SYSTEM {SPOOLING PAGING} AREA FULL
	VM/XA SP	All {paging spooling} space is in use.
0401	VM/XA SF	SYSTEM {SPOOLING PAGING} AREA 90 PERCENT FULL
	VM/XA SP	90 percent of all {paging spooling} space is in use.
0405	VM/XA SF	MOUNT FORM <i>operform</i> ON {PRT PUN} <i>rdev</i>
	VM/XA SP	Mount form <i>operform</i> on {printer punch} <i>rdev</i>
0406	VM/XA SF	SETUP FORM <i>operform</i> ON PRT <i>rdev</i> FOR FORMS ALIGNMENT CHECK
	VM/XA SP	Check forms alignment for form <i>operform</i> on printer <i>rdev</i> .
0407	VM/XA SF	NO FILES {SCANNED DUMPED LOADED} FOR SPTAPE ON DRIVE <i>rdev</i>
	VM/XA SP	No files were {scanned dumped loaded} for SPTAPE on drive <i>rdev</i> .
0408	VM/XA SF	INPUT TAPE ON DRIVE <i>rdev</i> IS NOT IN SPTAPE FORMAT
	VM/XA SP	The input tape on drive <i>rdev</i> is not in SPTAPE format.
0412	VM/XA SF	SPTAPE UNRECOVERABLE I/O ERROR ON DRIVE <i>rdev</i>
	VM/XA SP	An unrecoverable I/O error occurred on the SPTAPE tape drive <i>rdev</i> .
0413	VM/XA SF	COMMAND ENDED DUE TO SPOOL PAGING ERROR
	VM/XA SP	Command processing cannot complete due to a spool paging error.
0415	VM/XA SF	CONTINUOUS PAGING ERRORS ON VOLUME <i>volser</i>
	VM/XA SP	Six continuous paging errors have occurred on DASD <i>nnnn</i> volume <i>volser</i> .
0416	VM/XA SF	SPTAPE <i>func</i> FUNCTION ON DRIVE <i>rdev</i> TERMINATED
	VM/XA SP	The SPTAPE <i>func</i> function on drive <i>rdev</i> did not complete.
0417	VM/XA SF	{ <i>rdev vdev</i> } NOT AN OUTPUT SPOOLING DEVICE
	VM/XA SP	{ <i>rdev vdev</i> } is not an output spooling device.
0418	VM/XA SF	{ <i>rdev vdev</i> } NOT A SPOOLED DEVICE
	VM/XA SP	{ <i>rdev vdev</i> } is not a spooled device.
0419	VM/XA SF	{ <i>rdev vdev</i> } NOT A SPOOLED PRINTER
	VM/XA SP	{ <i>rdev vdev</i> } is not a spooled printer.
0421	VM/XA SF	PRT <i>pri-type</i> DOES NOT SUPPORT <i>feature command</i>
	VM/XA SP	Printer <i>pri-type</i> does not support the { <i>feature feature command command</i> }.
0422	VM/XA SF	CONFLICTING OPTION; SAME OPTION SPECIFIED TWICE
	VM/XA SP	The same option was specified twice.

Table 28 (Page 10 of 17). VM/XA SF and VM/XA SP Incompatible Messages

No.	System	Text
0423	VM/XA SF VM/XA SP	CONFLICTING OPTION; INCOMPATIBLE WITH PRIOR OPERAND The function requested is incompatible with a previously-specified operand.
0427	VM/XA SF VM/XA SP	{CON PRT PUN RDR NSS TAPE}{ <i>rdev</i> <i>vdev</i> <i>name</i> } SYSTEM SPOOL SPACE FULL; FILE {HELD PURGED} <i>type</i> { <i>rdev</i> <i>vdev</i> <i>name</i> } system spool space full; file {closed held purged}
0428	VM/XA SF VM/XA SP	{PRT PUN RDR TAPE} <i>rdev</i> SPOOL ERROR; FILE {HELD PURGED} <i>type rdev</i> spool error; file {held purged closed}
0429	VM/XA SF VM/XA SP	{CONS PRT PUN RDR} <i>vdev</i> SPOOL ERROR; FILE {HELD PURGED} <i>type vdev</i> spool error; file {held purged}
0431	VM/XA SF VM/XA SP	RDR <i>rdev</i> ID CARD MISSING OR INVALID Reader <i>rdev</i> id card missing or invalid
0432	VM/XA SF VM/XA SP	RDR <i>rdev</i> ID CARD INVALID; <i>userid</i> NOT IN CP DIRECTORY The ID card for reader <i>rdev</i> is invalid because <i>userid</i> is not in the CP directory.
0433	VM/XA SF VM/XA SP	RDR <i>rdev</i> ID CARD; INVALID DATA <i>data</i> Reader <i>rdev</i> id card; invalid data - <i>data</i>
0435	VM/XA SF VM/XA SP	PAGING I/O ERROR OCCURRED WHILE WRITING A PAGE. {DEFSYS DEFSEG SAVESYS SAVESEG} COMMAND NOT COMPLETED. [<i>SAVESYS</i> <i>SAVESEG</i>] command was not completed because a paging I/O error occurred while writing a page.] or [<i>DEFSYS</i> <i>DEFSEG</i>] command processing cannot complete because a paging I/O error occurred while writing a page.]
0439	VM/XA SF VM/XA SP	NO SPOOL FILE ID NUMBERS AVAILABLE {User <i>userid</i> *NSS *IMG *UCR *NLS} spool fileid limit exceeded
0440	VM/XA SF VM/XA SP	{SEGMENT SYSTEM} <i>name</i> {DEFINED SAVED} SUCCESSFULLY IN FILEID <i>fileid</i> . {Named Saved System (NSS) saved segment} <i>name</i> was successfully {saved defined} in fileid
0445	VM/XA SF VM/XA SP	{SEGMENT SYSTEM} <i>name</i> COULD NOT BE {DEFINED SAVED} DUE TO AN UNEXPECTED ERROR. The {Named Saved System (NSS) saved segment} <i>name</i> could not be {saved defined} due to an unexpected error.
0446	VM/XA SF VM/XA SP	{SEGMENT SYSTEM} <i>name</i> NOT PREVIOUSLY DEFINED AND CANNOT BE SAVED The {Named Saved System (NSS) saved segment} <i>name</i> was not previously defined and cannot be saved.
0447	VM/XA SF VM/XA SP	SYSTEM <i>sysname</i> CANNOT BE IPLLED DUE TO INVALID PROCESSOR CONFIGURATION System <i>sysname</i> cannot be IPLed due to an invalid processor configuration.
0448	VM/XA SF VM/XA SP	SYSTEM <i>name</i> NOT QUIESCED. OUTSTANDING {I/O ON DEVICE <i>vdev</i> EXTERNAL INTERRUPT}. System <i>name</i> not quiesced. Outstanding I/O on device <i>rdev</i> .
0449	VM/XA SF VM/XA SP	YOUR USERID IS NOT AUTHORIZED TO IPL SYSTEM <i>name</i> Your userid is not authorized to IPL system <i>name</i> .
0450	VM/XA SF VM/XA SP	CP ENTERED; DISABLED WAIT PSW <i>psw</i> CP entered; disabled wait PSW <i>psw</i>

Table 28 (Page 11 of 17). VM/XA SF and VM/XA SP Incompatible Messages

No.	System	Text
0452	VM/XA SF VM/XA SP	CP ENTERED; EXTERNAL INTERRUPT LOOP CP entered; external interrupt loop
0475	VM/XA SF VM/XA SP	FATAL I/O ERROR READING DIRECTORY ENTRY [FOR USER <i>userid</i>] Fatal I/O error trying to read directory from <i>valid</i> [for user <i>userid</i>]
0521	VM/XA SF VM/XA SP	<i>type rdev</i> HAS NO AVAILABLE CHANNEL PATHS <i>type rdev</i> has no available channel paths
0541	VM/XA SF VM/XA SP	COPY ERROR ON PRINTER The PF key copy function cannot complete due to a permanent I/O error on the printer.
0542	VM/XA SF VM/XA SP	DASD <i>rdev</i> OP INC CMD = <i>cm</i> SNS = <i>sense</i> IRB = <i>irb</i> USERID = <i>userid</i> BBC DASD <i>rdev</i> OP INC CMD = <i>cm</i> SNS = <i>sense</i> IRB = <i>irb</i> USERID = <i>userid</i> [BBCCHH = <i>bbcchh</i>]
0575	VM/XA SF VM/XA SP	I/O ERROR ADD = <i>raddr</i> , USERID = <i>userid</i> I/O error add <i>rdev</i> , <i>userid</i> = <i>userid</i>
0580	VM/XA SF VM/XA SP	RECORDING RETRIEVAL DISK <i>nn%</i> FULL, USER <i>userid</i> TAPE <i>rdev</i> A SENSE COMMAND WAS ISSUED WITH NO OUTSTANDING UNIT CHECK
0581	VM/XA SF VM/XA SP	RECORDING RETRIEVAL DISK FULL[, USER <i>userid</i>] TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE A LOAD DISPLAY CHECK OCCURRED LOAD DISPLAY CHECK OCCURRED
0582	VM/XA SF VM/XA SP	RECORDING <i>recording name nnn</i> PURGED; USER <i>userid</i> TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE A WRITE ID MARK CHECK OCCURRED
0584	VM/XA SF VM/XA SP	RECORDING COUNT <i>nnn</i> RECORDS <i>recording name userid</i> TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE A CAPABILITY CHECK OCCURRED
0585	VM/XA SF VM/XA SP	RECORDING ERROR <i>function re</i> RECORDS <i>recording name userid</i> TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE A TAPE VOID CHECK OCCURRED
0586	VM/XA SF VM/XA SP	RECORDING ERROR <i>function error code userid</i> TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE OF A LOSS OF TENSION ON THE TAPE
0587	VM/XA SF VM/XA SP	RECORDING IDENTIFY ERROR <i>userid</i> {INVALID PROTOCOL} TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE A TAPE LENGTH ERROR OCCURRED
0588	VM/XA SF VM/XA SP	RECORDING ENTRY <i>recording name userid</i> NOT ALTERED TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE THE PHYSICAL END OF TAPE WAS ENCOUNTERED
0589	VM/XA SF VM/XA SP	RECORDING DATA RETRIEVAL STARTED, RECORDS <i>recording name userid</i> TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE THE BEGINNING OF THE TAPE WAS ENCOUNTERED

Table 28 (Page 12 of 17). VM/XA SF and VM/XA SP Incompatible Messages

No.	System	Text
0591	VM/XA SF VM/XA SP	<i>nnnn recording name</i> RECORDS PROCESSED, USER <i>userid</i> TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE DESIRED BLOCK WAS NOT FOUND
0592	VM/XA SF VM/XA SP	ENTER END OR SUMMARY TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE THE DRIVE IS ASSIGNED ELSEWHERE
0593	VM/XA SF VM/XA SP	RECORDING ERROR <i>re</i> ON <i>function</i> USER <i>userid</i> TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE THE DRIVE IS OFFLINE
0594	VM/XA SF VM/XA SP	RECORDING RETRIEVAL, RECORD <i>recording name nnnn</i> TOO LARGE, USER <i>userid</i> TAPE <i>rdev</i> A CONTROL UNIT CHECK ONE ERROR OCCURRED
0595	VM/XA SF VM/XA SP	RECORDING RETRIEVAL <i>recording name</i> WRITE ERROR <i>rc</i> [,USER <i>userid</i>] TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE A CONTROL UNIT ERP FAILURE OCCURRED
0596	VM/XA SF VM/XA SP	INVALID INPUT PARAMETER <i>option</i> TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE THE CONTROL UNIT AND DRIVE ARE INCOMPATIBLE
0597	VM/XA SF VM/XA SP	RECORDING INITIALIZATION ERROR, RECORDS NOT RETRIEVABLE TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE A READ OPPOSITE CHECK OCCURRED
0598	VM/XA SF VM/XA SP	RECORDING ENTRY NOT FOUND TAPE <i>rdev</i> AN OPERATION WAS TERMINATED BECAUSE OF AN INVALID BLOCK ID SEQUENCE
0630	VM/XA SF VM/XA SP	TOD CLOCK SYNCHRONIZATION FAILURE The TOD-clock could not be synchronized due to a processor controller failure.
0631	VM/XA SF VM/XA SP	PROCESSOR <i>nn</i> - TOD CLOCK SYNCHRONIZATON FAILURE The TOD-clock could not be synchronized because CP was unable to vary a processor back online.
0632	VM/XA SF VM/XA SP	PROCESSOR CONTROLLER FAILURE; ORDERLY SYSTEM SHUTDOWN IS RECOMMENDED A system shutdown is recommended due to a processor controller failure.
0633	VM/XA SF VM/XA SP	COMMAND REJECTED; VECTOR <i>nn</i> ALREADY ONLINE The VARY ONLINE VECTOR command cannot be processed because vector <i>nn</i> is already online.
0634	VM/XA SF VM/XA SP	COMMAND REJECTED; VECTOR <i>nn</i> ALREADY OFFLINE The VARY OFFLINE VECTOR command cannot be processed because vector <i>nn</i> is already offline.
0635	VM/XA SF VM/XA SP	VECTOR <i>nn</i> LOGICALLY OFFLINE; PHYSICAL VARY FAILED Vector facility <i>nn</i> is logically offline but the physical vary failed.
0636	VM/XA SF VM/XA SP	VARY VECTOR COMMAND FAILED; PROCESSOR <i>nn</i> NOT ONLINE The VARY VECTOR command cannot be processed because processor <i>nn</i> is not online.

VM/XA SF Conversion

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No.	System	Text
0637	VM/XA SF VM/XA SP	VARY VECTOR COMMAND FAILED; VECTOR <i>nn</i> NOT AVAILABLE The VARY VECTOR command cannot be processed because vector facility <i>nn</i> is not available.
0638	VM/XA SF VM/XA SP	LAST OPERATIONAL VECTOR FACILITY HAS BEEN REMOVED FROM CONFIGURATION The last operational vector facility has been removed from the configuration.
0649	VM/XA SF VM/XA SP	VECTOR <i>nn</i> NO LONGER AVAILABLE TO SERVICE DEDICATED USER <i>vruser</i> CPU <i>nn</i> Vector facility <i>nn</i> is no longer available to service the dedicated user <i>userid</i> on CPU <i>nn</i> .
0650	VM/XA SF VM/XA SP	CP ENTERED; COMPLEX INTERRUPT LOOP The virtual machine is placed in CP mode due to a complex interrupt loop.
0657	VM/XA SF VM/XA SP	PAGE ZERO DAMAGED The virtual machine's page zero is unavailable because it is damaged.
0659	VM/XA SF VM/XA SP	VECTOR NOT DEFINED; VECTOR <i>nn</i> ALREADY EXISTS The vector cannot be defined because vector <i>nn</i> already exists.
0660	VM/XA SF VM/XA SP	VECTOR <i>nn</i> DOES NOT EXIST The DETACH command cannot be processed because vector <i>nn</i> does not exist.
0661	VM/XA SF VM/XA SP	VECTOR NOT DEFINED; CPU <i>nn</i> DOES NOT EXIST The vector cannot be defined because CPU <i>nn</i> does not exist.
0662	VM/XA SF VM/XA SP	NO REAL VECTOR FACILITY AVAILABLE TO SERVICE VECTOR <i>nn</i> [<i>nn...</i>] No real vector facility is available to service vector(s) <i>nn</i> { <i>nn...</i> }.
0663	VM/XA SF VM/XA SP	VECTOR NOT DEFINED; NO REAL VECTOR FACILITY INSTALLED The vector cannot be defined because no real vector facility is installed.
0664	VM/XA SF VM/XA SP	NO REAL VECTOR FACILITY AVAILABLE TO SERVICE NON-DEDICATED USERS No real vector facility is available to service non-dedicated users.
0743	VM/XA SF VM/XA SP	VECTOR FACILITY NOT AVAILABLE DIAL function not available
0745	VM/XA SF VM/XA SP	VECTOR REGISTER CONTENTS HAVE BEEN LOST FOR CPU <i>nn</i> The vector register contents have been lost for CPU <i>nn</i> .
0746	VM/XA SF VM/XA SP	SPOOL FILE ERROR WHILE PROCESSING VECTOR REGISTERS A spool file error occurred while processing the vector registers.
0749	VM/XA SF VM/XA SP	STORE EXCEEDS MAXIMUM ELEMENT Store exceeds maximum element
0750	VM/XA SF VM/XA SP	OPERAND EXCEEDS ALLOWED MAXIMUM LENGTH FOLLOWING USER <i>userid</i> RESTRICTED PASSWORD FILE{, ERROR DURING READ HAS BAD RECORD FORMAT HAS BAD RECORD LENGTH}
0751	VM/XA SF VM/XA SP	INVALID OPERAND - <i>operand</i> FOLLOWING USER <i>userid</i> INVALID OPERAND - <i>operand</i> [FOLLOWING PROFILE <i>profname</i> USER <i>userid</i>]

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No.	System	Text
0752	VM/XA SF VM/XA SP	STATEMENT SEQUENCE ERROR FOLLOWING USER <i>userid</i> STATEMENT SEQUENCE ERROR [FOLLOWING {PROFILE <i>profname</i> USER <i>profname</i> <i>userid</i>]
0765	VM/XA SF VM/XA SP	LOGICAL RECORD LENGTH OR RECORD FORMAT IS INCORRECT INVALID CLASS DEFINITION - <i>class</i>
0770	VM/XA SF VM/XA SP	DUPLICATE USERID <i>userid</i> FOUND Override invalid for <i>command</i>
0782	VM/XA SF VM/XA SP	I/O ERROR VIRTUAL DEVICE IS BUSY ERROR ATTEMPTING TO RETURN FREE STORAGE
0785	VM/XA SF VM/XA SP	INVALID ELEMENT <i>element</i> Invalid element - <i>element</i>
0799	VM/XA SF VM/XA SP	IPL FAILED DUE TO INSUFFICIENT OR FAULTY STORAGE IPL failed due to insufficient or faulty storage
0811	VM/XA SF VM/XA SP	PREFERRED VIRTUAL MACHINE RECOVERY SUPPRESSED - RESERVED PAGE FRAMES EXHAUSTED. Preferred virtual machine recovery is suppressed because the supply of reserved page frames is exhausted.
0820	VM/XA SF VM/XA SP	IUCV FUNCTION IS NO LONGER ACTIVE FOR USER <i>userid</i> The IUCV function is no longer active for user <i>userid</i> because preferred virtual machine recovery is in process.
0830	VM/XA SF VM/XA SP	PROCESSOR CONTROLLER IS RESPONDING SLOWLY The processor controller is responding slowly.
0831	VM/XA SF VM/XA SP	PROCESSOR CONTROLLER IS NOW RESPONDING The processor controller is now responding.
0832	VM/XA SF VM/XA SP	PROCESSOR CONTROLLER IS LOGICALLY DISCONNECTED FROM THE SYSTEM DUE TO AN INCONGRUOUS RESPONSE The processor controller is disconnected due to a system error.
0833	VM/XA SF VM/XA SP	IOCP WRITE SEQUENCE STARTED, WILL ALTER I/O CONFIGURATION DATA SET <i>xx</i> An IOCP has started a write sequence that will alter the I/O configuration data set <i>xx</i> .
0834	VM/XA SF VM/XA SP	IOCP WRITE SEQUENCE TERMINATED, I/O CONFIGURATION DATA SET <i>xx</i> IS INVALID The IOCP write processing cannot complete because the I/O configuration data set <i>xx</i> is invalid.
0835	VM/XA SF VM/XA SP	IOCP WRITE SEQUENCE COMPLETED, I/O CONFIGURATION DATA SET <i>xx</i> IS INVALID The IOCP write processing has completed; the I/O configuration data set <i>xx</i> is altered.
0836	VM/XA SF VM/XA SP	IOCP WRITE REQUEST REJECTED, LOCKED BY <i>userid</i> The IOCP write request cannot complete because <i>userid</i> already has a sequence in progress.

VM/XA SF Conversion

Table 28 (Page 15 of 17). VM/XA SF and VM/XA SP Incompatible Messages

No.	System	Text
0837	VM/XA SF VM/XA SP	IOCP READ REQUEST REJECTED, LOCKED BY <i>userid</i> The IOCP read request cannot complete because <i>userid</i> already has a sequence in progress.
0838	VM/XA SF VM/XA SP	PROCESSOR CONTROLLER FAILURE; REQUEST PROCE The request process cannot complete due to a processor controller failure.
0839	VM/XA SF VM/XA SP	IOCP READ OPEN REQUEST REJECTED, TRYING TO OPEN DIFFERENT DATA SET, OPENED DATA SET IS <i>xx</i> The IOCP read open request cannot complete because data set <i>xx</i> is already open.
0840	VM/XA SF VM/XA SP	IOCP WRITE OPEN REQUEST REJECTED, TRYING TO OPEN DIFFERENT DATA SET, OPENED DATA SET IS <i>xx</i> The IOCP write open request cannot complete because data set <i>xx</i> is already open.
0841	VM/XA SF VM/XA SP	NO SCP INFORMATION, PROCESSOR CONTROLLER REQUEST PROCESS IS SUSPENDED The processor controller request process cannot complete due to no SCP information.
0842	VM/XA SF VM/XA SP	IOCP READ REQUEST REJECTED, TRYING TO READ FROM UNOPENED DATA SET, CURRENT OPEN DATA SET IS <i>xx</i> The IOCP read request cannot complete because the data set is not open. The current open data set is <i>xx</i> .
0843	VM/XA SF VM/XA SP	IOCP WRITE REQUEST REJECTED, TRYING TO WRITE TO UNOPENED DATA SET, CURRENT OPEN DATA SET IS <i>xx</i> The IOCP write request cannot complete because the data set is not open. The current open data set is <i>xx</i> .
0844	VM/XA SF VM/XA SP	DEVICE NOT DEFINED; INVALID CONTROL UNIT TYPE The device is not defined due to an invalid control unit type.
0845	VM/XA SF VM/XA SP	DASD <i>rdev</i> NOT ATTACHED; PAGING ADDRESSES OFFLINE DASD <i>rdev</i> not attached; paging addresses offline
0846	VM/XA SF VM/XA SP	INVALID CHPID <i>yy</i> Invalid channel path identifier.
0863	VM/XA SF VM/XA SP	UNABLE TO SUPPRESS USER PAGES; ALL PAGES WILL BE PRINTED Invalid parameter - <i>parameter</i>
0880	VM/XA SF VM/XA SP	COMMAND REJECTED; PROCESSOR <i>nn</i> ALREADY ONLINE The command processing cannot complete because processor <i>nn</i> is already online.
0881	VM/XA SF VM/XA SP	COMMAND REJECTED; PROCESSOR <i>nn</i> ALREADY OFFLINE The command processing cannot complete because processor <i>nn</i> is already offline.
0882	VM/XA SF VM/XA SP	VARY PROCESSOR COMMAND FAILED, INITIALIZATION FAILURE The VARY command processing cannot complete due to an initialization failure.
0883	VM/XA SF VM/XA SP	COMMAND REJECTED; PROCESSOR <i>nn</i> NOT RESPONSIVE The command processing cannot complete because processor <i>nn</i> is not responsive.
0884	VM/XA SF VM/XA SP	COMMAND REJECTED; PROCESSOR <i>nn</i> IS THE ONLY ACTIVE PROCESSOR The command processing cannot complete because processor <i>nn</i> is the only active processor.

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No.	System	Text
0885	VM/XA SF VM/XA SP	PROCESSOR <i>nn</i> LOGICALLY OFFLINE, PHYSICAL VARY FAILED The VARY processing cannot complete because the physical vary failed; processor <i>nn</i> is logically offline.
0886	VM/XA SF VM/XA SP	VARY PROCESSOR COMMAND FAILED, PROCESSOR <i>nn</i> NOT AVAILABLE The VARY command processing cannot complete because processor <i>nn</i> is not available.
0890	VM/XA SF VM/XA SP	USER <i>userid</i> VIRTUAL CPU <i>cpuaddr</i> IS ALREADY DEDICATED User <i>userid</i> 's virtual CPU <i>nn</i> is already dedicated.
0891	VM/XA SF VM/XA SP	USER <i>userid</i> VIRTUAL CPU <i>cpuaddr</i> IS NOT DEDICATED User <i>userid</i> 's virtual CPU <i>nn</i> is not dedicated.
0892	VM/XA SF VM/XA SP	NO PROCESSOR AVAILABLE TO DEDICATE There is no processor available to dedicate.
0893	VM/XA SF VM/XA SP	NO V=R USER CURRENTLY LOGGED ON There is no Virtual = Real user currently logged on.
0894	VM/XA SF VM/XA SP	NUMBER OF CPUS DEDICATED IS <i>n</i> The number of newly dedicated processors is <i>n</i> .
0895	VM/XA SF VM/XA SP	NUMBER OF CPUS ALREADY DEDICATED IS <i>n</i> The number of previously dedicated processors is <i>n</i> .
0896	VM/XA SF VM/XA SP	NUMBER OF CPUS NOT DEDICATED IS <i>n</i> ; NO PROCESSORS AVAILABLE FOR DEDICATION The number of processors that could not be dedicated is <i>n</i> , because no processors were available.
0897	VM/XA SF VM/XA SP	NUMBER OF CPUS UNDEDICATED IS <i>n</i> The number of newly undedicated processors is <i>n</i> .
0898	VM/XA SF VM/XA SP	NUMBER OF CPUS NOT DEDICATED IS <i>n</i> The number of processors currently not dedicated is <i>n</i> .
0902	VM/XA SF VM/XA SP	SYSTEM RECOVERY FAILURE; FATAL I/O ERROR System recovery failure; fatal I/O error
0904	VM/XA SF VM/XA SP	SYSTEM RECOVERY FAILURE; INVALID WARM START DATA System recovery failure; invalid warm start data
0912	VM/XA SF VM/XA SP	SYSTEM RECOVERY FAILURE; VOLID <i>valid</i> NOT MOUNTED System recovery failure; valid <i>valid</i> not mounted
0934	VM/XA SF VM/XA SP	<i>type</i> CYLINDERS IGNORED ON SYSTEM VOLUME <i>valid</i> Cylinders allocated as {DRCT (Directory) SPOL (Spooling) TDSK (TDisk)} are ignored on system volume <i>valid</i>
0953	VM/XA SF VM/XA SP	UNABLE TO ALLOCATE SYSTEM DASD DUMP CP is unable to allocate system DASD dump space.
0955	VM/XA SF VM/XA SP	INSUFFICIENT STORAGE FOR VM/XA SYSTEMS FACILITY INSUFFICIENT STORAGE FOR {VM/XA SP IPLING SYSTEM}
0983	VM/XA SF VM/XA SP	SYSTEM RECOVERY FAILURE; SPOOL FILE ERROR System recovery failed due to a spool file error.

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No.	System	Text
0984	VM/XA SF	TOD CLOCK DAMAGED. ENABLE CLOCK SET SWITCH
	VM/XA SP	TOD clock damaged. Enable clock set switch

Message Texts That Have Changed Message Numbers

Some message texts that are the same in VM/XA SF and VM/XA SP have different message numbers. In the table below, the VM/XA SF message numbers and their corresponding VM/XA SP message numbers are paired. For convenience, the system names are abbreviated as "SF" and "SP."

SF	SP	SF	SP	SF	SP	SF	SP
014	1550	169	1600	274	1004	356	1604
017	6000	181	1025	275	1558	357	1605
027	1001	182	1026	276	1032	358	1606
030	1551	183	1027	281	1005	359	1607
032	1552	184	1028	288	1505	360	6276
034	6025	185	1029	292	1503	361	1250
037	1553	186	1030	294	6085	363	6277
039	6026	187	1031	296	2611	364	1010
048	1450	195	0039	298	1037	366	6278
065	6050	196	2003	301	1357	367	6279
066	6051	197	2004	302	1350	372	6280
069	1451	198	2005	303	1351	373	6281
070	9000	199	2006	304	1352	374	6282
071	9001	206	1556	311	6001	375	6283
075	1452	220	0206	316	6203	376	6284
079	2000	225	6076	317	6002	377	6285
080	2001	235	6077	318	6003	378	6286
084	1201	236	6078	320	9002	379	6287
085	1202	237	6079	321	9003	383	0733
087	1012	238	6080	322	9004	422	1354
089	1013	239	6075	323	9005	425	2505
097	1700	242	2500	324	1033	430	2504
100	1011	243	2501	325	1034	438	1559
119	6052	244	2502	326	1400	441	1353
129	1100	245	2503	327	1401	443	1355
135	2002	246	0270	328	1402	444	1356
149	1555	256	1557	330	1453	451	1459
151	1150	257	2200	331	1454	456	1455
152	1151	258	2201	332	1456	457	0580
153	1152	259	2202	334	1458	458	0583
154	1101	268	1002	341	9501	459	0582
156	1102	269	1500	343	1006	460	0584
157	1103	270	1501	350	9010	461	0585
158	1104	272	1003	354	1602	462	0586
159	1200	273	1502	355	1603	463	0587

SF	SP	SF	SP	SF	SP	SF	SP
464	0588	560	8053	654	2628	802	9402
465	0574	561	8054	655	2629	803	9403
466	0591	570	0589	656	2630	804	9404
467	0592	574	1105	658	0453	805	9405
468	0593	577	2218	665	8002	806	9406
469	0594	578	2219	666	8003	807	9407
470	0595	579	2220	667	8004	808	9408
471	0596	580	8056	668	8005	809	9409
472	0597	581	8057	669	8006	810	9410
473	0598	582	8058	670	8007	812	9412
480	6300	583	8059	671	8008	815	9415
481	6301	584	8060	672	8009	818	9417
482	6302	585	8061	673	8010	822	9418
483	6303	586	8062	674	8011	826	9413
484	6304	587	8073	675	8012	827	9414
485	6305	588	8063	676	8013	851	8150
486	6306	589	8064	677	8014	854	8156
487	6307	590	8065	678	8015	855	8157
488	6308	591	8066	679	8016	856	8158
489	6309	592	8067	680	8017	857	8159
490	6310	593	8068	681	8018	858	8160
491	6311	594	8069	682	8019	859	8161
492	6312	595	8070	683	8020	860	8162
493	6313	597	8071	684	8021	861	8163
494	6314	598	8072	685	8022	862	8164
495	6315	605	9100	686	8023	863	8151
511	2251	609	9111	687	8024	865	8166
533	2203	611	9101	688	8025	866	8167
534	2204	612	9102	689	8026	867	8168
535	2205	613	9103	690	8027	868	8169
536	2206	614	9104	691	8028	870	8170
538	2207	615	9105	692	8029	871	8171
539	2208	616	9106	693	8030	872	8172
540	2209	617	9107	694	8031	873	8173
546	2150	618	9108	695	8032	874	8174
550	8000	619	9109	696	8033	901	9015
551	8001	620	9110	697	8034	903	9016
552	8050	621	9150	698	8035	905	9017
553	0863	622	9151	699	8036	906	9018
554	8074	623	9152	706	0756	907	9019
555	8075	624	9153	707	9014	910	9250
556	8076	625	9154	730	8100	911	8200
557	8077	651	2625	770	0772	913	8201
558	8051	652	2626	800	9400	914	9251
559	8052	653	2627	801	9401	915	9020

VM/XA SF Conversion

SF	SP
916	9021
917	9022
918	2600
919	9225
920	9275
921	9276
922	9023
924	9300
925	2210
926	2211
927	0576
928	2213
929	2214
930	2215
932	6200
933	6201
934	6202
935	0319
936	0320
937	0321
938	0322
939	0323
940	0324
941	0325
942	326
943	0332
950	2252
956	2601
962	9024
963	9277
964	9025
966	9026
975	9200
976	9201
977	9202
978	9203
979	9204
987	9252
989	8202
990	9253
997	8203
998	8204
999	8205

Part 3. Migrating from VM/XA SP Release 1 to Release 2



Chapter 21. Migrating from VM/XA SP Release 1 to Release 2

In general, VM/XA SP Release 2 is upwardly compatible with VM/XA SP Release 1, with the exception of the AUTOLOG command, the user directory, and messages (which have changed significantly).

AUTOLOG Command Compatibility

In VM/XA SP Release 1, the AUTOLOG command and the XAUTOLOG command are synonymous. In VM/XA SP Release 2, the AUTOLOG command has fewer functions than in Release 1 (and is compatible with VM/SP HPO), and the XAUTOLOG command provides the functions of the Release 1 AUTOLOG command. A summary of differences follows:

Release 1 AUTOLOG and Release 2 XAUTOLOG	Release 2 AUTOLOG
The privilege class is A, B, or G.	The privilege class is A or B.
The command has keyword parameters.	The command does not have keyword parameters.
The command does not require use of a password.	The command requires use of a password, either on the command or in response to a prompt.
The logical-line-end symbol (#) precedes <i>console-input-data</i> .	The logical-line-end symbol (#) does not precede <i>console-input-data</i> .
The user ID being logged on need not have a corresponding IPL statement in the system directory.	The user ID being logged on must have a corresponding IPL statement in the system directory.
The command runs synchronously or asynchronously.	The command runs synchronously.
The command is not compatible with VM/SP HPO.	The command is compatible with VM/SP HPO.

Directory Compatibility

The Release 1 and Release 2 user directories are incompatible. Differences are:

- The MINIOPT statement.

A new parameter in Release 2, MDC/NOMDC, specifies whether a minidisk is to use the Expanded Storage cache. The default is to use the cache. However, to guarantee data integrity, minidisk caching should be disabled for any minidisk that is shared between two systems when one or both systems have write access to the minidisk. To disable caching for an individual minidisk, specify NOMDC on its MINIOPT statement. An alternative is to disable caching for all minidisks by issuing the RETAIN XSTORE MDC OFF command. (If you use this command you should place it in the AUTOLOG1 PROFILE.)

The change to MINIOPT does not have to be reversed when backing off to Release 1.

- The CONSOLE statement.

Device types 1052 and 3210 are not valid in Release 2; device types 3215 and 3270 still are. If you specify an invalid device type and you use the MIXED operand of the DIRECTXA command, Release 2 accepts the CONSOLE statement and assigns a valid device type.

- The INCLUDE statement, a new statement.

This statement specifies the name of a PROFILE entry to be invoked as part of this USER entry. Do not use it until you have completed migration to Release 2 and will not be backing off.

- The PROFILE statement, a new statement.

This statement defines the start of a profile entry in the source directory. Do not use it until you have completed migration to Release 2 and will not be backing off.

- The END parameter, a new parameter of the MDISK statement.

This parameter specifies that the MDISK should be defined with the remaining available cylinders. Do not use it until you have completed migration to Release 2 and will not be backing off.

Scenarios for Migrating from VM/XA SP Release 1 to Release 2

The following scenarios are examples of how a Release 2 system might be brought into production and later backed off if system problems occur. The scenarios take into account the incompatibilities in the Release 1 and Release 2 user directories. The scenarios are:

- Migrating to VM/XA SP Release 2 with one source and one object directory
- Backing off from VM/XA SP Release 2 with one source and one object directory
- Migrating to VM/XA SP Release 2 with one source and two object directories
- Backing off from VM/XA SP Release 2 with one source and two object directories.

The scenarios assume that the DIRECTXA MODULE exists on the system's source directory disk (the disk that contains the USER DIRECT file).

Migrating to VM/XA SP Release 2 with One Source and One Object Directory

1. Record DASD allocations in a log so that the information is available to operations personnel who might have to bring up or back off the Release 2 system. This information should have restricted access due to the sensitivity of the data contained on these devices. The DASD allocations you should record are the volume serial numbers, starting cylinder locations, and number of extents for:
 - The source user directory
 - The object user directory
 - CMS minidisks (usually 190 and 19E).
2. Make a copy of the Release 2 DIRECTXA MODULE available on your source directory disk by copying the Release 2 DIRECTXA MODULE as DIRECTXA SP2MOD. It is assumed that the Release 1 DIRECT MODULE already exists on the same disk.

3. Bring up your Release 2 system without a directory. To do this, respond with NODIRECT when CP issues the START prompt.
4. Because the system directory is invalid, do not allow any service machines to be autologged. Force the logoff of your installation's AUTOLOG1, DISKACNT, and EREP user IDs.
5. Define the source and object user directories as well as the CMS minidisks (190 and 19E) to the operator's logon ID. Use the DEF MDISK command and the previously logged device and allocation information.
6. Define 16Mb of storage. (Enter DEF STOR 16M.)
7. IPL a nonshared copy of CMS. (Enter IPL 190 and TERM MODE VM.)
8. Access the source directory disk (ACCESS command).
9. Swap the Release 1 and Release 2 DIRECTXA MODULE files. That is, rename DIRECTXA MODULE as DIRECTXA SP1MOD and DIRECTXA SP2MOD as DIRECTXA MODULE.
10. Modify the directory for Release 2. Using XEDIT with file serialization set off (SET SERIAL OFF), modify the source user directory (USER DIRECT) to reflect the needs of your installation and the incompatibilities with Release 1. (Refer to "Directory Compatibility" on page 239.)
11. Create a Release 2 object directory and bring it online. Do this by issuing the DIRECTXA command twice to overlay both the primary and alternate object directories with a Release 2 object directory.
12. Reinitialize the operator's logon ID by logging off and then logging on with that ID.
13. Use the XAUTOLOG command to log on your installation's AUTOLOG1, DISKACNT, and EREP user IDs automatically.
14. Bring your Release 2 system into production.

Backing Off from VM/XA SP Release 2 with One Source and One Object Directory

1. Locate the DASD allocations you recorded (the volume serial numbers, starting cylinder locations, and number of extents) for:
 - The source user directory
 - The object user directory
 - CMS minidisks (usually 190 & 19E).
2. Bring up your Release 1 system without a directory. To do this, respond with NODIRECT when CP issues the START prompt.
3. Because the system directory is invalid, do not allow any service machines to be autologged. Force the logoff of your installation's AUTOLOG1, DISKACNT, and EREP user IDs.
4. Define the source and object user directories as well as the CMS minidisks (190 and 19E) to the operator's logon ID. Use the DEF MDISK command and the previously logged device and allocation information.
5. Define 16Mb of storage. (Enter DEF STOR 16M.)
6. IPL a nonshared copy of CMS. (Enter IPL 190 and TERM MODE VM.)
7. Access the source directory disk (ACCESS command).

8. Swap the Release 1 and Release 2 DIRECTXA MODULE files. That is, rename DIRECTXA MODULE as DIRECTXA SP2MOD and DIRECTXA SP1MOD as DIRECTXA MODULE.
9. Create a Release 1 object directory and bring it online. Do this by issuing the DIRECTXA command twice to overlay both the primary and alternate object directories with a valid Release 1 object directory.
10. Reinitialize the operator's logon ID by logging off and then logging on with that ID.
11. Use the XAUTOLOG command to log on your installation's AUTOLOG1, DISKACNT, and EREP user IDs automatically.
12. Bring your Release 1 system into production.

Migrating to VM/XA SP Release 2 with One Source and Two Object Directories

1. Select a volume to be used for your Release 2 object directory. This should preferably be a volume dedicated for this purpose.
2. Use the CPFMTXA command to allocate the Release 2 object directory volume with a sufficient DRCT area. Refer to *VM/XA SP Planning and Administration* for directory size calculations.
3. Add the Release 2 object directory volume to your directory management ID (usually DIRMAINT) at a different address from your Release 1 object directory.
4. Access the source directory disk (ACCESS command).
5. Make a copy of the Release 2 DIRECTXA MODULE available on your source directory disk by copying the Release 2 DIRECTXA MODULE as DIRECTXA SP2MOD.
6. Swap the Release 1 and Release 2 DIRECTXA MODULE files. That is, rename DIRECTXA MODULE as DIRECTXA SP1MOD and DIRECTXA SP2MOD as DIRECTXA MODULE.
7. Using XEDIT with file serialization set off (SET SERIAL OFF), modify the source user directory (USER DIRECT) for Release 2 to reflect the needs of your installation. Be sure to keep a copy of the current directory "header" line for return to Release 1. You can do this by duplicating the DIRECTORY statement, commenting out one occurrence, and changing the device identification (VDEV DEVTYPE VOLSER) on the other occurrence to identify the volume and address that will contain the Release 2 object directory.
8. Obtain write access to the Release 2 object directory disk. To do this, ensure that the user ID that will issue the DIRECTXA command has either linked to the Release 2 object directory disk as the address specified in the DIRECTORY statement or has that volume attached to its virtual machine as this address.
9. Create Release 2 object directories by issuing the DIRECTXA command twice to overlay both the primary and alternate object directories on the Release 2 object directory volume with a valid Release 2 object directory.
10. Shut down your Release 1 system.

If your Release 1 object directory is on a volume used only as a directory residence volume, then shut down your Release 1 system. Make sure that this volume is physically disabled before you IPL your Release 2 system.

If your Release 1 object directory is on your system residence volume or on another volume that must be online for Release 2 production or testing, you must remove the DRCT allocation from this volume. Reallocate the volume using the ALLOCATE option of the CPFMTXA command and log the existing allocations for return to Release 1. Reallocate the areas that are DRCT to be PERM and shut down your Release 1 system.

11. IPL your Release 2 System.

Backing Off from VM/XA SP Release 2 with One Source and Two Object Directories

1. Locate the log that you created from your migration to Release 2.
2. Restore the Release 1 object directory volume.

If your Release 1 object directory was on a volume used only as a directory residence volume, you restore it by reenabling that device and attaching it to the ID that will perform the DIRECTXA. It should be attached as the address that was formerly in the directory "header" statement. This information can be retrieved from the log entry that you created when you migrated to Release 2.

If your Release 1 object directory was on your system residence volume or on another volume that was online for Release 2 production or testing, you must now restore the DRCT allocation on this volume. Reallocate the volume using the CPFMTXA command, restoring the original disk allocations to those from your log.

3. Access the source directory disk (with the ACCESS command).
4. Swap the Release 1 and Release 2 DIRECTXA MODULE files. That is, rename DIRECTXA MODULE as DIRECTXA SP2MOD and DIRECTXA SP1MOD as DIRECTXA MODULE.
5. Using XEDIT with file serialization set off (SET SERIAL OFF), modify the source user directory (USER DIRECT) for Release 1 to reflect the needs of your installation. Be sure to restore the Release 1 DIRECTORY statement by "uncommenting" it and commenting out the Release 2 version.
6. Obtain write access to the Release 1 object directory disk. To do this, ensure that the user ID that will issue the DIRECTXA command has either linked to the Release 2 object directory disk as the address specified in the DIRECTORY statement or has that volume attached to its virtual machine as this address.
7. Create a Release 1 object directory by issuing the DIRECTXA command twice to overlay both the primary and alternate object directories on the Release 1 directory volume with a valid Release 1 object directory.
8. Shut down your Release 2 system.

If your Release 2 object directory is on a volume used only as a directory residence volume, then shut down your Release 2 system. Make sure that this volume is physically disabled before you IPL your Release 1 system.

If your Release 2 object directory is on a volume that must be online for Release 1 production, you must remove the DRCT allocation from this volume. Reallocate the volume using the ALLOCATE option of the CPFMTXA command and restore your Release 1 allocation on this volume. This information can be retrieved from the log that you created during your conversion to Release 2.

9. IPL your Release 1 system.

Spool File Compatibility

Because the spool file formats are compatible between VM/XA SP Release 1 and Release 2, you do not need to cold start when migrating or backing off.

Message Compatibility

Table 29 compares VM/XA SP Release 1 and VM/XA SP Release 2 messages. Messages listed are:

- Sometimes-compatible messages. The message number exists in both systems, and Release 2 contains both a compatible and an incompatible message text. The particular situation determines which text is used.
- Incompatible messages. The message number exists in both systems but differences between message texts may cause applications that depend on message texts to execute incorrectly or not to execute at all.
- Release-1-only messages.

Messages *not* listed are:

- Compatible messages. The message number exists in both systems and has the same message text.
- Release-2-only messages.

Table 29 (Page 1 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
0001	IC	Release 1 Release 2	UNKNOWN CP COMMAND: <i>command</i> Unknown CP command: <i>command</i>
0002	IC	Release 1 Release 2	INVALID OPERAND - <i>operand</i> Invalid operand - <i>operand</i>
0003	SC	Release 1 Release 2	INVALID OPTION - <i>option</i> [Invalid option - <i>option</i>] or [INVALID OPTION - <i>option</i>]
0004	IC	Release 1 Release 2	INVALID HEXLOC - <i>hexloc</i> Invalid hexloc - <i>hexloc</i>
0005	IC	Release 1 Release 2	INVALID HEXDATA - <i>hexdata</i> Invalid hexdata - <i>hexdata</i>
0006	SC	Release 1 Release 2	INVALID DEVICE TYPE - { <i>rdev vdev ldev</i> } [Invalid device type - { <i>rdev vdev ldev</i> }] or [INVALID DEVICE TYPE - { <i>rdev vdev ldev</i> }]
0007	IC	Release 1 Release 2	INVALID USERID - <i>userid</i> Invalid userid - <i>userid</i>
0008	IC	Release 1 Release 2	INVALID SPOOLID - <i>spoolid</i> Invalid spoolid - <i>spoolid</i>
0009	IC	Release 1 Release 2	INVALID RANGE - <i>range</i> Invalid range - <i>range</i>

SC = sometimes compatible, IC = incompatible, IO = Release 1 only.
Not listed: compatible messages and Release-2-only messages.

Table 29 (Page 2 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
0010	IC	Release 1 Release 2	INVALID REGISTER - <i>register</i> Invalid register - <i>register</i>
0011	IC	Release 1 Release 2	INVALID DEVICE TYPE - <i>userid vdev</i> Invalid device type - <i>userid vdev</i>
0012	IC	Release 1 Release 2	INVALID PSW - <i>psw</i> Invalid PSW - <i>psw</i>
0013	IC	Release 1 Release 2	CONFLICTING OPTION - <i>option</i> Conflicting option - <i>option</i>
0018	IC	Release 1 Release 2	SPOOLID MISSING Spoolid missing
0019	IC	Release 1 Release 2	COMMAND PROCESSOR NOT LOADED The system command processor is not loaded.
0020	IC	Release 1 Release 2	USERID MISSING OR INVALID Userid missing or invalid
0021	IC	Release 1 Release 2	RDEV MISSING OR INVALID A real device number was not supplied or it is invalid.
0022	IC	Release 1 Release 2	VDEV MISSING OR INVALID [A virtual device number was not supplied or it was invalid.] or [A VIRTUAL DEVICE NUMBER WAS NOT SUPPLIED OR IT WAS INVALID.]
0023	SC	Release 1 Release 2	VOLID MISSING OR INVALID [VOLID missing or invalid] or [VOLID MISSING OR INVALID]
0024	SC	Release 1 Release 2	CYLINDERS MISSING OR INVALID [Cylinders missing or invalid] or [CYLINDERS MISSING OR INVALID]
0025	IC	Release 1 Release 2	STORAGE MISSING OR INVALID Storage missing or invalid
0026	IC	Release 1 Release 2	OPERAND MISSING OR INVALID Operand missing or invalid
0028	IC	Release 1 Release 2	CLASS MISSING OR INVALID Class missing or invalid
0030	IC	Release 1 Release 2	COPIES MISSING OR INVALID Copies missing or invalid
0031	IC	Release 1 Release 2	BUFFER MISSING OR INVALID: EXTENDED FCB NOT SUPPORTED Buffer missing or invalid; extended FCB not supported
0033	IC	Release 1 Release 2	HEXLOC MISSING OR INVALID Hexloc missing or invalid
0035	IC	Release 1 Release 2	DEVICE TYPE MISSING OR INVALID Device type missing or invalid

SC = sometimes compatible, IC = incompatible, IO = Release 1 only.
Not listed: compatible messages and Release-2-only messages.

Table 29 (Page 3 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
0036	IC	Release 1 Release 2	INDEX MISSING OR INVALID Index missing or invalid
0038	IC	Release 1 Release 2	PARAMETER FOR <i>option</i> OPTION MISSING OR INVALID - <i>parameter</i> Parameter for <i>option</i> option missing or invalid - <i>parameter</i>
0039	IC	Release 1 Release 2	PROCESSOR ADDRESS MISSING OR INVALID Processor address missing or invalid
0040	SC	Release 1 Release 2	DEVICE { <i>rdev</i> <i>vdev</i> <i>ldev</i> } DOES NOT EXIST [Device { <i>rdev</i> <i>vdev</i> <i>ldev</i> } does not exist] or [DEVICE { <i>rdev</i> <i>vdev</i> <i>ldev</i> } DOES NOT EXIST]
0041	IC	Release 1 Release 2	LOGMSG <i>nn</i> DOES NOT EXIST Logmsg <i>nn</i> does not exist.
0042	IC	Release 1 Release 2	USER <i>userid</i> SPOOLID <i>nnnn</i> DOES NOT EXIST User <i>userid</i> spoolid <i>nnnn</i> does not exist
0043	IC	Release 1 Release 2	BUFFER <i>name</i> DOES NOT EXIST Buffer <i>buffer</i> does not exist
0044	IC	Release 1 Release 2	SYSTEM <i>name</i> DOES NOT EXIST System { <i>name</i> <i>volume</i> } does not exist
0045	IC	Release 1 Release 2	<i>userid</i> NOT LOGGED ON <i>userid</i> not logged on
0046	IC	Release 1 Release 2	<i>type rdev</i> OFFLINE <i>type rdev</i> offline
0047	IC	Release 1 Release 2	<i>userid vdev</i> DOES NOT EXIST <i>userid vdev</i> does not exist
0049	IC	Release 1 Release 2	<i>type rdev</i> IN USE <i>type vdev</i> in use
0050	IC	Release 1 Release 2	PASSWORD INCORRECT LOGON unsuccessful--incorrect password
0052	IC	Release 1 Release 2	ERROR IN CP DIRECTORY [Error in CP directory] or [XAUTOLOG failed for <i>userid</i> : Error in CP directory]
0053	IC	Release 1 Release 2	<i>userid</i> NOT IN CP DIRECTORY [<i>userid</i> not in CP directory] or [XAUTOLOG failed for <i>userid</i> : <i>userid</i> not in CP directory]
0054	IC	Release 1 Release 2	ALREADY LOGGED ON {GRAF <i>rdev</i> GRAF <i>ldev</i> DISC} [XAUTOLOG failed for <i>userid</i> :] Already logged on { <i>display device</i> disconnected}
0055	IC	Release 1 Release 2	LINE(S) NOT AVAILABLE ON <i>userid</i> Line(s) not available on <i>userid</i>
0056	IC	Release 1 Release 2	LINE <i>vdev</i> BUSY ON <i>userid</i> Line <i>vdev</i> busy on <i>userid</i>

SC = sometimes compatible, IC = incompatible, IO = Release 1 only.
Not listed: compatible messages and Release-2-only messages.

Table 29 (Page 4 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
0057	IC	Release 1 Release 2	<i>userid</i> NOT RECEIVING; <i>text</i> <i>userid</i> not receiving; <i>text</i>
0058	IC	Release 1 Release 2	CTCA <i>vdev</i> BUSY ON <i>userid</i> CTCA <i>vdev</i> busy on <i>userid</i>
0059	IC	Release 1 Release 2	AUTOLOG FAILED FOR <i>userid</i> {X A}AUTOLOG AUTOLOG} failed for <i>userid</i> - {IPL missing IPL failed accounting errors incorrect password}
0060	IC	Release 1 Release 2	DUMP FAILED; VIRTUAL PRINTER UNAVAILABLE {Dump failed Printer output terminated}; virtual printer unavailable
0061	IC	Release 1 Release 2	DUMP FAILED; VIRTUAL PRINTER ERROR Dump failed; virtual printer error
0068	IC	Release 1 Release 2	SEND COMMAND FAILED, <i>text</i> SEND command failed; <i>text</i>
0088	IC	Release 1 Release 2	INVALID COUNT FOR <i>option</i> - <i>operand</i> An invalid number was supplied for {COPY FLASH} - <i>operand</i> .
0090	IC	Release 1 Release 2	DEVICE <i>vdev</i> NOT DEFINED; DEVICE { <i>rdev</i> <i>volser</i> } NOT AVAILABLE Device <i>vdev</i> not defined; { <i>rdev</i> <i>volser</i> } not available
0091	IC	Release 1 Release 2	DASD <i>vdev</i> NOT DEFINED; TEMP SPACE NOT AVAILABLE DASD <i>vdev</i> not defined; temp space not available
0093	1O	Release 1	DEVICE <i>vdev</i> NOT DEFINED; ERROR IN CP DIRECTORY
0094	IC	Release 1 Release 2	STORAGE EXCEEDS ALLOWED MAXIMUM OF <i>nnn</i> MEG Storage exceeds allowed maximum of <i>nnn</i> MEG
0095	IC	Release 1 Release 2	DEVICE <i>vdev</i> NOT DEFINED; MAXIMUM NUMBER OF DEVICES ALREADY DEFINED Device <i>vdev</i> is not defined because the maximum number of devices is already defined.
0101	IC	Release 1 Release 2	DASD <i>vdev</i> FORCED R/O; R/O BY { <i>nnnnn</i> USERS <i>userid</i> } DASD <i>vdev</i> forced R/O; R/O by { <i>nnnnn</i> users <i>userid</i> }
0102	IC	Release 1 Release 2	DASD <i>vdev</i> FORCED R/O; R/W BY { <i>nnnnn</i> USERS <i>userid</i> } DASD <i>vdev</i> forced R/O; R/W by { <i>nnnnn</i> users <i>userid</i> }
0103	IC	Release 1 Release 2	DASD <i>vdev</i> FORCED R/O; R/W BY { <i>nnnnn</i> USERS <i>userid</i> }; R/O BY { <i>nnnnn</i> USERS <i>userid</i> } DASD <i>vdev</i> forced R/O; R/W by { <i>nnnnn</i> users <i>userid</i> }; R/O by { <i>nnnnn</i> users <i>userid</i> }
0104	IC	Release 1 Release 2	<i>userid</i> <i>vdev</i> NOT LINKED; R/O BY { <i>nnnnn</i> USERS <i>userid</i> } <i>userid</i> <i>vdev</i> not linked; R/O by { <i>nnnnn</i> users <i>userid</i> }
0105	IC	Release 1 Release 2	<i>userid</i> <i>vdev</i> NOT LINKED; R/W BY { <i>nnnnn</i> USERS <i>userid</i> } <i>userid</i> <i>vdev</i> not linked; R/W by { <i>nnnnn</i> users <i>userid</i> }

SC = sometimes compatible, IC = incompatible, 1O = Release 1 only.
Not listed: compatible messages and Release-2-only messages.

VM/XA SP Release 1 to Release 2 Migration

Table 29 (Page 5 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
0106	IC	Release 1 Release 2	<i>userid vdev</i> NOT LINKED; R/W BY {nnnnnUSERS <i>userid</i> }; R/O BY {nnnnn USERS <i>userid</i> } <i>userid vdev</i> not linked; R/W by {nnnnn users <i>userid</i> }, R/O by {nnnnn users <i>userid</i> }
0107	IC	Release 1 Release 2	<i>userid vdev</i> NOT LINKED; NOT IN CP DIRECTORY <i>userid vdev</i> not linked; not in CP directory
0108	IC	Release 1 Release 2	<i>userid vdev</i> NOT LINKED; VOLID <i>valid</i> NOT MOUNTED <i>userid vdev</i> not linked; valid <i>valid</i> not mounted
0109	IC	Release 1 Release 2	<i>userid vdev</i> NOT LINKED; INVALID LINK DEVICE <i>userid vdev</i> not linked; invalid link device
0110	IC	Release 1 Release 2	<i>userid vdev</i> NOT LINKED; <i>type vdev</i> ALREADY DEFINED <i>userid vdev</i> not linked; <i>type vdev</i> already defined
0111	IC	Release 1 Release 2	<i>userid vdev</i> NOT LINKED; NO READ PASSWORD <i>userid vdev</i> not linked; no read password
0112	IC	Release 1 Release 2	<i>userid vdev</i> NOT LINKED; NO WRITE PASSWORD <i>userid vdev</i> not linked; no write password
0113	IC	Release 1 Release 2	<i>userid vdev</i> NOT LINKED; NO MULTIPLE PASSWORD <i>userid vdev</i> not linked; no multiple password
0114	IC	Release 1 Release 2	<i>userid vdev</i> NOT LINKED; MODE OR PASSWORD INCORRECT <i>userid vdev</i> not linked; mode or password incorrect
0115	IC	Release 1 Release 2	{AUTOLOG/LINK} INVALID; EXCESSIVE INCORRECT PASSWORDS {LINK AUTOLOG XAUTOLOG} invalid; excessive incorrect passwords
0117	IC	Release 1 Release 2	USERID <i>userid</i> NOT LINKED; VOLID <i>valid</i> CONFLICT Userid <i>userid</i> not linked; valid <i>valid</i> conflict
0118	IC	Release 1 Release 2	<i>userid vdev</i> NOT LINKED; COMMAND FORMAT NOT VALID <i>userid vdev</i> not linked; command format not valid
0120	IC	Release 1 Release 2	<i>type {rdev ldev}</i> NOT ATTACHED; <i>userid vdev</i> ALREADY DEFINED <i>type {rdev ldev}</i> not attached; <i>userid vdev</i> already defined
0121	IC	Release 1 Release 2	<i>type {rdev ldev}</i> NOT ATTACHED TO <i>userid</i> <i>type {rdev ldev}</i> not attached to { <i>userid system</i> }
0122	IC	Release 1 Release 2	<i>type {rdev ldev}</i> ALREADY ATTACHED TO <i>userid</i> <i>type {rdev ldev}</i> already attached to <i>userid</i>
0123	IC	Release 1 Release 2	DASD <i>rdev</i> CP-OWNED DASD <i>rdev</i> CP-owned
0124	IC	Release 1 Release 2	DASD <i>rdev</i> IN USE BY nnnnn USERS DASD <i>rdev</i> in use by nnnnn users
0125	IC	Release 1 Release 2	DASD <i>rdev</i> VOLID <i>valid</i> ALREADY ATTACHED TO SYSTEM DASD <i>rdev</i> valid <i>valid</i> already attached to system

SC = sometimes compatible, IC = incompatible, IO = Release 1 only.
Not listed: compatible messages and Release-2-only messages.

Table 29 (Page 6 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
0126	IC	Release 1 Release 2	DASD <i>rdev</i> ERROR READING VOLID DASD <i>rdev</i> error reading valid
0127	IC	Release 1 Release 2	DASD <i>rdev</i> VOLID <i>valid</i> DOES NOT MATCH DASD <i>rdev</i> valid <i>valid</i> does not match
0128	IC	Release 1 Release 2	DASD <i>rdev</i> ERROR READING ALLOCATION RECORD DASD <i>rdev</i> error reading allocation record
0140	IC	Release 1 Release 2	<i>type</i> { <i>rdev</i> <i>ldev</i> } ATTACHED TO <i>userid</i> <i>type</i> { <i>rdev</i> <i>ldev</i> } attached to <i>userid</i>
0141	IC	Release 1 Release 2	<i>type rdev</i> NOT ACTIVE <i>type rdev</i> not active
0142	IC	Release 1 Release 2	<i>type rdev</i> NOT DRAINED <i>type rdev</i> not drained
0143	IC	Release 1 Release 2	<i>type rdev</i> IN USE BY SYSTEM <i>type rdev</i> in use by system
0146	IC	Release 1 Release 2	VMDUMP FAILED; SPOOLING ERROR VMDUMP failed; spooling error
0148	IC	Release 1 Release 2	PRT <i>rdev</i> BUFFER LOAD <i>name</i> FAILED Printer <i>rdev</i> buffer load <i>name</i> failed
0150	IC	Release 1 Release 2	USER <i>userid</i> HAS ISSUED A {CP/VM} READ User <i>userid</i> has issued a {CP/VM} read
0153	IC	Release 1 Release 2	DEV { <i>vdev</i> RNG} NOT ATTACHED, EXCEEDS MAX NUM DEVICES Device { <i>vdev</i> RANGE} exceeds maximum number of virtual devices
0155	IC	Release 1 Release 2	DEVICE <i>rdev</i> HAS NOT BEEN ATTACHED TO THE SYSTEM BECAUSE IT IS NOT A DASD DEVICE Device <i>rdev</i> has not been attached to the system because it is not a DASD device.
0160	IC	Release 1 Release 2	HEXLOC <i>hexloc</i> EXCEEDS STORAGE Hexloc <i>hexloc</i> exceeds storage
0163	IC	Release 1 Release 2	STORE EXCEEDS MAXIMUM REGISTER STORE exceeds maximum register
0164	IC	Release 1 Release 2	HEXLOC <i>hexloc</i> NON-ADDRESSABLE STORAGE Hexloc <i>hexloc</i> non-addressable storage
0167	IC	Release 1 Release 2	INVALID MASK FOR DATA RANGE SPECIFIED The mask is invalid for the specified data range.
0170	IC	Release 1 Release 2	SYSTEM <i>name</i> EXCEEDS STORAGE SIZE; { <i>nnnK</i> / <i>nnnM</i> } REQUIRED System <i>name</i> exceeds storage size; { <i>nnnnnnnnK</i> / <i>nnnM</i> } required
0174	IC	Release 1 Release 2	PAGING I/O ERROR; IPL FAILED Paging I/O error; IPL failed

SC = sometimes compatible, IC = incompatible, IO = Release 1 only.
Not listed: compatible messages and Release-2-only messages.

VM/XA SP Release 1 to Release 2 Migration

Table 29 (Page 7 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
0177	IC	Release 1	YOUR PARM DATA EXCEEDS THE LIMIT OF <i>nn</i> CHARACTERS. CORRECT YOUR DATA STRING AND REISSUE THE IPL COMMAND.
		Release 2	Your PARM data exceeds the limit of <i>nn</i> characters. Correct your data string and reissue the IPL command.
0180	IC	Release 1	TRACE NOT IN EFFECT
		Release 2	Trace not in effect
0196	IC	Release 1	SECONDARY USER NOT IN CP DIRECTORY
		Release 2	Secondary user not in CP directory
0197	IC	Release 1	SECONDARY USER IS NOT AVAILABLE
		Release 2	Secondary user is not available
0200	IC	Release 1	VIRT=REAL AREA NOT AVAILABLE; IN USE BY {userid nnnn user(s)}
		Release 2	Virtual=Real area not available; in use by {userid nnnn user(s)}
0202	IC	Release 1	VIRT=REAL AREA NOT AVAILABLE; INSUFFICIENT STORAGE
		Release 2	Virtual={Real Fixed} area not available; insufficient storage
0203	IC	Release 1	V=R AREA REQUIRES IPL BY DEVICE NUMBER
		Release 2	Virtual={Real Fixed} area requires IPL by device number
0204	IC	Release 1	INVALID PAGE(S) SPECIFIED, V=R AREA
		Release 2	Invalid page(s) specified - Virtual=Real area
0205	IC	Release 1	VIRT=REAL AREA NOT GENERATED
		Release 2	The virtual=real area is not available because it was not generated.
0206	IC	Release 1	CANNOT CONNECT TO HOST VIRTUAL MACHINE
		Release 2	Cannot connect to host virtual machine
0232	IC	Release 1	IPL UNIT ERROR, {CSW = <i>csw</i> IRB = <i>irb</i> }, SENSE = <i>sense</i>
		Release 2	IPL UNIT ERROR, {CSW = <i>csw</i> IRB = <i>irb</i> }, SNS = <i>sense</i>
0240	IC	Release 1	PRT <i>rdev</i> FCB <i>fc</i> DOES NOT MATCH FORM LENGTH
		Release 2	The form length mounted on printer <i>rdev</i> does not match the length described by the FCB <i>fc</i> .
0241	IC	Release 1	PRT <i>rdev</i> UNDEFINED LOAD IMAGE <i>imagname</i> SPECIFIED
		Release 2	An undefined load image <i>imagname</i> was specified for printer <i>rdev</i> .
0255	IC	Release 1	PRT <i>rdev</i> , PAGE BUFFER DESTROYED, BACKUP PAGE COUNT = <i>nnnn</i>
		Release 2	PRINTER <i>rdev</i> ; PAGE BUFFER DESTROYED, BACKUP PAGE COUNT = <i>nnnn</i>
0259	IC	Release 1	SIZE PARAMETERS MISSING OR INVALID
		Release 2	SIZE parameter missing or invalid
0260	IC	Release 1	COMMAND <i>command</i> ENDED DUE TO ERRORS
		Release 2	{Command SPTAPE <i>command</i> <i>command</i> <i>command</i> } processing cannot complete due to errors.

SC = sometimes compatible, IC = incompatible, IO = Release 1 only.
 Not listed: compatible messages and Release-2-only messages.

Table 29 (Page 8 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
0261	IC	Release 1 Release 2	INVALID KEY - <i>key</i> <i>key</i> is an invalid storage key.
0262	IC	Release 1 Release 2	VIRTUAL CONSOLE NOT DEFINED The virtual console is not defined or is detached.
0263	IC	Release 1 Release 2	TOO MANY OPERANDS IN COMMAND LINE [Too many operands were supplied for this command.] or [TOO MANY OPERANDS WERE SUPPLIED FOR THIS COMMAND.]
0264	IC	Release 1 Release 2	OPTION(S) IGNORED; <i>option(s)</i> One or more options are ignored during reconnect processing - <i>option(s)</i>
0266	IC	Release 1 Release 2	ACCOUNT NUMBER MISSING OR INVALID An account number was not supplied or is invalid.
0267	IC	Release 1 Release 2	SCHIB MISSING OR INVALID A subchannel number was not supplied or is invalid.
0270	IC	Release 1 Release 2	PRT <i>rdev</i> TOO MANY WCGMS NEEDED FOR "CHARS" The character sets specified for the printer <i>rdev</i> required more writable character generation modules than were available.
0295	IC	Release 1 Release 2	INVALID PAGE(S) SPECIFIED, NOT CP PAGEABLE AREA The specified pages cannot be locked or unlocked because they are not in the CP pageable area.
0298	IC	Release 1 Release 2	<i>userid vdev</i> NOT LINKED; REQUEST DENIED <i>userid vdev</i> not linked; request denied
0299	IC	Release 1 Release 2	<i>name</i> NOT DEFINED; SKELETON ALREADY EXISTS. The {Named Saved System (NSS) saved segment} <i>name</i> could not be defined because a class S file with the same name already exists.
0300	IC	Release 1 Release 2	SAVE REQUEST BEYOND VIRTUAL MACHINE SIZE Save request beyond virtual machine size
0310	IC	Release 1 Release 2	DATE <i>date</i> INVALID; NOT CHANGED Date <i>date</i> invalid; not changed
0315	IC	Release 1 Release 2	INVALID MODE - MUST BE 370 THE CPFORMAT COMMAND REQUIRES THE VIRTUAL MACHINE TO BE IN 370 MODE.
0319	IC	Release 1 Release 2	ERROR PROCESSING SUBSYSTEM COMMAND <i>cmd</i> FOR DASD <i>rdev</i> Error processing subsystem command - <i>cmd</i> for DASD <i>rdev</i>
0326	IC	Release 1 Release 2	DASD <i>rdev</i> TRACK FORMAT NOT SUPPORTED FOR PAGING - <i>ss-XX-XX</i> DASD <i>rdev</i> TRACK FORMAT NOT SUPPORTED FOR PAGING - <i>ss-XX-XX</i> PAGING - <i>b-XX-XX</i>
0332	IC	Release 1 Release 2	INVALID CONTROL UNIT TYPE - <i>rdev</i> Invalid control unit type - <i>rdev</i>

SC = sometimes compatible, IC = incompatible, IO = Release 1 only.

Not listed: compatible messages and Release-2-only messages.

VM/XA SP Release 1 to Release 2 Migration

Table 29 (Page 9 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
0339	IC	Release 1	INVALID PAGE DESCRIPTOR CODE <i>invalid-code</i> FOR RANGE <i>nnnnn-nnnnn</i> ; SEGMENT ZERO MUST BE EXCLUSIVE.
		Release 2	The command processing cannot complete because the page descriptor code <i>invalid-code</i> for the page range <i>nnnnn-nnnnn</i> should be exclusive.
0351	IC	Release 1	DASD <i>rdev</i> NOT READY - SYSRES VOLUME
		Release 2	DASD <i>rdev</i> SYSRES NOT READY
0353	IC	Release 1	SYSRES DEVICE TYPE INVALID OR DEVICE <i>rdev</i> NOT OPERATIONAL
		Release 2	Sysres device type invalid or device <i>rdev</i> not operational
0361	IC	Release 1	LOGOFF/FORCE PENDING FOR THIS USER <i>userid</i>
		Release 2	{XAUTOLOG failed for <i>userid</i> .} LOGOFF/FORCE pending for user <i>userid</i>
0362	IC	Release 1	DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE THE SUBCHANNEL-ID IS INVALID.
		Release 2	[Device <i>rdev</i> cannot be varied online because the subchannel-id is invalid.] or [DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE THE SUBCHANNEL-ID IS INVALID.]
0386	IC	Release 1	DASD <i>vdev</i> IS READ ONLY
		Release 2	FORMATTING CANNOT BE DONE ON DASD <i>vdev</i> BECAUSE IT IS READ-ONLY.
0387	IC	Release 1	INVALID CONSOLE <i>vdev</i> FOR CP FORMAT
		Release 2	THE CPFORMAT COMMAND REQUIRES A 3-DIGIT DEVICE NUMBER FOR THE VIRTUAL CONSOLE <i>vdev</i> .
0388	IC	Release 1	CP FORMAT CANNOT BE ISSUED BY A {V=R V=F} USER
		Release 2	CPFORMAT cannot be issued by a Virtual={Real Fixed} user.
0389	IC	Release 1	CYLINDER RANGE TOO LARGE - DEVICE <i>vdev</i> HAS <i>nnnn</i> CYLINDERS
		Release 2	THE CYLINDER RANGE IS TOO LARGE BECAUSE DEVICE <i>vdev</i> HAS <i>nnnn</i> CYLINDERS.
0396	IC	Release 1	{CPFORMAT CPFM TXA} TERMINATED
		Release 2	THE CPFORMAT COMMAND PROCESSING DID NOT COMPLETE.
0400	IC	Release 1	SYSTEM {SPOOLING PAGING} AREA FULL
		Release 2	All {paging spooling} space is in use.
0401	IC	Release 1	SYSTEM {SPOOLING PAGING} AREA 90 PERCENT FULL
		Release 2	90 percent of all {paging spooling} space is in use.
0405	IC	Release 1	MOUNT FORM <i>operform</i> ON {PRT PUN} <i>rdev</i>
		Release 2	Mount form <i>operform</i> on {printer punch} <i>rdev</i>
0406	IC	Release 1	SETUP FORM <i>operform</i> ON PRT <i>rdev</i> FOR FORMS ALIGNMENT CHECK
		Release 2	Check forms alignment for form <i>operform</i> on printer <i>rdev</i> .
0407	IC	Release 1	NO FILES FOR SPTAPE ON DRIVE <i>rdev</i>
		Release 2	No files were {scanned dumped loaded} for SPTAPE on drive <i>rdev</i> .

SC = sometimes compatible, IC = incompatible, IO = Release 1 only.
 Not listed: compatible messages and Release-2-only messages.

Table 29 (Page 10 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
0408	IC	Release 1 Release 2	INPUT TAPE ON DRIVE <i>rdev</i> IS NOT IN SPTAPE FORMAT The input tape on drive <i>rdev</i> is not in SPTAPE format.
0409	IO	Release 1	SPTAPE OUTPUT TAPE CAPACITY EXCEEDED ON DRIVE <i>rdev</i>
0412	IC	Release 1 Release 2	SPTAPE UNRECOVERABLE I/O ERROR ON DRIVE <i>rdev</i> An unrecoverable I/O error occurred on the SPTAPE tape drive <i>rdev</i> .
0413	IC	Release 1 Release 2	COMMAND ENDED DUE TO SPOOL PAGING ERROR Command processing cannot complete due to a spool paging error.
0415	IC	Release 1 Release 2	CONTINUOUS PAGING ERRORS FROM DASD <i>nnnn</i> VOLUME <i>volser</i> Six continuous paging errors have occurred on DASD <i>nnnn</i> volume <i>volser</i> .
0416	IC	Release 1 Release 2	SPTAPE <i>func</i> FUNCTION ON DRIVE <i>rdev</i> TERMINATED The SPTAPE <i>func</i> function on drive <i>rdev</i> did not complete.
0417	IC	Release 1 Release 2	{ <i>rdev vdev</i> } NOT AN OUTPUT SPOOLING DEVICE { <i>rdev vdev</i> } is not an output spooling device.
0418	IC	Release 1 Release 2	{ <i>rdev vdev</i> } NOT A SPOOLED DEVICE { <i>rdev vdev</i> } is not a spooled device.
0419	IC	Release 1 Release 2	{ <i>rdev vdev</i> } NOT A SPOOLED PRINTER { <i>rdev vdev</i> } is not a spooled printer.
0421	IC	Release 1 Release 2	PRT <i>prt-type</i> DOES NOT SUPPORT <i>feature command</i> Printer <i>prt-type</i> does not support the { <i>feature feature command command</i> }.
0422	IC	Release 1 Release 2	CONFLICTING OPTION; SAME OPTION SPECIFIED TWICE The same option was specified twice.
0423	IC	Release 1 Release 2	CONFLICTING OPTION; INCOMPATIBLE WITH PRIOR OPERAND The function requested is incompatible with a previously specified operand.
0427	IC	Release 1 Release 2	<i>type</i> { <i>rdev vdev name</i> } SYSTEM SPOOL SPACE FULL; FILE {HELD PURGED} <i>type</i> { <i>rdev vdev name</i> } system spool space full; file {closed held purged}
0428	IC	Release 1 Release 2	{PRT PUN RDR TAPE} <i>rdev</i> SPOOL ERROR; FILE {HELD PURGED} <i>type rdev</i> spool error; file {held purged closed}
0429	IC	Release 1 Release 2	{CONS PRT PUN RDR} <i>vdev</i> SPOOL ERROR; FILE {HELD PURGED} <i>type vdev</i> spool error; file {held purged}
0431	IC	Release 1 Release 2	RDR <i>rdev</i> ID CARD MISSING OR INVALID Reader <i>rdev</i> id card missing or invalid
0432	IC	Release 1 Release 2	RDR <i>rdev</i> ID CARD INVALID; <i>userid</i> NOT IN CP DIRECTORY The ID card for reader <i>rdev</i> is invalid because <i>userid</i> is not in the CP directory.
0433	IC	Release 1 Release 2	RDR <i>rdev</i> ID CARD; INVALID DATA - <i>data</i> Reader <i>rdev</i> id card; invalid data - <i>data</i>

SC = sometimes compatible, IC = incompatible, IO = Release 1 only.
Not listed: compatible messages and Release-2-only messages.

VM/XA SP Release 1 to Release 2 Migration

Table 29 (Page 11 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
0435	IC	Release 1	PAGING I/O ERROR OCCURRED WHILE WRITING A PAGE. {DEFSYS DEFSEG SAVESYS SAVESEG} COMMAND NOT COMPLETED.
		Release 2	{SAVESYS SAVESEG} command was not completed because a paging I/O error occurred while writing a page.
0439	IC	Release 1	USER <i>userid</i> SPOOL FILEID LIMIT EXCEEDED
		Release 2	{User <i>userid</i> *NSS *IMG *UCR *NLS} spool fileid limit exceeded
0440	IC	Release 1	{SYSTEM SEGMENT} <i>name</i> {DEFINED SAVED} SUCCESSFULLY IN FILEID <i>fileid</i> .
		Release 2	{Named Saved System (NSS) saved segment} <i>name</i> was successfully {saved defined} in fileid <i>fileid</i>
0445	IC	Release 1	{SEGMENT SYSTEM} <i>name</i> COULD NOT BE {DEFINED SAVED} DUE TO AN UNEXPECTED ERROR.
		Release 2	The {Named Saved System (NSS) saved segment} <i>name</i> could not be {saved defined} due to an unexpected error.
0446	IC	Release 1	{SEGMENT SYSTEM} <i>name</i> NOT PREVIOUSLY DEFINED AND CANNOT BE SAVED.
		Release 2	The {Named Saved System (NSS) saved segment} <i>name</i> was not previously defined and cannot be saved.
0447	IC	Release 1	SYSTEM <i>sysname</i> CANNOT BE IPLED DUE TO INVALID PROCESSOR CONFIGURATION
		Release 2	System <i>sysname</i> cannot be IPLed due to an invalid processor configuration.
0448	IC	Release 1	SYSTEM <i>name</i> NOT QUIESCED. OUTSTANDING {I/O ON DEVICE <i>vdev</i> EXTERNAL INTERRUPT}
		Release 2	System <i>name</i> not quiesced. Outstanding {I/O on device <i>vdev</i> external interrupt}
0449	IC	Release 1	YOUR USERID IS NOT AUTHORIZED TO IPL SYSTEM <i>name</i>
		Release 2	Your <i>userid</i> is not authorized to IPL system <i>name</i> .
0450	IC	Release 1	CP ENTERED; DISABLED WAIT PSW <i>psw</i>
		Release 2	CP entered; disabled wait PSW <i>psw</i>
0452	IC	Release 1	CP ENTERED; EXTERNAL INTERRUPT LOOP
		Release 2	CP entered; external interrupt loop
0453	IC	Release 1	CP ENTERED; PROGRAM INTERRUPT LOOP
		Release 2	CP entered; program interrupt loop
0475	IC	Release 1	FATAL I/O ERROR TRYING TO READ DIRECTORY FROM <i>valid</i> [FOR USER <i>userid</i>]
		Release 2	Fatal I/O error trying to read directory from <i>valid</i> [for user <i>userid</i>]
0521	SC	Release 1	<i>type rdev</i> HAS NO AVAILABLE CHANNEL PATHS
		Release 2	[<i>type rdev</i> has no available channel paths] or [<i>type rdev</i> HAS NO AVAILABLE CHANNEL PATHS]
0541	IC	Release 1	COPY ERROR ON PRINTER
		Release 2	The PF key copy function cannot complete due to a permanent I/O error on the printer.

SC = sometimes compatible, IC = incompatible, IO = Release 1 only.
Not listed: compatible messages and Release-2-only messages.

Table 29 (Page 12 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
0542	IC	Release 1	DASD <i>rdev</i> OP INC CMD = <i>cm</i> SNS = <i>sense</i> IRB = <i>irb</i> USERID = <i>userid</i> [BBCCHH = <i>bbcchh</i>]
		Release 2	DASD <i>rdev</i> OP INC CMD = <i>cm</i> SNS = <i>sense</i> IRB = <i>irb</i> USERID = <i>userid</i> [BBCCHH = <i>bbcchh</i>]
0575	IC	Release 1	I/O ERROR ADD = <i>raddr</i> , USERID = <i>userid</i>
		Release 2	I/O error add <i>rdev</i> , <i>userid</i> = <i>userid</i>
0630	IC	Release 1	TOD CLOCK SYNCHRONIZATION FAILURE
		Release 2	The TOD-clock could not be synchronized due to a processor controller failure.
0631	IC	Release 1	PROCESSOR <i>nn</i> - TOD CLOCK SYNCHRONIZATION FAILURE
		Release 2	The TOD-clock could not be synchronized because CP was unable to vary a processor back online.
0632	IC	Release 1	PROCESSOR CONTROLLER FAILURE; ORDERLY SYSTEM SHUTDOWN IS RECOMMENDED
		Release 2	A system shutdown is recommended due to a processor controller failure.
0633	IC	Release 1	COMMAND REJECTED; VECTOR <i>nn</i> ALREADY ONLINE
		Release 2	The VARY ONLINE VECTOR command cannot be processed because vector <i>nn</i> is already online.
0634	IC	Release 1	COMMAND REJECTED; VECTOR <i>nn</i> ALREADY OFFLINE
		Release 2	The VARY OFFLINE VECTOR command cannot be processed because vector <i>nn</i> is already offline.
0635	IC	Release 1	VECTOR <i>nn</i> LOGICALLY OFFLINE; PHYSICAL VARY FAILED
		Release 2	Vector facility <i>nn</i> is logically offline but the physical vary failed.
0636	IC	Release 1	VARY VECTOR COMMAND FAILED; PROCESSOR <i>nn</i> NOT ONLINE
		Release 2	The VARY VECTOR command cannot be processed because processor <i>nn</i> is not online.
0637	IC	Release 1	VARY VECTOR COMMAND FAILED; VECTOR <i>nn</i> NOT AVAILABLE
		Release 2	The VARY VECTOR command cannot be processed because vector facility <i>nn</i> is not available.
0638	IC	Release 1	LAST OPERATIONAL VECTOR FACILITY HAS BEEN REMOVED FROM CONFIGURATION
		Release 2	The last operational vector facility has been removed from the configuration.
0645	IC	Release 1	VECTOR FACILITY NOT AVAILABLE
		Release 2	Vector facility not available
0649	IC	Release 1	VECTOR <i>nn</i> NO LONGER AVAILABLE TO SERVICE DEDICATED USER <i>vruser</i> CPU <i>nn</i>
		Release 2	Vector facility <i>nn</i> is no longer available to service the dedicated user <i>userid</i> on CPU <i>nn</i> .
0650	IC	Release 1	CP ENTERED; COMPLEX INTERRUPT LOOP
		Release 2	The virtual machine is placed in CP mode due to a complex interrupt loop.

SC = sometimes compatible, IC = incompatible, IO = Release 1 only.

Not listed: compatible messages and Release-2-only messages.

VM/XA SP Release 1 to Release 2 Migration

Table 29 (Page 13 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
0657	IC	Release 1 Release 2	PAGE ZERO DAMAGED The virtual machine's page zero is unavailable because it is damaged.
0659	IC	Release 1 Release 2	VECTOR NOT DEFINED; VECTOR <i>nn</i> ALREADY EXISTS The vector cannot be defined because vector <i>nn</i> already exists.
0660	IC	Release 1 Release 2	VECTOR <i>nn</i> DOES NOT EXIST The DETACH command cannot be processed because vector <i>nn</i> does not exist.
0661	IC	Release 1 Release 2	VECTOR NOT DEFINED; CPU <i>nn</i> DOES NOT EXIST The vector cannot be defined because CPU <i>nn</i> does not exist.
0662	IC	Release 1 Release 2	NO REAL VECTOR FACILITY AVAILABLE TO SERVICE VECTOR <i>nn</i> [<i>nn...</i>] No real vector facility is available to service vector(s) <i>nn</i> { <i>nn...</i> }.
0663	IC	Release 1 Release 2	VECTOR NOT DEFINED; NO REAL VECTOR FACILITY INSTALLED The vector cannot be defined because no real vector facility is installed.
0664	IC	Release 1 Release 2	NO REAL VECTOR FACILITY AVAILABLE TO SERVICE NON-DEDICATED USERS No real vector facility is available to service non-dedicated users.
0743	IC	Release 1 Release 2	DIAL FUNCTION NOT AVAILABLE DIAL function not available
0745	IC	Release 1 Release 2	VECTOR REGISTER CONTENTS HAVE BEEN LOST FOR CPU <i>nn</i> The vector register contents have been lost for CPU <i>nn</i> .
0746	IC	Release 1 Release 2	SPOOL FILE ERROR WHILE PROCESSING VECTOR REGISTERS A spool file error occurred while processing the vector registers.
0749	IC	Release 1 Release 2	STORE EXCEEDS MAXIMUM ELEMENT Store exceeds maximum element
0752	IC	Release 1 Release 2	STATEMENT SEQUENCE ERROR FOLLOWING USER <i>userid</i> STATEMENT SEQUENCE ERRIR [FOLLOWING {PROFILE <i>profname</i> USER <i>userid</i> }]
0770	IC	Release 1 Release 2	OVERRIDE INVALID FOR <i>command</i> Override invalid for <i>command</i>
0785	IC	Release 1 Release 2	INVALID ELEMENT - <i>element</i> Invalid element - <i>element</i>
0795	1O	Release 1	STATEMENT CONFLICTS WITH CLASS VALUE ON USER STATEMENT FOLLOWING USER <i>userid</i>
0798	IC	Release 1 Release 2	<i>keyword1</i> KEYWORD CONFLICTS WITH <i>keyword2</i> FOLLOWING USER <i>userid</i> <i>keyword1</i> KEYWORD CONFLICTS WITH <i>keyword2</i> FOLLOWING {PROFILE <i>profname</i> USER <i>userid</i> }
0799	IC	Release 1 Release 2	IPL FAILED DUE TO INSUFFICIENT OR FAULTY STORAGE IPL failed due to insufficient or faulty storage

SC = sometimes compatible, IC = incompatible, 1O = Release 1 only.
Not listed: compatible messages and Release-2-only messages.

Table 29 (Page 14 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
0811	IC	Release 1	PREFERRED VIRTUAL MACHINE RECOVERY SUPPRESSED - RESERVED PAGE FRAMES EXHAUSTED.
		Release 2	Preferred virtual machine recovery is suppressed because the supply of reserved page frames is exhausted.
0820	IC	Release 1	IUCV FUNCTION IS NO LONGER ACTIVE FOR USER <i>userid</i> DUE TO PREFERRED VIRTUAL MACHINE RECOVERY.
		Release 2	The IUCV function is no longer active for user <i>userid</i> because preferred virtual machine recovery is in process.
0825	SC	Release 1	PREFERRED VIRTUAL MACHINE RECOVERY SUPPRESSED. REASON: <i>text</i>
		Release 2	[PREFERRED VIRTUAL MACHINE RECOVERY SUPPRESSED. REASON: <i>text</i>] or [Preferred virtual machine recovery suppressed. Reason: Expanded storage not recovered.]
0830	IC	Release 1	PROCESSOR CONTROLLER IS RESPONDING SLOWLY
		Release 2	The processor controller is responding slowly.
0831	IC	Release 1	PROCESSOR CONTROLLER IS NOW RESPONDING
		Release 2	The processor controller is now responding.
0832	IC	Release 1	PROCESSOR CONTROLLER IS LOGICALLY DISCONNECTED FROM THE SYSTEM DUE TO AN INCONGRUOUS RESPONSE
		Release 2	The processor controller is disconnected due to a system error.
0833	IC	Release 1	IOCP WRITE SEQUENCE STARTED, WILL ALTER I/O CONFIGURATION DATA SET <i>xx</i>
		Release 2	An IOCP has started a write sequence that will alter the I/O configuration data set <i>xx</i> .
0834	IC	Release 1	IOCP WRITE SEQUENCE TERMINATED, I/O CONFIGURATION DATA SET <i>xx</i> IS INVALID
		Release 2	The IOCP write processing cannot complete because the I/O configuration data set <i>xx</i> is invalid.
0835	IC	Release 1	IOCP WRITE SEQUENCE COMPLETED, I/O CONFIGURATION DATA SET <i>xx</i> HAS BEEN ALTERED
		Release 2	The IOCP write processing has completed; the I/O configuration data set <i>xx</i> is altered.
0836	IC	Release 1	IOCP WRITE REQUEST REJECTED, LOCKED BY <i>userid</i>
		Release 2	The IOCP write request cannot complete because <i>userid</i> already has a sequence in progress.
0837	IC	Release 1	IOCP READ REQUEST REJECTED, LOCKED BY <i>userid</i>
		Release 2	The IOCP read request cannot complete because <i>userid</i> already has a sequence in progress.
0838	IC	Release 1	PROCESSOR CONTROLLER FAILURE; REQUEST PROCESS IS SUSPENDED
		Release 2	The request process cannot complete due to a processor controller failure.

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Not listed: compatible messages and Release-2-only messages.

VM/XA SP Release 1 to Release 2 Migration

Table 29 (Page 15 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
0839	IC	Release 1	IOCP READ OPEN REQUEST REJECTED, TRYING TO OPEN DIFFERENT DATA SET, OPENED DATA SET IS <i>xx</i>
		Release 2	The IOCP read open request cannot complete because data set <i>xx</i> is already open.
0840	IC	Release 1	IOCP WRITE OPEN REQUEST REJECTED, TRYING TO OPEN DIFFERENT DATA SET, OPENED DATA SET IS <i>xx</i>
		Release 2	The IOCP write open request cannot complete because data set <i>xx</i> is already open.
0841	IC	Release 1	NO SCP INFORMATION, PROCESSOR CONTROLLER REQUEST PROCESS IS SUSPENDED
		Release 2	The processor controller request process cannot complete due to no SCP information.
0842	IC	Release 1	IOCP READ REQUEST REJECTED, TRYING TO READ FROM UNOPENED DATA SET, CURRENT OPEN DATA SET IS <i>xx</i>
		Release 2	The IOCP read request cannot complete because the data set is not open. The current open data set is <i>xx</i> .
0843	IC	Release 1	IOCP WRITE REQUEST REJECTED, TRYING TO WRITE TO UNOPENED DATA SET, CURRENT OPEN DATA SET IS <i>xx</i>
		Release 2	The IOCP write request cannot complete because the data set is not open. The current open data set is <i>xx</i> .
0844	IC	Release 1	DEVICE NOT DEFINED; INVALID CONTROL UNIT TYPE
		Release 2	The device is not defined due to an invalid control unit type.
0845	IC	Release 1	DASD <i>rdev</i> NOT ATTACHED; PAGING ADDRESSES OFFLINE
		Release 2	DASD <i>rdev</i> not attached; paging addresses offline
0846	IC	Release 1	INVALID CHPID <i>yy</i>
		Release 2	<i>yy</i> is an invalid channel path identifier.
0847	IC	Release 1	MAXIMUM SYSTEM SPOOL FILE LIMIT EXCEEDED
		Release 2	Maximum system spool file limit exceeded
0848	IC	Release 1	SYSTEM PARAMETER IS INVALID WITH THE SPOOLID OPTION
		Release 2	SYSTEM parameter is invalid with the spoolid option
0849	IC	Release 1	A USERID MUST BE SPECIFIED WITH THE SPOOLID
		Release 2	A userid must be specified with the spoolid
0863	IC	Release 1	INVALID PARAMETER - <i>parameter</i>
		Release 2	Invalid parameter - <i>parameter</i>
0880	IC	Release 1	COMMAND REJECTED; PROCESSOR <i>nn</i> ALREADY ONLINE
		Release 2	The command processing cannot complete because processor <i>nn</i> is already online.
0881	IC	Release 1	COMMAND REJECTED; PROCESSOR <i>nn</i> ALREADY OFFLINE
		Release 2	The command processing cannot complete because processor <i>nn</i> is already offline.

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Not listed: compatible messages and Release-2-only messages.

Table 29 (Page 16 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
0882	IC	Release 1	VARY PROCESSOR COMMAND FAILED, INITIALIZATION FAILURE
		Release 2	The VARY command processing cannot complete due to an initialization failure.
0883	IC	Release 1	COMMAND REJECTED; PROCESSOR <i>nn</i> NOT RESPONSIVE
		Release 2	The command processing cannot complete because processor <i>nn</i> is not responsive.
0884	IC	Release 1	COMMAND REJECTED; PROCESSOR <i>nn</i> IS THE ONLY ACTIVE PROCESSOR
		Release 2	The command processing cannot complete because processor <i>nn</i> is the only active processor.
0885	IC	Release 1	PROCESSOR <i>nn</i> LOGICALLY OFFLINE, PHYSICAL VARY FAILED
		Release 2	The VARY processing cannot complete because the physical vary failed; processor <i>nn</i> is logically offline.
0886	IC	Release 1	VARY PROCESSOR COMMAND FAILED, PROCESSOR <i>nn</i> NOT AVAILABLE
		Release 2	The VARY command processing cannot complete because processor <i>nn</i> is not available.
0890	IC	Release 1	USER <i>userid</i> VIRTUAL CPU <i>cpuaddr</i> IS ALREADY DEDICATED
		Release 2	User <i>userid</i> 's virtual CPU <i>nn</i> is already dedicated.
0891	IC	Release 1	USER <i>userid</i> VIRTUAL CPU <i>cpuaddr</i> IS NOT DEDICATED
		Release 2	User <i>userid</i> 's virtual CPU <i>nn</i> is not dedicated.
0892	IC	Release 1	NO PROCESSOR AVAILABLE TO DEDICATE
		Release 2	There is no processor available to dedicate.
0893	IC	Release 1	NO V=R USER CURRENTLY LOGGED ON
		Release 2	There is no Virtual=Real user currently logged on.
0894	IC	Release 1	NUMBER OF CPUS DEDICATED IS <i>n</i>
		Release 2	The number of newly dedicated processors is <i>n</i> .
0895	IC	Release 1	NUMBER OF CPUS ALREADY DEDICATED IS <i>n</i>
		Release 2	The number of previously dedicated processors is <i>n</i> .
0896	IC	Release 1	NUMBER OF CPUS NOT DEDICATED IS <i>n</i> ; NO PROCESSORS AVAILABLE FOR DEDICATION
		Release 2	The number of processors that could not be dedicated is <i>n</i> , because no processors were available.
0897	IC	Release 1	NUMBER OF CPUS UNDEDICATED IS <i>n</i>
		Release 2	The number of newly undedicated processors is <i>n</i> .
0898	IC	Release 1	NUMBER OF CPUS NOT DEDICATED IS <i>a</i>
		Release 2	The number of processors currently not dedicated is <i>n</i> .
0902	IC	Release 1	SYSTEM RECOVERY FAILURE; FATAL I/O ERROR
		Release 2	System recovery failure; fatal I/O error
0904	IC	Release 1	SYSTEM RECOVERY FAILURE; INVALID WARM START DATA
		Release 2	System recovery failure; invalid warm start data

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Not listed: compatible messages and Release-2-only messages.

VM/XA SP Release 1 to Release 2 Migration

Table 29 (Page 17 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
0912	IC	Release 1 Release 2	SYSTEM RECOVERY FAILURE; VOLID <i>valid</i> NOT MOUNTED System recovery failure; valid <i>valid</i> not mounted
0953	IC	Release 1 Release 2	UNABLE TO ALLOCATE SYSTEM DASD DUMP CP is unable to allocate system DASD dump space.
0983	IC	Release 1 Release 2	SYSTEM RECOVERY FAILURE; SPOOL FILE ERROR System recovery failed due to a spool file error.
0984	IC	Release 1 Release 2	TOD CLOCK DAMAGED. ENABLE CLOCK SET SWITCH TOD clock damaged. Enable clock set switch
1001	IC	Release 1 Release 2	MISSING OPERAND FOR <i>option</i> An operand is missing for <i>option</i> .
1002	IC	Release 1 Release 2	VOLID <i>valid</i> DOES NOT EXIST Volume identifier <i>valid</i> does not exist.
1003	IC	Release 1 Release 2	<i>arg</i> NOT FOUND { <i>CP module name</i> <i>rdev</i> <i>ldev</i> } { <i>is</i> <i>was</i> } not found.
1005	IC	Release 1 Release 2	INVALID CHARACTER An invalid character was encountered.
1006	IC	Release 1 Release 2	COMMAND REJECTED; SYSTEM RESOURCES NOT AVAILABLE The command processing cannot complete because system resources are not available.
1008	IC	Release 1 Release 2	DEVICE <i>rdev</i> IS NOT A DASD Device <i>rdev</i> is not a DASD
1009	IC	Release 1 Release 2	DEVICE <i>rdev</i> IS NOT ATTACHED TO THE SYSTEM Device <i>rdev</i> is not attached to the system
1011	IC	Release 1 Release 2	HARD ABEND CODE TABLE FULL An operand is missing for <i>option</i> .
1012	IC	Release 1 Release 2	QUEUE TYPE MISSING OR INVALID Queue type missing or invalid
1013	IC	Release 1 Release 2	INVALID OPERAND FOR <i>option - operand</i> An invalid operand was supplied for <i>option - operand</i> .
1025	IC	Release 1 Release 2	RECURSIVE TRACE CALL REJECTED A recursive trace call cannot be done.
1026	IC	Release 1 Release 2	TRACE RETURN REJECTED; NO CALLING TRACE SET The trace return cannot be done because there is no matching trace call.
1027	IC	Release 1 Release 2	AN ACTIVE TRACE SET HAS TURNED RUN OFF An active trace set has turned RUN off.
1028	IC	Release 1 Release 2	TRACE ENTRY CANCELLED DUE TO PAGING ERROR Trace entry cannot complete due to paging error.

SC = sometimes compatible, IC = incompatible, IO = Release 1 only.

Not listed: compatible messages and Release-2-only messages.

Table 29 (Page 18 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
1029	IC	Release 1	CCW TRACING CANCELLED; MAXIMUM BUFFER SIZE HAS BEEN EXCEEDED
		Release 2	CCW tracing cannot complete because the maximum buffer size has been exceeded.
1030	IC	Release 1	CCW TRACING CANCELLED; SYSTEM VIRTUAL STORAGE PAGING ERROR
		Release 2	CCW tracing cannot complete due to a system virtual storage paging error.
1031	IC	Release 1	SET RUN ON IS NOT ALLOWED WHEN TRACE IS ACTIVE
		Release 2	SET RUN ON is not allowed when the trace function is active.
1032	IC	Release 1	SYNTAX ERROR
		Release 2	A syntax error was encountered.
1033	IC	Release 1	NO SPECIFIC TRACE IN EFFECT
		Release 2	No SPECIFIC CP TRACE is in effect.
1034	IC	Release 1	NO SPECIFIC TRACE IN EFFECT FOR <i>xxxxxxxx</i>
		Release 2	No SPECIFIC CP TRACE is in effect for <i>userid</i> .
1035	IC	Release 1	TRACE SET CANNOT BE APPENDED TO ITSELF
		Release 2	A trace set cannot be appended to itself.
1036	IC	Release 1	<i>traceset</i> IS AN EMPTY TRACE SET
		Release 2	{ <i>traceset</i> The current trace set} is an empty trace set.
1037	IC	Release 1	TRAP LIMIT EXCEEDED; COMMAND REJECTED
		Release 2	The command cannot be processed because the maximum number of TRACE traps is already defined.
1100	IC	Release 1	LDEV MISSING OR INVALID
		Release 2	A logical device number was not supplied or it is invalid.
1101	IC	Release 1	<i>type rdev</i> IS NOT SUPPORTED AS A SYSTEM-OWNED DEVICE
		Release 2	DASD <i>rdev</i> is not supported as a system-owned device.
1102	IC	Release 1	<i>type rdev</i> HAS NOT BEEN ATTACHED BECAUSE THE PAGING SUBSYSTEM IS ALREADY OWNED BY <i>userid</i>
		Release 2	DASD <i>rdev</i> has not been attached because the paging subsystem is already owned by <i>userid</i> .
1103	IC	Release 1	<i>type rdev</i> HAS NOT BEEN ATTACHED BECAUSE A REAL DASD PAGING SUBSYSTEM MUST MAP TO ONLY ONE VIRTUAL PAGING SUBSYSTEM
		Release 2	DASD <i>rdev</i> has not been attached because a real DASD subsystem must map to only one virtual paging subsystem.
1104	IC	Release 1	<i>type rdev</i> HAS NOT BEEN ATTACHED BECAUSE MULTIPLE REAL DASD PAGING SUBSYSTEMS MUST NOT MAP TO THE SAME VIRTUAL DASD PAGING SUBSYSTEM
		Release 2	DASD <i>rdev</i> has not been attached because multiple real DASD paging subsystems must not map to the same virtual DASD paging subsystem.
1105	SC	Release 1	TAPE <i>rdev</i> NOT ATTACHED; TAPE ASSIGNED ELSEWHERE
		Release 2	[Tape <i>rdev</i> not attached; tape assigned elsewhere.] or [TAPE <i>rdev</i> NOT ATTACHED; TAPE ASSIGNED ELSEWHERE]

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 Not listed: compatible messages and Release-2-only messages.

VM/XA SP Release 1 to Release 2 Migration

Table 29 (Page 19 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
1107	IC	Release 1 Release 2	ATTACH FAILED; I/O ERROR ON <i>type rdev</i> Attach failed; I/O error on tape <i>rdev</i>
1150	IC	Release 1 Release 2	DASD { <i>rdev vdev</i> } IS NOT A VALID BASE EXPOSURE DASD { <i>rdev vdev</i> } is not a valid base exposure.
1151	IC	Release 1 Release 2	<i>userid vdev</i> HAS NOT BEEN LINKED BECAUSE IT IS NOT WITHIN CP VOLUME CYLINDER EXTENTS <i>userid vdev</i> has not been linked because it is not within CP volume cylinder extents.
1152	IC	Release 1 Release 2	<i>userid vdev</i> HAS NOT BEEN LINKED BECAUSE IT WOULD OVERLAP SYSTEM <i>type</i> SPACE <i>userid vdev</i> has not been liked because it would overlap { <i>directory spool page temporary disk</i> } space
1200	IC	Release 1 Release 2	DASD <i>vdev</i> HAS NOT BEEN REDEFINED BECAUSE PAGING SUBSYSTEM DEVICES CANNOT BE REDEFINED DASD <i>vdev</i> has not been redefined because paging subsystem device cannot be redefined.
1201	IC	Release 1 Release 2	DEVICE <i>vdev</i> ACTIVE, CANNOT BE READIED Device <i>vdev</i> cannot be readied because it is active.
1202	IC	Release 1 Release 2	DEVICE <i>vdev</i> ACTIVE, REWIND NOT DONE Device <i>vdev</i> was not rewound because it is active.
1250	SC	Release 1 Release 2	DEVICE <i>vdev</i> CANNOT BE VARIED ON-LINE BECAUSE A TIME-OUT CONDITION OCCURRED. [Device <i>rdev</i> cannot be varied online because a time-out condition occurred.] or [DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE A TIME-OUT CONDITION OCCURRED.]
1280	IC	Release 1 Release 2	DEVICE <i>vdev</i> NOT USABLE; RESERVE LOST [BY <i>userid AS vdev</i>] Device <i>vdev</i> not usable; reserve lost [by <i>userid as vdev</i>]
1281	IC	Release 1 Release 2	PATH <i>xx</i> TO DEVICE <i>rdev</i> NOW OFFLINE; PATH GROUP ID MISMATCH Path <i>channel</i> to device <i>rdev</i> now offline; path group ID mismatch.
1350	IC	Release 1 Release 2	{SYSTEM SEGMENT} <i>name</i> CANNOT BE SAVED. {V=R V=F MP} USERS CANNOT SAVE AN NSS OR DCSS. {Named Saved System (NSS) The saved segment} <i>name</i> cannot be saved because {MP Virtual=Real Virtual=Fixed} users cannot save a {Named Saved System (NSS) saved segment}.
1352	IC	Release 1 Release 2	SYSTEM <i>name</i> CANNOT BE PROCESSED. System <i>name</i> cannot be processed.
1353	IC	Release 1 Release 2	AN INVALID {NAME <i>name</i> PAGE RANGE <i>nnnnn-nnnnn</i> } WAS DETECTED IN {DEFSYS DEFSEG} COMMAND. An invalid { <i>name name</i> page range <i>nnnnn-nnnnn</i> } was detected in the {DEFSYS DEFSEG} command

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Table 29 (Page 20 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
1354	IC	Release 1	AN INVALID STORAGE PAGE DESCRIPTOR CODE <i>invalid-code</i> WAS DETECTED FOR PAGE RANGE <i>nnnnn-nnnnn</i>
		Release 2	An invalid storage page descriptor code <i>invalid-code</i> was detected for page range <i>nnnnn-nnnnn</i> .
1355	IC	Release 1	SEGMENT NUMBER <i>nnn</i> HAS CONFLICTING SHARED AND EXCLUSIVE PAGE DESCRIPTOR CODES.
		Release 2	Segment number <i>nnn</i> was defined with both shared and exclusive page descriptor codes.
1356	IC	Release 1	CONFLICTING PAGE RANGE <i>nnnnn-nnnnn</i> PLEASE CHECK FOR OVERLAPS AND RE-ISSUE THE COMMAND.
		Release 2	<i>nnnnn-nnnnn</i> is a conflicting page range. Please check for overlaps and reissue the command.
1357	IC	Release 1	370 GUEST CANNOT LOAD A DCSS GREATER THAN 16M.
		Release 2	370 GUEST CANNOT LOAD A SAVED SEGMENT GREATER THAN 16M.
1358	IC	Release 1	CP DCSS <i>name</i> CANNOT BE LOADED IN NON-SHARED MODE.
		Release 2	CP saved segment <i>name</i> cannot be loaded in exclusive mode.
1359	IC	Release 1	CP NSS DCSS <i>name</i> CANNOT BE SAVED; A CP COPY IS ALREADY [ACTIVE PENDING PURGE].
		Release 2	[CP]{Saved segment Named Saved Segment (NSS)} <i>name</i> cannot be saved because a [CP] copy is already {active waiting to be purged}.
1400	IC	Release 1	XSTORE NOT AVAILABLE. ALREADY IN USE [BY USER- <i>userid</i>]
		Release 2	Expanded storage is not available because it is already in use.
1401	IC	Release 1	XSTORE NOT AVAILABLE WITHIN THIS HARDWARE CONFIGURATION
		Release 2	Expanded storage is not available within this hardware configuration.
1402	IC	Release 1	XSTORE IS NOT ATTACHED TO USER <i>userid</i>
		Release 2	Expanded storage is not attached to user <i>userid</i> .
1450	IC	Release 1	STORAGE EXCEEDS SIZE OF V = R AREA WHICH IS <i>nnnn</i> MEGABYTES
		Release 2	The storage request exceeds the current size available for Virtual = {Real Fixed} user <i>userid</i> , which is <i>nnnn</i> MEG.
1451	IC	Release 1	UNABLE TO DUMP PAGE <i>hexloc</i>
		Release 2	CP is unable to dump page <i>hexloc</i> .
1452	IC	Release 1	MORE THAN 8 CPUS IN CONFIGURATION; ADDITIONAL CPU DATA NOT DUMPED
		Release 2	The VMDUMP command is unable to process CPU dump data for more than 8 CPU's.
1453	IC	Release 1	CPU NOT DEFINED; CPU <i>nn</i> ALREADY EXISTS
		Release 2	CPU <i>nn</i> is not defined because it already exists.
1454	IC	Release 1	CPU <i>nn</i> DOES NOT EXIST
		Release 2	CPU <i>nn</i> does not exist.

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 Not listed: compatible messages and Release-2-only messages.

VM/XA SP Release 1 to Release 2 Migration

Table 29 (Page 21 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
1455	IC	Release 1 Release 2	CPU <i>nn</i> NOT STARTED, CPU IN CHECK- STOP STATE CPU <i>nn</i> is not started because it is in check-stop state.
1456	IC	Release 1 Release 2	CPU <i>nn</i> (BASE) IS NOT DETACHED The base CPU <i>nn</i> cannot be detached.
1457	IC	Release 1 Release 2	SLEEP COMMAND TERMINATED BY AN ATTENTION AT CONSOLE The SLEEP command processing was halted due to an attention interrupt at the console.
1458	IC	Release 1 Release 2	CPU NOT DEFINED; WOULD EXCEED MAXIMUM An attempt was made to define more CPU's than is allowed in your directory.
1459	IC	Release 1 Release 2	CPU <i>nn</i> STOPPED; CHECK-STOP STATE ENTERED The virtual machine is placed in check-stop state due to a system malfunction with CPU <i>nn</i> .
1500	IC	Release 1 Release 2	LOGON PROHIBITED, USERID <i>userid</i> IN HOLD {XAUTOLOG failed for <i>userid</i> :} Logon cannot be done because <i>userid</i> <i>userid</i> is in system hold state.
1501	IC	Release 1 Release 2	ACCOUNTING ERROR An accounting error was encountered.
1502	IC	Release 1 Release 2	USERID DIRECTORY ENTRY IN USE {XAUTOLOG failed for <i>userid</i> :} The directory entry for this <i>userid</i> is in use.
1503	IC	Release 1 Release 2	HOLD QUEUE FULL, HOLD STATUS NOT SET Hold status is not set because the hold queue is full.
1505	IC	Release 1 Release 2	CONSOLE TYPE CONFLICT The device being used for LOGON conflicts with the console definition in the directory.
1506	IC	Release 1 Release 2	THE LAST LINE (50) IN THE LOG MESSAGE IS ALREADY IN USE. The last line (50) in the log message is already in use.
1507	IC	Release 1 Release 2	DIRECTORY NOT VALID The directory is not valid.
1550	IC	Release 1 Release 2	INVALID DEVICE CLASS - <i>rdev</i> <i>value</i> is an invalid device class.
1551	IC	Release 1 Release 2	INVALID NUMBER FOR <i>option</i> - <i>operand</i> <i>value</i> is an invalid number for MODIFY.
1552	IC	Release 1 Release 2	TOO MANY <i>option</i> OPERANDS SPECIFIED; CANNOT EXCEED <i>n</i> More than {4 8} operands were specified for the {CHARS CLASS} option.
1553	IC	Release 1 Release 2	<i>userid</i> NOT IN HOLD {PRT PUN ALL LOGON} STATUS <i>userid</i> is not in hold status for {printer punch logon all devices}.
1554	IC	Release 1 Release 2	BLANK DIRECTORY ENTRY BYPASSED FOR <i>vdev</i> VM A blank directory entry has been bypassed for the <i>vdev</i> virtual machine.

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Not listed: compatible messages and Release-2-only messages.

Table 29 (Page 22 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
1555	IC	Release 1 Release 2	SPTAPE DRIVE <i>rdev</i> IN USE BY <i>userid</i> <i>userid</i> is already using SPTAPE drive <i>rdev</i> .
1556	IC	Release 1 Release 2	VIRT = REAL AREA NOT AVAILABLE; UNLOCKED The Virtual = Real area is not available because it is unlocked.
1557	IC	Release 1 Release 2	SPTAPE NOT ACTIVE ON DRIVE <i>rdev</i> SPTAPE is not active on drive <i>rdev</i> .
1558	IC	Release 1 Release 2	COMMAND TERMINATED Command processing cannot complete.
1559	IC	Release 1 Release 2	DSNAME TRUNCATED TO 16 CHARACTERS The DSNAME is truncated to 16 characters.
1560	IC	Release 1 Release 2	FILE WAS NOT {CHANGED TRANSFERRED} FILE WAS CREATED WITH THE NORETURN OPTION File was not {changed transferred} because it was created with the NORETURN option.
1561	IC	Release 1 Release 2	USER <i>userid</i> FILE <i>spoolid</i> {HELD PURGED FLUSHED REQUEUED CLOSED} User <i>userid</i> 's file <i>spoolid</i> is {held purged flushed requeued closed}.
1600	IC	Release 1 Release 2	SPECIFIED CYLINDER NUMBER <i>cylno</i> IS NOT ON THE VIRTUAL DISK Specified cylinder number <i>cylinder</i> is not on the virtual DASD.
1601	IC	Release 1 Release 2	THE PARM OPTION IS NOT ALLOWED WITH THE SYSTEM SPECIFIED ON YOUR IPL COMMAND The PARM option is not allowed for the system specified with the IPL command.
1602	IC	Release 1 Release 2	DASD <i>rdev</i> VOLID NOT <i>valid</i> The system nucleus disk label <i>valid</i> does not match the SYSRES device <i>valid</i> label.
1700	IC	Release 1 Release 2	VIRTUAL CPU(S) NOT DEFINED; ERROR IN CP DIRECTORY One or more virtual CPUs are not defined due to an error in the CP directory.
1701	IC	Release 1 Release 2	VIRTUAL VECTOR FACILITY CONTENTS HAVE BEEN LOST The virtual vector facility contents have been lost.
1751	IC	Release 1 Release 2	THE DIRECTORY ON VOLUME <i>volser</i> AT ADDRESS <i>rdev</i> HAS BEEN BROUGHT ONLINE. The directory on volume <i>volume</i> at address <i>rdev</i> has been brought online.
1752	IC	Release 1 Release 2	NO DIRECTORY WAS FOUND; THERE IS NO DIRECTORY ONLINE. No directory is online because none was found.
1753	IC	Release 1 Release 2	THE DIRECTORY ON VOLUME <i>volser</i> AT ADDRESS <i>rdev</i> IS NOT VALID; THERE IS NO DIRECTORY ONLINE. There is no directory online because the directory on volume <i>volser</i> at address <i>rdev</i> is not valid.

SC = sometimes compatible, IC = incompatible, IO = Release 1 only.
Not listed: compatible messages and Release-2-only messages.

VM/XA SP Release 1 to Release 2 Migration

Table 29 (Page 23 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
2000	IC	Release 1 Release 2	RESERVE NOT RESET ON <i>type rdev</i> . NOT A SHARED DASD The reserve was not reset on <i>rdev</i> because it is not a shared DASD.
2001	IC	Release 1 Release 2	RESERVE NOT RESET ON <i>type rdev</i> . DEVICE NOT RESERVED The reserve was not reset on DASD <i>rdev</i> because it was not reserved.
2002	IC	Release 1 Release 2	RESERVED DEVICE <i>vdev</i> UNCONDITIONALLY RESERVED BY <i>userid vdev</i> Reserved device <i>vdev</i> is unconditionally reserved by <i>userid's vdev</i> .
2003	IC	Release 1 Release 2	SHARED NOT SET {ON OF} FOR <i>type rdev</i> ; NOT A SHARED DEVICE Shared not set for <i>type rdev</i> ; not a shared device.
2004	IC	Release 1 Release 2	SHARED NOT SET {ON OFF} FOR <i>type rdev</i> ; DOES NOT SUPPORT RESERVE/RELEASE Shared not set for <i>type rdev</i> ; does not support reserve/release.
2005	IC	Release 1 Release 2	RESERVE PENDING ON <i>rdev</i> FOR USER <i>userid</i> Reserve pending on DASD <i>rdev</i> for user <i>userid</i>
2006	IC	Release 1 Release 2	SHARED NOT SET {ON OFF} FOR <i>type rdev</i> ; DEVICE NOT ONLINE Shared not set for DASD <i>rdev</i> ; device not online.
2500	IC	Release 1 Release 2	IMAGE LIBRARY <i>libname</i> NOT FOUND [FOR PRT <i>rdev</i>] Image library <i>libname</i> could not be found [for printer <i>rdev</i>].
2501	IC	Release 1 Release 2	PRT <i>rdev</i> SPOOL PAGING I/O ERROR READING IMAGE [LIBRARY] <i>imagname</i> A spool paging I/O error occurred while reading image [library] <i>imagname</i> on printer <i>rdev</i>
2502	IC	Release 1 Release 2	PRT <i>rdev</i> LOAD CHECK OCCURRED ON IMAGE <i>imagname</i> ; FILE <i>spid</i> {HELD PURGED FLUSHED REQUEUED CLOSED} Image <i>imagname</i> on printer <i>rdev</i> caused a load check error
2503	IC	Release 1 Release 2	PRT <i>rdev</i> INVALID SEPARATOR {CHAR FCB} IMAGE SPECIFIED - <i>name</i> An invalid separator {FCB CHAR} image <i>imagname</i> was specified for printer <i>rdev</i>
2504	IC	Release 1 Release 2	{RDR PRT PUN} <i>rdev</i> PERMANENT {LIBRARY I/O} ERROR; DEVICE {DRAINED RESET} <i>type rdev</i> was {drained reset} due to a permanent {I/O library} error.
2505	IC	Release 1 Release 2	INVALID DESTINATION; CANNOT SEND SYSTEM DATA FILE TO AN OUTPUT DEVICE An output device is an invalid destination for system data files.
2600	IC	Release 1 Release 2	DASD <i>rdev</i> SUBSYSTEM STORAGE STATUS CANNOT BE DETERMINED DASD <i>rdev</i> subsystem storage status cannot be determined.
2601	IC	Release 1 Release 2	THE <i>command</i> COMMAND FAILED BECAUSE DASD <i>rdev</i> IS ELIGIBLE FOR I/O ASSIST The <i>command</i> command failed because DASD <i>rdev</i> is eligible for I/O assist.

SC = sometimes compatible, IC = incompatible, IO = Release 1 only.

Not listed: compatible messages and Release-2-only messages.

Table 29 (Page 24 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
2611	IC	Release 1 Release 2	{KEY DATA} NOT STORED, READ/ONLY PAGE {Data Key} cannot be stored into a read-only page.
2625	IC	Release 1 Release 2	CP ENTERED; SIGP INITIAL PROGRAM RESET FROM CPU <i>nn</i> The virtual machine is placed in CP mode due to a SIGP initial program reset from CPU <i>nn</i> .
2626	IC	Release 1 Release 2	CP ENTERED; SIGP PROGRAM RESET FROM CPU <i>nn</i> The virtual machine is placed in CP mode due to a SIGP program reset from CPU <i>nn</i> .
2627	IC	Release 1 Release 2	CP ENTERED; SIGP INITIAL CPU RESET FROM CPU <i>nn</i> The virtual machine is placed in CP mode due to a SIGP initial CPU reset from CPU <i>nn</i> .
2628	IC	Release 1 Release 2	CP ENTERED; SIGP CPU RESET FROM CPU <i>nn</i> The virtual machine is placed in CP mode due to a SIGP CPU reset from CPU <i>nn</i> .
2629	IC	Release 1 Release 2	CP ENTERED; SIGP STOP FROM CPU <i>nn</i> The virtual machine is placed in CP mode due to a SIGP stop from CPU <i>nn</i> .
2630	IC	Release 1 Release 2	CP ENTERED; SIGP STOP AND STORE STATUS FROM CPU <i>nn</i> The virtual machine is placed in CP mode due to a SIGP stop and store status from CPU <i>nn</i> .
6000	IC	Release 1 Release 2	RANGE CAN NOT EXCEED 256 DEVICES The range of device numbers cannot exceed 256.
6003	IC	Release 1 Release 2	CPFORMAT VIRTUAL CONSOLE NOT DEFINED CPFORMAT VIRTUAL CONSOLE IS NOT DEFINED.
6004	IC	Release 1 Release 2	COMMAND <i>command</i> NOT SUPPORTED BY VM/XA SP Command <i>command</i> is not supported by VM/XA SP.
6005	IC	Release 1 Release 2	OPTION <i>option</i> NOT SUPPORTED BY VM/XA SP Option <i>option</i> is not supported by VM/XA SP.
6025	IC	Release 1 Release 2	OPERAND <i>operand</i> INVALID; CPU <i>nn</i> IN CHECK-STOP STATE Operand {STATUS STORE STATUS RESTART} is invalid because CPU <i>nn</i> is in check-stop state.
6026	IC	Release 1 Release 2	<i>command</i> COMMAND FOR CPU <i>nn</i> INVALID; CPU IN CHECK-STOP STATE The <i>command</i> command for CPU <i>nn</i> is invalid because the CPU is in check-stop state.
6027	IC	Release 1 Release 2	THE PROTECTED APPLICATION ENVIRONMENT IS NOT ALLOWED IN VIRTUAL MP MODE THE PROTECTED APPLICATION ENVIRONMENT IS {CANCELLED NOT ESTABLISHED} The protected end user environment is not allowed in virtual MP mode. The protected end user environment {cancelled is not established}.
6050	IC	Release 1 Release 2	THIS USERID NOT AUTHORIZED TO AUTOLOG USERID <i>userid</i> Your userid is not authorized to automatically logon userid <i>userid</i>

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Not listed: compatible messages and Release-2-only messages.

VM/XA SP Release 1 to Release 2 Migration

Table 29 (Page 25 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
6051	IC	Release 1 Release 2	RECONNECT FAILED; RESTART LOGON PROCEDURE Restart the logon procedure because reconnect processing cannot be done.
6052	IC	Release 1 Release 2	AUTOLOG COMMAND REJECTED; COMMAND FORMAT NOT VALID XAUTOLOG command rejected; command format not valid.
6053	IC	Release 1 Release 2	YOU CANNOT {AUTOLOG LOGON} BECAUSE THE MAXIMUM NUMBER OF USERS ALLOWED IS ALREADY LOGGED ON XAUTOLOG failed for <i>a</i> : You cannot issue the XAUTOLOG command because the maximum number of users allowed is already logged on.
6054	IC	Release 1 Release 2	AUTOLOG FAILED FOR <i>userid</i> - {IPL MISSING IPL FAILED ACCOUNTING ERRORS INCORRECT PASSWORD} XAUTOLOG failed for <i>userid</i> : Explanatory message to follow.
6075	IC	Release 1 Release 2	END OF VOLUME <i>seqno</i> ON TRSAVE TAPE <i>rdev</i> The end of volume <i>seqno</i> has been reached on TRSAVE tape <i>rdev</i> or TRSAVE processing has been suspended.
6076	IC	Release 1 Release 2	TRSAVE NOT ACTIVE TRSAVE is not active.
6077	IC	Release 1 Release 2	TRSAVE ALREADY ACTIVE TRSAVE is already active.
6078	IC	Release 1 Release 2	TRACE TABLE ENTRIES NOT SAVED BY TRSAVE FUNCTION The trace table entries were not saved by TRSAVE.
6079	IC	Release 1 Release 2	TAPE DRIVE <i>rdev</i> DOES NOT SUPPORT MODE {800 1600 6250 38k} Tape drive <i>rdev</i> does not support mode <i>mode</i> .
6080	IC	Release 1 Release 2	UNRECOVERABLE I/O ERROR ON DRIVE <i>rdev</i> Unrecoverable I/O error has occurred on drive <i>rdev</i> .
6085	IC	Release 1 Release 2	TRSAVE PENDING ACTIVE The TRSAVE command cannot be processed because the function is in a transition state.
6202	IC	Release 1 Release 2	<i>type</i> CYLINDERS IGNORED ON SYSTEM VOLUME <i>valid</i> The {spool temporary disk directory} cylinders were ignored on system volume <i>valid</i> .
6203	IC	Release 1 Release 2	DEVICE <i>nnnn</i> NOT WITHIN THE 370 ADDRESS RANGE THE ADDRESS OF DEVICE <i>nnnn</i> IS BEYOND THE RANGE OF VALID 370 DEVICE ADDRESSES.
6225	IC	Release 1 Release 2	IUCV PATH TO *MONITOR IS QUIESCED MONITOR {SAMPLE EVENT} INITIALIZATION RECORDS DELAYED Monitor {event sample} initialization records were delayed because the IUCV path to *MONITOR is quiesced.
6226	IC	Release 1 Release 2	MONITOR {EVENT SAMPLE} START FAILED - NO VIRTUAL MACHINE CONNECTED TO *MONITOR SYSTEM SERVICE Monitor {event sample} collection cannot start because no virtual machine is connected to the *MONITOR system service.

SC = sometimes compatible, IC = incompatible, 1O = Release 1 only.
Not listed: compatible messages and Release-2-only messages.

Table 29 (Page 26 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
6227	IC	Release 1 Release 2	MONITOR {EVENT SAMPLE} NOT ACTIVE Monitor {event sample} collection is not active.
6228	IC	Release 1 Release 2	MONITOR SAMPLE START FAILED-DCSS - <i>dcssname</i> COMPLETELY PARTITIONED FOR EVENT DATA Monitor sample collection cannot start because DCSS <i>dcssname</i> is completely partitioned for event data.
6229	IC	Release 1 Release 2	MONITOR {EVENT SAMPLE} ALREADY STARTED Monitor {event sample} collection is already active.
6230	IC	Release 1 Release 2	MONITOR EVENT START FAILED-BLOCK SIZE IS GREATER THAN HALF THE PARTITION SIZE Monitor event collection cannot start because the block size is greater than half the partition size.
6231	IC	Release 1 Release 2	MONITOR EVENT START FAILED-PARTITION SIZE IS LARGER THAN DCSS - <i>dcssname</i> SIZE Monitor event collection cannot start because the partition size is larger than DCSS <i>dcssname</i> size.
6232	IC	Release 1 Release 2	MONITOR {EVENT SAMPLE} START FAILED - CP PAGING ERROR Monitor {event sample} collection cannot start due to a CP paging error.
6233	IC	Release 1 Release 2	MONITOR EVENT START FAILED-PARTITION SIZE EQUALS THE SIZE OF DCSS - <i>dcssname</i> Monitor event collection cannot start because the partition size equals the size of DCSS <i>dcssname</i> .
6234	IC	Release 1 Release 2	INVALID MONITOR BLOCK VALUE <i>value</i> <i>value</i> is an invalid monitor block value.
6235	IC	Release 1 Release 2	INVALID MONITOR PARTITION VALUE <i>value</i> <i>value</i> is an invalid monitor partition value.
6236	IC	Release 1 Release 2	INVALID MONITOR INTERVAL VALUE <i>value</i> <i>value</i> is an invalid monitor interval value.
6237	IC	Release 1 Release 2	EVENT MONITORING WILL NOT BEGIN UNTIL NEXT SAMPLE INTERVAL Event monitoring will not begin until the next sample interval.
6238	IC	Release 1 Release 2	INVALID MONITOR RATE VALUE <i>value</i> <i>value</i> is an invalid monitor rate value.
6240	IC	Release 1 Release 2	DEVICE <i>dev</i> IS ALREADY ENABLED FOR MONITORING Device <i>device</i> is already enabled for monitoring.
6241	IC	Release 1 Release 2	THE NUMBER OF DEVICES SUCCESSFULLY ENABLED FOR MONITORING IS <i>nnnn</i> THE NUMBER OF DEVICES ENABLED BUT OFFLINE IS <i>nnnn</i> The number of devices successfully enabled for monitoring is <i>nnnn</i> .
6242	IC	Release 1 Release 2	INVALID DEVICE CLASS OR TYPE FOR SEEKS MONITORING FOR DEVICE <i>dev</i> The class or type of device <i>device</i> is invalid for SEEKS monitoring

SC = sometimes compatible, IC = incompatible, IO = Release 1 only.

Not listed: compatible messages and Release-2-only messages.

VM/XA SP Release 1 to Release 2 Migration

Table 29 (Page 27 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
6243	IC	Release 1	NO REPLY FROM <i>userid</i> FOR PREVIOUS MONITOR SAMPLE DATA - NEW INTERVAL SKIPPED
		Release 2	The new Monitor sample interval is skipped because <i>userid</i> has not replied for the previous interval.
6244	IC	Release 1	NO REPLY FROM <i>userid</i> FOR TWO CONSECUTIVE MONITOR SAMPLE INTERVALS - SAMPLE MONITORING STOPPED
		Release 2	No REPLY from <i>userid</i> for two consecutive monitor sample intervals - sample monitoring stopped.
6245	IC	Release 1	MONITOR IUCV PATH WAS ABNORMALLY SEVERED BY USERID <i>userid</i> CODE <i>code</i>
		Release 2	The monitor IUCV path was abnormally severed by <i>userid</i> <i>userid</i> with error code <i>code</i> .
6246	IC	Release 1	MONITOR HAS BEEN TERMINATED DUE TO SOFT ABEND
		Release 2	Monitor has been terminated due to a soft abend.
6247	IC	Release 1	MONITOR EVENT PORTION OF DCSS <i>dcssname</i> IS FULL, EVENT PROCESSING {SUSPENDED STOPPED}
		Release 2	Event processing has {suspended stopped} because the monitor event portion of DCSS <i>dcssname</i> is full.
6248	IC	Release 1	DCSS <i>dcssname</i> FOR MONITOR IS NOT LOADED BY THE USER CONNECTED TO *MONITOR
		Release 2	DCSS <i>dcssname</i> is not loaded by the user connected to *MONITOR.
6249	IC	Release 1	DEVICE <i>rdev</i> IS ENABLED FOR MONITORING, BUT IS OFFLINE
		Release 2	Device <i>rdev</i> is enabled for monitoring, but is offline
6276	SC	Release 1	DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE THE SUBCHANNEL IS NOT OPERATIONAL.
		Release 2	[Device <i>rdev</i> cannot be varied online because the subchannel is not operational.] or DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE THE SUBCHANNEL IS NOT OPERATIONAL.]
6277	SC	Release 1	DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE I/O ERRORS OCCURRED.
		Release 2	[Device <i>rdev</i> cannot be varied online because I/O errors occurred.] or [DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE I/O ERRORS OCCURRED.]
6280	IC	Release 1	DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE A DYNAMIC PATHING ERROR OCCURRED.
		Release 2	Device <i>rdev</i> cannot be varied online because an error occurred while attempting to establish a path group.
6281	IC	Release 1	DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE OF CONFLICTING DEVICE IDENTIFICATION.
		Release 2	Device <i>rdev</i> cannot be varied online because of conflicting device identification information.

SC = sometimes compatible, IC = incompatible, 1O = Release 1 only.
 Not listed: compatible messages and Release-2-only messages.

Table 29 (Page 28 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
6282	SC	Release 1	DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE THE SUBCHANNEL IS INVALID.
		Release 2	[Device <i>rdev</i> cannot be varied online because the subchannel is invalid.] or [DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE THE SUBCHANNEL IS INVALID.]
6283	IC	Release 1	DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE NO CHANNEL PATH IS AVAILABLE
		Release 2	Device <i>rdev</i> cannot be varied online because no channel path is available.
6284	IC	Release 1	DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE OF CONFLICTING DEVICE CLASSIFICATION.
		Release 2	Device <i>rdev</i> cannot be varied online due to conflicting device classification information.
6285	IC	Release 1	DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE OF CONFLICTING DEVICE NUMBERS.
		Release 2	Device <i>rdev</i> cannot be varied online due to conflicting device numbers.
6286	SC	Release 1	DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE THE SUBCHANNEL CANNOT BE MODIFIED.
		Release 2	[Device <i>rdev</i> cannot be varied online because the subchannel cannot be modified.] or [DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE THE SUBCHANNEL CANNOT BE MODIFIED.]
6287	SC	Release 1	DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE IT DID NOT RESPOND TO A NO-OP COMMAND.
		Release 2	[Device <i>rdev</i> cannot be varied online because it did not respond to a no-op command.] or [DEVICE <i>rdev</i> CANNOT BE VARIED ONLINE BECAUSE IT DID NOT RESPOND TO A NO-OP COMMAND.]
8058	IC	Release 1	RECORDING <i>recording-name nnnnn</i> PURGED; USER <i>userid</i>
		Release 2	User <i>userid</i> has purged <i>count</i> records from recording queue <i>recording-name</i> .
8059	IC	Release 1	RECORDING <i>recording-name userid</i> USER NOT RETRIEVING
		Release 2	CP is recording on queue <i>recording-name</i> but user <i>userid</i> is not actively retrieving.
8060	IC	Release 1	RECORDING COUNT <i>nnnnn</i> RECORDS <i>recording-name userid</i>
		Release 2	User <i>userid</i> should retrieve records from <i>recording-name</i> because the recording count <i>count</i> has exceeded a predetermined limit.
8061	IC	Release 1	RECORDING ERROR <i>function rc</i> RECORDS <i>recording-name userid</i>
		Release 2	Recording error <i>VMCF-function return code</i> records <i>recording-name userid</i>
8062	IC	Release 1	RECORDING ERROR <i>function error-code userid</i>
		Release 2	Recording error <i>VMCF function VMCF error flag userid</i>
8063	IC	Release 1	RECORDING ENTRY <i>recording-name userid</i> NOT ALTERED
		Release 2	Recording entry <i>recording-name userid</i> not altered
8064	IC	Release 1	RECORDING DATA RETRIEVAL STARTED, RECORDS <i>recording-name userid</i>
		Release 2	Recording data retrieval started, records <i>recording-name userid</i>

SC = sometimes compatible, IC = incompatible, IO = Release 1 only.
 Not listed: compatible messages and Release-2-only messages.

VM/XA SP Release 1 to Release 2 Migration

Table 29 (Page 29 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
8071	IC	Release 1	RECORDING INITIALIZATION ERROR, RECORDS NOT RETRIEVABLE
		Release 2	Recording initialization error, records not retrievable
8072	IC	Release 1	RECORDING ENTRY NOT FOUND
		Release 2	Recording entry not found
8073	IC	Release 1	RECORDING IDENTIFY ERROR <i>userid</i> {INVALID PROTOCOL}
		Release 2	Recording identify error <i>userid error identifier</i>
9000	SC	Release 1	MACHINE CHECK DURING SYSTEM INITIALIZATION
		Release 2	[A machine check occurred during system initialization.] or [A MACHINE CHECK OCCURRED DURING SYSTEM INITIALIZATION]
9104	IC	Release 1	STORAGE PAGE AT <i>xxxxxxxx</i> WILL BE TAKEN OFFLINE WHEN POSSIBLE (IF EVER).
		Release 2	The storage page at <i>xxxxxxxx</i> will be taken offline if possible.
9105	IC	Release 1	MACHINE-CHECK WARNING: POWER OR COOLING FAILURE IMMINENT
		Release 2	Machine-check warning: A power or cooling failure is imminent.
9106	IC	Release 1	MACHINE-CHECK DEGRADATION (BUFFER OR TLB DAMAGE?).
		Release 2	A machine-check degradation is present. There may be possible buffer or TLB damage.
9107	IC	Release 1	SOFT MACHINE-CHECK RECORDING DISABLED
		Release 2	Recording was disabled for "system recovery" machine check.
9109	IC	Release 1	SYSTEM OPERATION CONTINUES
		Release 2	System operation continues.
9110	IC	Release 1	MACHINE CHECKS TOO FREQUENT. REPORTING WILL BE SUSPENDED AWHILE.
		Release 2	Reporting will be suspended temporarily because machine checks are occurring too frequently.
9111	IC	Release 1	EXPANDED STORAGE ERROR.
		Release 2	An expanded storage error has occurred.
9150	IC	Release 1	PROCESSOR <i>nn</i> SIGNALLING FACILITY DAMAGED, {EQUIPMENT RECEIVER} CH.
		Release 2	A(n) {equipment receiver} check has occurred because the signalling facility for processor <i>nn</i> is damaged.
9151	IC	Release 1	PROCESSOR <i>nn</i> {OPERATOR INTERVENING STOPPED}
		Release 2	Processor <i>nn</i> {has stopped operator is intervening.}
9152	IC	Release 1	PROCESSOR <i>nn</i> NOT RESPONSIVE, VARYING OFFLINE
		Release 2	Processor <i>nn</i> is being varied offline because it is not responsive.
9153	IC	Release 1	PROCESSOR <i>nn</i> SEVERE MACHINE CHECK, VARYING OFFLINE
		Release 2	Processor <i>nn</i> is being varied offline due to a severe machine check.

SC = sometimes compatible, IC = incompatible, IO = Release 1 only.

Not listed: compatible messages and Release-2-only messages.

Table 29 (Page 30 of 30). VM/XA SP Release 1 and VM/XA SP Release 2 Message Compatibility

No.	Code	System	Text
9154	IC	Release 1	PROCESSOR <i>nm</i> - TOD CLOCK SYNCHRONIZATON FAILURE, VARYING OFFLINE
		Release 2	Processor <i>nm</i> is being varied offline because the TOD clock is not synchronized.
9200	IC	Release 1	SYSTEM RECOVERY FAILURE; CONFIGURATION ERROR
		Release 2	System recovery failed due to a configuration error.
9201	IC	Release 1	SYSTEM RECOVERY FAILURE; RECORDING ERROR
		Release 2	System recovery failed due to a recording error.
9202	IC	Release 1	UNIT RECORD RECOVERY INCOMPLETE
		Release 2	Unit record recovery is incomplete.
9203	IC	Release 1	SYSTEM RECOVERY FAILURE; BLOCK REQUESTED BEYOND CHECKPOINT AREA
		Release 2	System recovery failed during warm start because the block requested is beyond the checkpoint area.
9204	IC	Release 1	SYSTEM RECOVERY FAILURE; BLOCK REQUESTED BEYOND CHECKPOINT AREA
		Release 2	System recovery failed during a forced start because the block requested is beyond the checkpoint area.
9300	IC	Release 1	SYSTEM SOFT ABEND ON CPU <i>nnnn</i> , [ABEND] CODE <i>code</i> [USER <i>userid</i>]
		Release 2	A system soft abend <i>code</i> has occurred on CPU <i>nnnn</i> [for user <i>userid</i>].
9309	IC	Release 1	CP WAS UNABLE TO ALLOCATE A SOFT ABEND DUMP FILE
		Release 2	CP was unable to allocate a soft abend dump file.
9406	IC	Release 1	PREFERRED VIRTUAL MACHINE RECOVERY SUCCEEDED.
		Release 2	Preferred virtual machine recovery succeeded.
9410	IC	Release 1	PREFERRED VIRTUAL MACHINE RECOVERY SUPPRESSED - RESERVED FREE STORAGE EXHAUSTED
		Release 2	Preferred virtual machine recovery has been suppressed because reserved free storage is exhausted.

SC = sometimes compatible, IC = incompatible, 1O = Release 1 only.

Not listed: compatible messages and Release-2-only messages.



Part 4. Appendixes



Appendix A. Conversion Tools

IBM is providing two sample EXECs on the product tape to help you convert system files from VM/SP HPO to VM/XA SP and applications from VM/SP HPO or VM/XA SF to VM/XA SP. The EXECs are:

- COMPSCAN SAMPEXEC, which uses a keyword file to flag keywords in VM/SP HPO or VM/XA SF files that may need to be changed. The keyword file provided is called COMPSCAN SAMPLIST.
- FILECONV SAMPEXEC, which uses keyword files to convert incompatible VM/SP HPO parameters to their equivalent VM/XA SP parameters. The keyword files that are provided are:
 - CONVSYS SAMPCMDS
 - CONVUCR SAMPCMDS.

IBM provides the files as samples that you can tailor to fit your installation's programming standards and priorities. For example, if your installation does not use abbreviations in application programs, you can remove the abbreviations from the COMPSCAN SAMPLIST file.

The following table summarizes the items that need to be converted and the tool that can be used.

To Convert	Tool to Be Used
VM/SP HPO directory	COMPSCAN SAMPEXEC with COMPSCAN SAMPLIST
VM/SP HPO DMKRIO to HCPRIO	COMPSCAN SAMPEXEC with COMPSCAN SAMPLIST
VM/SP HPO DMKSYS to HCPSYS	COMPSCAN SAMPEXEC with COMPSCAN SAMPLIST or FILECONV SAMPEXEC with CONVSYS SAMPCMDS
VM/SP HPO class override file	FILECONV SAMPEXEC with CONVUCR SAMPCMDS
VM/SP HPO or VM/XA SF applications	COMPSCAN SAMPEXEC with COMPSCAN SAMPLIST

Syntax of COMPSCAN

Use the COMPSCAN SAMPEXEC to flag keywords in a file that may need to be converted. The syntax of the COMPSCAN SAMPEXEC is:

COMPSCAN	<pre>[fn1 ft1 fm1] [fn2 ft2 fm2] [(options)] [CMS EXEC A] [COMPSCAN ft A] [HELP] [?] options: [DEPth {n}] [SEVerity {n}] [{3}] [{2}] [USERgroup {aaaaaaa}] [{ORPSACG}] [HPQ] [COMments] [SF2] [NOCOMments] [CMS] [SYS] [RIO] [DIR] [SAVe] [NOSAVe]</pre>
----------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

where:

fn1 ft1 fm1

CMS EXEC A

is a list of files that you want to scan. The list must be in the same format as the list produced by the CMS LISTFILE command with the EXEC option. The default file name is CMS EXEC A.

fn2 ft2 fm2

COMPSCAN ft A

is the name of the output file from COMPSCAN. The default file name is COMPSCAN ft A, where ft is a unique filetype.

Note: If you specify the name of the output file, you must also specify the input file, the name of the list of files you want to scan.

HELP

?

gives you an explanation of the options in COMPSCAN.

DEPTH {n}

controls the precision of the COMPSCAN search for incompatible items. Because COMPSCAN searches for strings, some strings flagged may have no relationship to the actual incompatibility, except for having the same sequence of letters. DEPTH determines how specific the string search is.

1 requests the most specific search and generates the least output. Examples of validly-coded CP ATTACH commands that could be found when DEPTH is 1 are (b indicates a blank):

```
(attb
'attb
"attb
battb
```

2 requests a medium-level search. For example, the output could include all of the DEPTH 1 items plus:

```
attachb
```

The default is 2.

3 requests the least specific search and generates the most output. For example, the output could include all of the DEPTH 1 and DEPTH 2 items plus the string:

```
attachedb
```

SEVerity {n}

SEVerity {2}

indicates the impact of not correcting the incompatibility. COMPSCAN tells you what the severity for each flagged item is in the output file.

1 indicates the program will not function as designed. You probably should not attempt to use the program at all.

2 indicates the effect of the incompatibility depends on how the program is used.

3 indicates the program will probably run, but with degraded performance, or incompatibilities will probably be obvious during program testing.

The default is 2.

USERgroup {aaaaaaa}

USERgroup {ORPSACG}

tells COMPSCAN to limit the search to items that affect the user groups you specify (aaaaaaa). The letters you specify follow with their definitions.

- O** System operator. The system operator can issue all privilege class A commands.
- R** Resource operator. The system resource operator can issue all privilege class B commands.
- P** System programmer. The system programmer can issue all privilege class C commands.
- S** Spooling operator. The spooling operator can issue all privilege class D commands.
- A** System analyst. The system analyst can issue all privilege class E commands.

Conversion Tools

- C** IBM customer engineer. The IBM customer engineer can issue all privilege class F commands.
- G** General user. The general user can issue all privilege class G commands.

You can use any combination of user group letters. The default is ORPSACG. IBM recommends you always include user group G.

HPO
CMS
SF2
SYS
RIO
DIR

indicates what incompatibilities you want COMPSCAN to search for:

- HPO indicates you want to see CP command, DIAGNOSE code, and control block incompatibilities between VM/SP HPO Release 5 and VM/XA SP.
- CMS indicates you want to see incompatibilities between the CMS component in VM/SP Release 5 and the CMS component in VM/XA SP.
- SF2 indicates you want to see CP command, DIAGNOSE code, control block, and CMS incompatibilities between VM/XA SF Release 2 and VM/XA SP.
- SYS indicates you want to see incompatibilities between the VM/SP HPO Release 5 DMKSYS ASSEMBLE file and the VM/XA SP HCPSYS ASSEMBLE file.
- RIO indicates you want to see incompatibilities between the VM/SP HPO Release 5 DMKRIO ASSEMBLE file and the VM/XA SP HCPRIO ASSEMBLE file.
- DIR indicates you want to see incompatibilities between the VM/SP HPO Release 5 user directory source file and that in VM/XA SP.

HPO is the default. If you choose HPO, you probably should include the CMS option.

COMments

NOCOMments

indicates whether you want COMPSCAN to scan comment records that begin and end on a single line and are the only elements on the line. Comments are indicated by * in ASSEMBLE files and delineated by /* and */ in EXEC files.

SAVe

NOSAVe

indicates whether you want COMPSCAN to close the output file after scanning each target file. NOSAVe helps performance, but you run the risk of losing your data should disk space become exhausted or if the system reloads (IPL).

Usage Notes:

1. You can tailor COMPSCAN SAMPEXEC for your own needs.
2. COMPSCAN uses a keyword file to do its work. The keyword file is called COMPSCAN SAMPLIST. You *should* modify this file so that it includes only strings that are likely to be found in your source files.

3. COMPSCAN may not find all incompatibilities in a file. Its success depends on your installation's programming practices. COMPSCAN's usefulness is its ability to give you an estimate of the amount of conversion work required for a program.
4. COMPSCAN does not find keywords split over lines.
5. COMPSCAN does not flag normal release-to-release changes or VM/XA SF Release 2 externals changed by new functions. Examples are QUERY CPLEVEL and changes to the QUERY RDR response as a result of spool file limit removal.
6. COMPSCAN should be used for source code. The output is not meaningful for object code.
7. COMPSCAN flags **all** instances of a keyword. It is up to you to determine whether a flagged record is significant.

The Output File from COMPSCAN: The layout of the output file from COMPSCAN looks like this:

```
fn ft fm
REC#  INCOMPATIBLE WORDS S TYPE TEXT OF RECORD.....
-----
nnnnn aaaaa                n aa  'aaaaaaaaaaaaaaaaaaaaa'
```

where:

fn ft fm

is the file name, type, and mode of the file scanned.

REC#

specifies the record numbers of records in the file.

INCOMPATIBLE WORDS

shows you what string COMPSCAN has flagged in the record.

S

is the potential severity of the incompatibility, if uncorrected.

1

indicates the program will not function as designed. You probably should not attempt to use the program at all.

2

indicates the effect of the incompatibility depends on the usage in the program.

3

indicates the program will probably run, but with degraded performance, or incompatibilities will probably be obvious during program testing.

TYPE

indicates the areas of possible incompatibility:

I

indicates the incompatibility may exist in the invocation of this function. For instance, the string may be a command invocation.

R

indicates the incompatibility may exist in the response or in the data returned from the function.

H indicates the incompatibility may be due to an VM/SP HPO-only item that is not used in VM/XA SP.

F indicates the incompatibility may be due to a functional difference between systems.

C indicates the incompatibility may be a reference to an incompatible control block.

? indicates the incompatibility may be due to any of the above. For example, QUERY *variable* is flagged because COMPSCAN cannot determine what the variable is.

TEXT

is the text of the record from *fn ft fm* which COMPSCAN flagged. COMPSCAN records 86 bytes surrounding the keyword.

Using the COMPSCAN SAMPEXEC

Use the COMPSCAN SAMPEXEC to flag keywords in a file that may need to be converted. This will help you to determine the impact of converting VM/SP HPO system files or VM/SP HPO and VM/XA SF applications. The tool does not actually convert the keywords to their VM/XA SP equivalent; it merely flags them.

To use COMPSCAN, do the following:

1. Look at the COMPSCAN SAMPLIST file and tailor it to your installation's needs. You may also tailor COMPSCAN SAMPEXEC.
2. Rename COMPSCAN SAMPEXEC to COMPSCAN EXEC.
3. If the files that you want to scan are compressed or packed, unpack them.
4. Use the CMS LISTFILE command with the EXEC option to create a list of files to be scanned.
5. Run COMPSCAN with the appropriate options.
6. Analyze the output.

When analyzing the output, note that not all hits will be definite incompatibilities. In many cases:

- Hits will be false.
- Hits will be valid but the usage is compatible.
- Hits will be valid and the usage may be incompatible. Use "VM/SP HPO and VM/XA SP Command Compatibility" on page 105 or "VM/XA SF and VM/XA SP Command Compatibility" on page 213 to find out what is incompatible. Then, look at the file to determine whether the code or usage needs to be changed.

The following is an example of the output file from COMPSCAN.

```

TEST EXEC A1
REC#  INCOMPATIBLE WORDS S TYPE TEXT OF RECORD.....
-----
00002 LINK                3 IF  'LINK TEST 250 250 RR'
00004 DETACH              2 IRF  'DETACH 251'
00005 SET EC              1 H   'CP SET EC ON'
00006 'Q                  2 R   'Q FILES'
00007 TRACE               3 IRF  'CP TRACE I/O'
00008 DETACH              2 IRF  'DETACH 251'
00009 DIAG 00             2 CR  DIAGRC(14,RNSB,00C)
00009 DIAG 14             2 CR  DIAGRC(14,RNSB,00C)
00010 DETACH              2 IRF  /* Don't detach 250 yet */
Scan completed for file TEST EXEC A1.

```

Some hits are obviously insignificant. Due to all the different languages and formats possible, there is no definite basis on which to reject a hit. It is safer to show all, and let human judgement prevail. Other hits will require that you look the keyword up in this manual or the *VM/XA SP CMS Application Program Conversion Guide* to determine its significance.

In the example:

- Record 2 **may** be significant. The LINK command's incompatibility involves linking multiple exposure devices. If device 250 in this file is not a multiple exposure device, there is no problem.
- Record 4 **may** be significant. COMPSCAN flagged DETACH for invocation (I), function (F), and response (R). The invocation is no problem for this instance. DETACH was flagged for a possible functional difference, which involves detaching devices from users. But since this case does not detach a device from a user, there is no problem. Finally, DETACH was flagged for an incompatibility in the response. You have to verify that the program does not attempt to parse the response.
- Record 5 **is** significant. This is a valid invocation of a VM/SP HPO-only command (H), and will not work on VM/XA SP.
- Record 6 **may** be significant if the program parses the response by column rather than by word and if it is not prepared for a longer count field.
- Record 7 **may** be significant. You must determine whether or not the functional differences will affect the program.
- Record 8 **may** be significant. You must use the same judgement as you did for record 4.
- Record 9(a) is **not** significant. This is an example of an invalid hit, because COMPSCAN found DIAG 00 and it obviously is not DIAGNOSE X'00'. You can safely ignore this one.
- Record 9(b) **may** be significant, depending on how the program uses the data returned. The format of the control block returned may be different.
- Record 10 is **not** significant. This is obviously a comment. In some cases, comments can help you find significant things about the program, since they indicate intent or reveal cryptic code. You can avoid scanning full-line comments by using the option NOCOMMENTS.

5. Run FILECONV against the source files to be converted, specifying the sample command file that describes the changes. IBM provides two sample command files: one for converting DMKSYS (CONVSYS SAMPCMDS) and one for converting the VM/SP HPO class override file (CONVUCR SAMPCMDS).

6. Examine the output file.

If statements can be converted without requiring your judgement, the EXEC converts the original source statement to a comment, marking it with a C, and includes the new statement in the line below.

If statements can be deleted without requiring your judgement, the EXEC converts original source statement to a comment, marking it with a D.

If statements need to be converted but require your judgement, the EXEC marks the statement with a W.

7. Because lines will have been added and deleted, resequence the output file.

Analyzing the Output

Example: Converting the Class Override File

The VM/SP HPO class override input file might look like this:

```
*
* CLASS OVERRIDE EXAMPLE INPUT *
*
DEST 200 3380 VMRES
AUTOLOG CLASS=ABL
INDICATE TYPE=0 NEWCLASS=AGU
INDICATE TYPE=A CLASS=EGU
INDICATE TYPE=G CLASS=GU
INDICATE TYPE=P CLASS=GU
QUERY TYPE=R CLASS=BEQ
QUERY TYPE=S CLASS=DP
QUERY TYPE=G CLASS=GU
```

After running FILECONV, the output file would appear as follows:

```
*
* CLASS OVERRIDE EXAMPLE OUTPUT *
*
*D>ST 200 3380 VMRES
*C>TOLOG CLASS=ABL
AUTOLOG NEWCLASS=ABL
*C>DICATE TYPE=0 NEWCLASS=AGU
INDICATE IBMCLASS=A NEWCLASS=AGU
*C>DICATE TYPE=A CLASS=EGU
INDICATE IBMCLASS=E NEWCLASS=EGU
*C>DICATE TYPE=G CLASS=GU
INDICATE IBMCLASS=G NEWCLASS=GU
*C>DICATE TYPE=P CLASS=GU
INDICATE IBMCLASS=C NEWCLASS=GU
*C>ERY TYPE=R CLASS=BEQ
QUERY IBMCLASS=B NEWCLASS=BEQ
*C>ERY TYPE=S CLASS=DP
QUERY IBMCLASS=D NEWCLASS=DP
*C>ERY TYPE=G CLASS=GU
QUERY IBMCLASS=G NEWCLASS=GU
```


In the output:

- A C indicates that the statement was changed. The new statement appears in the line below. For example:

```
*C>TOLOG CLASS=ABL
    AUTOLOG NEWCLASS=ABL
```

- A D indicates that the statement was deleted. For example:

```
*D>ST 200 3380 VMRES
```

Example: Converting DMKSYS

Suppose the VM/SP HPO DMKSYS file looked like:

```
DMKSYS CSECT (SAMPLE INPUT) DMK00010
SYSOWN VOLID1,VOLID2,VOLID3,VOLID4 DMK00020
SYSRES SYSVOL=VOLID5,SYSTYPE=3380,SYSPNUC=2,SYSCPK=(30,10), XDMK00030
      SYSERR=(27,3),SYSCLR=YES DMK00040
SYSMON USERID=VMAP, XDMK00050
      AUTO=NO, XDMK00060
      BUFFS=3 DMK00070
END DMK00080
```

After running FILECONV, the output file would appear as follows:

```
*C>SYS CSECT (SAMPLE INPUT) DMK00010
HCPSYS CSECT (SAMPLE INPUT) DMK00010
*C> SYSOWN VOLID1,VOLID2,VOLID3,VOLID4 DMK00020
      SYSCPVOL VOLID1,VOLID2,VOLID3,VOLID4 DMK00020
      SYSRES SYSVOL=VOLID5,SYSTYPE=3380,SYSPNUC=2,SYSCPK=(30,10), XDMK00030
      SYSERR=(27,3),SYSCLR=YES DMK00040
W> <HPO>=(27,3),<HPO>=YES DMK00040
*D> SYSMON USERID=VMAP, XDMK00050
      AUTO=NO, XDMK00060
      BUFFS=3 DMK00070
*D> END DMK00080
W> SYSACNT USERID=<ENTER USERID>
W> SYSDUMP
W> SYSEREP
W> SYSUVOL
END
```

In the output:

- A C indicates that the statement was changed. The new statement appears in the line below. For example:

```
*C> SYSOWN VOLID1,VOLID2,VOLID3,VOLID4
      SYSCPVOL VOLID1,VOLID2,VOLID3,VOLID4
```

- A D indicates that the statement or statements were deleted. For example:

```
*D> SYSMON USERID=VMAP,
      AUTO=NO,
      BUFFS=3
```

- A W indicates that the statement needs to be changed but the change requires human judgement. The area that you must change is marked by < >. For example, you must enter the userid in the following line.

```
W> SYSACNT USERID=<ENTER USERID>
```

<HPO> means that the parameter is VM/SP HPO-only and an equivalent parameter does not exist in VM/XA SP. For example:

```
*C>          SYSERR=(27,3),SYSCLR=YES  
W>          <HPO>=(27,3),<HPO>=YES
```

Although not shown in this example, statements that extend beyond the screen are always marked with a W.

Usage Notes

1. You can tailor FILECONV SAMPEXEC to meet your installation's needs.
2. FILECONV uses a keyword file to do its work. IBM supplies two keyword files, called CONVSYS SAMPCMDS and CONVUCR SAMPCMDS, which you can tailor according to your needs.
3. FILECONV only works on fixed-length, 80-character records. Columns 72-80 are reserved for continuation and sequence numbers.



Appendix B. Alternative Conversion Strategies

Read This First

The information in this appendix has not been submitted to any formal IBM test and is distributed on an "as is" basis without any warranty either express or implied. The use of this information or the implementation of any of these techniques is a customer responsibility and depends on the customer's ability to evaluate and integrate it into the customer's operational environment. While each item may have been reviewed by IBM for accuracy in a specific situation, there is no guarantee that the same or similar results will be obtained elsewhere. Customers attempting to adapt these techniques to their own environments do so at their own risk.

There are alternatives to the conversion strategies documented in this manual, but the alternatives involve the use of unsupported system environments. An unsupported system environment is one that IBM does not recommend or service, such as an environment in which levels of CMS and CP are mixed.

Although unsupported, if you cannot convert to VM/XA SP by changing both CP and CMS at the same time, you might consider converting to VM/XA SP CMS first and running it on your VM/SP HPO or VM/XA SF system. If you experience a problem, however, you will have to recreate it on a supported environment before reporting it to IBM.

We tried running VM/XA SP CMS on VM/SP HPO Release 4.2, VM/SP HPO Release 5, and VM/XA SF Release 2. For VM/SP HPO Release 5, we found no problems in the environments we ran. On VM/SP HPO Release 4.2 we found:

- There is no support for full-screen CMS.
- If you use PARM SAVESYS when loading (IPLing) CMS, the name of the named saved system must be exactly 8 characters or you must put X'00' at the end of the parameter string. This is due to the way the IPL command initializes named saved systems.

To put X'00' at the end of the parameter string, do the following:

1. Load CMS. Enter:

```
IPL 190 STOP PARM SAVESYS name
```

where *name* is the name of the saved system.

2. Store X'00' at the end of the parameter string in the general registers.

If you save CMS from an EXEC, you can put the X'00' at the end of the IPL statement in the EXEC.

When running VM/XA SP CMS on VM/XA SF Release 2 at the correct maintenance level, we found no problems. To run VM/XA SP CMS on VM/XA SF Release 2, be sure to:

- Apply PUT 8705
- Apply the fixes for the following APARs:
 - VM28326

- VM28426
- VM28757
- VM28759
- VM28760
- VM28761
- VM28762
- VM28763
- VM28767
- VM28768
- VM28769
- VM28770
- VM28771
- VM28772
- VM28773
- VM28775.

You may experience other problems when you try running VM/XA SP CMS on either VM/SP HPO or VM/XA SF.

Appendix C. Object-Code-Only (OCO) and Limited-Distribution Modules

This appendix lists the names of:

- OCO modules in VM/XA SF Release 2, VM/XA SP Release 1, and VM/XA SP Release 2
- Limited-distribution modules in VM/XA SP Release 1 and VM/XA SP Release 2.

OCO Modules

OCO modules are distributed only in object code form. No source program materials are available.

Table 30 lists CP OCO module names, Table 31 on page 293 lists CMS OCO module names, and Table 32 on page 293 lists dump viewing facility OCO module names. These tables show the functional areas to which the OCO modules belong. Each functional area may or may not also have non-OCO modules.

Functional Area	Module Name	OCO in VM/XA SF Rel. 2	OCO in VM/XA SP Rel. 1	OCO in VM/XA SP Rel. 2
Vector facility	HCPAFF, HCPAIS, HCPVDV, HCPVFD, HCPVFE, HCPVFR, HCPVFS, HCPVJV, HCPVSM, HCPWIS	Yes	Yes	Yes
Virtual SIE	HCPWAT, HCPWKY, HCPWPR, HCPWRU, HCPWSH, HCPWSI	No	Yes	Yes
IBM 3092 Processor Controller interface	HCPPCB, HCPPCR, HCPPCV, HCPFRG, HCPSCP	No	Yes	Yes
CCW translation	HCPADP, HCPCCW, HCPCHS, HCPDCP, HCPDCT, HCPDDP, HCPDUP, HCPGCS, HCPINS, HCPMDP, HCPMD1, HCPMD2, HCPMD3, HCPMD4, HCPMD5, HCPMSP, HCPTCS, HCPTDD, HCPTMD, HCPTMT, HCPTPP, HCPTRM, HCPTTP, HCPTUP, HCPTUR, HCPUNT, HCPURP (see note 1 on page 292)	No	Yes	Yes
Multiple preferred guest support	HCPALE*, HCPASI*, HCPBIE*, HCPDED*, HCPMCF*, HCPPTT, HCPRPC, HCPRQU*, HCPXSC, HCPXSM*, HCPZMG*, HCPZMI*, HCPZMX*	Did not exist	Yes (see note 2 on page 292)	Yes

Table 30 (Page 2 of 2). CP OCO Modules

Functional Area	Module Name	OCO in VM/XA SF Rel. 2	OCO in VM/XA SP Rel. 1	OCO in VM/XA SP Rel. 2
DUMpload processing	HCPEDA, HCPEDB, HCPEDC, HCPEDD, HCPEDE, HCPEDF, HCPEDH, HCPEDI, HCPEDJ, HCPEDK, HCPEDM (see note 3), HCPEDN, HCPEDR, HCPEDS, HCPEDT, HCPEDU, HCPEDV, HCPEDW, HCPEDX, HCPEDY	No	No	Yes
Hardware instruction simulation	HCPVOP	No	No	Yes
Initialization of hardware features	HCPRFI	Did not exist	Did not exist	Yes
VM dump support	HCPVDU, HCPVMD	No	No	Yes
Processing for SET command	HCPSCA	No	No	Yes
DISPLAY DUMP processing	HCPCDA, HCPCDB, HCPCDC, HCPCDD	No	No	Yes
Processing for QUERY and SET commands	HCPPSF	No	No	Yes
Console command support	HCPCFC	No	No	Yes
SEND command processing	HCPSEC	Did not exist	No	Yes

Notes:

1. The module names shown for CCW translation are the VM/XA SP names. The module names used in VM/XA SF Release 2 include three that are the same as in VM/XA SP although the modules themselves have been rewritten (HCPCCW, HCPTRM, and HCPUNT) and five that are not used in VM/XA SP (HPCCON, HCPDSM, HCPOPC, HCPRDS, and HCPTPS).
2. Names marked with an asterisk (*) did not exist in the initial release of VM/XA SP Release 1 but were introduced in an enhancement to that release.
3. The module names shown for DUMpload processing are the VM/XA SP Release 2 names. The module names used in VM/XA SF Release 2 and VM/XA SP Release 1 include HCPEDM, but the module is rewritten for VM/XA SP Release 2.

Table 31. CMS OCO Modules				
Functional Area	Module Name	OCO in VM/XA SF Rel. 2	OCO in VM/XA SP Rel. 1	OCO in VM/XA SP Rel. 2
Vector facility	DMSINV	No (see note)	Yes	Yes
DCA enhanced connectivity enhancement	DMSBOF, DMSBUS, DMSCCM, DMSCIA, DMSDFT, DMSICT, DMSPBS, DMSSAP, DMSSNC, DMSSUP, DMSTRC	No (see note)	Yes	Yes
Note: CMS is not supported in VM/XA SF Release 2.				

Table 32. Dump Viewing Facility OCO Modules				
Functional Area	Module Name	OCO in VM/XA SF Rel. 2	OCO in VM/XA SP Rel. 1	OCO in VM/XA SP Rel. 2
Dump viewing facility	All modules except HCSTBL. (Dump viewing facility module names begin with the letters HCS.)	No	Yes	Yes

Limited-Distribution Modules

The following materials are available for limited-distribution modules:

- Object code
- Microfiche of the assembler-generated source/object program listing and compiler-generated information listing.

Machine-readable source code is not available.

IBM maintains limited-distribution modules at the object-code level. When necessary, the module object code is either fully replaced or it is updated by using the VER and REP control records under the patch facility or the CMS ZAP command. The patch facility is described in the *VM/XA SP Installation and Service manual* and the ZAP command is described in the *VM/XA SP CMS Command Reference*.

This section lists the names of CP, CMS, and GCS limited-distribution modules. The names are in alphabetic order by component, not by functional area. Refer to the microfiche to determine functional areas.

There are no limited-distribution modules in VM/XA SF Release 2.

CP Limited-Distribution Modules

CP Module Name	Limited Distribution in VM/XA SP Release 1	Limited Distribution in VM/XA SP Release 2	CP Module Name	Limited Distribution in VM/XA SP Release 1	Limited Distribution in VM/XA SP Release 2
HPCBBI	Yes	Yes	HCPMOJ	Yes	Yes
HPCBNC	Yes	Yes	HCPMOK	Yes	Yes
HCPERM	No	Yes	HCPMOM	Yes	Yes
HCPLDS	Yes	Yes	HCPMON	Yes	Yes
HCPLMT	No	Yes	HCPMOO	Yes	Yes
HCPMCT	No	Yes	HCPMOP	Yes	Yes
HCPMNA	Yes	Yes	HCPMOQ	Yes	Yes
HCPMNB	Yes	Yes	HCPMOR	Yes	Yes
HCPMNC	Yes	Yes	HCPMOS	Yes	Yes
HCPMND	Yes	Yes	HCPMOT	Yes	Yes
HCPMNE	Yes	Yes	HCPMOU	Yes	Yes
HCPMNF	Yes	Yes	HCPMOV	Yes	Yes
HCPMNG	Yes	Yes	HCPMOX	Yes	Yes
HCPMNH	Yes	Yes	HCPMOY	Yes	Yes
HCPMNI	Yes	Yes	HCPMOZ	Yes	Yes
HCPMNJ	Yes	Yes	HCPMXU	Yes	Yes
HCPMNK	Yes	Yes	HCPREI	Yes	Yes
HCPMNL	Yes	Yes	HCPTSA	No	Yes
HCPMNM	Yes	Yes	HCPTSB	No	Yes
HCPMNN	Yes	Yes	HCPTSC	No	Yes
HCPMNO	Yes	Yes	HCPTSD	No	Yes
HCPMNP	Yes	Yes	HCPTSF	No	Yes
HCPMNQ	Yes	Yes	HCPTSG	No	Yes
HCPMNR	Yes	Yes	HCPTSH	No	Yes
HCPMNS	Yes	Yes	HCPTSJ	No	Yes
HCPMNT	Yes	Yes	HCPTSK	No	Yes
HCPMNU	Yes	Yes	HCPTSN	No	Yes
HCPMNV	Yes	Yes	HCPTSO	No	Yes
HCPMNW	Yes	Yes	HCPTSP	No	Yes
HCPMNX	Yes	Yes	HCPTSQ	No	Yes
HCPMNY	Yes	Yes	HCPTSR	No	Yes
HCPMNZ	Yes	Yes	HCPTSU	No	Yes
HCPMOB	Yes	Yes	HCPTSW	No	Yes
HCPMOC	Yes	Yes	HCPTSX	No	Yes
HCPMOD	Yes	Yes	HCPTSY	No	Yes
HCPMOE	Yes	Yes	HCPTUD	Yes	Yes
HCPMOF	Yes	Yes	HCPTUT	Yes	Yes
HCPMOG	Yes	Yes	HCPUTT	Yes	Yes
HCPMOH	Yes	Yes	HCPUUR	Yes	Yes
HCPMOI	Yes	Yes	HCPVCY	No	Yes

CMS Limited-Distribution Modules

The modules named below have limited distribution in VM/XA SP Release 1 and VM/XA SP Release 2 except for VMFLDS, which has limited distribution in VM/XA SP Release 2 only. CMS is not supported in VM/XA SF Release 2.

CMS Module Name	CMS Module Name	CMS Module Name	CMS Module Name
DMSADD	DMSMGE	DMSRTE	DMSWRT
DMSALA	DMSMGM	DMSSCA	DMSWST
DMSALC	DMSMGX	DMSSCL	DMSWVC
DMSAST	DMSMIN	DMSSEF	DMSWVD
DMSBCT	DMSMKS	DMSSEG	DMSWVE
DMSBLG	DMSPAR	DMSSHO	DMSWVL
DMSCCP	DMSPBK	DMSSIZ	DMSWVQ
DMSCCS	DMSPCA	DMSSLG	DMSWVS
DMSCCX	DMSPCB	DMSSMG	DMSWVT
DMSCDI	DMSPCC	DMSSRE	DMSWVX
DMSCLN	DMSPCL	DMSSRH	VMFLDS
DMSCLR	DMSPCR	DMSSRP	
DMSCRT	DMSPT	DMSSRQ	
DMSCST	DMSPCW	DMSSTC	
DMSCUR	DMSPGM	DMSSTK	
DMSDCS	DMSPKR	DMSUSR	
DMSDEF	DMSPKT	DMSUST	
DMSDEL	DMSPLC	DMSVLD	
DMSDEV	DMSPMD	DMSWAT	
DMSDIE	DMSPPL	DMSWBX	
DMSDRO	DMSPPO	DMSWEN	
DMSDRP	DMSPRB	DMSWEX	
DMSEVC	DMSPRI	DMSWID	
DMSGET	DMSPRJ	DMSWIF	
DMSGRQ	DMSPSM	DMSWIM	
DMSGTS	DMSPST	DMSWIN	
DMSGTU	DMSPTC	DMSWIO	
DMSHDS	DMSPTK	DMSWIR	
DMSHID	DMSPTL	DMSWIS	
DMSHLC	DMSPTR	DMSWIT	
DMSHLL	DMSPTT	DMSWLR	
DMSHLM	DMSPUT	DMSWLW	
DMSHLR	DMSPVF	DMSWMI	
DMSHLT	DMSQRF	DMSWMM	
DMSHLZ	DMSQRG	DMSWMO	
DMSIAC	DMSQRH	DMSWMU	
DMSLMX	DMSREF	DMSWMX	
DMSMAX	DMSRES	DMSWQI	
DMSMGC	DMSRLD	DMSWQM	
DMSMGD	DMSROU	DMSWRD	

GCS Limited-Distribution Modules

The modules named below have limited distribution in VM/XA SP Release 2 only.
GCS does not exist in VM/XA SP Release 1.

GCS Module Name	GCS Module Name	GCS Module Name
CSIABD	CSIIU	CSIQRL
CSIAES	CSIIINI	CSIQRQ
CSIANM	CSIIINS	CSIQRR
CSIAANT	CSIIIPR	CSIRET
CSIAATT	CSIIITA	CSIRPY
CSICMD	CSIIITE	CSISDT
CSICMH	CSIIITL	CSISDX
CSICOM	CSIIITP	CSISUP
CSICON	CSIIIUE	CSITIH
CSIDIE	CSIIUI	CSITIM
CSIDSP	CSIIUM	CSIVAL
CSIDUM	CSIIUS	CSIWAI
CSIDUQ	CSIIUX	CSIWTR
CSIDUR	CSIIVL	CSIYTD
CSIENQ	CSIIXT	CSIYTE
CSIEST	CSILAC	CSIYTG
CSIFNC	CSILDC	CSIYTI
CSIFSV	CSILLK	CSIYTO
CSIGFC	CSIMSG	CSIYTS
CSIGFD	CSIMTA	CSIYTW
CSIGFE	CSIMTB	CSIYTX00
CSIGFI	CSINUC	DSIEX15
CSIGFT	CSINXT	
CSIGIA	CSIPMA	
CSIGII	CSIPMB	
CSIGIM	CSIPMC	
CSIGIN	CSIPMD	
CSIGIP	CSIPMI	
CSIGIT	CSIPML	
CSIGIU	CSIPMM	
CSIGIX	CSIPMN	
CSIGSU	CSIPMR	
CSIGSV	CSIPMS	
CSIGSW	CSIPNC	
CSIGSX	CSIPND	
CSIIAL	CSIPNI	
CSIIIDS	CSIPNM	
CSIIEX	CSIPNP	
CSIIFL	CSIPNX	
CSIIFT	CSIQRD	

Summary of Changes

Technical changes throughout this manual are indicated by vertical bars to the left of the changed material.

Second Edition

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Changes to this publication:

- **For those converting from VM/SP HPO Release 4.2 or 5**

Part 1, "Converting from VM/SP HPO to VM/XA SP" has been updated to the VM/XA SP Release 2 level.

- **For those converting from VM/XA SF Release 2**

Part 2, "Converting from VM/XA SF to VM/XA SP" has been updated to the VM/XA SP Release 2 level.

- **For those migrating from VM/XA SP Release 1**

Part 3, "Migrating from VM/XA SP Release 1 to Release 2" has been added.



Glossary

A

automatic software re-IPL. The process by which the control program attempts to restart the system after abnormal termination. This process does not involve the hardware IPL process. See also virtual = real machine recovery.

C

CCS. Console communication services.

CCW. Channel command word.

channel command word (CCW). A doubleword structure that directs an I/O operation on a device or channel and includes pointers to any storage areas associated with the operation. One or more CCWs make up a channel program.

CMS. Conversational monitor system.

console communication services (CCS). A group of CP routines that interface with the VTAM service machine, providing full VM/XA SP console capabilities for SNA/CCS terminal users.

control program (CP). The component of VM/XA SP that manages the resources of a single System/370-Extended Architecture system so that multiple computing systems appear to exist. Each virtual machine is the functional equivalent of either a System/370 computing system or a System/370-Extended Architecture computing system.

conversational monitor system (CMS). The component of VM/XA SP that, as a virtual machine operating system, provides interactive time-sharing. CMS allows users to communicate with the system and with each other, to create and edit files, and to develop and run application programs. It operates in either System/370 mode or 370-XA mode under the control of CP.

CP. Control program.

D

DCSS. Discontiguous saved segment.

directory. A CP disk file that includes an entry for each user in the system. The entry defines the characteristics of the user's initial virtual machine configuration. These characteristics include the userid, the password, normal and maximum allowable virtual storage, virtual device definitions, the privilege class, the dispatching priority, logical line editing characters, and the account number.

discontiguous saved segment (DCSS). A saved segment that occupies one or more architecturally-defined segments. It begins and ends on segment boundaries. It is accessed by its own name. Contrast with member saved segment. See also saved segment, segment, segment space.

dump viewing facility. A VM/XA SP component that allows users to display, format, and print data interactively from CP hard and softabend, stand-alone, and virtual machine dumps, and to process CP trace table data stored on tape or in a system trace file.

dynamic paging area. The area of real storage allocated by CP for V=V machine paging. This area also contains CP nonresident modules, CP control blocks, CP trace tables, free storage pages, and the alternate processor's prefix storage areas.

E

Expanded Storage. Optional integrated high-speed storage. In VM/XA SP, Expanded Storage may be shared by CP and one or more virtual machines. It may also be dedicated to CP or to a particular virtual machine.

F

full-pack minidisk. A virtual disk that contains all of the addressable cylinders of a real DASD volume.

full-screen mode. In VM/XA SP, the environment in which an entire 3270 display screen is under the control of a program running in a virtual machine.

G

GCS. Group control system.

group control system (GCS). The component of VM/XA SP that, as a virtual machine supervisor, executes in a group of System/370 virtual machines under CP control to provide an interface that helps support a native Systems Network Architecture (SNA) network.

guest. An operating system running in a virtual machine managed by the VM/XA SP control program. Contrast with host.

guest real storage. The storage that appears real to the operating system running in a virtual machine. Contrast with guest virtual storage, host real storage, and host virtual storage.

guest virtual storage. The storage that appears virtual to the operating system running in a virtual machine. Contrast with guest real storage, host real storage, and host virtual storage.

H

host. The VM/XA SP control program in its capacity as manager of a virtual machine in which another operating system is running. Contrast with guest.

host real storage. The storage that appears real to the control program. If VM/XA SP is running native, this is real storage; if VM/XA SP is running in a virtual machine, this is virtual storage. Contrast with guest real storage, guest virtual storage, and host virtual storage.

host virtual storage. The storage that appears virtual to the control program. Contrast with guest real storage, guest virtual storage, and host real storage.

I

image library. A set of modules, contained in a system data file, that define the spacing, characters, and copy modification data that a 3800 printer uses to print a spool file or that define the spacing and character set that an impact printer uses to print a spool file. See also system data file.

inter-user communication vehicle (IUCV). A generalized CP interface that facilitates the transfer of data among virtual machines.

IUCV. Inter-user communication vehicle.

M

member saved segment. A saved segment that begins and ends on a page boundary. It belongs to up to 64 segment spaces and is accessed either by the segment space name or by its own name. Contrast with discontinuous saved segment. See also saved segment, segment, segment space.

missing interrupt handler. A CP function for detecting and dealing with real I/O operations that do not complete within a specified time.

multiple preferred guests. A VM/XA SP facility that supports up to six preferred virtual machines when the Processor Resource/System Manager (PR/SM) feature is installed in the real machine. See also preferred virtual machine.

N

named saved system (NSS). A copy of an operating system that a user has named and retained in a system data file. The user can load the operating system by its name, which is more efficient than loading it by device number. See also discontinuous saved segment, member saved segment, saved segment, segment space, system data file.

NSS. Named saved system.

P

pageable virtual machine. Synonymous with virtual = virtual machine.

preferred virtual machine. A virtual machine that runs in the V = R area. CP gives this virtual machine preferred treatment in the areas of performance, processor assignment, and I/O interrupt handling. See also multiple preferred guests, virtual = fixed machine, virtual = real area, virtual = real machine.

Processor Resource/Systems Manager (PR/SM). A separately orderable feature available with 3090E processors that provides for logical partitioning of

the real machine and support of multiple preferred guests. See also multiple preferred guests.

PR/SM. Processor Resource/Systems Manager.

R

real system operator. Any user who loads and runs VM/XA SP in the real machine. Contrast with virtual machine operator.

S

saved segment. One or more pages of storage that have been named and retained in a system data file. See also discontinuous saved segment, member saved segment, segment, segment space, system data file.

segment. In System/370 architecture, 64 kilobytes of storage. In 370-XA architecture, 1 megabyte of storage. See also saved segment.

segment space. A saved segment composed of up to 64 member saved segments accessed by a single name. A segment space occupies one or more architecturally-defined segments; it begins and ends on segment boundaries. A user with access to a segment space has access to all of its members. See also discontinuous saved segment, member saved segment, saved segment, segment.

service virtual machine. A virtual machine that provides system services. These services include accounting, error recording, monitoring, and those provided by supported licensed programs.

SMSG function. A CP function that allows a virtual machine to send a special message to another virtual machine programmed to accept and process the message. See also special message.

SNA. Systems Network Architecture.

SNA/CCS terminal. Any terminal accessing VM/XA SP that is managed by a VTAM service machine.

special message. A data transmission, made up of instructions or commands, sent from one virtual machine to another via the SMSG function. A special message is processed by the receiving virtual machine and does not appear on the receiver's console. See also SMSG function.

spool file. A collection of data along with CCWs for processing on a unit record device. Contrast with system data file.

SVC 76. In VM/XA SP, a supervisor call instruction that records the error incidents encountered by certain operating systems running in virtual machines. When a virtual machine operating system issues an SVC 76, VM/XA SP translates the virtual storage and I/O device addresses to real addresses, records the information on the VM/XA SP error recording virtual machine, and returns control to the issuing virtual machine. This interface bypasses the virtual machine's own error recording routine, and avoids duplicate error recording.

System/370 mode. A virtual machine operating mode in which System/370 functions are simulated. Contrast with 370-XA mode.

system data file. A collection of data associated with a particular function. Types of system data files include saved segments, NSSs, UCR files, image libraries, and system trace files. Because a system data file contains no CCWs, it cannot be processed on a unit record device. Contrast with spool file.

system hold status. A spool file status that prevents a file from being printed, punched, or read until the real system operator releases it. Contrast with user hold status.

system trace file. A type of system data file that contains CP or virtual machine trace data.

Systems Network Architecture (SNA). The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through, and controlling the configuration and operation of, networks.

U

UCR file. User class restructure file.

unit record device. A reader, a printer, or a punch.

user class restructure file (UCR file). A type of system data file that contains information used to override the IBM-defined privilege class structure of

CP commands, DIAGNOSE instruction codes, and certain CP system functions.

user directory. See directory.

user hold status. A spool file status that prevents a file from being printed, punched, or read until the file owner releases it. Contrast with system hold status.

V

Vector Facility (VF). A hardware feature that provides synchronous instruction processing for high-speed manipulation of fixed-point and floating-point data.

VF. Vector Facility.

V = F machine. Virtual = fixed machine.

virtual = fixed machine (V = F machine). A preferred virtual machine with a fixed, contiguous area of host real storage that does not start at page 0. CP provides performance enhancements for this virtual machine. See also multiple preferred guests, preferred virtual machine, virtual = real area, virtual = real machine, virtual = virtual machine.

virtual machine. In VM/XA SP, a functional equivalent of either a System/370 computing system or a System/370-Extended Architecture computing system. Each virtual machine is controlled by an operating system. VM/XA SP controls the concurrent execution of multiple virtual machines on an actual System/370-Extended Architecture system.

Virtual Machine/Extended Architecture System Product (VM/XA SP). An operating system that allows multiple IBM System/370 and 370-XA operating systems to run simultaneously on a single 370-XA processor. The multiple systems may be used for production, testing, developing application programs, maintenance, and migration. VM/XA SP also provides a high-capacity interactive environment. There are four components: the control program (CP), the conversational monitor system (CMS), the dump viewing facility, and the group control system (GCS).

virtual machine operator. Any user who loads and runs an operating system in a virtual machine. Contrast with real system operator.

virtual = real area (V = R area). A fixed, contiguous section of real storage, starting at page 0, in which preferred virtual machines execute. CP does not page this storage. See also preferred virtual machine, virtual = fixed machine, virtual = real machine.

virtual = real machine (V = R machine). A preferred virtual machine with a fixed, contiguous area of host real storage that starts at page 0. CP provides performance enhancements and an automatic recovery facility for this virtual machine. See also multiple preferred guests, preferred virtual machine, virtual = real area, virtual = real machine recovery, virtual = virtual machine.

virtual = real machine recovery (V = R machine recovery). A CP function that allows the V = R machine to resume operation after most CP abnormal terminations. When possible, the facility reestablishes the V = R machine environment, allowing the operating system running in that virtual machine to perform its own recovery processes. See also automatic software re-IPL.

virtual = virtual machine (V = V machine). A virtual machine that runs in the dynamic paging area. CP pages this virtual machine's guest real storage in and out of host real storage. See also dynamic paging area, virtual = fixed machine, virtual = real machine.

virtual supervisor state. A condition, controlled by a virtual machine's current PSW, during which the control program allows the virtual machine to issue input/output and other privileged instructions. When these instructions are not emulated, the control program intercepts these instructions and simulates their functions for the virtual machine.

virtual wait time. The period during which the control program suspends the processing of a program while a required resource is unavailable.

VM/XA SP. Virtual Machine/Extended Architecture System Product.

VTAM service machine. A collection of networking programs running in a virtual machine that, together with the CP console communication services (CCS) routines, provide full VM/XA SP console capabilities for SNA/CCS terminal users. A VTAM service machine contains either (1) VM/VTAM with VSCS running as an application under control of GCS, or (2) VM/VCNA running

as a VTAM application under control of the VSE or VSI operating system.

V = R area. Virtual = real area.

V = R machine. Virtual = real machine.

V = R machine recovery. Virtual = real machine recovery.

V = V machine. Virtual = virtual machine.

Numerics

370 mode. Synonym for System/370 mode.

370-XA mode. A virtual machine operating mode in which System/370-Extended Architecture functions are simulated. Contrast with System/370 mode.



Bibliography

This bibliography gives the names and order numbers of microfiche and publications about VM/XA System Product and related products.

VM/XA System Product Microfiche

You can order microfiche listings that contain code. The order numbers for the microfiche are:

Order No.	Description
LYC7-0330	VM/XA System Product: CP listings
LYC7-0331	VM/XA System Product: CMS listings
LYC7-0332	VM/XA System Product: GCS listings
LYC7-0334	VM/XA System Product: dump viewing facility listings.

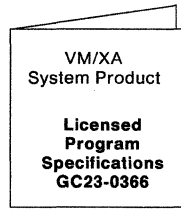
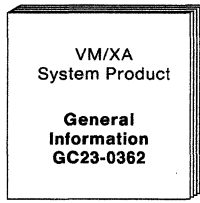
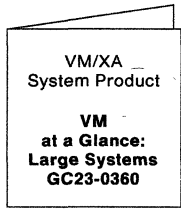
VM/XA System Product Publications

The publications are shown in Figure 24 on page 306. You can order any of them by their individual order numbers or you can order most of them as a group by using a single order number, SBOF-0260. SBOF-0260 provides:

- All unlicensed publications (order numbers that do not begin with LY)
- Enough three-ring binders to hold the publications
- Spine and cover inserts for the binders.

Note: The Release 2 editions of *VM/XA SP General Information* and the *VM/XA SP Conversion Notebook* are available *prior to* general availability of VM/XA SP Release 2. Release 2 editions of other publications are available *at the same time as* general availability of VM/XA SP Release 2.

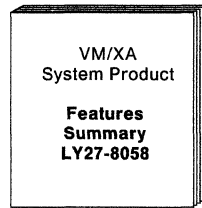
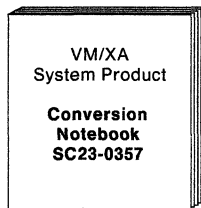
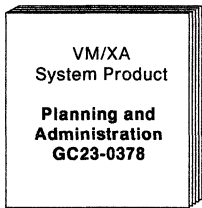
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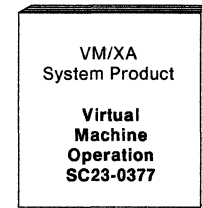
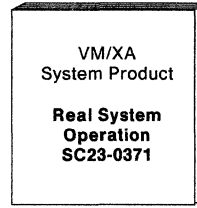
Installation



Planning and Administration



Operation



End Use

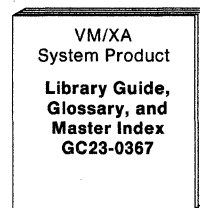
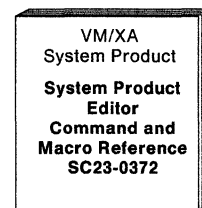
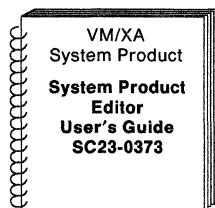
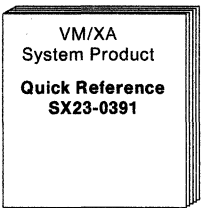
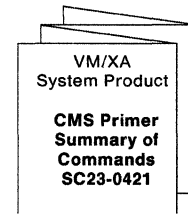
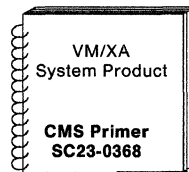
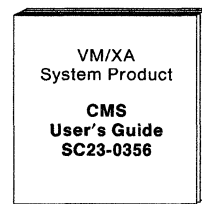
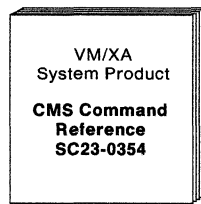
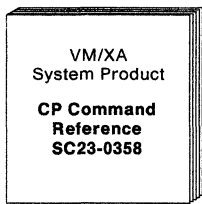
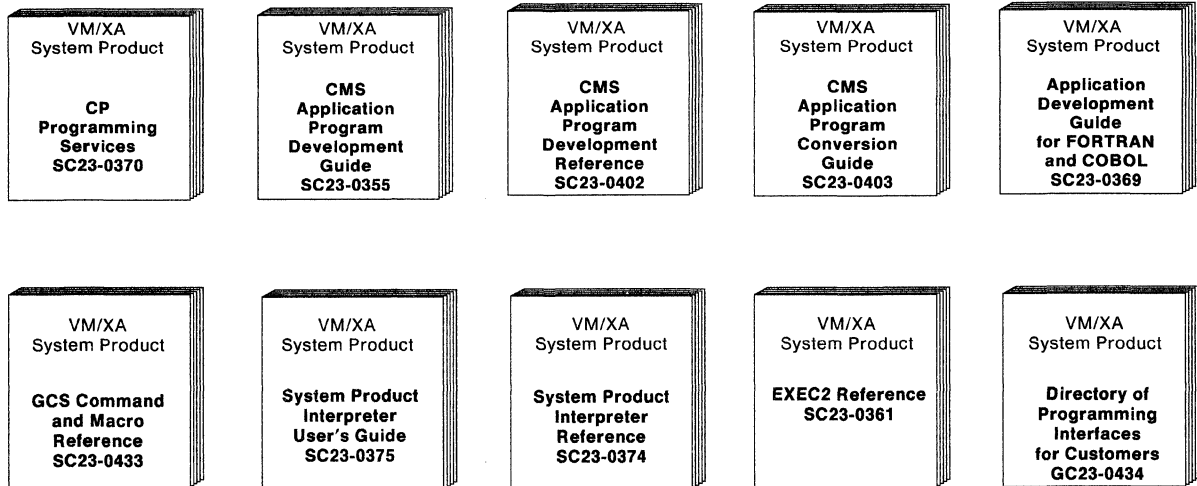
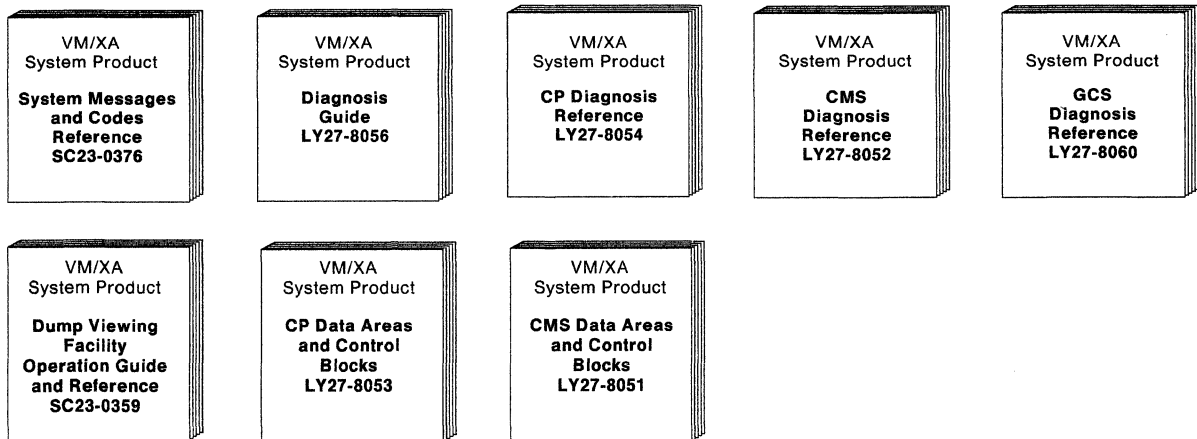


Figure 24 (Part 1 of 2). VM/XA System Product Publications

Application Programming



Diagnosis



Binders and Inserts

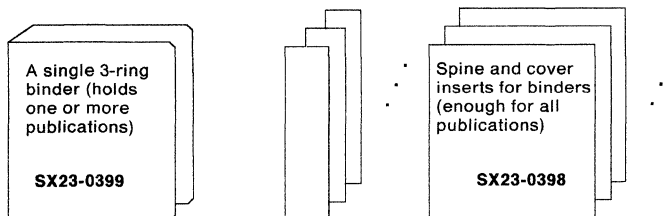


Figure 24 (Part 2 of 2). VM/XA System Product Publications



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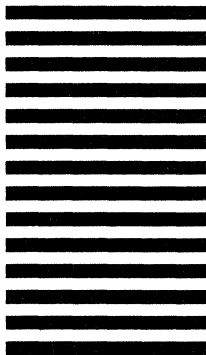
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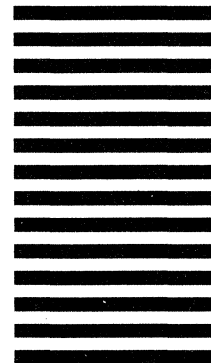
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