

VM/SYSTEM PRODUCT RELEASE 6

Contents

Announcement Letter Number 287-445 dated October 20, 1987

US - Last Revised on October 20, 1987

Brief Description of Announcement, Charges, and Availability.

VM/System Product (VM/SP) Release 6 provides new and enhanced support focused on application enabling. This support includes file sharing, connectivity, high-level language support, Systems Application Architecture (SAA), RAS, NLS, security, and bimodal CMS programming interfaces. CMS has been extended to include a Shared File System facility for management and sharing of CMS files. The Advanced Program-to-Program Communication/Virtual Machine (APPC/VM) interface has been enhanced to include SNA LU type 6.2 support, permitting the Transparent Services Access Facility (TSAF) to become an active participant in a SNA network. A Callable Services Library provides the high-level language programmer with access to VM functions and services without requiring the programmer to write Assembler subroutines. CMS has been extended to allow CMS users to develop applications on VM/SP that utilize the IBM System/370 Extended Architecture when the application is executed on the VM/XA System Product.

Charges

Monthly License Charge: \$500

GRADUATED

PROCESSOR GROUP	BASIC OTC
10	\$ 7,740
20	13,540
30	19,345
40	30,950

Planned Availability: December 1988

Customer Letter Section

HIGHLIGHTS

- o Shared File System
- o Bimodal CMS programming interfaces
- o Saved segment management support
- o Enhanced connectivity
- o Callable Services Library
- o Systems Application Architecture
- o Base enhancements
- o Department of Defense (DOD) Security Statement of Direction

DESCRIPTION

SHARED FILE SYSTEM

CMS is extended to include a Shared File System facility for the management and sharing of CMS files. This support is in addition to existing support for CMS files on minidisks and includes the following added capability.

FILE LEVEL SHARING OF CMS FILES: Files stored in the new Shared File System facility can be shared by multiple CMS users. Sharing is at the file level, providing multiple readers and one writer access to a file at the same time. Readers will see the latest committed level of a file. A reader will not see changes made by the writer until he reads the file again.

Control over the sharing of files by multiple users is based on user authorizations granted/revoked by the file creator (owner) or an administrator rather than data or minidisk passwords.

DISTRIBUTED FILE ACCESS SUPPORT ACROSS VM SYSTEMS: Files stored in the Shared File System can be shared across multiple VM systems. This includes VM systems connected in a SNA network, as well as VM systems in a TSAF collection.

The distributed file access support provides a significant application of the APPC/VM enhancements provided by VM/SP Release 6. Sharing files across multiple interconnected VM systems is an important and immediate benefit of VM/SP Release 6.

DASD SPACE MANAGEMENT: Users enrolled in the Shared File System are given a space authorization, but actual DASD space is not physically allocated. Physical allocation of space is done dynamically on a demand basis as users create or extend files. Similarly, space is dynamically reclaimed as files are erased or replaced. User space authorizations can be extended online through an administrator command. Any CMS file stored in the Shared File System, whether shared or not, will benefit from DASD space sharing.

HIERARCHICAL DIRECTORY SUPPORT: Because file access in the Shared File System is not governed by LINKs and ACCESSes to physical minidisks, a new hierarchical directory addressing structure is provided for data stored in the Shared File System. This support is a compatible extension to the current CMS support for file modes. The hierarchical directory support allows CMS users (and applications) to organize their files in multiple, hierarchically structured directories. The support includes the capability to register the same file in multiple directories.

DATA RECOVERY ENHANCEMENTS: Dynamic backout and system restart recovery is supported for files stored in the Shared File System. This support allows coordination of updates to multiple files in multiple directories.

COMPATIBILITY FOR CMS APPLICATIONS: Most current CMS applications will continue to operate correctly against files that have been stored in the Shared File System. Applications that do not share data or that use read only sharing, and use only interfaces documented in the CMS publications should run without change. An exception to this is applications that use and exploit the update-in-place function (filemode 6).

The program compatibility support includes:

- o CMS File System (FS) Macros Support: FS macros are supported for files stored in the Shared File System.
- o OS and DOS Simulation Support: OS simulation and DOS simulation are supported for files stored in the Shared File System. This support means that System Application Architecture high-level language interfaces for file access are supported for files stored in the Shared File System.

COEXISTENCE WITH MINIDISK SUPPORT: A single application can use CMS files stored in the Shared File System and CMS files stored in minidisks. It is not necessary to migrate all application files to the Shared File System at once.

BIMODAL CMS PROGRAMMING INTERFACES

Support for the bimodal CMS programming interfaces announced as part of the VM/XA System Product Release 1 (refer to Programming Announcement 287-239, dated June 11, 1987) is included in VM/SP Release 6 CMS. This support provides bimodal CMS program interfaces which enable an application to be coded so that it can be executed independently of the processor, System/370 or 370-XA environment. In addition to the bimodal programming interfaces, the following extensions are included:

- o Program link-edit and load facilities have been enhanced to support module relocation at load time.
- o The CMS storage management facility has been improved by the use of a subpooling scheme similar to OS which allows subpools of storage to be manipulated as a single entity.
- o Enhanced support for Discontiguous Shared Segments (DCSS)
 - DCSSs can now be located within a user's virtual machine. In prior releases, a DCSS could be loaded only outside of the defined virtual machine.
- o Enhancements to the MVS development, test, and execution environment provided by CMS

The currently supported OS macros shipped with CMS have been uplevelled with the equivalent versions provided in MVS/XA Release 2.2.0.

The OS simulation capabilities of CMS have been upgraded to support the MVS/XA macros that have been replaced, or are extensions to, the OS macros previously supported.

SAVED SEGMENT MANAGEMENT SUPPORT

This support enables multiple logical saved segments to be packed together and managed in a single physical saved segment. Multiple objects, for example, nucleus extensions, EXECs, NLS language repositories, and Callable Services Libraries, may reside in a single logical segment.

In addition, CMS program handling has been enhanced to manage the code that resides within a segment. When the segment is loaded, its contents are made available in ways appropriate for the type of file (for example, EXEC is handled as an EXEC; Module as a NUCEXT, etc.).

ENHANCED CONNECTIVITY

VM/SP Advanced Program-to-Program Communications connectivity is being significantly enhanced in Release 6. Major improvements have been made both to APPC/VM communication and programming support functions.

In March 1989, additional VM/SP support for ACF/VTAM Version 3 Release 2 will include the capability to connect VM/SP systems in a TSAF collection using SNA.

APPC/VM COMMUNICATION ENHANCEMENTS: APPC/VM functions are enhanced in VM/SP Release 6, permitting APPC/VM programs in TSAF collections to communicate over SNA LU Type 6.2 networks.

- o An APPC/VM program running in a virtual machine on a VM/SP system can communicate with APPC programs outside the VM/SP TSAF collection on which the program is running.
- o Users on a remote host or a workstation (or an APPC program) can access TSAF resources anywhere in the TSAF collection of VM/SP systems.

This support will enable APPC/VM programs to communicate (via ACF/VTAM) with other APPC/VM programs, as well as non-VM APPC programs which use SNA LU Type 6.2 base communication functions. A VM/SP program using APPC/VM will be able to establish an APPC conversation with a SNA LU Type 6.2 program. A SNA LU Type 6.2 program will be able to establish an APPC conversation with an APPC/VM program (for example, TSAF resource) anywhere in the TSAF collection of VM/SP systems.

To support the TSAF interface to the SNA network, a new function has been added to VM/SP referred to as the APPC/VM VTAM support. This support is an ACF/VTAM application that provides the

functions necessary for APPC/VM programs to communicate via ACF/VTAM Version 3 Release 2 with APPC programs in a SNA network.

COMMON PROGRAMMING INTERFACE FOR COMMUNICATIONS (CPI COMMUNICATIONS):

The VM/SP CPI Communications provides a call interface for high-level language APPC/VM application programs in a VM/SP Release 6 CMS

environment. CPI Communications provides System Applications Architecture (SAA) defined functions for APPC Basic and Mapped conversations for high-level language programs. The callable routines are stored in the Callable Services Library described below.

The VM/SP CPI Communications high-level language support enables increased productivity in the development of distributed applications. It simplifies development of distributed applications in which segments of an application are executed in different systems. For example, a segment that provides end-user screen support, a segment that does the primary processing of data for the application, or a segment that provides access to data can be executed in the system that provides the best utilization of that system's capabilities, for example, end-user interface, processor productivity and performance, or access to data.

The APPC functions supported in VM/SP CPI Communications include:

- o Initiating or terminating a program-to-program connection
- o Sending and receiving data between programs
- o Synchronization of processing between programs
- o Error notification.

COLLECTION COMMUNICATION USING SNA: Additional VM/SP support for ACF/VTAM Version 3 Release 2 includes the capability to connect VM/SP systems in a TSAF collection using SNA. This function supports the formation of a TSAF collection using SNA (LU Type 6.2) session control provided by ACF/VTAM Version 3 Release 2. This support will be available in March 1989.

This support will increase the connectivity options available in the formation of TSAF collections. Some important wide area networking that will be available through ACF/VTAM Version 3 Release 2 includes the support of SNA SDLC lines, high-speed T1 lines, and X.25 packet switching networks. Collection data traffic can share physical lines with other ACF/VTAM application data traffic, including SNA network management data exchanged over the SNA network. In addition, the management of the collection lines and data traffic can be administered using the IBM NetView (TM) network management product.

With the enhancement of TSAF to support collections formed using SNA, the bisynchronous communication line support, the Channel-to-Channel Adapter support, and the IBM Token Ring support delivered as a part of the initial TSAF component in VM/SP Release 5 for TSAF server virtual machine communications are being stabilized. No future enhancements will be made to these TSAF line drivers.

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APPC/VM USAGE BY PVM: In VM/SP Release 6, PVM Release 4 uses APPC/VM to communicate with its counterpart PVM on another VM system. This support allows an installation to have ACF/VTAM manage the communication activity between two VM/SP systems for a set of PVM nodes that would otherwise require their own (independent) physical links. When an installation uses ACF/VTAM, any type of physical link supported by ACF/VTAM may be used to connect the VM systems (SDLC, X.25, T1, and others).

CALLABLE SERVICES LIBRARY

The Callable Services Library provides the high-level language programmer with access to VM functions and services without requiring the programmer to write Assembler subroutines. The languages supported include COBOL, FORTRAN, PL/1, C, REXX, as well as Assembler. In addition, the customer can build and maintain libraries of installation-specific routines using Assembler language.

All routines accessed via the Callable Services Library may be stored in a saved segment. Also, all calls to the routines will be resolved at execution time. This provides a level of insulation against having to re-link, re-compile, or modify the source statements of an application when a library member is changed.

Routines provided in the Callable Services Library include:

- o The APPC/VM Common Programming Interface for Communications discussed earlier.
- o A Call REXX function, allowing high-level language applications to invoke a REXX program. The invoked REXX program could make unlimited use of operating system services and yet be accessible to, and modifiable by, user support.
- o Access to REXX program variables from a high-level language program invoked by the REXX program.
- o An Extract/Replace function, allowing high-level language applications to obtain information stored in CMS control blocks. The information returned is in a form that is consistent from release to release and also architecturally independent.
- o A Shared File System interface, allowing high-level language applications to call Shared File System functions.

SYSTEMS APPLICATION ARCHITECTURE

VM/SP Release 6 provides many of the services defined in the System Application Architecture (SAA). The Systems Application Architecture defines selected software interfaces, conventions, and protocols that serve as a common platform for development of consistent applications across the future offerings of the major IBM computing environments: System/370, System/3X, and IBM Personal Computers. Refer to Systems Application Architecture: An Overview (GC26-4341) and Programming Announcement 287-088, dated March 17, 1987, for details of the Systems Application Architecture.

VM/SP Release 6 provides the following SAA services:

- o REXX Language

The VM/SP System Product Interpreter (REXX) continues to implement the SAA procedures language.

In addition, the System Product Interpreter has been enhanced.

- o High-Level Language File Access

OS and DOS simulation are supported for files stored in the Shared File System. This means SAA high-level language interfaces for file access are supported for files stored in the Shared File System.

- o Common Programming Interface for Communications

CPI Communications provides SAA-defined functions for APPC

Basic and Mapped conversations for high-level language programs.

BASE ENHANCEMENTS

Enhancements to basic VM/SP functions have been made in numerous areas.

RAS ENHANCEMENTS: VM/SP Release 6 provides new function in the areas of isolating CP data and tracing CCWs. The functions are accessed by enhancements to the CPTRAP command and include:

- o A DATATRAP function to allow collecting various types of data at various selected points in CP

- o A CCWTRACE function to allow the tracing of I/O activity between CP and selected real devices.

The Interactive Problem Control System (IPCS) is enhanced to aid in the online analysis of data collected by the new CPTRAP command enhancements. Formatting and printing of selected or all records in the CPTRAP file are also provided.

Until now, TRAPRED has been the method used to display and analyze records in the CPTRAP file. This facility will no longer be supported.

To support debugging activities in a remote environment, the

SET AUTODUMP command can be used to control the creation of a dump of CMS in the event of an abnormal termination (ABEND). The user may elect to have the dump created only for unrecoverable CMS system ABENDs, or for all ABENDs occurring in the virtual machine.

NLS ENHANCEMENTS: National language support has been expanded to seven languages. Menus, messages, and publications have been translated for the following languages: German, French, Uppercase English, Brazilian Portuguese, Japanese, Spanish, and Chinese Simplified.

REXX has been enhanced to provide double-byte character set support, allowing users to write programs in REXX that manipulate DBCS data without destroying the integrity of double-byte character strings.

SECURITY ENHANCEMENTS: VM/SP Release 5 was enhanced by a Small Programming Enhancement (SPE) addressing the Composite Reader File problem, which could occur when a group of files is sent as a single spool file from one VM user to another. Compatible defaults were provided in the SPE. VM/SP Release 6 provides secure system defaults.

A transfer device function has been added that allows a virtual machine to transfer ownership of a dedicated tape device to another user on the same system.

SYSTEM DATA COLLECTION ENHANCEMENTS: The current accounting support resets selected information with no indication or notice. This is changed either to not reset the data, or to provide an indicator showing when the data has been reset. Also, a new CP function has been included to pass application data required for the Shared File System to the CP monitor for subsequent reduction by a postprocessing program such as VM MAP.

BLOCK I/O ENHANCEMENTS: The Block I/O function in CP is enhanced to provide for reading and writing up to 256 contiguous or discontinuous CMS formatted FBA or CKD blocks with a single Block I/O request. All block sizes currently supported by Block I/O are supported for Multiple Block I/O. Existing applications using Block I/O will continue to work without change.

TEMPORARY DISK UTILIZATION: A new algorithm for TDISK space utilization distributes temporary disk space I/O across all available disk packs, avoiding I/O concentration on one pack only and reducing channel contention.

IDENTIFICATION OF DEFAULT A-DISK LOCATION: To support the Shared File System's need to know where a user's default A-disk is located, on a minidisk or in a file pool, a parameter has been added to the

IPL statement to indicate its location. This parameter may also be stored in the system directory.

DEPARTMENT OF DEFENSE (DOD) SECURITY STATEMENT OF DIRECTION

It is IBM's intention to evolve the security of VM/SP with RACF, configured with or without HPO, by providing functions that are designed to meet the standards for C2 as currently defined in the publication, Trusted Computer System Evaluation Criteria, reference number DOD 5200.28-STD.

IBM is currently engaged in a Developmental evaluation at the C2 level with the National Computer Security Center (NCSC). This evaluation allows the NCSC and IBM to identify the requirements that must be satisfied for that candidate class.

IBM plans to develop a VM/SP Release 5-based C2-level system that meets these requirements and to make that system available to the NCSC by fourth quarter 1988 for initiation of the formal evaluation.

There is no commitment that the NCSC will evaluate the specified system at the C2 security level, nor is there any prediction when this product might be placed on the Evaluated Product List (EPL).

WITHDRAWAL FROM MARKETING

IBM will withdraw from marketing the following releases of programs licensed under the Agreement for IBM Licensed Programs on January 20, 1988:

- o VM/System Product Release 2 (5664-167)
- o VM/System Product Release 3 (5664-167)

PUBLICATIONS

Several manuals within the VM/SP Library will be modified or eliminated, and new manuals will be provided. These changes result in manuals that are more task oriented, providing the user with the appropriate information needed to perform the desired task.

Some of the CMS-related books are changed to reflect their common use by VM/SP and VM/XA. Application Conversion Guide for CMS (SC24-5366) describes the enhancements for CMS XA support and discusses how they affect new and existing programs.

The VM/SP Release 6 Guide (SC24-5368) describes additions and enhancements for this release and serves as a supplement to the remainder of the library. The guide begins with general information about each functional change and discusses the VM/SP library and the changes to it. It defines the functional changes and lists the incompatibilities that may occur and internal design changes that result from the functional changes.

A new book is provided for the Shared File System, VM/SP CMS Shared File System Administration (SC24-5367). The book is addressed to the system programmer and system administrator and covers administrative information about the new Shared File System. Topics, such as operating the server machine, managing users, protecting data, managing storage, accounting, remote use, monitoring performance, reorganization, etc., are discussed in detail.

VM/SP TSAF Reference (SC24-5287) is replaced by two new books, VM/SP Connectivity Programming Guide and Reference (SC24-5377) and VM/SP Connectivity Planning, Administration, and Operation (SC24-5378). The books describe VM connectivity and show the interrelationship between integrated functions and products such as VM/VTAM and RSCS. They include descriptions of the Advanced Program-to-Program Communication/Virtual Machine (APPC/VM) extensions in Release 6, as well as the new APPC/VM VTAM Support (AVS) component. They also include descriptions of the Transparent Services Access Facility (TSAF) virtual machine and the system services associated with TSAF.

Using Release 6 Enhancements (SC24-5369) describes the interfaces application developers can use to access the new functional enhancements in VM/SP Release 6. It is written specifically for system and application programmers. The book will be available prior to the planned availability of Release 6. It contains all the new and changed commands, macros, diagnose codes, and system facilities for Release 6.

The VM/SP HELP Facility Introduction (SX24-5221) is a reference card presenting the structure of the Help facility to end users. This card provides a simple introduction for using Help.

The VM/SP Interactive Problem Control System Guide and Reference (SC24-5260), which was discontinued for VM/SP Release 5, is available for Release 6. The information that was disseminated into other books is returned and enhanced in this stand-alone publication.

VM/SP Commands (General User) Reference Summary (SX20-4401) and VM/SP Commands (Other than General User) Reference Summary (SX20-4402) will not be available for Release 6, but will continue to be available at the VM/SP Release 5 level. For Release 6, they are replaced by VM/SP CP Command Reference Summary (SX24-5219) and VM/SP CMS Command Reference Summary (SX24-5220).

EDUCATION SUPPORT

The VM/SP educational offerings will be updated as required to reflect the new facilities offered in VM/SP Release 6.

SCHEDULE

Planned availability is December 1988.

TECHNICAL INFORMATION

SPECIFIED OPERATING ENVIRONMENT

MACHINE REQUIREMENTS: VM/SP Release 6 is designed to run on the IBM 3081 Model D16 Processor, on IBM 43XX processors, and on IBM 9370 processors.

REAL STORAGE REQUIREMENTS: VM/SP Release 6 requires a minimum user-accessible storage of 768KB.

PROGRAMMING REQUIREMENTS: VM/EREP 3.3.0 (5654-260) and Device Support Facilities 1.8.0 (5747-DS1) are shipped with all VM/SP Release 6 orders to users with an IBM processor.

COMPATIBILITY: Application programs that currently execute under VM/Basic Systems Extensions, VM/System Extensions, and VM/SP Releases 1, 2, 3, 4, and 5 licensed programs and are not dependent on internal CP, CMS, or GCS structure and/or control blocks, should also run on VM/SP Release 6, except as noted below.

- o Because of the command syntax for specifying Shared File System filepoolid and directory names, the ":" and "." characters are no longer valid in a USERID.
- o QUERY SEARCH now has an additional data item being passed back, for the Shared File System directory ID. Existing EXECs that do not use "." to capture unwanted parameters at the end may not work.
- o To support the Shared File System, a minidisk that has no files in it cannot be accessed R/O as in the past.
- o The AFT control block has been reformatted to support the Shared File System.
- o The RAS enhancements has resulted in the DUMPSCAN and PRTDUMP IPCS command names being replaced with names that more accurately reflect the enhanced function. Also, the TRAPRED command has been eliminated because its function has been absorbed by IPCS. Any product or EXEC that invokes the previous command names must be updated to invoke the new commands and subcommands.
- o The Composite Reader File enhancement has changed the system defaults for the DISK LOAD and READCARD commands.
- o REXX programs that bypass the documented restriction on placement of the PROCEDURE statement will need to be corrected.

USER GROUP REQUIREMENT RESOLUTION:

SEAS:

- o VMVM86141 -- CMS OS Simulation
- o VMVM86142 -- IUCV/APPC to VTAM/APPC Bridge.

GUIDE:

- o GO5VMC87002 -- VM Passthru to Use VM TSAF Facility
- o GO5OPS86013 -- CCWTRACE Must be a Supported Feature of VM/SP
- o GO5OPS85013 -- File Level Password Protection for CMS Files.

SHARE:

- o SBCMS/80023 VM/CMS File Sharing
- o SBCMS/82004 Relocatable Module Support in CMS
- o SBCMS/84003 Improvements to DCSS Support
- o SBCMS/84004 CMS/XA Support for Compatibility and Memory Expansion.

PLANNING INFORMATION

CUSTOMER RESPONSIBILITIES: Protection of customer data remains the customer's responsibility.

INSTALLABILITY: The installation procedures will be updated to support VM/SP Release 6 and associated object code serviced modules including the Group Control System, VM Transparent Services Access Facility, and other selected VM/SP modules.

PACKAGING: The VM/SP Release 6 shipment package will contain one of each of the following:

- o Distribution medium containing the basic machine-readable material (for example, Text, MACLIB, source (except for GCS, TSAF, and other object code serviced modules), etc.)
- o Distribution medium containing Current PUT Tape
- o Memo to New Licensees
- o Program Directory
- o Publications -- information will be provided when the program becomes available.

SYSTEM INTEGRITY

System integrity is an important characteristic of VM/SP. IBM will accept APARs that describe exposure to system integrity or that describe problems encountered when a program running in a virtual machine not authorized by a mechanism under the customer's control introduces an exposure to system integrity. For the definition of VM/SP system integrity, refer to Programming Announcement 283-185, dated June 21, 1983. For a definition of GCS system integrity, refer to Programming Announcement 286-420, dated October 7, 1986.

SECURITY, AUDITABILITY, AND CONTROL

Many of the Release 6 enhancements described earlier extend the VM/SP system in providing the user with facilities to control and monitor system activities/operations. User management is responsible for evaluation, selection, and implementation of these features, for administrative procedures, and for appropriate controls in

application systems.

ORDERING INFORMATION

Ordering instructions will be provided when the program becomes available.

TERMS AND CONDITIONS

LICENSING: The program in this announcement is licensed under the terms and conditions of the Agreement for IBM Licensed Programs.

GRADUATED CHARGES AMENDMENT APPLIES: Yes, for licenses obtained for a graduated one-time charge.

INSTALLATION LICENSE OR LOCATION LICENSE APPLIES: No. A separate license is required for each designated machine on which the licensed program materials will be used except as otherwise provided by IBM.

USAGE LICENSE APPLIES: No

EDUCATIONAL ALLOWANCE: A 15% educational allowance toward eligible license charges is available to qualifying institutions in accordance with the Educational Allowance Amendment. The educational allowance may not be added to any other discount or allowance.

VOLUME DISCOUNT: Volume discounting is available under the Volume Procurement Amendment (VPA) for Machines and Programs and the VPA Exhibit for Graduated Charges. VM/SP Release 6 (5664-167) is in Categories G11, H11, J11, and K11. The following discount schedule applies for licenses obtained under the graduated one-time charge option.

DISCOUNT PERCENTAGE

CATEGORIES BY PROCESSOR GROUP

MINIMUM QUANTITY OF PROGRAMS BY CATEGORY	GROUP 10	GROUP 20	GROUP 30	GROUP 40
CATEGORY	G11	H11	J11	K11
3	20%	10%	10%	10%
5	25%	15%	15%	15%
10	30%	20%	20%	20%
20	35%	25%	25%	25%

The VPA category specified must correspond to the processor group applicable to the machines on which the programs will run.

Only programs within the same category (for example, G11) may be aggregated to determine the applicable discount percentage.

Processor group upgrades are not eligible for volume discounting.

Volume discounting applies to both basic and DSLO one-time charge licenses.

Program upgrades are not eligible for volume discounting.

WARRANTED: Basic license -- yes. DSLO -- Not applicable.

LICENSED PROGRAM MATERIALS AVAILABILITY: Restricted materials: Yes. This licensed program will be available with source licensed program materials for some modules designated as RESTRICTED MATERIALS OF IBM. In addition, some modules will be available without source licensed program materials. These modules will be available in object code and are listed in the Program Directory.

TESTING PERIOD: Basic license -- two months. DSLO -- not applicable.

PROGRAM SERVICES: Central Service, including the IBM Support Center, will be available until discontinued by IBM upon 12 months' written notice. Central Service, including the IBM Support Center, for DSLO licenses will be provided only through the customer location designated for the basic license.

PROGRAM CURRENCY: Program Services previously announced for the following VM/SP releases will be available until August 31, 1988.

Refer to Programming Announcement 286-420, dated October 7, 1986.

- o VM/System Product Release 4
- o VM/370 Release 6 (5749-010)

IBM will withdraw from marketing the following releases of programs licensed under the Agreement for IBM Licensed Programs on January 20, 1988:

- o VM/System Product Release 2 (5664-167)
- o VM/System Product Release 3 (5664-167).

CHARGES

MONTHLY LICENSE CHARGE

- o Basic: \$500
- o DSLO: 375

	BASIC	DSLO
PROCESSOR GROUP	GRADUATED OTC	GRADUATED OTC
10	\$ 7,740	\$ 5,805
20	13,540	10,155
30	19,345	14,510
40	30,950	23,215

ONE-TIME CHARGE: Customers who pay a graduated or non-graduated one-time charge for a licensed program receive enhancements and future releases, if any, at no additional charge. Significant new function may be offered as a optional feature and charged for separately. If a new version is announced and the customer elects to license the new version for a one-time charge and replace the prior version, an upgrade charge may apply.

GRADUATED CHARGES: The applicable graduated one-time charge will be based on the processor group of the designated machine on which the licensed program is licensed for use. The charge for processor group upgrades will be the difference in the current charges between the two groups. Licenses for which the customer has paid a graduated one-time charge may be redesignated to a processor in the same processor group or a lower processor group. There will be no adjustment or refund for processor group downgrades.

LICENSED OPTIONAL PROGRAM MATERIALS CHARGE: Selected optional program materials are available for a separate one-time charge.

December 7, 1987

In the Description section, information regarding Common Programming Interface for Communications (CPI Communications) has been added under the heading of Enhanced Connectivity, and included as an additional routine under Callable Services Library and an additional service under Systems Application Architecture.