

VIRTUAL MACHINE/SYSTEM PRODUCT VM/SP (5664-167)

PURPOSE

The VM/System Product provides usability and performance extensions to VM/370; it is recommended for users running DOS/VSE, VSE, VS1, SVS and MVS under VM/370 on processors supported by those SCPs, or users with high-speed paging devices, and CMS intensive users. The VM/System Product is designed to run on S/370 mdls 135, 135-3, 138, 145, 145-3, 155 II, 158, 158-3, 158AP, 158MP, 165 II, 168, 168-3, 168AP, 168MP and on 4321, 4331, 4331 Model Group 2, 4341, 4341 Model Group 2, 3031, 3031AP, 3032, 3033 Model Group N, 3033, 3033S, 3033AP, 3033AP-2, 3033MP, and the 2K storage protect key version of the 3081 D16 Processor Complex in S/370 mode.

Note: Information on the availability of the VM/SP High Performance Option Licensed Program (5664-173) for VM/SP Release 3 will be available prior to the availability of VM/SP Release 3.

SQL/DS on VM/SP Release 3 will be supported on AP/MP, the 3081-D16 Processor, and the VM/SP High Performance Option concurrent with the above stated availability.

The VM/System Product Release 3 contains all the function previously available in the VM/370 Release 6 SCP, its priced extensions program products (VM/BSE and VM/SE), VM/SP Release 1, and VM/SP Release 2. Refer to the appropriate pages for an overview of the functions provided in each of these products.

DESCRIPTION

Multiprocessor Support: The VM/System Product will offer to users of VM/370 the reliability and availability characteristics of a full multiprocessor environment. The VM/SP will support the 158MP, 168MP and 3033MP configurations with up to 16 channels per processor and a maximum of 32 channels per MP configuration.

3042 Attached Processor Model 2 Support: The VM/System Product, when generated in multiprocessor mode, will support I/O on both sides of a 3033 Attached Processor complex when the complex includes a 3042 Attached Processor mdl 2.

The 3042 mdl 2 offers a standard group of 6 channels, and an optional feature adds another group of 6, for configurations of 18, 22, 24 or 28 channels in a 3033 Attached Processor complex.

3081 Processor in MP Mode: When the 3081 is structured so that a channel set is available to each of the two integral central processors, the multiprocessor mode of VM/SP should be specified. This permits up to 16 channels per central processor and up to an aggregate capability of 24 channels. The 3081 Processor may be structured to limit a single channel set to one of the two central processors inherent in 3081 (AP mode).

Note: VM/SP does not simulate multi-processing for virtual machines other than under Single Processor Mode. A virtual machine will be dispatched by VM/SP on only one of the two processors in an MP configuration unless the Single Processor Mode of the VM/SP is in effect.

Enhanced Attached Processor Support: Several significant enhancements to the VM/370 AP environment are available in the VM/System Product, notably:

- Improved locking logic that may result in a reduction in contention on the global system lock.
- Extended channel error recovery.

In addition, for both the AP and MP environments, several CP commands have been improved to extend the system status and processor activity data available to the system operator.

Improvements in Resource Management

Throughput Improvements: May be achieved in the following environments:

- Systems with real storage bottlenecks.

When a real storage bottleneck is indicated, the resource manager may reduce the effect and increase the level of multiprogramming. This is achieved through the use of improved scheduling and paging algorithms, which give rise to smaller working set size estimates and higher page steal ratios. The net result is that a given real storage size appears more able to contain the given load with improved throughput.

The resource manager also migrates swap tables of interactive users and frees up real storage for other purposes. This may increase the level of multiprogramming and improve throughput.

- Storage bound systems with long running non-interactive users and high multiprogramming levels.

Such systems devote a large part of their paging activity to swapping the long running users in and out of storage as each is given a timeslice. The resource manager reduces this paging overhead by swapping the longest running users into real storage

less frequently but keeping them there for longer periods. This may lower the overall level of paging activity with accompanying reduction in supervisor overhead and some increased throughput.

- Systems that need more paging space than is available on preferred paging devices.

The resource manager maintains active user pages on the high speed or primary paging devices using a page migration scheme. Page wait due to slow access times of secondary devices is reduced and improved processor utilization and throughput may result.

Improved Response to Trivial Interactions: May be achieved in the following environments:

- Where terminal interactions occur for both single trivial commands and nontrivial transactions during terminal I/O.

The resource manager distinguishes between the two types of transactions by tracking the resource consumption rate and giving higher priority to the smallest consumer.

- Where transactions are characterized by a wide range of resource requirements.

The fair share algorithms of the resource manager, which are effective in both compute-bound and paging-bound environments, distinguish between the different resource requirements of the users. Consequently, a better interactive/non-interactive split is achieved with improved responsiveness to trivial transactions.

Improved Installation Management: Over the services provided in the following environments:

- Where multiple users require a specific percentage of the processor.

The SET FAVOR command with percentage option may now be specified for more than one user.

- Where CMS batch facilities run non-interactively.

Directory priority controls may now be utilized to make CMS batch facilities either fully non-interactive to minimize impact on the system, or fully interactive to encourage its use.

CP Performance Improvements

The storage management algorithm for returning free storage to the dynamic area was modified. A check is made every hour and also upon a user logging off, to determine if any dynamic area pages obtained for free storage purposes can be returned to the dynamic area.

The set favored command accepts a percentage specification of 100. This specification is handled as a special case by the scheduler where the designated user will be kept at the top of the run list.

CMS disk I/O (Diagnose 18) takes advantage of ECPS:VM/370 for CCW translation. The improvement is available with the existing ECPS:VM/370 assist on the 3135-3, 3138, 3145-3 and 3148 Processors. The improvement is also available with the ECPS:VM/370 assist on the 4341 Processor.

Addition to ECPS: ECPS for VM/370 on S/370 mdls 135-3, 138, 145-3 and 148, and on the 4321, 4331 and 4341 processors has been enhanced to accelerate the processing of the DIAGNOSE Interface between a virtual machine and CP. Because CMS is a heavy user of DIAGNOSE, the CMS user may receive improved performance.

Operation of VM/SP on a 4321 processor is recommended in a VM/CMS-only environment.

Small CP Option: Small CP option reduces real memory requirements for CP which makes more pageable storage available to virtual machines.

Shadow Page and Segment Table Maintenance: VM/SP reduces overhead associated with maintaining shadow tables used to run virtual systems.

Multiple shadow tables will be maintained to reduce the overhead associated with building shadow tables when a different address space within a virtual machine is dispatched.

Shadow table entries will be selectively invalidated when VM/SP (extended by the VM/SP) steals a page from a virtual machine.

Shadow tables can be eliminated for V=R users running a production system.

Shadow table maintenance will be reduced for areas in a virtual system where the virtual address is equal to the real address.

Extended Support: VM/SP will support operating systems that utilize the S/370 Extended Facility of the 3031, 3032, 3033 and 3081 Processors, and the S/370 Extended Feature of the S/370 mdls 158 and 168, provided the S/370 Extended Feature is installed on the hardware. Thus, MVS/Systems Extensions and MVS/System Product can be run under the VM/System Product on these processors.

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MVS Guest Environment: Release 1 of the MVS/System Product (JES2, program number 5740-XY5, and JES3, program number 5740-XYN) will be supported as guest operating systems under the VM/System Product.

The cross-memory services of Release 2 of the MVS/System Product (JES2 and JES3) will be supported in the guest operating system environment under the level of VM/System Product which is most current at the time of availability, or Release 2 of MVS/System Product. However, cross-memory services will use the hardware microcode implementation of the 3033 Extension Feature (Feature #6850) only when executing under VM/SP High Performance Option (5664-173).

RELEASE 3 ENHANCEMENTS

- **SQL/DS Support**
SQL/DS is a Relational data base Licensed Program (5748-XXJ). CP and CMS enhancements have been included to allow SQL/DS Release 2 to operate on VM/SP Release 3 without a guest VSE operating system and without VSE/VSAM. These extensions have been provided in a generalized fashion so that other applications may take advantage of them. The CP/CMS Extensions for Application Programs sections below describe this support.
- **System Product Interpreter**
The System Product Interpreter is a new command and macro processor. It can be used for interpreted applications, command processing and generation, for macros such as those used by the System Product Editor, as a desk calculator, mathematical problem solver, or for any other purpose for which an interpreted simple-to-use language is suitable. Syntax is in a high level form which is easy to learn.
- **Highlights of the System Product Interpreter include:**
 - Extended Control Structure:
 - If-Then-Else
 - Select-When-Otherwise-End
 - Do-Interactive-End
 - Iterate and Leave
 - Full set of arithmetic, character, and logical operators
 - Selection of Standard functions
 - Free Format, Mixed Case
 - Interactive Debug
 - In line Function and Subroutine calls
 - Decimal and Scientific arithmetic capability
 - Built-in string parsing instructions
- **The System Product Interpreter will be the primary interpretive command and macro processor for VM/SP in the future. It is intended that all future enhancements will be applied to the System Product Interpreter. EXEC and EXEC2 will remain supported and will coexist with the more powerful System Product Interpreter.**
- **Programmable Operator Enhancements**
Several enhancements to the Programmable Operator Facility have been added. Among them are:
 - Message routing with nicknames - allow messages to be routed to other than the logical operator or to multiple operators via CMS "TELL". This enhances the ability to have SPOOL and/or TAPE operators at the remote site in addition to a system operator at the host.

- Remote Node Availability - ability for periodic signaling between a host and remote system and alerting the host operator of the inability to communicate with a remote system. Improved availability is also provided with the capability to recover from Programmable Operator Facility ABENDS.
- Enhanced text comparison - allows multiple text comparison strings in a routing table entry with logical operations on the strings.
- EXEC Action Routines - ability for action routines to be written in all EXEC languages supported by CMS, including the new System Product Interpreter.
- LOG recording and error handling enhancements.
- **Enhanced Serviceability**
 - Symptom Records - A new record will be created that will assist in problem identification. Information from this record can be useful in communicating problems to the IBM support center. The VM Interactive Problem Control Program System Extension (VM IPCS/E 5748-SA1) Release 2 at the then current service level is required to implement this enhancement.
 - S/370 Program Event Recording (PER) support - This enhancement provides CP command support to facilitate debugging in a virtual machine. It uses the S/370 hardware program event recording (PER) feature to monitor successful branches, instructions fetched within an address range, alteration of storage within an address range, and alteration of a specific general purpose register. In addition, the support provides the ability to trace within multiple ranges, compare altered storage and registers to specific values and execute CP commands on specific events.
- **CP Extensions for Application Programs**
Several extensions to CP have been made to support Application programs:
 - A DASD Block I/O System Service allowing a virtual machine fast, device independent asynchronous access to fixed size blocks on CMS formatted virtual DASD I/O devices.
 - Inter-User Communication Vehicle (IUCV) extensions to provide:
 1. Fast communications through data specification in the parameter list and related protocol extensions.
 2. Extended mask capability for individual IUCV control interrupts
 3. Expanded trace capability
 4. Support for the DASD Block I/O System Service
 - Diagnose Zero support of time zone differential from Greenwich Mean Time
- **CMS Extensions for Application Programs**
A number of enhancements to CMS have been included to support applications written to run on CMS:
 - CMS File System Extensions - The CMS File System Extensions include:
 - 512-byte length physical DASD blocks - A new block size of 512 bytes is supported and is available through a new option on the CMS FORMAT command.
 - DASD Block I/O Support - New and extended CMS commands and functions are provided to initialize CMS disks for use with the CP DASD Block I/O system service.
 - CMS IUCV Support
Support for IUCV communication has been introduced into CMS. This support will allow multiple programs within a virtual machine to use IUCV functions. Included is the ability to initialize a CMS machine for IUCV communication and to invoke IUCV functions via new CMS macros. These macros will also allow the user to specify path-specific exits for IUCV external interrupts. CMS IUCV support can be used to access a CP DASD Block I/O system service.
 - CMS Wait on ECB - The ability to wait on an ECB or a list of ECBs will be supported via a new CMS macro. This macro will provide the capability to wait on OS and VSE format ECBs.
 - CMS ABEND Exit - A general CMS abnormal exit capability will be provided so that user programs may specify the address of a routine to get control before CMS ABEND recovery begins. An exit is established and cleared through a new CMS macro.
 - RDTERM Direct - A new option on the RDTERM macro will allow a program to read an input line directly from the console. Lines already stacked in the program or console stack will not read. This function will enable a program to prompt a terminal user for a response without disturbing the contents of the program or console stack.
 - Immediate Command Extensions - The immediate command capability of CMS will be extended by allowing users to define

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their own immediate commands.

- **Enhanced VSAM Support**
Programs being written for execution on CMS will now have the following defined VSAM interface to use:
 - VSE/VSAM Release 3 Support - CMS will support VSE/VSAM Release 3 which includes significant enhancements designed to improve catalog reliability and integrity while providing additional serviceability and usability. VSE/VSAM Release 2 is not supported.
 - Assembler Language VSAM Support - An Assembler Language interface to VSAM will be provided and supported. Most OS/VSAM and VSE/VSAM macros are supported. OS/VSAM requests are mapped to VSE/VSAM requests and executed using VSE/VSAM code.
 - VSAM Macro Distribution Enhancements - OS/VSAM macros will be provided for use in a new CMS macro library. A utility will be provided to install VSE/VSAM macros to a CMS macro library.
- **New and Improved System Product Editor (XEDIT) Functions**
Enhancements to the System Product Editor (XEDIT) to provide new or improved support in the following areas:
 - Prefix macro support
 - Selective line editing
 - Screen Control
 - Additional SET RESERVED capabilities
 - Extended data stream (color)
 - Vertical screen split
 - Several new functions intended to provide additional data manipulating capabilities
 - Modifications to miscellaneous existing XEDIT functions to improve flexibility and/or consistency between related subcommands

XEDIT provides all of the major capabilities available in EDIT. It is IBM's intent to provide all future VM/SP editing enhancements to XEDIT. XEDIT has attempted to provide the most useful capabilities available in various editors. A compatibility function for Display Editing System 5796-PJP (EDGAR) was provided in VM/System Product Release 1 to assist EDGAR users in the transition to XEDIT. Its primary purpose was for migration only.

A subset of the EDGAR functions was provided to aid in migration. Not all EDGAR commands or functions are supported in the same manner as in EDGAR. There will not be any changes or enhancements to this migration support. It is recommended that all those using this migration support should complete the migration to XEDIT when VM/SP Release 3 is installed. New XEDIT users should not use the EDGAR migration functions.

- **Publications Enhancements**
New publications to be added to the Library:
 - *VM/SP Installation Guide* - This manual provides procedural and reference information pertaining to the VM/SP install process.
 - *VM/SP Release 3 Guide* - Intended primarily for current users, this manual provides a summary of the Release 3 enhancements to VM/SP, including use-oriented examples and identification of changed modules.
 - *VM/SP System Product Interpreter User's Guide* - A step-by-step guide to using the System Product Interpreter for new users.
 - *VM/SP System Product Interpreter Reference* - A complete compilation of reference information for using the System Product Interpreter.
 - *VM/SP System Product Interpreter Reference Summary* - This publication provides quick synoptic reference information about System Product Interpreter statements and their use.

These publications will become available when the product becomes available.

Additionally, two previously announced functions will be available in VM/SP Release 3. They are:

The Missing Interrupt support announced July 6, 1982. This function will monitor system I/O activity for interrupts not completing within a certain time period and attempt to correct the condition. See Programming Announcement 282-116 for additional information.

Support for the Speed Matching Buffer for the IBM 3375 announced July 30, 1982. This support provides the capability to use the hardware when connected to a 1.5 megabyte channel. This includes paging, spooling, and/or mini disks.

RELEASE 2 ENHANCEMENTS

- **Programmable Operator Support**
The Programmable Operator facility can be used in a VM/SP system to reduce or eliminate system operator messages. This facility provides the capability to log messages, suppress messages, redirect messages, execute commands, and pre-program message responses, all under the control of an editable message routing table in a CMS file.

The Programmable Operator facility can be used by a stand-alone VM/SP system or can allow the operation of a remote VM/SP system to be controlled by an operator at a host VM/SP system. Remote operation of a VM/SP system requires Release 2 or Release 3 of the RSCS Networking program product on both VM/SP systems. Installation of the RSCS Networking Release 3 program product will provide enhanced display utilization.
- **New CMS End-user Functions**
Numerous end-user functions are being provided to assist the non-professional user as well as the professional user in utilizing the system. These functions are provided to enhance the system usability and to improve user productivity. These functions provide:
 - The new VM/SP SENDFILE and RECEIVE commands may be used in conjunction with the TSO/E Interactive Data Transmission Facility TRANSMIT and RECEIVE commands to exchange files between VM/SP Release 2 and MVS/TSO systems connected through an NJE/NJI network.
 - Enhanced full screen capability to display information about Reader Spool files. Allows the ability to review/browse through files, to discard files, or initiate other actions such as copy, or forward the file to other media/users.
 - A full screen capability to display file information (information presented is similar to what LISTFILE provides today) and issue CMS commands that perform some type(s) of action on the file(s) being displayed. Program function keys are also assigned to useful functions like EDIT, SORT or HELP.
 - Enhanced command capability such as:
 - a. Header Option on Print.
 - b. DISK LOAD extended to allow sequence identification and the ability to load a file and retain its original date/time.
 - c. Ability to specify '=' for any file identifier in the fileid2 operand of the COMPARE command.
 - d. LISTFILE enhanced to allow 'STACK', 'ARGS', 'BLOCK', 'TRACE', 'FIFO', 'LIFO' and extended pattern matching options.
 - e. UPDATE extended to keep a record of missing PTF files.
 - f. A new command to display environmental status such as userid, nodeid, date, time, zone.
- **New CMS Productivity Aids for the DP Professional**
CMS has been enhanced to provide the DP professional user with several productivity enhancements to make their system implementation easier. These productivity enhancements provide:
 - A CMS facility to allow I/O between a device and an EXEC program.
 - The ability to dynamically extend the CMS nucleus.
 - A routine to display at the console or stack virtual reader file characteristics.
 - An enhanced CMS QUERY command to display CMSLEVEL information such as product name, release identification, service level and information regarding virtual disks that are accessed. In addition, QUERY command results can be stacked.
 - A GLOBALV command which allows a user to maintain a collection of named values whose lifetime is either within a single IPL, within a session or across sessions.
 - The ability to specify that portions of a line should be displayed, highlighted, protected, and/or masked using the VM/SP editor.
 - The ability to directly access EXEC 2 variables. Variables may then be inspected and/or set from a program.
- **DIAL Command support for remote BSC 3270 users.**
This support provides the ability for remote BSC 3270 users to issue the DIAL command. The remote 3270 will appear to be a locally attached terminal to the dialed virtual machine.

In addition, this support removes the previous restriction of 16 remote communication lines. The maximum number of remote communication lines is now 256.

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- **CMS Nucleus Restructured.**
The CMS nucleus has been restructure to provide a CMS system which is more flexible and extendible for development, serviceability and maintenance purposes.
- **CMS Tokenization.**
The eight-byte tokenization restriction has been eliminated for parameter passing.
- **Starter System Full Screen Support.**
The ability to operate the new CMS editor in full screen mode has been extended to the VM/SP Starter System running second-level. Previously, the new CMS editor would only run in single line mode.
- **HELP Files.**
The HELP files can now be placed on disks other than the S-DISK.
- **CMS/DOS Upgrade.**
CMS/DOS support has been upgraded to VSE/Advanced Functions Release 3 and VSE/VSAM Release 2 including support for the 3375 DASD .
- **Command Retrieve Capability.**
The CP SET Program Function command is enhanced to include the option "RETRIEVE". When specified, the system will save input lines. When the specified program function key is pressed, the saved input lines are redisplayed in the reverse sequence of entry. The number of saved lines depends upon buffer size and input line length.
- **QUERY Command Enhanced.**
The QUERY command is enhanced to allow the user to specify the operands "USERID" or "CPLEVEL". The Query USERID command responds with the userid and with the system identifier of the system that the user is logged on to.

The query CPLEVEL provides information relative to the software product's name (e.g., VM/SP), release number, service level number, Nucleus Creation Date and time, along with the IPL date and time.

- **Enhanced ASCII Support.**
ASCII support has been enhanced to support the 3101 user with the following:
 - Screen Management - Contolled scrolling of output.
 - Prompting - Linefeed prompting can be selected to allow data to be entered starting in column 1.
 - Read operations can be command-chained to write operations.
 - Linesize Control option has been added.
- **Enhanced 3800 Support.**
This enhancement allows the RSCS Networking Release 3 program product to pass to CP the 3800 attributes defined in an NJI header created by a system using the NJI protocol. This will also allow files created in these systems to print properly on a 3800 controlled by VM/SP Release 2. Copy group and burst attributes remain unsupported.
- **Support for IBM 3375 DASD.**
VM/SP Release 2 will support the 3375 Direct Access Storage Device with the 3800 Storage Control Models 1 or 2.
The new DASD will be supported as a paging, spooling, system residence, T-disk, mini-disk and as a dedicated device to a virtual machine operating system that supports the 3375 DASD.
- **Support for the new Speed-Matching Buffer (Feature #6550).**
The 3880 Speed-Matching Buffer Feature support allows attachment of the new high speed 3380 DASD to processors with channel speeds slower than those normally required by the new devices. Refer to Announcement Letter 280-61 for details regarding the hardware support.
VM/SP support for the Speed-Matching Buffer is provided for use of CMS, via Diagnose 18, as well as by the CP component of the operating system.
- **Trace Table Recording Facility.**
A new serviceability enhancement is provided to record a history of system operations on spool. This facility is controlled by a new Class C command. Selective recording of CP trace entries by type, VMBLOK address, interrupt code and device type is provided. In addition, user generated information from a virtual machine and CP information can be included.
A utility program is also provided. This utility provides the user with the capability to print the collected information or display it on a terminal.

As a customer convenience, the Class 2 SCP Stand-alone Device Support Facility is being shipped in conjunction with VM/System Product. Device Support Facility is a utility used to initialize DASD

volumes or mini disks and performs data analysis and recovery either stand-alone or in a virtual machine under VM/SP.

RELEASE 1 ENHANCEMENTS

Dynamic SCP Transition To and From Native Mode: An installation can have the ability to run another SCP in native mode on the same system used for running VM/SP with a minimum of disruption to the system's operation; it is possible to switch from VM/SP to another SCP, run that SCP in native mode and then switch back to VM/SP without IPLing the system. The guest SCP must run in a V=R area. It can be MVS, SVS or VS1 in non-handshaking mode.

When the transition is made to native mode, the OS/VS SCP is operating without VM/SP. The performance of the OS/VS system will be equivalent to that OS/VS system running native with the same amount of storage and the same I/O configuration it was using in the VM/SP V=R area. When the installation again requires VM/SP services, the operator returns control to VM/SP and the installation again has all the advantages that result from using VM/SP.

This gives an installation operational flexibility that it did not have before. It is possible to run both VM/SP and OS/VS in native mode on the same system, without the disruption of an IPL when a switch is made between VM/SP and OS/VS. This capability is particularly valuable when running an application that cannot be shut down, such as DB/DC.

Note: This function is not supported for MVS on the 4321, 4331 or the 4341 processors.

Single Processor Mode: It is possible to run VM/SP in Single Processor Mode (SPM). SPM will allow an installation to restrict VM/SP to a single processor of an AP or MP system, leaving the other processor for the exclusive use of a virtual machine running MVS. In SPM, MVS must be IPLed in a V=R area. MVS will then initialize the other processor and run in AP or MP mode.

IPL Command Enhancement: This enhancement allows a user to activate an OS/VS1 system without any operator intervention. It is similar to the capability provided by the DOS/VSE Automatic System Initialization (ASI) Facility.

Virtual Machine Storage Preservation: In VM/SP, during a warm start or an abnormal termination by VM/SP, the virtual storage of specified virtual machines will be preserved. Specifically, virtual machine IPL was changed so that it no longer uses a page of the user's virtual storage, and the V=R area under VM/SP will be preserved during warm start. In addition, specific virtual machines can be identified such that at VM/SP abend, or when that virtual machine is abnormally terminated by VM/SP, the registers and main storage for that virtual machine will be saved.

The improved integrity of virtual storage is particularly beneficial to IMS/VS users running in a virtual machine who need to have storage preserved so that they can run a stand-alone program to recover IMS/VS Log Buffers. In addition, stand-alone dumps that are IPL'd from an external storage device will now accurately reflect the user's virtual storage, because VM/SP will no longer use a page of that storage.

Single Console Image Facility: This support enables the operator of a virtual machine to control multiple virtual machines from one physical terminal. Availability is improved in cases where there is a console failure because control can be automatically passed to the virtual console of another user. This capability is available for use by any guest machine.

Functions that enhance the reliability, availability and serviceability characteristics of the VM/SP system include:

- An enhancement that will detect missing I/O interrupts and notify a system operator of the problem.
- Enhancements to allow an installation to dynamically allocate space for a dump after an IPL and to reserve sufficient contiguous DASD space for one or more system dumps.
- Expansion of the checkpoint limit for spool files from the current limit of 2,048 to a new limit of 9,900, the maximum allowable number of spool files in the system.

New functions that enhance the integrity and security of the VM/SP system include:

- A system option that will automatically clear allocated T-Disk DASD space and prevent access to residual data.
- A function to prevent the system operator from being automatically logged on during an automatic system restart if the operator was not logged on the primary system console when the system ABEND occurred.
- An enhancement to the SPTAPE command to support the DUMP and LOAD functions for CP DUMP reader files.

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Full Screen Console Support Via SIO Interface: Full screen console support will enable a guest machine (for example, VSE DOC or OS/VS DDOCS) and CP to share a locally-attached display terminal controlled by CP. The guest machine can use a display terminal as a graphics device in full screen mode while CP shares the terminal and uses it as a line device. A Start I/O (SIO) instruction is the interface for this support. A guest machine can use either the existing DIAGNOSE interface or the SIO interface, but not both simultaneously.

Systems Network Architecture (SNA) Support: Full VM/370 operator console capabilities are provided to the SNA terminal users. These console functions include full CP/CMS command processing capabilities, CMS editor processing mode and full screen support for 3270 display terminal devices. This support requires that the Virtual Machine/VTAM Communications Network Application (VM/VCNA) program product and its prerequisites be installed.

Inter-User Communication Capability: The inter-user communication vehicle (IUCV) facilitates the transfer of messages among virtual machines and between a virtual machine and CP.

- All IUCV interfaces are provided to the user at a macro level.
- A user can selectively establish and terminate communications paths.
- Two users can establish multiple paths between themselves.
- A virtual machine can receive messages and reply either synchronously without an interrupt or asynchronously via an external interrupt.
- An installation can restrict the number of messages outstanding on each communication path.
- A receiver can selectively reject messages.
- IUCV coexists with VMCF and provides extended inter-user communication capabilities.

CP Spooling Enhancements

- Association of a form number with each spool file and spool device. Features of form number support are:
 - An eight character alphanumeric form number.
 - Optional automatic prompting of the spool operator for forms changes.
 - Optional "setup mode" to allow the spool operator to align forms.
 - Ability to order, change, purge, transfer, spool-to-tape and query spool files by form number.
 - Default form numbers that are installation specified.
 - Optional installation specified translation from user form numbers to operator form numbers.
- Ability to transfer spool files between the reader and printer queues, or the reader and punch queues.
- Capturing of the Load FCB, Fold and Unfold CCWs in a virtual printer spool file, and their subsequent execution on the real printer.
- Ability to select spool files for the QUERY command based on their hold status.
- An enhanced header page and a new trailer page for printed output. A file sequence number helps the spool operator distribute output correctly.
- Additional spool operator information:
 - A "waiting" message when a real spool device finishes work.
 - Ability to display the number of records left to print or punch in the currently active spool file.
 - Display of the distribution code and the new file sequence number for each file printed or punched.
- Ability for the installation to specify classification titles for selected spool file classes. The title will be printed on the separator page, and optionally on each page of output.
- Ability to specify the distribution code on SPOOL command.
- Increase in the allowable copy count to 255.

Spool Files to Tape: This support provides Class D commands which enable the spooling operator to store to tape, or retrieve from tape, those unit record output files which he or she wishes to schedule for real output at some later time on the VM/SP system. The restored files will retain the same characteristics as the original files, but will be assigned new spool-ids to avoid duplicate identification within the spooling system. The spooling operator can store or retrieve spool files selectively (by class or spool-id) or completely. An option is provided to allow the operator to scan the tape.

Spooling of Accounting Records: This support provides the installation with the ability to spool accounting data to a designated virtual machine with a designated class. The data can be spooled to provide punched output or spooled to a virtual machine's reader for additional processing. This eliminates the need to have a real card punch online at all times to get accounting records.

CMS File System Enhancements: The file system enhancements will provide the user with a more efficient and flexible file system. Specifically, the enhancements are:

- Removal of the limitations on the size of CMS disks and the number of files per CMS disk.
- Support for physical block sizes of 800, 1024, 2048 and 4096 bytes.
- Efficient handling of variable length files.
- Selective directory updating.
- Fixed Block Mode (FBM) device type support.
- Concurrent open for read and write of CMS files.
- CMS access to one system disk and up to 25 minidisks concurrently.

Interactive Help Facility Under CMS: The help facility is an informational, online display service available at the CMS terminal to guide the user in using CP and CMS commands and reacting to CP and CMS messages. As a result, the user can, in most cases, avoid referencing manuals during CMS sessions.

With the enhanced HELP Facility of VM/SP, the user will be able to issue CMS (including editor) and CP commands directly from the screen on which a HELP file is displayed. Because HELP files will be viewed via the new CMS editor, scrolling and locate facilities will be improved.

The New CMS EXEC Interpreter: VM/SP CMS will provide the user with more advanced EXEC processing capabilities and improved performance. The new EXEC interpreter:

- Accepts words of up to 255 characters each.
- Allows commands to be issued either to CMS or to specified subcommand environments; for example, to an editor.
- Provides new string manipulation functions.
- Provides arithmetic functions for multiplication and division.
- Provides debugging facilities.
- Supports user-defined functions and subroutines.
- Improves execution time.
- Coexists with the current CMS EXEC interpreter.

The New CMS Editor: The new CMS editor provides:

- Full screen support for 3270 display stations, including: multiple views of the same file or of different files, selective column viewing and automatic wrapping of lines larger than the screen.
- Ability to extend and tailor editor commands with a powerful macro mechanism which uses the new CMS EXEC interpreter.
- Extended string search facilities to improve text processing.
- Enhanced functions to handle program development including automatic update generation.
- Ability to define the screen format according to individual preferences.
- Data import and export facilities.
- Coexistence with the CMS editor.
- 3278-5 and 3279 terminal support.

CMS OS Loader Capability: The CMS OS Loader will enable OS relocatable load modules to be used under CMS. The load modules may be loaded from an OS partitioned data set or a CMS load library. This support also provides a facility to list, copy or compress members of a CMS load library and to merge CMS load libraries.

This support further allows use of the OS/VS Linkage Editor to create a CMS LOADLIB or a LOADLIB member. This is accomplished using the existing LKED command. The supported Linkage Editor options are defined in the *CMS Command and Macro Reference* (SC19-6209).

CMS Use of CP Page Management Interfaces: CMS now takes advantage of the existing page control interfaces to better communicate the true working set of pages to CP, thus better utilizing the page frame resources of the real machine.

CMS Tape Command Performance Improvement: To decrease overhead, a large block-size (4K) is supported for tape dump.

CMS Support of Labeled Tapes: CMS processes labeled tapes as follows:

VM/SP (cont'd)

- VOL 1 Labels
 - Processed by DOS or OS OPEN simulation routines.
 - Processed by CMS TAPPDS or TAPEMAC commands.
 - Displayed or written by CMS TAPE command.
 - HDR Labels
 - Processed by DOS or OS OPEN simulation routines; exits are provided to allow access to user-written routines to process standard user (UHL) labels.
 - Processed by CMS TAPPDS or TAPEMAC commands.
 - Processed by a CMS macro designed for use in assembly language programs in conjunction with other CMS tape macros.
 - EOF/EOV Labels
 - Processed by DOS or OS CLOSE simulation routines; exits are provided to allow access to user-written routines to process standard user (UTL) labels.
 - Processed by a CMS macro designed for use in assembly language programs in conjunction with other CMS tape macros.
 - Non-Standard Labels
 - User exits are provided in DOS or OS OPEN and CLOSE simulation routines and in TAPPDS or TAPEMAC commands to allow access to user-written routines to process non-standard labels.
- Note: The following are supported:
- Label processing for tapes which are read backwards.
 - Multi-volume files.
 - ASCII labels.

CMS Support of Unlabeled Tapes: CMS will process unlabeled tapes.

Enhanced Support for the 3270 Information Display System Which Includes:

APL Text Feature: The 3270 APL-TEXT feature provides the 3270 user with access to the full APL, TEXT and EBCDIC character sets. This makes it possible for the user to interact with the VS APL program product as well as text processing applications which run under CMS. This support extends the APL-TEXT function to users with 3274 Controllers/3278 Display Stations.

Intensified Display: VM/System Product takes advantage of the intensified display feature of the 3270 Information Display System as follows:

- The "Current Line" of the CMS Editor will be intensified.
- All CMS Edit messages will be intensified.
- An application program may supply a 3270 Start Field order and an attribute byte in a DIAGNOSE 58, CCW Code 19 (Virtual Console Interface) data stream. This provides an application program with the ability to define a field as normal intensity, intensified or non-display.
- Messages from the system operator or other users will be intensified.
- The re-display of user input is intensified so that it may be distinguished from output. The SET command will activate or deactivate intensification of input re-display.

Support for the Enhanced Display Terminals: The following terminals and associated printers are supported:

- 2250 mdl 3 Display Unit
- 2840 Display Control mdl 2
- 3250 Graphics Display System
- 3251 Display Station
- 3255 Display Control Unit
- 3258 Channel Control Unit
- 3262 Printer mdls 3 and 13
- 3274 Control Unit mdl 1B, 21B (3272 compatible)
- 3274 Control Unit mdl 1C, 21C, 31C, 51C (TP - BSC only)
- 3274 Control Unit mdl 1D, 21D, 31D (3272 compatible)
- 3276 Control Unit/Display Station mdl 2 (1920 character screen)
- 3276 Control Unit/Display Station mdl 3 (2560 character screen)
- 3276 Control Unit/Display Station mdl 4 (3440 character screen)
- 3278 Display Station mdl 2 (1920 character screen)
- 3278 Display Station mdl 3 (2560 character screen)
- 3278 Display Station mdl 4 (3440 character screen)
- 3278 Display Station mdl 5 (3564 character screen)
- 3279 Display Station (Multi-color display screen)
- 3268/3287/3289 Printer (Copy command support only)

This includes support for the 96-character set (94 characters plus space and null), and PF keys 13 through 24.

The VM/SP support for the 3279 provides a new data stream for communicating between the device and the host, multiple colors for data display, programmable symbol-set capability and extended highlighting attributes; extended highlight functions are character underscore, reverse video and blinking character. These attributes can be set and reset for the different areas of the display screen. VM/SP support for color enables the user to select colors for CP messages, virtual machine output, redisplay of user input, user input area and the CP status area.

Support for the 3880 Storage Control Models 1, 2 and 3

Support for the 3800 Printing Subsystem as a Virtual Spooling Device: The VM/SP will allow extended use of the font, image and copy capabilities of the 3800 Printing Subsystem. A user is able to print a file on a real 3800 or on any real spooling device supported by CP Spooling running in conjunction with the VM/SP.

Dedication of Remote 328X Printers: Remote bisynchronous 328X printers can now be dedicated to guest machines. This support further allows the Remote Spooling Communication Subsystem (RSCS) program product to spool and print VM/370 files on the 328X printers. (For further information, see the RSCS documentation.)

Support for the 3289 Printer Model 4: The 3289 mdl 4 is a 400 line-per-minute printer, functionally compatible with the 3203 Printer mdl 4 except in the area of UCS buffer load.

Support for the 3262 Printer Models 1 and 11: The 3262 mdls 1 and 11 are, respectively, 650 and 325 line-per minute printers.

Support for the 3262 Printer Model 5: The 3262 mdl 5 is a channel-attached 650 lines-per-minute printer functionally compatible with the 3262 mdl 1.

Support for the 8809 Tape: The 8809 is a two-speed tape drive (12.5 ips and 100 ips). It is supported at 12.5 ips in VM/370. The stand-alone dump-restore utility (DDR) supports the device at 100 ips to provide high-speed backup capability when executing on a stand-alone processor and 3310/3370 DASD.

Support for the 3310/3370 Direct Access Devices: The 3310/3370 are direct access devices that use Fixed Block Architecture. The Direct Access Storage Compatibility Feature (#7901) of the 4331 Processor for emulation of 2314, 3330 or 3340 format data on the 3310 or 3370 is supported. VM/SP supports 3310 or 3370 volumes containing emulated data which are dedicated to a guest operating system other than VM/SP or CMS.

3380 DASD Support: VM/SP supports the 3380 Direct Access Storage with the 3880 Storage Control mdls 2 and 3, using the Data Streaming Feature on the 3031, 3032 and 3033 Processors, or attached to a 3 MB channel on the 4341.

The 3380 DASD is supported by VM/SP as a paging, spooling, SYSRES, T-disk or mini-disk device and as a device dedicated to a virtual machine operating system that supports the 3380 DASD.

The 3380 DASD offers a new level of reliability and performance, with increased capacity for online data storage.

Note: VM/SP does not support the dynamic path selection capability of the 3380 DASD mdls AAF and A4.

Missing Interrupt Handler: System I/O activity is monitored to detect interrupts not occurring within an installation specified period of time. An attempt at corrective action is made and a message is sent to the system operator to advise of the results.

Note: Missing Interrupt Handler support for Release 2 of VM/System Product is available 4Q 1982.

CUSTOMER RESPONSIBILITIES

- Ordering and installing all of the required communications facilities.
- Generating the appropriate 3704/3705 Communications Controller programs.
- Allocating and formatting direct access storage space for the VM/SP control program, the CMS system residence area and user work areas.
- Generating and updating user directory and virtual machine descriptions.
- Making the final evaluation as to which programs should be run under VM/SP in his environment.
- Training personnel to operate the VM/SP system.
- Teaching users VM/SP commands and how to operate the remote terminals.

Note: To run SVS under the VM/System Product, PTF UY77568 must have been applied to the SVS system.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

PROGRAM PRODUCTS
VM/SP (cont'd)

VM/System Product is designed to run on IBM S/370 models 135, 135-3, 138, 145, 145-3, 148, 155 II, 158, 158-3, 158AP, 158MP, 165 II, 168, 168-3, 168AP, 168MP and on the 4321, 4331, 4331 Model Group 2, 4341, 4341 Model Group 2, 3031, 3031AP, 3032, 3033 Model Group N, 3033, 3033S, 3033AP, 3033AP-2, 3033MP and the 2K storage protect version of the 3081 Model D16 Processor Complex. Note: Support of the VM/System Product High Performance Option Licensed Program (5664-173) for VM/System Product Release 3 will be available in first quarter 1984.

VM/SP Release 3 support of AP/MP and the 3081-D16 Processors will be available in first quarter 1984. Note: The VM/SP requires as a prerequisite the application of EC #274276 (shipped in June 1980) to the 3031 uniprocessor and 3031 attached processor.

Real Storage Requirement: The VM/System Product requires a minimum user accessible storage of 512K.

Minimum machine requirements are listed for information only. Depending upon the number of terminals used, the total workload of the system, and the desired response time, all users should consider increasing real storage size as appropriate.

Display Terminal Support: The IBM 3278 mdl 5 and 3279 display terminals are supported.

Notes

1. VM/System Product supports a cardless environment. By using the facility to spool accounting records and altering the system generation procedures to use tape devices, the requirement for a card reader/punch can be eliminated. Specific details are contained in the *VM/SP Planning and System Generation Guide*.
2. Specific details relevant to the minimum configuration required for hardware maintenance should be directed to the Field Engineering Division.

ECPS: VM/370 Support

Model No.	VM/370	Availability
135-3	Level 18	EC #149136 and later
138	Level 18	EC #149136 and later
145-3	Level 18	EC #356901 and later
148	Level 18	EC #147710 and later
3031	Level 19	EC#274276 and later
3131AP	Level 19	EC#274276/388860 and later
4321	Level 19	At shipment of processor
4331MG1	Level 19	EC#364290 and later
4331MG2	Level 19	EC#364415 and later
4341MG1	Level 19	EC#154315 and later
4341MG2	Level 19	EC#856093 and later

Notes

1. The VM/System Product will execute on the 135-3, 138, 145-3 and 148 processors at earlier EC levels, but the hardware assist will not be used.
2. The 3031, 4321, 4331 and 3031AP Processors support only a subset of ECPS:VM/370 function.
3. If users running the VM/SP on S/370 mdls 135-3, 138, 145-3 or 148 with ECPS for VM/370 also choose to use the shadow table maintenance functions of the VM/SP, they will not realize the full benefit of ECPS. This is because the shadow table maintenance algorithms will be used in preference to some ECPS algorithms.
4. CMS disk I/O (Diagnose 18) has been modified to take advantage of ECPS:VM/370 for CCW translation. The improvement is available with the existing ECPS:VM/370 assist on the S/370 135-3, 138, 145-3 and 148 Processors. The improvement is also available with the ECPS:VM/370 assist on the 4341 Processor.
5. The ECPS:VM/370 and ECPS:MVS options on the 4341 Model Group 1 are mutually exclusive. The 4341 Model Group 1 Processor MVS users who have specific throughput or terminal response requirements and who plan to run the MVS/System Products in conjunction with the VM/SP should carefully review their configurations to ensure that executed performance needs are met.
6. The ECPS:VM/370 and ECPS:MVS options may be concurrently utilized on the 4341 Model Group 2 Processor, whenever ECPS:VM/370 and ECPS:MVS are both selected at IML time. With this joint selection, functions of the shadow table bypass assist defined in *Virtual Machine Assist and Shadow Table Bypass Assist* (GA22-7074) are included. These functions are designed to enhance the performance of MVS running under VM/370 in a V=R environment with the VM/System Product.

Shadow Table Bypass Support: On the 3031 and 3031 AP processors, an engineering change (EC #276271 and later) is available to improve the performance gains of the shadow table function of the VM/SP. Because system performance is dependent on a number of variables, IBM will not warrant that improvement in performance will be

realized in all cases where the VM/SP shadow table function is activated.

SOFTWARE REQUIREMENTS

VSE/VSAM Release 3 program product support and CMS/DOS services for VSE/Advanced Function Release 3 are supported by VM/SP Release 3.

COMPATIBILITY

Application programs that currently execute under the VM/Basic System Extensions program product or the VM/System Extensions program product or the VM/System Product Release 1 and are not dependent on internal CD or CMS structure and/or control blocks, should also run on the VM/System Product Release 2.

For ease of migration, the existing CMS editor continues to be supported in the VM/SP. However, the existing CMS editor dan Migration macros. If he or she desires, the user can invoke the existing CMS editor.

The new VM/SP editor includes among its enhancements some of the functions contained in the Display Editing System (DES) IUP, order number 5796-PJP. Macros are provided to aid users in migrating from DES to the new editor by providing a DES display format for command input. The Macros provide a SYGSET of the EDGAR functions. Not all functions will work exactly as EDGAR native mode.

CONVERSION

SPOOL file information has been changed in Release 3. A conversion aid will be available via the SPTAPE function to allow those users who currently have VM/SP Release 1 or Release 2 installed and do not want to perform a COLD start the ability to migrate their SPOOL files to VM/SP Release 3.

VM/SP Release 2 Programmable Operator Routing Tables must be converted to the VM/SP Release 3 routing table format. A CMS EXEC will be provided to aid in this conversion.

Other than the optional compatibility macros announced in VM/SP Release 1, and the above items, no conversion aids are required to move from VM/Basic System Extensions Release 2, VM/System Extensions Release 2, or VM/SP Releases 1 or 2 to Release 3 of VM/SP.

DOCUMENTATION

(available from Mechanicsburg)

Title	Order Number
Virtual Machine System Product:	
Introduction	GC19-6200
Glossary and Master Index	GC19-6207
Planning and System Generation Guide	SC19-6201
Operator's Guide	SC19-6202
System Programmer's Guide	SC19-6203
System Messages	SC19-6204
OLTSEP and ERROR Recording Guide	SC19-6205
Terminal User's Guide	GC19-6206
Remote Spooling Communications Subsystems (RSCS) User's Guide	GC20-1816
CMS Command and Macro Reference	SC19-6209
CMS User's Guide	SC19-6210
CP Command Reference for General User's	SC19-6211
Operating Systems in a Virtual Machine	GC19-6212
Interactive Problem Control System (IPCS) User's Guide	GC20-1823
VM/SP Quick Guide for General Users	SX20-4400
VM/SP Commands (General Users) Reference Summary	SX20-4401
VM/SP Commands (Other than General Users) Reference Summary	SX20-4402
EXEC 2 Reference	SC24-5219
System Product Editor User's Guide	SC24-5220
System Product Editor Command and Macro Reference	SC24-5221

RFQs ACCEPTED: No

TERMS and CONDITIONS See PP Index
 ZONE ***
 ZONE ***

**SYSTEM/3 DISK RPG II
5702-RG1**

PURPOSE

IBM System/3 Disk RPG II is a program product that operates under control of the System Control Programming. It is disk resident on the IBM 5444 Disk Storage Drive, and in addition to the functions provided by the Card RPG II, the Disk RPG II facilitates reading and writing disk records and updating existing disk files using card and disk input/output. A directly attached IBM 3741 Data Station is supported for input or output at compile or execution time. Disk RPG II can be used on IBM System/3 mdl 8.

DESCRIPTION

The 1442 is supported as an I/O device, and for reading RPG II source statements or data. Disk RPG II permits punching 256 characters (see GX20-1703) and packed decimal on the 1442.

The recording techniques used by all disk file organizations permit multiple records to be read or written with a single I/O instruction. Unlike previous data management techniques, System/3 disk files can be written or read using different blocking factors in different programs. This facility allows the user to process single records when a program uses a large amount of storage or to use as much core as available in processing multiple records to increase throughput.

Any of the disk data files created by System/3 object programs can be processed by any program on the System/3 which uses disk system management to access the files and has compatible disk storage.

The access methods supported are as follows:

1. Sequential
 - a) Consecutive processing - including updating in place.
 - b) Random processing - by relative record number including updating but excluding file loading.
2. Indexed
 - a) Random processing - by key.
 - b) Consecutive processing - by key including file loading.

Unlike previous indexed file organizations, the keys and data may be in a different physical sequence; i.e., the most active records may be placed in the front of the file with the index in sequence by item number.
3. Direct
 - a) Random Processing - by relative record number, including updating and file loading. The open routine on the file load clears the data area on disk.
 - b) Consecutive processing.

Standard System/3 disk labels are mandatory on all disk files. Non-standard labels cannot be used except as data records within the file.

In addition to the extensions to RPG implemented in the System/3 Card RPG II, Disk RPG II has the following language extensions:

- a) Chain Operation Code - User control of direct processing by key or relative record number through the calculation specifications. This facility can be used for chaining from one record to another record in the same file and user generation of the key or relative record number through program logic.
- b) Automatic Overlay - When a program generates too much object code for the stated machine size, the Disk RPG II Compiler will generate overlays to fit. Not all programs - even with overlays - can fit into the stated machine size. In any event, programs cannot be compiled that would exceed 64K without overlays.
- c) AND/OR - Relationships on calculation specifications.
- d) Square root operation code in calculation specifications.
- e) Display Operation Code - The ability to display messages on and accept data from the 5471 Printer-Keyboard.
- f) Spread card processing is provided for within RPG II.
- g) Output from the Disk RPG II Compiler may be loaded into the object program library or punched into cards or written on diskette for subsequent loading.
- h) Support for nonstandard (RPQ and OEM) devices is included. The user must provide a suitable I/O routine (object program) to support the nonstandard device. The remainder of the program written in RPG II will be linked with the user's I/O routine during program compilation.
- i) MOVEA operation code - provides the ability to move a field to an array or an array to a field. The move is left-justified and can begin at any element of the array. This gives the user the ability to access a field on a byte-by-byte basis.
- j) SETLL operation code—allows the user to set limits during calculations for processing indexed files within limits.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirement: For source program compilation - an IBM System/3 model 10 which includes an IBM 5410 Processing Unit mdl

A13 (12K bytes), an IBM 5424 MFCU mdl A1 or an IBM 1442 Card Read Punch mdl 6, an IBM 5203 Printer mdl 1 or an IBM 1403 Printer mdl 2 and an IBM 5444 Disk Storage Drive mdl 1.

The object program generated by the Disk RPG II Compiler supports, in addition, all capacities of the IBM 5203 and 1403 Printers, IBM 5424 MFCU, 1442 mdl 7, 3741 Data Station/Programmable Workstation directly attached, 5444 Disk Storage Drive, 5445/5448 Disk Storage (see Disk RPG II 5445 Disk Storage Drive feature), 3410/3411 Magnetic Tape Subsystem (see Disk RPG II Magnetic Tape Feature), and 5410 Processing Unit of 12K bytes and above.

For source program compilation on a model 8 - an IBM 5408 Processing Unit mdl A14 (16K bytes), an IBM 5203 Printer, an IBM 5444 Disk Storage Drive mdl A1, and either an IBM 3741 Data Station/Programmable Workstation directly attached or an IBM 5471 Printer-Keyboard.

The object program generated by the Disk RPG II Compiler on the mdl 8 supports, in addition, all the capabilities of the IBM 5203 Printer, 3741 Data Station/Programmable Work Station directly attached, 5444 Disk Storage Drives, 5448 Disk Storage (see "Disk RPG II 5445 Disk Storage Drive Feature"), 3410/3411 Magnetic Tape Subsystems (see "Disk RPG II Magnetic Tape Feature"), and 5408 Processing Unit of 16K bytes and above.

SOFTWARE REQUIREMENTS

5702-SC1. For 3741 support, 5702-SC1 feature #6066/#6067 is required.

DOCUMENTATION
(available from Mechanicsburg)

RPG II Reference Manual (SC21-7504) ... RPG II Additional Topics Programmer's Guide (GC21-7567) ... Disk Concepts and Planning Guide (GC21-7571) ... RPG II Disk File Processing Programmer's Guide (GC21-7566) ... Introduction to RPG II (GC21-7514) ... System/3 Bibliography (GC20-8080).

**DISK RPG II TELECOMMUNICATIONS FEATURE
FEATURES #6000 and #6002**

PURPOSE

This feature is applicable to IBM System/3 mdl 8. The Disk RPG II Telecommunications feature provides the user with the capability of sending or receiving binary synchronous data over voice grade or high speed*** communications lines. This support is achieved through the use of an RPG II Telecommunications Specifications Sheet, and the addition of BSCA (Binary Synchronous Communications Adapter) as a device entry on the RPG II File Description Specification. This RPG II support permits System/3 to function in one of the following communication modes:

Receive only ... Receive with conversational reply*** ... Transmit only ... Transmit with conversational reply*** ... Alternate transmit and receive file.****

DESCRIPTION

The following RPG II language features are supported for communications:

Input, Output and Combined Files ... Demand Files for Transmit and Receive ... Blocking and Deblocking of Records ... Dual I/O Areas.

These BSCA features, options, and capabilities are supported by the feature:

Manual call ... Manual answer ... Auto-call ... Auto-answer ... Medium speed ... High speed ... Station selection ... EBCDIC data transparency ... Intermediate block checking ... EBCDIC or ASCII data and data link control characters. File translation of ASCII data can be accomplished by proper use of the file translate extension of RPG II.

System/3 with a BSCA supported by the RPG II Telecommunications feature can communicate with the following systems:

- Another System/3 with BSCA, program supported by RPG II Telecommunications feature.
- A System/32 with BSCA, program-supported by RPG II.
- A System/34 equipped with a Communications Adapter, program-supported by RPG II and Assembler.
- A System/360 mdl 20 with BSCA, program-supported by BSCA IOCS.
- S/360 mdl 22 or larger, S/370
- A 2770 Data Communication System.
- A 2780 Data Transmission Terminal.
- A 3741-2 Data Station/3741-4 Programmable Workstation.
- A 5110 Computer System supported as a 3741 mdl 2 or 4.
- A 5231 mdl 2 with BSCA (#2074). Receive mode only. Supported as a 3741 mdl 2 or 4.
- A 5280 Distributed Data System
- A Series/1 - Refer to Series/1 pages for appropriate features.



PROGRAM PRODUCTS

S/3 Disk RPG II (cont'd)

- A 6670 Information Distributor (as a 2770)
- A System/7 with BSCA (#2074)

This program provides the support to use System/3 in the following telecommunications networks:

Point-to-Point switched ... Point-to-Point nonswitched ... Multipoint (as a tributary station).

System/3 with BSCA is a compatible member of the IBM BSC family of terminals. It can be intermixed with other BSC terminals (System/360 mdl 20, 1130, 1800, 5280, System/32, System/34, 2770, 2780, 3741-2, 3741-4, 3780 and 2715 mdl 2) on a multipoint line when operating as a tributary station with a central System/360 or System/370 computer* using DOS or OS BTAM. It can also share the same phone number at the central System/360 or System/370 computer* with other BSC terminals (System/360 or System/370 computers**, System/360 mdl 20, 1130, 1800, System/32, System/34, 2780, 2770, 3780, 3741-2, 3741-4 and 6670 (as a 2770), 2715 Model 2).

* System/360 mdls 22, 25 and 30 DOS, mdls 40, 50, 65, 67 (in 65 mode), and 75 with DOS and OS, and mdls 85, 91 and 195 with OS; System/370 mdls 135, 145 and 155 using DOS or OS, and mdl 165 using OS when operating in Basic Compatibility Mode.

** System/360 mdl 22 with DOS, mdls 25 and 30 with BOS/BPS or DOS/360, mdls 40, 50, 65, 67 (in 65 mode), and 75 with BOS/BPS, DOS or OS/360 and mdls 85, 91 and 195 with OS/360, System/370 mdl 135, 145 and 155 with DOS and OS, and mdl 165 with OS when operating in Basic Compatibility Mode.

*** Not supported in communication with System/32, System/34, 5280, 2770, 2780, 3741-2 or 3741-4.

**** Transmit interspersed with Receive is not supported in communication with 2770, 2780, 3741-2 or 3741-4.

† Operator Identification Card Reader feature (#5450) and the Expanded Communications/Multipoint Data Link Control feature (#1685) on 3741-2, -4 are not supported.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirement: For source compilation: same as Disk RPG II (5702-RG1).

For object program execution: Mdl 10 - an IBM 5410 Processing Unit with a BSCA (Feature #2074) ... Mdl 8 - an IBM 5408 Processing Unit with either the ICA (feature #4645) or the BSCA (feature #2074).

SOFTWARE REQUIREMENTS

5702-SC1; 5702-RG1.

DOCUMENTATION

(available from Mechanicsburg)

RPG II Telecommunications Reference Manual (SC21-7507) ... System/3 Bibliography (GC20-8080).

DISK RPG II 5445 DISK STORAGE DRIVE FEATURE FEATURE #6012, #6014

PURPOSE

This feature supports the 5448 on both the mdl 8 and mdl 10, but supports the 5445 on the mdl 10 only. The feature allows RPG II users to process data files on the 5445/5448 Disk Storage Drive.

DESCRIPTION

The File Description Specifications define the control information and device entry of the 5445/5448 Disk Storage Drive to the RPG II compiler.

This feature supports the 5445/5448 Disk Storage Drive for data files only. The same capability for data file storage and retrieval is provided for the 5445/5448 as is provided for the 5444. The file organizations supported by Disk RPG II are: Sequential, Direct, and Indexed.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: For compilation on the mdl 8, the same requirements as Disk RPG II (5702-RG1). For object program execution, an IBM 5448 Disk Storage Drive is required.

For compilation on the mdl 10, the same requirements as Disk RPG II (5702-RG1). For object program execution, an IBM 5445 or 5448 Disk Storage Drive is required.

SOFTWARE REQUIREMENTS

5702-RG1; 5702-SC1; 5702-SC1 feature #6022/#6023 (5445 Support) or 5702-SC1 feature #6074 (5448 Support).

Note: For users of 5448 Disk Storage Drive, specify feature #6014 for 200-cylinder 5444 disk cartridge distribution.

DISK RPG II MAGNETIC TAPE FEATURE FEATURE #6016 or #6018

PURPOSE

This feature is applicable to IBM System/3 mdl 8. The Disk RPG II Magnetic Tape Feature provides the user with RPG II support to process data or record address files on magnetic tape. Records may be fixed or variable length and may be either blocked or unblocked. Minimum record or block length is 18 bytes; the maximum is 9,999 bytes.

The File Description Specifications define the control information and device entry of Magnetic Tape to the RPG II compiler.

The feature supports consecutive input and output files. The files may be recorded in either EBCDIC or ASCII code.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirement: For source compilation: For both the mdl 8 and mdl 10 - the same requirements for compilation as Disk RPG II (5702-RG1). For object program execution: In addition to what is required for compilation, one or more units of the IBM 3410/3411 Magnetic Tape Subsystem are required.

SOFTWARE REQUIREMENTS

5702-RG1; 5702-SC1; 5702-SC1 feature #6024/#6025.

DOCUMENTATION

(available from Mechanicsburg)

IBM System/3 Magnetic Tape Planning Manual (GC21-5040) ... System/3 Bibliography (GC20-8080).

Note: For users of 5448 Disk Storage Drive, specify feature #6014 for 200-cylinder 5440 disk cartridge distribution.

SYSTEM/3 MODEL 10 RPG II AUTO-REPORT FEATURE FEATURE #6028, #6029

PURPOSE

This feature is applicable to System/3 mdl 8. The RPG II Auto-Report feature enhances the RPG II language by providing functions which eliminate much of the preparation and coding work normally done by the user when producing an application program in RPG II. It is specifically designed to facilitate report preparation.

DESCRIPTION

The Auto-Report program executes as a preprocessor to the RPG II compiler which is a prerequisite for the feature. The input to the program is RPG II source statements and new Auto-Report statements. Auto-Report produces a diagnostic listing, replaces the Auto-Report statements with generated or copied RPG II source statements and calls the RPG II compiler for execution.

Features: Coding of applications in RPG II is made easier by the following Auto-Report functions.

- Page Headings - the user need supply only the report title. Auto-Report generates skipping, spacing, horizontal alignment and date and page number constants. Page overflow is considered and the heading conditioned to print on the top of each page.
- Simplified Output Specifications - A single output field specification can result in Auto Report generated statement to:
 - indicate printing with editing,
 - place column heading over the data fields,
 - control spacing,
 - control horizontal alignment of data,
 - define total fields and calculation specifications to accumulate totals by control levels (total rolling)
 - flag total lines with asterisk indication.
- COPY - The COPY statement provides the ability to copy RPG II source statements from a disk library into the RPG II source program. Some values on the copied specifications may be modified for the resulting compilation.
- Source Program - The Auto-Report program passes control directly to the RPG II compiler to cause compilation of the expanded source program. In addition, users may elect to punch the source program so that they can make modifications which tailor the program more closely to their requirements. They can also elect to catalog to the Source Library a copy of the source program for later compilation.

The Auto-Report functions may be specified for one printer file in any RPG II program. Any RPG II specifications not related to the selected printer file and any RPG II statements for the printer file but not

S/3 Disk RPG II (cont'd)

requesting Auto-Report functions, are passed to the RPG II compiler as a part of the source program.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

Minimum System Requirements: Same as for RPG II.

This feature is applicable for the mdl 8 and has the same requirements as Disk RPG II.

SOFTWARE REQUIREMENTS

5702-RG1; 5702-SC1.

DOCUMENTATION

(available from Mechanicsburg)

Disk System RPG II Auto-Report Feature General Information Manual (GC21-7563) ... RPG II Auto-Report Reference Manual (SC21-5057) System/3 Bibliography (GC20-8080).

**RPG II 3270 DISPLAY CONTROL FEATURE
FEATURE #6070****PURPOSE**

The RPG II 3270 Display Control feature provides telecommunications services for local or remote 3270 devices. This program is automatically linked into the RPG II application program via the SPECIAL file exit capability on the RPG II File Description Specification Sheet. Neither the Assembler nor the RPG II Telecommunications feature is required.

DESCRIPTION

The following services are provided by the 3270 Display Control feature:

- RPG II access to 3270 Display System terminals attached via the Local Communications Adapter (mdl 10), the Local Display Adapter, or Integrated Communications Adapter (mdl 8) or BSCA (mdls 8 and 10).
- Automatic buffering and queuing of terminal data
- A display formatting interface which permits the support of 3270 devices with coding in RPG II.
- Complete line control procedures are provided.
- Up to 18 terminals may be controlled (up to 12 can be attached via the Local Display Adapter on the mdl 8).
- Two subroutines are provided. SUBR13 allows an RPG II program to support the 3270 Information Display System without using CCP. Using SUBR14, an existing program using the 3270 Display Control Feature may be converted to execute under control of CCP by replacing SUBR13 references with SUBR14 references in the RPG II source program. The user must then make any adjustments required by CCP and recompile the program.
- Provides the capability of coding one or more applications within one program. No task switching is provided.

Terminals Supported: The following terminals and communications facilities are supported under the RPG II 3270 Display Control feature:

With the Local Communications Adapter (mdl 10)

- One 3275 Display Station and Control
- One 3271 Display Control Unit (mdl 1 or 2) with:
 - 3277 Display Station (mdl 1 or 2)
 - 3284 Printer (mdl 1 or 2)
 - 3286 Printer (mdl 1 or 2)
 - 3288 Printer (mdl 2)

With the Local Display Adapter (mdl 8)

- 3277 Display Station (mdl 1 or 2)
- 3284 Printer (mdl 1 or 2)
- 3286 Printer (mdl 1 or 2)
- 3288 Printer (mdl 2)

Note: A maximum of 12 terminals may be attached via the Local Display Adapter.

With the Integrated Communications Adapter (mdl 8)

- One 3275 Display Station and Control, or
- One 3271 Display Control Unit (mdl 1 or 2), with:
 - 3277 Display Station (mdl 1 or 2)
 - 3284 Printer (mdl 1 or 2)
 - 3286 Printer (mdl 1 or 2)
 - 3288 Printer (mdl 2)

With the Binary Synchronous Communications Adapter (mdls 8 and 10)

- 3275 Display Station and Control, or
- 3271 Display Control Unit (mdl 1 or 2), with:

- 3277 Display Station (mdl 1 or 2)
- 3284 Printer (mdl 1 or 2)
- 3286 Printer (mdl 1 or 2)
- 3288 Printer (mdl 2)

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS****Minimum System Requirements**

Model 8...The RPG II 3270 Display Control feature requires an IBM System/3 mdl 8 which includes an IBM 5408 Processing Unit mdl A16 (32K bytes)...An IBM 5444 A02 Disk Storage Drive...An IBM 5203 Printer...An IBM 5471 Printer-Keyboard or 3741 Data Station directly attached...An Integrated Communications Adapter, Local Display Adapter, or Binary Synchronous Communications Adapter...and one of the devices listed under "Terminals Supported".

Model 10...The RPG II 3270 Display Control feature requires an IBM System/3 mdl 10 which includes an IBM 5410 Processing Unit mdl A16 (32K bytes)...An IBM 5444 mdl 2 Disk Storage Drive...An IBM 5203 or 1403 Printer...An IBM 5424 MFCU or 1442 Card Read Punch...A Local Communications Adapter or Binary Synchronous Communications Adapter...and one of the devices listed under "Terminals Supported".

Using SUBR13, approximately 10K-13.5K bytes is added to the size of the object program; using SUBR14, 4.25K-5.25K bytes is added. The actual amount of resident overhead is determined by the user options selected, and that size can be increased to approximately 15K if the trace options are additionally selected when using SUBR13.

SOFTWARE REQUIREMENTS

5702-SC1, 5702-SC1 feature #6021, 5702-SC1 feature #6031 and 5702-RG1.

COMPATIBILITY

The System/3 mdl 8/10 RPG II 3270 Display Control feature is functionally compatible with the System/3 mdl 12 and System/3 mdl 15 RPG II 3270 Display Control feature.

DOCUMENTATION

(available from Mechanicsburg)

IBM RPG II 3270 Display Control Feature Reference and Logic Manual (SC21-5161) ... System/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 DISK SORT PROGRAM
5702-SM1****PURPOSE**

The IBM System/3 model 10 Disk Sort Program will sort any disk file organization supported by System/3 in ascending or descending sequence. This includes Indexed, Direct, and Sequential files.

DESCRIPTION

The files must be located on a 5444 Disk Storage Drive. The sort program will also accept fixed length records from magnetic tape files created by tape sequential access methods supported by System/3 data management. Output of the sort program may be created on either magnetic tape or disk. The sort program can select desired records from the input file to be included or excluded from the sort. Recognition of individual records can be based on:

- 1) Record code
- 2) Relation of a field to a constant
- 3) Relation of two fields in a record
- 4) Any relationship in a series (ORing)
- 5) All relationships in a series (ANDing)
- 6) Multiples of the above test in any combinations.

Control fields may be in a different location in records within the file.

Output from the sort program will be in three formats:

- 1) Tags - A file of three-byte binary relative record numbers in the sequence specified by the user.
- 2) Tagalong - A file of records containing the sort control fields and/or the data fields the user has specified. By using this option, the user can select only the data he needs from his input file to be included in the output. By specifying the entire input record as a tagalong field, the user can, in effect, accomplish a record sort.
- 3) Summary Tagalong - Records containing identical control fields are combined by summarizing (totaling) specified fields into one record.

Specification of record selection, sort parameters and tagalong data fields is accomplished by simple, RPG-like coding sheets that are similar to those used by the MFCU sort program.

Sort control card diagnostics and messages are printed on either the 5203 or 1403 Printers or the 5471 Printer-Keyboards, depending on which has been assigned to the system's logging function via the operator control language. If the logging function has been 'turned off,' the sort printed output will be suppressed.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

Minimum System Requirement: An IBM System/3 model 10 which includes an IBM 5410 Processing Unit model A13 (12K bytes), an IBM 5424 MFCU model A1 or an IBM 1442 Card Read Punch model 6, an IBM 5203 Printer model 1 or an IBM 1403 Printer model 2 and an IBM 5444 Disk Storage Drive model 1.

For use on IBM System/3 model 8 - an IBM 5408 Processing Unit model A14 (16K bytes), an IBM 5203 Printer, an IBM 5444 Disk Storage Drive model A1, and either an IBM 3741 Data Station directly attached or an IBM 5471 Printer-Keyboards.

SOFTWARE REQUIREMENTS

5702-SC1; for tape support, 5702-SC1 feature #6024/#6025 is also required.

DOCUMENTATION

(available from Mechanicsburg)

Disk Sort Reference Manual (SC21-7522) ... System/3 Bibliography (GC20-8080).

**DISK SORT 5445 DISK STORAGE DRIVE FEATURE
(Feature #6008/#6010)****PURPOSE**

This feature enables the user to sort all disk file organizations supported for System/3 in either ascending or descending sequence. This feature supports the 5448 on both the System/3 model 8 and model 10, but supports the 5445 on the model 10 only.

All functions available to the Disk System user through the Disk Sort Program (5702-SM1) are provided.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

Minimum System Requirement: For the IBM Model 8 - the same requirements as the Disk Sort Program (5702-SM1) for the model 8, plus the IBM 5448 Disk Storage Drive (the 5448 requires a 5444 model A2 as a prerequisite).

For the IBM Model 10 - the same requirements as the Disk Sort Program (5702-SM1) for the model 10, plus the IBM 5445 or 5448 Disk Storage Drive (the 5448 requires a 5444 model 2 or A2 as a prerequisite).

SOFTWARE REQUIREMENTS

5702-SM1; 5702-SC1; 5702-SC1 feature #6022/#6023 (5445 Support) or 5702-SC1 feature #6074 (5448 Support).

Note: For users of 5448 Disk Storage Drive, specify feature #6010 for 200-cylinder 5440 disk cartridge distribution.

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 DISK RESIDENT MAGNETIC TAPE SORT
5702-SM2****PURPOSE**

The IBM System/3 Disk Resident Magnetic Tape Sort program sorts fixed length, blocked and unblocked files residing on Magnetic Tape. The sort requires a system with a minimum of 12K bytes of core and three magnetic tape drives. Up to four magnetic tape drives may be utilized by the sort program. The file may be recorded in either EBCDIC or ASCII code, and may reside on multiple tape reels. (This feature is applicable to System/3 model 8.)

DESCRIPTION

The sort program can select desired records from the input file to be included or excluded from the sort. Recognition of individual records can be based on:

- Record code
- Relation of a field to a constant
- Relation of two fields in a record
- Any relationship in a series (ORing)
- All relationships in a series (ANDing)
- Multiples of the above test in any combinations

Control fields may be in a different location in records within the file.

Output from the sort program is in the following format:

A file of records containing the sort control fields and the data fields the user has specified. The user need select only the data he needs from his input to be included in the output. By specifying the entire input record as a tagalong field, the user can, in effect, accomplish a record sort.

Specification of record selection, sort parameters and tagalong data fields is accomplished by simple, RPG-like coding sheets that are similar to those used by the Disk Sort program, 5702-SM1. The addroot and summary sort capabilities of the Disk Sort are not supported in the Magnetic Tape Sort programs.

Sort control card diagnostics and messages are printed on the system output device.

Checkpoint/Restart is supported but does not require the SCP feature (5702-SC1, feature #6026/#6027). The maximum block or record size for input or output is 9,999 bytes. Input and output files may be multi-volume, but work files for the sort can be single volume files only.

To utilize all of the functions of this program, at least three 9-track work tapes must be available. If one or more of the work tapes is 7-track, then only those sort functions that relate to the standard System/3 64-character set (EBCDIC) are supported. As a result, sorts of packed decimal data, of signed numeric data, or on zones are not allowed in these 7-track configurations.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

Minimum System Requirements: In addition to the minimum system requirements for 5702-SM1, an IBM System/3 model 8 or model 10 requires three magnetic tape drives. (When operating using DPF, a minimum program level of 8K is required).

SOFTWARE REQUIREMENTS

5702-SC1; 5702-SC1, feature #6024/#6025.

DOCUMENTATION

(available from Mechanicsburg)

Tape Sort Program Reference Manual (SC21-7572). ... System/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index



PROGRAM PRODUCTS

**SYSTEM/3 DISK RESIDENT CARD UTILITIES
5702-UT1**

PURPOSE

The following IBM System/3 Card System Utilities may be ordered as disk resident on an IBM 5444 Disk Storage Drive. Their function is the same as their card system equivalents:

- MFCU Sort/Collate
- 96-Column List
- Reproduce/Interpret
- Data Recording
- Data Verifying
- 80-96 Conversion Program.

(This feature not applicable to IBM System/3 model 8.)

DESCRIPTION

The Model 10 Gangpunch program is available only for the disk system and provides the following capabilities:

- Interspersed master-card gangpunching: The master and detail cards are intermixed in the primary file.
- Count-controlled gangpunching: A fixed or variable counter may be used to punch a specified number of detail cards. The master card is in the secondary file and the detail cards are in the primary file.
- Match master cards and detail cards on a control field and punch into the detail card if a match occurs: The master card is in the secondary file and the detail card is in the primary file.
- The following functions may be performed with any of the major types of gangpunching described above: Offset gangpunching ... gangpunching consecutive numbers into detail cards ... gangpunching a constant into detail cards ... card interpretation (entire card or only what is punched) ... selection of a single type of master card from many master cards ... selection of a single type of detail card from many detail cards.
- For count-controlled and match fields processing, MFCU2 is used for input and MFCU1 is used for output. For interspersed processing, MFCU1 is used for both input and output.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirement: An IBM System/3 model 10 which includes an IBM 5410 Processing Unit model A13 (12K bytes), an IBM 5424 MFCU model A1, an IBM 5203 Printer model 1 or 1403 Printer model 2 and an IBM 5444 Disk Storage Drive model 1.

An IBM 5475 Data Entry Keyboard is required if the Data Recording and/or Data Verifying programs are utilized.

An IBM 1442 Card Read Punch model 6 is required, in addition to the IBM 5424 MFCU, if the 80-96 Conversion program is utilized.

SOFTWARE REQUIREMENTS: 5702-SC1.

DOCUMENTATION

(available from Mechanicsburg)

Sort Collate and Card Utilities Reference Manual (SC21-7529) ... System/3 80-96 Conversion Program and RPG Support for the 1442 Card Read Punch (SC21-7518) ... System/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 UTILITY PROGRAM FOR
1255 MAGNETIC CHARACTER READER
5702-UT2****PURPOSE**

This IBM System/3 utility program provides the disk oriented IBM System/3 model 10 user control of document processing on the IBM 1255 Magnetic Character Reader. It provides a means of reading MICR-encoded documents from the 1255, accumulating document totals and amount field totals for each pocket, and placing the data from the documents on output disk and printer files. The program is designed to fulfill the basic requirements of the "ON-US" data capture run required for all Demand Deposit Application programming. (This program is applicable to the IBM System/3 model 8.)

DESCRIPTION

The program reads fields from the documents as specified by the user and then, based on decisions indicated by the user, it will stacker select these documents into user-specified pockets. If requested, Modulus 10 and 11 checking will be performed. Then, after each document has been read and stacker selected, the utility will print user-specified fields from that document. Fixed-length records will also be created and placed on disk file (5444 or 5445 or 5448) or a tape file (3410 or 3411, 9-track only).

An additional facility provided by the program is the accumulation of document totals and amount field totals and then printing these at end of job. Subtotals may be printed at any time as indicated by the user during program execution.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

Minimum System Configuration: Utility Program for the IBM 1255 Magnetic Character Reader will operate on a minimum configuration IBM System/3 model 10 which includes an IBM 5410 Processing Unit (12K bytes) with a Serial I/O Channel (#7081), an IBM 5424 MFCU (250 cpm read and 60 cpm punch and print), an IBM 5203 Printer (96 print positions and 100 lpm), or an IBM 1403 Printer (132 print positions and 600 lpm), an IBM 5444 Disk Storage Drive (2.45 million bytes) and an IBM 1255 Magnetic Character Reader. The minimum main storage required to support a system including an IBM 5445 or 5448 Disk Storage Drive or IBM 3410/3411 Magnetic Tape Subsystem is 16K bytes.

For use on IBM System/3 model 8 - an IBM 5408 Processing Unit model A14 (16K bytes), an IBM 5203 Printer, an IBM 5444 Disk Storage Drive model A1, and either an IBM 3741 Data Station directly attached or an IBM 5471 Printer-Keyboard. In addition, a Serial I/O Channel and an IBM 1255 Magnetic Character Reader is required.

SOFTWARE REQUIREMENTS

5702-SC1. For IBM 5445 support. 5702-SC1 feature #6022/#6023 is also required (model 10 only). For IBM 5448 support, 5702-SC1 feature #6074 (model 10 only - IBM 5448 mutually exclusive with SIOC on model 8). For tape support, 5702-SC1 feature #6024/#6025.

DOCUMENTATION

(available from Mechanicsburg)

Utility Program For IBM 1255 Magnetic Character Reader Reference Manual (SC21-7521) ... System/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index



PROGRAM PRODUCTS

**JOB ANALYSIS SYSTEM/3 (JAS/3)
5702-XP1**

PURPOSE

IBM Job Analysis System/3 (JAS/3) provides a powerful tool to aid management in fulfilling its responsibilities in the planning, supervising, and controlling of project-oriented work by the critical path method. It is designed to be a high performance system with features which make it easily usable by non-technical personnel.

JAS/3 operates under the System/3 Disk System Control Programs 5702-SC1 or 5703-SC1, 5704-SC1, 5704-SC2, or 5705-SC1. Depending on core availability, JAS/3 has a processing capacity of from 180 to 736 activities or work items and relationships per subnet depending on core size.

HIGHLIGHTS

Front-to-back interfacing of up to 10 subnets to form a network with up to 7,000 activities ... multiple networks per master file ... multiple calendars (each subnet in a network can have its own calendar) ... every relationship can have a lag ... multiple starts and ends (explicit or implicit) ... reports easily modifiable via control cards ... progress reporting specifying actual start date and/or remaining duration ... three types of schedule dates ... nine levels of milestones ... Direct Access Master File ... free-form data input.

Use: To use JAS/3, the customer must describe the activities which constitute the project network. This data is punched into cards or diskettes, for entry into the System/3 or can be entered directly from the keyboard. Processing and report requests can also be entered in either fashion.

CUSTOMER RESPONSIBILITIES

All users should be familiar with the various features of this system before attempting to use it for actual project control. Users will need a knowledge of the fundamentals of the critical path technique before they can prepare input.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum Configuration

System	Unit	Storage Size	Reader/Punch	Disk	Printer	Control Unit
5415	A17	48K	5424 MFCU or 2560 MFCM or 1442 or 3741 Dir. Attach Attach	5444 Mod1	1403	5421
5415	B17	48K	5424 MFCU or 2560 MFCM or 1442 or 3741 Dir. Attach	3340	1403	5421
5415	D19	96K	5424 MFCU or 1442 or 2560 or 3741 Dir. Attach	3340	1403	5421
5412	B16	32K	5424 MFCU or 1442 Card Read Punch 3741 Dir. Attach	3340 Mod C2	1403 or 5203	5421
5410	A13	12K	5424 MFCU or 1442 Mod 6 or 3741 Dir. Attach	5444 Mod 1	1403 or 5203	5421
5408	A14	16K	3741 Dir. Attach Keyboard	5444 Mod 1	5203	
5406	B3	12K		5444 Mod 1 or	5213 2222	

Additional Supported Devices:

5415			5444 and 5445s 2501 and 3340, 3344			
5410			5471 Printer/ 5475 Keyboard	2(5444s) 5445		
5408				2(5444s)		
5406			5496 3741 Dir. Attach	2(5444s)	Only Left Carriage on Dual 132 Chr. Mar.	

Note: JAS/3 Does Not Support Spooling.

SOFTWARE REQUIREMENTS

JAS/3 is written in System/3 Basic Assembler language and operates under the IBM System/3 Disk System Control Program. On a system with Dual Programming feature, JAS/3 must run in Program Level 1.

DOCUMENTATION

(available from Mechanicsburg)

General Information Manual (GH20-1085) ... Program Description and Operations Manual (SH20-1176).

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

SYSTEM/3 DATA/3
5702-XX1, 5704-XX1, 5704-XX3, and 5705-XX1

PURPOSE

This program product provides users of IBM System/3 models 8, 10 Disk, 12 and 15 with a terminal-oriented data entry, inquiry, and file maintenance system. The specific functions it provides are data entry, data entry with master file input, inquiry, and inquiry with update.

HIGHLIGHTS

- Uses a program definition and a data definition form. Both are designed for ease-of-use with forms already familiar to the user.
- Easy to install and use via RPG-like forms and fill-in-the-blanks type prompting.
- DATA/3 generated programs do not require a dedicated system; that is, another program - batch or CCP - can be executed in the other program level or partition.
- DATA/3 generated programs can be executed under control of CCP.
- Places control and responsibility for data integrity at the data source.
- Offers up to four separate program security checks. Two are available in the DATA/3 generated programs; two additional checks are available when running under CCP.
- Requires no knowledge of programming languages by the terminal operator.
- Provides standard checking functions.

DESCRIPTION

Data Entry: Allows the operator to enter data on either a field or a record basis. It creates a single output file which can contain multiple record types depending on the application. Output files can be sequential, indexed, or direct. During data entry, the operator can page forward or backward through the entry screens. The definition of the output record format controls the program's flow by insuring that the proper input, edit, and output record display format operations are performed. If a field fails to pass a validity check, the field in error is intensified, indicating a correction must be made by the operator.

Data Entry with Master File Input: Allows the operator to extract information from up to eight existing master files and combine this information with data entered at the terminal. This combined data is displayed, verified or overridden by the operator, and incorporated into the output data file. Output files can be sequential or indexed, and, as above, the operator can page forward and backward through the entry screens during data entry.

Inquiry: This function allows access to records in a disk file by using a record key. When there are several inquiry screen format displays used by the program, the operator can switch from display to display. The program may also specify 'ease-of-reading' editing for numeric fields.

Inquiry with Update: This function provides file maintenance capability. When a record is accessed by key and displayed at the terminal, the operator can change the appropriate fields and direct the program to replace the record on disk with the new information. Data integrity is preserved by having user specify at program definition time which fields may be altered (unprotected) and which displayed fields may not be altered (protected). Records may also be added by the operator at the terminal.

Use: DATA/3 can be used in a wide variety of applications where a need exists for online data entry, data inquiry and file maintenance.

It is particularly suited for customer service ... order entry ... inventory and production control ... stockholder records ... credit control.

CUSTOMER RESPONSIBILITIES

Customizing DATA/3 to their specific needs. This will include the initial specification of the data files that DATA/3 generated programs will interface with. A data definition form is available.

Program definition forms are available for use when a program is to be generated using the DATA/3 facilities. These forms enable users to specify program name, security, data file interfaces, 3270 screen formats and field editing requirements of their various programs.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

The minimum configuration for IBM System/3 model 10 Disk System is IBM 5410 Processing Unit - 24K for Non-CCP or 32K for CCP ... IBM 5444 Disk Storage Drive model 2 ... IBM 5424 Multi-function Card Unit or 1442 Card Read Punch ... IBM 5203 Printer or 1403 Printer ... Local Communications Adapter (LCA) or Binary Synchronous Communications Adapter (BSCA) ... IBM 3270 Information Display System (minimum one display station). Programming Requirements include ... model 10 Disk System Control Programming (5702-SC1, Release 12 or later; or Release 13 if the Display Adapter is to be used) ... BSCA Multiline/Multipoint feature (5702-SC1, feature #6030/#6031), ...

Macros feature (5702-SC1, feature #6020/#6021) ... Overlay Linkage Editor and Checkpoint/Restart feature (5702-SC1 feature #6026/#6027) ... RPG II Compiler (5702-RG1).

The minimum configuration for the IBM System/3 model 8 is IBM 5408 Processing Unit model A16 (32K bytes) ... IBM 5444 Disk Storage Drive model A2 ... IBM 5203 Printer ... IBM 5471 Printer-Keyboard or 3741 Data Station/Programmable Workstation directly attached ... Integrated Communications Adapter (ICA) or Binary Synchronous Communications Adapter (BSCA) or the Local Display Adapter ... IBM 3270 Information Display System (minimum one display station). Programming Requirements same as IBM System/3 model 10.

The minimum configuration for IBM System/3 model 12 is IBM 5412 Processing Unit B16 (32K) ... IBM 5424 MFCU or 1442 Card Read Punch or 3741 Data Station/Programmable Workstation directly attached ... IBM 5203 or 1403 Printer ... IBM 3340 DASF ... Integrated Communications Adapter (ICA) or Binary Synchronous Communications Adapter (BSCA) or Local Display Adapter ... IBM 3270 Information Display System (minimum one display station). Programming requirements include ... IBM model 12 System Control Programming (5705-SC1) ... RPG II Compiler (5705-RG1).

The minimum configuration for IBM System/3 model 15 is the same as for model 15 SCP, but in addition, the following are required: IBM 3270 Information Display System (minimum one display station) ... Local Communications Adapter (LCA) or BSCA or Display Adapter (FC4601); or the model 15D, the BSCC is supported by DATA/3, but only under CCP. Programming requirements for 5704-XX1 include the SCP (5704-SC1 Release 3 or later; or Release 4 if the Display Adapter is to be used) and RPG II Compiler (5704-RG1). Programming requirements for 5704-XX3 include the SCP (5704-SC2) and RPG II Compiler (5704-RG2).

Additional devices supported include additional 5444 or 5445 disks, 5448 disks, 3340 disks, 3344 disks, and multiple terminals (including printers) on the 3270 Information Display System. (Program Function Keys 1-5 are required on the 3270 terminals.) The Data Entry Keyboard is recommended on the 3270 terminals.

SOFTWARE REQUIREMENTS

DATA/3 generated programs are compiled and executed like any other RPG II program. The generated programs operate under control of the System/3 System Control Programming (SCP) as follows:

SYSTEM/3	DATA/3	SCP
Models 8 and 10	5702-XX1	5702-SC1
Model 12	5705-XX1	5705-SC1
Model 15	5704-XX1	5704-SC1
Model 15	5704-XX3	5704-SC2

DOCUMENTATION

(available from Mechanicsburg)

DATA/3 Reference Manual (SC21-5102) *S/3 Bibliography* (GC20-8080).

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 DISK FORTRAN IV
5703-FO1**

PURPOSE

IBM System/3 Disk FORTRAN IV processes programs written in the IBM System/3 FORTRAN language, producing output suitable for execution with the IBM System/3 model 6 System Control Programming (5703-SC1). (This program is not used with the model 4).

HIGHLIGHTS

The System/3 FORTRAN language contains those features defined in American National Standard Basic FORTRAN, X3.10.1966; language extensions supported by IBM 1130 Basic FORTRAN; and additional features and capabilities previously available only with certain IBM Full FORTRAN compilers. These features include:

- The DEBUG facility, which enables the user to locate errors in a FORTRAN source program. By use of four basic statements, the debug facility provides for tracing flow within a program and between programs, and for checking the validity of subscripts.
- The IMPLICIT statement, which enables the user to specify the type (including length) of all variables, arrays, and user-supplied functions whose name begins with a particular letter.
- Length specification for INTEGER and REAL type statements, which allows the explicit specification of the INTEGER*2, INTEGER*4, REAL*4, and REAL*8 (double precision) data types.
- The relational IF statement, which is used to direct the transfer of control after the evaluation of relational expressions.
- List-directed input/output, which permits reading and writing of formatted data without a FORMAT statement.
- The GENERIC statement, which enables the user to specify a single name for a FORTRAN built-in or library function having several names. Depending on argument type, the correct function is selected by the compiler with each appearance of the name.
- IBM FORTRAN language extensions INVOKE, PROGRAM and GLOBAL, which allow FORTRAN main programs to be loaded successively into main storage and executed, while permitting these programs to share a common data area. These language extensions provide function equivalent to 1130 FORTRAN CALL LINK.
- Names of up to six characters for variables, arrays, functions, and subroutines.

DESCRIPTION

The System/3 Disk FORTRAN IV library contains mathematical and service subprograms required during execution to perform arithmetic operations, input and output constant conversion and input/output control.

System/3 Disk FORTRAN IV is supplemented by a Commercial Subroutine Package which is equivalent in function to the 1130 Commercial Subroutine Package with the exception that I/O routines for the model 6 version are not provided. Therefore, FORTRAN I/O must be used for model 6 device support.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Configuration: For compilation and execution, a System/3 model 6 with a minimum of 12K bytes of main storage is required. Disk FORTRAN IV requires a minimum of 9K bytes of main storage for compilation - exclusive of control program requirements.

- 1 - IBM 5406 Central Processing Unit (model B03)
- 1 - IBM 5444 Disk Drive (model 1)
- 1 - IBM 5213 Printer (model 1) or 2222 Printer (model 1)

Additional Device Support

IBM 5406 Central Processing Unit (model B04) ... IBM 5213 Printer models 2 or 3 ... IBM 2222 Printer model 2 ... IBM 5444 Disk models 2 or 3 ... IBM 5496 Online Data Recorder with IBM System/3 model 6 attachment feature ... IBM 129 Online Data Recorder with card I/O attachment feature (supported as IBM 5496). FORTRAN supports the IBM 3741 directly attached as an input or output device for compilation only.

Prerequisite: EC 571595 is required for all IBM System/3 model 6 CPUs on which System/3 FORTRAN will be run.

SOFTWARE REQUIREMENTS

5703-SC1; 5703-SC1 feature #6010/#6011.

COMPATIBILITY

System/3 Disk FORTRAN IV source programs for System/3 model 6 are compatible with the System/3 Disk FORTRAN IV for System/3 model 10 except for changes required to accommodate differences in attached I/O. The System/3 Disk FORTRAN IV compiler accepts source programs written in the IBM System/360 Basic FORTRAN IV language, which encompasses American National Standard Basic FORTRAN as defined in X3.10.1966. The compiler also accepts source programs written in the IBM 1130 Basic FORTRAN language with minor modifications.

PERFORMANCE

The System/3 Disk FORTRAN IV will compile and execute approximately 100 source statements on a 12K system with increased capacity on a 16K system.

The System/3 Disk FORTRAN will compile and execute in 9K of main storage, exclusive of control program requirements. Object time performance is dependent on program type, size, I/O functions performed and other factors pertinent to program execution speed.

DOCUMENTATION

(available from Mechanicsburg)

FORTRAN Reference Manual (SC28-6874) ... FORTRAN Commercial Subroutines (SC28-6875). ... S/3 Bibliography (GC20-8080).

Multiple Program Requests: Program Products and System Control Programming type 5703 (System/3 model 4 or 6) which are ordered from PID for shipment at the same time will be shipped to the user stacked on a 5440 disk cartridge (or equivalent)* under the following conditions:

1. The scheduled ship date, seven-digit customer number and CPU number must be the same for all programs ordered.
2. All of the program feature orders must specify the same cylinder size (100 cyl or 200 cyl). (Note: Model 4 uses only 200-cylinder disks).
3. The total storage requirements of the programs ordered must not exceed the number of available cylinders indicated by the specify number (100 or 200 cylinders).*
4. The announcement of availability must indicate that the program can be stacked.

* More than one disk cartridge may be required.

Action Required: Sufficient lead time is necessary to facilitate the proper coordination of System Control Programming and program products shipped from PID, and the system installation date. The following procedures must be followed:

- System Control Programming and program products are shipped from PID on 5440 Disk Cartridge. A cartridge may either be supplied by the user or it may be ordered from IBM.
- Orders may be submitted directly to PID for 5440 disk cartridges to be used for program deliveries.
- Orders will be scheduled for shipment from PID the Friday of the second week following AAS order entry, unless a later scheduled ship date is requested. Customer disks must arrive at PID the Tuesday before the Friday scheduled date.
- The branch must verify that System Control Programming and program products are on order and scheduled for shipment from PID to ensure their arrival concurrent with systems delivery.
- When rescheduling a system, the branch must also ensure that associated System Control Programming, program products, and disks are also properly rescheduled.

Failure to adhere to the above procedures can result in late shipment of programs and late installations.

System/3 Model 4 Program Products Minimum System Requirements

Program Products	5404	5213	5447	SCP
				5703-SC1
RPG II	X	X	X	X
Disk Sort Program	X	X	X	X
CCP/Disk Sort	X	X	X	X
Conversational Utilities	X	X	X	X

PROGRAM PRODUCTS

S/3 Disk FORTRAN IV (cont'd)

System/3 Model 6 Program Products Minimum System Requirements

Program Products	5406		5213	5444	SCP
	8K	12K			5703-SC1
Model 6 RPG II	X		X	X	X
Model 6 Sort	X		X	X	X
Model 6 Conversational Utility Programs					
-Keyboard Data Entry	X		X	X	X
-Keyboard Source Entry	X		X	X	X
-Data Interchange Utility	X		X	X	X
1255 Magnetic Character Reader Utility (plus 1255)		X	X	X	X
System/3 BASIC	X		X	X	
Disk FORTRAN IV		X	X	X	X

Note: To support the 3741 directly attached or 2265, a minimum of 12K 5406 is required.

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 HEALTH, WELFARE AND PENSION FUND
SYSTEM (5703-N11)****PURPOSE**

The IBM System/3 Health, Welfare and Pension Fund System meets basic contribution accounting requirements for jointly administered Health, Welfare and Pension Funds. In addition, member, contribution, and claims information is maintained for improved management analysis and control. The program is designed for the System/3 model 6.

The compact System/3 model 6 offers for the first time all the benefits of a stored program system to a large number of smaller funds, while avoiding significant facility problems. The Health, Welfare and Pension Fund System program product provides a comprehensive, easily installed package which assumes minimum tailoring and no permanent user programming capability.

HIGHLIGHTS

- Contribution accounting including prelisting for both hourly and flat rate contribution funds
- Notification of employer contribution shortage
- Member contribution/history file
- Claim history file
- Historic employer contribution file
- Computer prepared claim and pension checks
- Inquiry facility for all primary files
- Full maintenance of all system files
- Data for typical eligibility determination
- Utilization of the low cost System/3 model 6
- Control of all files, complete audit trail

Use: The Health, Welfare and Pension Fund will use this system for contribution accounting, pension and claim check preparation, to provide data for eligibility determination and for analysis and control of its operation.

CUSTOMER RESPONSIBILITIES

A thorough knowledge and understanding of both current contribution accounting procedures and controls and of the program product contribution accounting and controls ... any modification for unique requirements ... generation of system control program and program product ... coding and capture of required files and tables ... assignment of employer account numbers, claim codes, contract codes ... establishing individual audit requirements ... providing for manual supervision of controls and the integration of controls into the reporting framework used by the fund.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS****Minimum Machine Configuration**

Description	Type	M/SF
Processing Unit (12K)	5406	B3
Printer Attachment		3902
Printer (132 positions)	5213	2
Disk Storage (2.45 M bytes)	5444	1

The file storage requirements will vary greatly from fund to fund based upon such factors as number of members, collection cycle, and claim rate characteristics. Additional information can be found in the *General Information Manual*. Please contact your Regional Insurance Industry Marketing representative or the Insurance System Center, Princeton, New Jersey, for further assistance.

Reconstruction from machine-readable media will require the purchase of additional 5440 Disk Cartridges.

SOFTWARE REQUIREMENTS

The Health, Welfare and Pension Fund system is written in RPG II and operates under the control of the IBM System/3 model 6 System Control Program (5703-SC1).

All files are indexed disk.

Required Program Products - System/3 Model 6

- RPG II (5703-RG1)
- Conversational Utilities (5703-UT1)
- Disk Sort (5703-SM1)

DOCUMENTATION

(available from Mechanicsburg)

General Information Manual (GH20-1189)

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 MODEL 6 RPG II
5703-RG1**

PURPOSE

IBM System/3 model 6 RPG II is a program product that operates under control of the System Control Programming. It is disk resident, and in addition to the functions provided by the S/3 Disk RPG II (5702-RG1), the S/3 model 6 RPG II supports operator keyboard console and other unique devices, as indicated below.

DESCRIPTION

The recording techniques used by all disk file organizations permit multiple records to be read or written with a single I/O instruction. Unlike previous data management techniques, System/3 disk files can be written or read using different blocking factors in different programs. This facility allows the user to process single records when a program uses a large amount of storage or to use as much core as available in processing multiple records to increase throughput.

System/3 Model 6 RPG II supports three types of file organization - Sequential, Indexed, and Direct. Direct files are addressed by relative record number; records may be loaded or retrieved by specifying the number of the record in the file.

The access methods supported are as follows:

1. Sequential
 - a) Consecutive processing - including updating in place.
 - b) Random processing - by relative record number including updating but excluding file loading.
2. Indexed
 - a) Random processing - by key.
 - b) Sequential processing - by key including file loading. Unlike previous indexed file organizations, the keys and data may be in a different physical sequence; i.e., the most active records may be placed in the front of the file with the index in sequence by item number.
3. Direct
 - a) Random processing - by relative record number, including updating and file loading. The open routine on the file load clears the data area on disk.
 - b) Consecutive processing.

Standard S/3 disk labels are mandatory on all disk files. Non-standard labels cannot be used except as data records within the file.

When a program generates too much object code for the specified size, the compiler will generate overlays. Not all programs - even with overlays - can fit into the stated machine size. In any event, programs cannot be compiled that would exceed 64K without overlays.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

System Configuration: An IBM System/3 model 4 workstation system includes: IBM 5404 Processing Unit model A18 (64K bytes) ... IBM 5447 Disk Storage and Control ... IBM 5213 Printer ... IBM 3277 Display Station model 1 ... at least one locally attached terminal. (Note: The 3277 is supported only by CCP; RPG II does not use the 3277.) A minimum IBM System/3 model 6 configuration includes: IBM 5406 Processing Unit model B2 (8K bytes) ... IBM 5444 Disk Storage Drive ... IBM 5213 or 2222 Printer.

Devices Supported: The following devices and features are supported by RPG II object programs:

Mdl 4	Mdl 6	Description
	X	129 Card Data Recorder mdl 1, 2 or 3
	X	2222 Printer mdl 1 or 2 (including Ledger Card Device and second tractor)
	X	2265 Display Station mdl 2 (5406-B3 or B4 is required)
	X	3741 Data Station mdl 1 or 2 directly attached
	X	3741 Programmable Workstation mdl 3 or 4 directly attached
	X	5213 Printer mdl 1, 2 or 3
X		5213 Printer mdl 3
X		5404 Processing Unit mdl A18
	X	5406 Processing Unit mdl B2, B3 or B4
	X	5444 Disk Storage Drive mdl 1, 2, 3
X		5447 Disk Storage and Control mdl A1 or A2
	X	5496 Data Recorder mdl 1

SOFTWARE REQUIREMENTS

5703-SC1 for IBM 3741 support, 5703-SC1 feature #6026/#6027 is required.

COMPATIBILITY

System/3 model 6 RPG II is source language compatible with RPG II for other System/3 models, except for differences due to different hardware.

Disk data files created by disk system management are compatible across System/3 models.

DOCUMENTATION
(available from Mechanicsburg)

System/3 Models 4 and 6 RPG II Reference Manual (SC21-7517) ... Introduction to RPG II (GC21-7514) ... RPG II Additional Topics Programmer's Guide (GC21-7567) ... RPG II Disk File Processing Programmer's Guide (GC21-7566) ... Disk Concepts and Planning Guide (GC21-7571) ... S/3 Bibliography (GC20-8080).

RPG II TELECOMMUNICATIONS FEATURE
(Feature #6000 or #6002)

PURPOSE

The RPG II Telecommunications feature provides the user with the capability of sending or receiving binary synchronous data over voice grade or high speed communications lines. This support is achieved through the use of an RPG II Telecommunications Specification Sheet, and the addition of BSCA (Binary Synchronous Communications Adapter) as a device entry on the RPG II File Description Specification. This RPG II support permits System/3 to function in one of the following communication modes:

- Receive only
- Receive with conversational reply***
- Transmit only
- Transmit with conversational reply***
- Alternate transmit and receive file****

DESCRIPTION

The RPG II language features supported for communications are:

Input, Output and Combined Files ... Demand Files for Transmit and Receive ... Blocking and Deblocking of Records ... Dual I/O Areas.

These BSCA features, options, and capabilities are supported by the feature:

Manual call ... Manual answer ... Auto-call ... Auto-answer ... Medium speed ... High speed ... Station selection ... EBCDIC data transparency ... Intermediate block checking ... EBCDIC or ASCII data and data link control characters. File translation of ASCII data can be accomplished by proper use of the file translate extension of RPG II.

System/3 with a BSCA supported by the RPG II Telecommunications feature can communicate with the following systems:

Another System/3 with BSCA, program-supported by RPG II Telecommunications feature.

A System/32 with BSCA (#2074), program-supported by RPG II.

A System/34 equipped with a Communications Adapter, program-supported by RPG II and Assembler.

A System/360 model 20 with BSCA, program-supported by BSCA IOCS.

A System/360 (or System/370 when operating in Basic Compatibility mode) program-supported by DOS BTAM, OS BTAM, or OS TCAM*.

A 2770 Data Communication System.

A 2780 Data Transmission Terminal.

A 3741-2 Data Station.†

A 3741-4 Programmable Work Station.†

A 5110 Computer System supported as a 3741 model 2 or 4.

A 5230 Data Collection System with BSCA (#2074). Receive mode only. Supported as a 3741 model 2 or 4.

A 5280 Distributed Data System with Communications Adapter (#2500).

A Series/1 - Refer to Series/1 pages for appropriate features.

A 6670 Information Distributor (as a 2770).

A System/7 with (#2074)

This program provides the support to use System/3 in the following telecommunications networks:

Point-to-Point switched ... Point-to-Point nonswitched ... Multipoint (as a tributary station).

System/3 with BSCA is a compatible member of the IBM BSC family of terminals. It can be intermixed with other BSC terminals (System/360 model 20, 5280, System/32, System/34, 1130, 1800, 2770, 2780 and 2715 model 2, 3780, 3741-2) on a multipoint line when operating as a tributary station with a central System/360 or System/370 computer* using DOS or OS BTAM. It can also share the

S/3 Mdl 6 RPG II (cont'd)

same phone number at the central System/360 or System/370 computer* with other BSC terminals (System/360 or System/370 computers**, System/360 model 20, System/32, System/34, 5280, 1130, 1800, 2780, 2770 and 2715 model 2, 6670 (as a 2770), 3780 , 3741-2, -4).

* System/360 models 22, 25 and 30 with DOS/360, models 40, 50, 65, 67 (in 65 mode), and 75 with DOS/360 and OS/360 and models 85, 91 and 195 with OS/360. System/370 models 135, 145 and 155 with DOS and OS and model 165 with OS when operating in Basic Compatibility mode.

** System/360 models 22, 25 and 30 with BOS/BPS or DOS/360, models 40, 50, 65, 67 (in 65 mode), and 75 with BOS/BPS, DOS or OS/360 and models 85, 91 and 195 with OS/360. System/370 models 135, 145 and 155 with DOS and OS and model 165 with OS when operating in Basic Compatibility mode.

*** Not supported in communications with System/32, System/34, 2770, 2780 and 3741-2, -4.

**** Transmit interspersed with Receive is not supported in communication with 2770, 2780 or 3741-2, -4.

† Operator Identification Card Reader feature (#5450) and the Expanded Communications/Multipoint Data Link Control feature (#1685) on 3741-2, 4 are not supported.

The functions and specifications for the System/3 model 6 RPG II Telecommunications feature are identical to those of the System/3 model 10 Disk RPG II Telecommunications feature.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

This program can be used on the IBM System/3 model 4 or model 6. Minimum requirements are the same as for RPG II (5703-RG1).

For object program execution - the Binary Synchronous Communications Adapter (#2074) is required. For System/3 model 6, an IBM 5406 model B3 or B4 is required to support communications with an IBM 2770 or 2780.

SOFTWARE REQUIREMENTS

5703-RG1; 5703-SC1

DOCUMENTATION

(available from Mechanicsburg)

RPG II Telecommunications Programming Reference Manual (GC21-7507). ... System/3 Bibliography (GC20-8080).

RPG II AUTO-REPORT FEATURES

(Features #6008, #6009)

PURPOSE

The RPG II Auto-Report feature enhances the RPG II language by providing functions which eliminate much of the preparation and coding work normally done by the user when producing an application program in RPG II. It is specifically designed to facilitate report preparation.

The IBM System/3 Auto-Report program executes as a preprocessor to the RPG II compiler which is a prerequisite for this feature. The input to the program is RPG II source statements and Auto-Report statements. Auto-Report produces a diagnostic listing, replaces the Auto-Report statements with generated or copied RPG II source statements and calls the RPG II compiler for execution.

DESCRIPTION

Coding of applications in RPG II is made easier by the following Auto-Report functions.

- Page Headings - The user need supply only the report title. Auto-Report generates skipping, spacing, horizontal alignment and date and page number constants. Page overflow is considered and the heading conditioned to print on the top of each page.
- Simplified Output Specifications - A single output field specification can result in Auto-Report generated statements to:
 - Indicate printing with editing
 - Place column heading over the data fields
 - Control spacing
 - Control horizontal alignment of data
 - Define total fields and calculation specifications to accumulate totals by control levels (total rolling),
 - Flag total lines with asterisk indication.
- COPY - The COPY statement provides the ability to copy RPG II source statements from a disk library into the RPG II source program. Some values on the copies specifications may be modified for the resulting compilation.
- Source Program - The Auto Report program passes control directly to the RPG II compiler to cause compilation of the expanded source program. In addition, the user may elect to catalog to disk a copy

of the source program so that he can make modifications which tailor the program more closely to his requirements.

The Auto-Report functions may be specified for one printer file in any RPG II program. Any RPG II specifications not related to the selected printer file and any RPG II statements for the printer file but not requesting Auto-Report functions, are passed to the RPG II compiler as a part of the source program.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

System Configuration: This program can be used on the IBM System/3 model 4 or model 6. Minimum requirements are the same as for RPG II (5703-RG1).

SOFTWARE REQUIREMENTS

5703-RG1; 5703-SC1.

DOCUMENTATION

(available from Mechanicsburg)

RPG II Auto-Report Reference Manual (SC21-5057) ... System/3 Bibliography (GC20-8080)

RPG II 3270 DISPLAY CONTROL FEATURE

(Feature #6030 - Model 4 only)

PURPOSE

The RPG II 3270 Display Control feature provides telecommunications services on the IBM model 4 for local or remote IBM 3270 devices. This program is automatically linked into the RPG II application program via the SPECIAL file exit capability on the RPG II File Description Specification Sheet. The RPG II Telecommunications feature is not required.

DESCRIPTION

The following services are provided by the RPG II 3270 Display Control feature:

- RPG II access to 3270 Display System terminals attached to the CPU or the Binary Synchronous Communications Adapter.
- Automatic buffering and queuing of terminal data.
- A display formatting interface which permits the support of 3270 devices with coding in RPG II.
- Complete line control procedures are provided.
- Up to 18 terminals may be controlled (up to 5 can be attached to the CPU).
- Two subroutines are provided. SUBR13 allows an RPG II program to support the 3270 Information Display System without using CCP. Using SUBR14, an existing program using the 3270 Display Control feature may be converted to execute under control of CCP by replacing SUBR13 references with SUBR14 references in the RPG II source program. The user must only then make any adjustments required by CCP and recompile the program.
- Provides the capability of coding one or more applicatons within one program. No task switching is provided.

Terminals Supported: The following terminals and Communication facilities are supported by the RPG II 3270 Display Control feature:

With the Binary Synchronous Communications Adapter

- 3275 Display Station and Control
- 3271 Display Control Unit (models 1 or 2) with:
 - 3277 Display Stations (models 1 or 2)
 - 3284 Printer (models 1 or 2)
 - 3286 Printer (models 1 or 2)
 - 3288 Printer (model 2)

Directly to CPU

- 3277 Display Stations (models 1 or 2)
- 3284 Printer (models 1 or 2)
- 3286 Printer (models 1 or 2)
- 3288 Printer (model 2)

Note: A maximum of 5 terminals may be attached to the CPU.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements

The RPG II IBM 3270 Display Control feature requires an IBM System/3 model 4 which includes an IBM 5404 Processing Unit model A18 (64K bytes)...an IBM 5447 Disk Storage and Control ... an IBM 5213 model 3 Printer...and one of the devices listed under "Terminals Supported".

Using SUBR13, approximately 10.25K-13.75K bytes is added to the size of the object program; using SUBR14, 4.25K-5.25K bytes is

S/3 Mdl 6 RPG II (cont'd)

added. The actual amount of resident overhead is determined by the user options selected, and that size can be increased to approximately 15K if the trace options are optionally selected when using SUBR13.

SOFTWARE REQUIREMENTS

5703-SC1, 5703-RG1

DOCUMENTATION

(available from Mechanicsburg)

IBM RPG II 3270 Display Control Feature Reference and Logic Manual (SC21-5161) ... System/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 MODEL 6 DISK SORT PROGRAM
5703-SM1**

PURPOSE

This IBM System/3 model 6 disk sort program sorts any disk file organization supported by IBM System/3 disk systems management in ascending or descending sequence. This includes Indexed, Direct, and Sequential files. The sort program can select desired records from the input file to be included or excluded from the sort. Recognition of individual records can be based on:

- 1) Record code
- 2) Relation of a field to a constant
- 3) Relation of two fields in a record
- 4) Any relationship in a series (ORing)
- 5) All relationships in a series (ANDing)
- 6) Multiples of the above tests in any combinations.

DESCRIPTION

Control fields can be in a different location in records within the file.

Output from the sort program will be in one of three formats:

- 1) Tags - A file of 3-byte binary relative record numbers in the sequence specified by the user.
- 2) Tagalong - A file of records containing the sort control fields and/or the data fields the user has specified. By using this option, the user can select only the data he needs from his input file to be included in the output. By specifying the entire input record as a tagalong field, the user can, in effect, accomplish a record sort.
- 3) Summary Tagalong - Records containing identical control fields are combined by summarizing (totaling) specified fields into one record.

Specification of record selection, sort parameters and tagalong data fields is accomplished by simple, RPG-like coding sheets.

The functions and syntax of specification statements for the System/3 model 6 Disk Sort program are identical with those of the System/3 model 10 Disk Sort. An output data file created by the System/3 model 6 Disk Sort can be processed by any System/3 program which uses disk system management to access the file.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

An IBM System/3 model 4 workstation system includes: IBM 5404 Processing Unit model A18 (64K bytes) ... IBM 5447 Disk Storage and Control ... IBM 5213 Printer ... IBM 3277 Display Station model 1 ... at least one locally attached terminal. (Note: The IBM 3277 is supported only by CCP; the Disk Sort Program does not use the 3277.)

The minimum System/3 model 6 configuration includes: IBM 5406 Processing Unit model B2 (8K bytes) ... IBM 5444 Disk Storage Drive ... IBM 5213 or 2222 Printer.

Devices Supported

The following devices are supported by the Disk Sort program:

Model 4	Model 6	Description
	X	129 Card Data Recorder model 1, 2 or 3
	X	2222 Printer model 1 or 2
	X	2265 Display Station model 2 (5406 model B3 or B4 is required)
	X	3741 Data Station model 1 or 2 directly attached
	X	3741 Programmable Workstation model 3 or 4 directly attached
	X	5213 Printer model 1, 2 or 3
X		5213 Printer model 3
X		5404 Processing Unit model A18
	X	5406 Processing Unit model B2, B3 or B4
	X	5444 Disk Storage Drive model 1, 2 or 3
X		5447 Disk Storage and Control model A1 or A2
	X	5496 Data Recorder model 1

For Sort Specification input: IBM 129, 3741, 5444, 5447, 5496, or operator keyboard/console.

For input, work and output files: IBM 5444, 5447

For diagnostics and messages: IBM 2222, 2265, 5213

SOFTWARE REQUIREMENTS

5703-SC1. For IBM 3741 support, 5703-SC1 feature #6026/#6027 is required.

DOCUMENTATION

(available from Mechanicsburg)

Disk Sort Reference Manual (SC21-7522) ... S/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index

CCP/DISK SORT PROGRAM (Model 4 Only)
5703-SM2**PURPOSE**

This program is functionally compatible with the IBM System/3 model 6 Disk Sort program (5703-SM1). With the CCP/Disk Sort program, however, the user can generate an object module which can be executed as a task under control of the Communications Control program (CCP) (5703-SC1 feature #6033), or as a program in batch (non-CCP) mode.

This program requires 12K bytes of main storage (exclusive of control program requirements) for both generation and execution, and automatic allocation of sort work files is not supported.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

An IBM System/3 model 4 workstation system includes: IBM 5404 Processing Unit model A18 (64K bytes) ... IBM 5447 Disk Storage and Control model A1 or A2 ... IBM 5213 Printer model 3 ... IBM 3277 Display Station model 1 ... at least one locally attached terminal. (Note: The IBM 3277 is supported only by CCP).

SOFTWARE REQUIREMENTS

5703-SC1; 5703-SC1 feature #6011. For execution under CCP: 5703-SC1 feature #6033.

DOCUMENTATION

(available from Mechanicsburg)

Disk Sort Reference Manual (GC21-7522) ... *S/3 Bibliography* (GC20-8080).

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 MODEL 6 CONVERSATIONAL UTILITY PROGRAMS
5703-UT1****PURPOSE**

There are three IBM System/3 Conversational Utility programs that are disk resident and operate under control of the SCP:

The Keyboard Data Entry program allows the user to key data directly onto the disk. It will format records according to user specifications and output an indexed disk file which can later be processed by a user RPG II program or the Sort program. Additional functions of the program include the ability to correct records and take hash or control totals.

The Keyboard Source Entry program allows the user to key source statements (RPG II) or procedures directly from the keyboard to the source library on disk. The source statements may be in the form of RPG II source programs, format records for the Keyboard Data Entry program, Utility control statements, etc. The disk library is in a format which is acceptable to the system and to the RPG II compiler. Additional features include the ability to correct source statements.

The Data Interchange Utility allows the user to convert disk data files created by disk system management (such as RPG II - produced data files) into BASIC data files, and vice versa. The files are not converted in place; instead, a new file is created. The user must specify the format of his RPG II records and the fields to be converted. The final output will be acceptable to the new system.

(Note: The Data Interchange Utility is not used with the model 4). Data files created by the System/3 model 6 Conversational Utilities can be processed by any System/3 program which uses disk system management to access the files. The exception is that data files that are converted by the Data Interchange Utility (DIU) program to System/3 BASIC format are accessible only by System/3 BASIC and by DIU.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

An IBM System/3 model 4 workstation system includes: IBM 5404 Processing Unit model A18 (64K bytes) ... IBM 5447 Disk Storage and Control ... IBM 5213 Printer ... IBM 3277 Display Station model 1 ... at least one locally attached terminal. (Note: The IBM 3277 is supported only by CCP; the Conversational Utilities do not use the 3277.)

A minimum IBM System/3 model 6 configuration includes: IBM 5406 Processing Unit model B2 (8K bytes) ... IBM 5444 Disk Storage Drive ... IBM 5213 or 2222 Printer.

SOFTWARE REQUIREMENTS

5703-SC1.

DOCUMENTATION

(available from Mechanicsburg)

System/3 Model 4 and 6 Conversational Utilities Reference Manual (SC21-7528) ... S/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index



PROGRAM PRODUCTS

**SYSTEM/3 UTILITY PROGRAM FOR
1255 MAGNETIC CHARACTER READER
5703-UT2**

PURPOSE

This utility program allows the IBM System/3 model 6 user to control document processing on the IBM 1255 Magnetic Character Reader. It provides a means of reading MICR-encoded documents from the 1255, accumulating document totals and amount field totals for each stacker, and placing the data from the documents on output disk and printer files. The program is designed to fulfill the basic requirements of the "ON-US" data capture run required for all Demand Deposit Application programming.

The program will read fields from the documents as specified by the user and then, based on decisions indicated by the user, it will stacker select these documents into user-specified stackers. If requested, Modulus 10 or 11 checking will be performed. Then after each document has been read and stacker selected, the utility will print user-specified fields from that document. Fixed-length disk records will also be created and placed on a disk file.

An additional facility provided by the program is the printing of document totals and amount field totals at end of job. Subtotals may be printed during program execution at times selected by the user.

The utility program is functionally compatible with System/3 model 10 Disk System Utility program for 1255 Magnetic Character Reader.

(This program is not used with the model 4.)

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

This program requires an IBM 5406 Processing Unit model B3 or B4 with a Serial I/O Channel (#7081) ... IBM 5444 Disk Storage Drive model 1, 2 or 3 ... IBM 5213 Printer model 1, 2 or 3 or IBM 2222 Printer model 1 or 2 ... and IBM 1255 Magnetic Character Reader model 1, 2 or 3.

SOFTWARE REQUIREMENTS: 5703-SC1.

DOCUMENTATION

(available from Mechanicsburg)

1255 Utility Reference Manual (SC21-7527) ... S/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index

STAT/BASIC FOR SYSTEM/3 MODEL 6 5703-XA1

PURPOSE

STAT/BASIC is an interactive program encompassing the most commonly used statistical techniques for the analysis of numerical data. The program operates on an IBM System/3 model 6.

STAT/BASIC is designed to meet the needs of the statistician, engineer, researcher or business analyst. It helps in using the computer directly for statistical analyses. A statistically-oriented user should have no difficulty in quickly learning the capabilities of the program. The interactive mode of the package allows a non-data processing-oriented user to use the program with ease, with a minimum of training.

Direct use on the System/3 model 6 provides the user with fast results. Because of the interactive nature of STAT/BASIC, the user can sit at the keyboard and see the results of his analyses as they are developed. Delays and some of the sources of error familiar in batch processing are eliminated with STAT/BASIC.

DESCRIPTION

STAT/BASIC consists of 40 procedures, written in the BASIC language, providing a wide range of capabilities under the following categories:

- Data Generation - Read ... Print Edit ... Transformation.
- Elementary Statistics - Cross Tabulation ... Histogram ... Tally ... Moments ... T-test ... Chi-square.
- Regression and Correlation Analysis - Correlation ... Simple Regression ... Stepwise Regression ... Multiple Regression ... Polynomial Regression.
- Multivariate Analysis - Discriminant Analysis ... Canonical Correlation ... Factor Analysis Part 1 ... Factor Analysis Part 2.
- Analysis of Variance - One-way Analysis of Variance ... Factorial Design.
- Nonparametric Statistics - Kendall Rank Correlation ... Sign Test ... Wilcoxon's Matched-pairs Signed-ranks Test ... Cochran Q Test ... Friedman Two-way Analysis of Variance ... Mann-Whitney U Test ... Kendall Coefficient of Concordance ... Biserial Correlation ... Point-biserial Correlation ... Tetrachoric Correlation ... Phi Coefficient.
- Time Series Analysis - Moving Average ... Seasonal Analysis ... Cyclical Analysis ... Auto-covariance and Auto-correlation ... Cross-covariance and Cross-correlation ... Triple Exponential Smoothing.
- Biostatistics - Survival Rate ... Probit Analysis.

On a System/3 model 6, the maximum size of a data matrix that can be processed is 300 rows (observations) by 30 columns (variables).

Exceptions are:

- For the edit and transformation programs, this limitation of 300 rows and 30 columns applies, but the number of rows (N) times the number of columns (M) must not exceed 3500 ($N \times M \leq 3500$).
- For the chi-square and Kendall coefficient of concordance programs, the maximum size of a data matrix is 100 rows by 30 columns.

HIGHLIGHTS

- A comprehensive set of statistical procedures.
- A user with a knowledge of statistics can learn the program capabilities with a minimum of effort.
- Interactive mode simplifies usage.
- Calculations performed in short or long precision.
- Extensive error checking with correction facilities.
- Instructional messages clarify procedures or options available.

Use: The user may utilize any of the STAT/BASIC programs through the console keyboard with System/3 model 6. The user first types a few systems commands and the name of the desired statistical program. Following a Ready indication, STAT/BASIC guides the user through his problem by typing out procedural instructions. Alternate courses of action or options are usually in the form of questions, which the user answers by typing the appropriate replies.

CUSTOMER RESPONSIBILITIES

The STAT/BASIC programs are distributed in machine-readable form for loading into the user system. Once stored, it is available to any member of the organization authorized to use the system.

If confidential information is to be stored in the library, the user must take appropriate steps to safeguard against unauthorized access.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

The size of the user area required to run the STAT/BASIC procedures is a function of the number of statements in an individual procedure and the amount of data processed in short and long precision.

All procedures, with the exception of the transformation procedure, can be executed in short precision in a user area of 40,000 bytes with a symbol table size of 9,000 bytes.

All procedures, with the exception of the transformation procedure, can be executed in long precision in a user area of 50,000 bytes with a symbol table size of 16,300 bytes. The transformation procedure cannot be executed in long precision; it can be executed in short precision in a user area of 50,000 bytes with a symbol table size of 10,800 bytes.

IBM System/3 Model 6 ... The minimum system is the same as that required for System/3 BASIC, specifically IBM 5406 Processing Unit model B2 (8K) ... one IBM 5444 Disk Storage Drive model 1 ... one IBM 5213 Printer model 1.

SOFTWARE REQUIREMENTS

STAT/BASIC is written in BASIC. To run the program on an IBM System/3 model 6 requires the System/3 BASIC (5703-XM1) program product.

DOCUMENTATION

(available from Mechanicsburg)

General Information Manual (GH20-1027).

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 BASIC
5703-XM1****PURPOSE**

IBM System/3 BASIC is a stand-alone, total facility interactive programming system. BASIC enables the user to enter BASIC statements, commands, utilities, BASIC data, and Desk Calculator (DCALC) instructions all in a completely interactive environment.

DESCRIPTION

System programs, source programs, and data files are stored on disk for direct accessibility. The system uses a virtual memory concept to allow the user to compile and execute large programs that otherwise would not fit into main storage.

System/3 BASIC, besides having a complete interactive interface to the user through the operator keyboard console, also provides the ability for continuous execution of stacked jobs without operator intervention.

Input to the System/3 BASIC is in the form of commands, data, or BASIC statements from either the keyboard console or from cards. Output is to the printer and/or to the 2265 model 2 Display Station. The disk is an input or output device as well as temporary and permanent storage for all forms of user data or programs.

DCALC (Desk Calculator) is a function of BASIC allowing the user to use the system as a large, highly sophisticated electronic desk calculator. No user knowledge of programming is necessary to put DCALC to its full use.

DCALC will give the user the ability to add, subtract, multiply, divide, and compute powers, roots, trigonometric functions, etc. Special procedures can be defined and stored into DCALC for future use. All of the functional routines (built-in functions) within BASIC are available to the DCALC user, except for the DET function.

The user has full control over his BASIC program with the command language. Commands are analyzed and result in the requested action being performed immediately upon the system. These commands allow the user intervention before, during, and after BASIC program execution.

A set of utilities are included in System/3 BASIC to allow for system generation and disk pack usage. The utilities give disk copy, file allocation, configuration, analysis, initialization, and track assignment capabilities to the user.

PERFORMANCE

The BASIC compiler can compile a 500-statement BASIC source program in 30 to 35 seconds. The BASIC program can be listed at a rate of approximately 60 statements-per-minute on the 5213 model 1 Printer (assuming the average statement is 40 characters long).

DCALC will respond to any user input within two seconds.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

Minimum System Requirements: The minimum system configuration for System/3 BASIC, DCALC, and the utilities is: An IBM 5406 Processing Unit model B2 (8K bytes), an IBM 5213 Printer model 1 or an IBM 2222 Printer model 1 and an IBM 5444 Disk Storage Drive model 1.

Additional units and features supported are: IBM 5406 Processing Unit models B3 (12K bytes) and B4 (16K bytes), IBM 5213 Printer models 2 and 3, IBM 2222 Printer model 2, IBM 5496 Data Recorder with System/3 model 6 Attachment feature, IBM 129 Card Data Recorder with System/3 model 6 Card Input/Output feature, additional capacities of the IBM 5444 Disk Storage Drive, and the IBM 2265 model 2 Display Station. (Support of the 2265 requires a minimum of 12K bytes of main storage and the eight additional command keys.)

Note: A co-resident system requires a minimum of 4.90 million bytes of 5444 disk storage for operation.

System/3 BASIC is not supported on the model 4.

SOFTWARE REQUIREMENTS: None.

DOCUMENTATION

(available from Mechanicsburg)

BASIC Reference Manual (GC34-0001) ... BASIC Operator's Guide (GC34-0003) ... S/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index



MATH/BASIC for SYSTEM/3 MODEL 6 5703-XM2

PURPOSE

IBM System/3 MATH/BASIC is a set of conversational routines for the solution of the most frequently encountered mathematical problems in science and industry. The library operates on an IBM System/3 model 6.

MATH/BASIC is designed to meet the needs of the engineer and scientist. The conversational features of MATH/BASIC allow a non-data processing-oriented user to use the programs with a minimum of training.

HIGHLIGHTS

- A comprehensive set of mathematical routines.
- Calculations in short and long precision.
- Control of operation in the case of ill-conditioned problems and error messages.
- Ease-of-use due to conversational mode.

DESCRIPTION

MATH/BASIC consists of 44 routines providing computing capabilities in the following areas:

Linear equations, matrix eigenvalue problem.
Zeros of polynomials, zeros and minima of functions.
Quadrature/differentiation
Interpolation, approximation and smoothing.
Ordinary differential equations.
Discrete Fourier transform.
Special functions.
Linear programming.

Use: The user can utilize any of the MATH/BASIC routines through a System/3 model 6 console keyboard.

The user first enters a few systems commands and the name of the desired MATH/BASIC routine. Following a READY indication, MATH/BASIC guides the user through his problem by printing procedural instructions. Alternate courses of action or options are described usually in the form of questions, which the user answers by entering the appropriate replies.

CUSTOMER RESPONSIBILITIES

The MATH/BASIC program is distributed in machine-readable form for loading into the user's system. Once stored, it is available to any member of the organization authorized to use the system.

If confidential information is to be stored in the library, the user must take appropriate steps to safeguard against unauthorized access.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

The minimum configuration for the IBM System/3 model 6 is the same as that required for System/3 BASIC, that is, one IBM 5406 Processing Unit model B2 (8K) ... one IBM 5444 Disk Storage Drive model 1 ... one IBM 5213 Printer model 1.

SOFTWARE REQUIREMENTS

MATH/BASIC is written in the BASIC language. To run the program on an IBM System/3 model 6 requires the System/3 BASIC (5703-XM1).

DOCUMENTATION (available from Mechanicsburg)

General Information Manual (GH20-1128) .

TERMS and CONDITIONS: See PP Index

**BUSINESS ANALYSIS/BASIC FOR
SYSTEM/3 MODEL 6
5703-XM3****PURPOSE**

Business Analysis/BASIC is a comprehensive set of interactive routines for use on the IBM System/3 model 6.

It consists of 30 routines written in the BASIC language, providing the problem-solver professional with procedures for data generation and maintenance, spread sheet analysis, investment analysis, break-even or cost-volume-profit analysis, depreciation analysis, and time series analysis. The program is designed so that a detailed knowledge of programming is not required.

DESCRIPTION

Business Analysis/BASIC includes 30 interactive routines for assisting the problem-solver in exercising the following functions:

- Spread Sheet Analysis:
 - Spread Sheet data file creation and update
 - Spread Sheet report formatting
- Investment Analysis:
 - Return-on-Investment computation
 - Discounted Cash Flow analysis
 - Loan analysis (multiple and single)
 - Lease vs Purchase analysis
 - Make vs Buy analysis
- Break-Even Analysis:
 - Break-even with definite assumptions
 - Break-even with probabilistic assumptions
- Depreciation Analysis:
 - Straight line depreciation
 - Sum-of-years digits depreciation
 - Declining balance depreciation
 - Equipment units depreciation
- Time Series Analysis:
 - Compound growth rate projection
 - Moving average
 - Seasonal analysis
 - Cyclical analysis
 - Autocovariance and Autocorrelation
 - Crosscovariance and Crosscorrelation
 - Exponential Smoothing
 - Simple Regression
- Graphic Presentation:
 - Histograms
 - Exponential Smoothing Plots
- Routine and File Indexing:
 - Business Analysis/BASIC routine index
 - User-created data file log
- Data Generation and Maintenance:
 - Create and update data files
 - Select and rearrange records in data files and spread sheet data files
 - Resequence records in data files and spread sheet data files
 - Print data files

HIGHLIGHTS

- Comprehensive set of analytical routines to assist the user in examining investment alternatives and in preparing financial plans.
- Spread sheet analysis capability for report creation and update.
- Interactive features include instructional messages, flexible control of calculations, extensive error checking, and data editing.

Use: The professional analyst can utilize any of the Business Analysis/BASIC routines through the System/3 model 6 console keyboard.

The user first enters a few systems commands (LOGON, EDIT, etc.) and the name of the desired Business Analysis/BASIC routine. Following a READY indication, the Business Analysis/BASIC routine guides the user through his problem by typing out procedural instructions. Alternative courses of action or options are presented in the form of questions, which the user answers by entering the appropriate replies.

CUSTOMER RESPONSIBILITIES

The user must have the necessary computer configuration as described below. The user will also need the associated program product for his system as mentioned under "Programming Systems".

Business Analysis/BASIC program is distributed in machine-readable form for loading into the user's system. Once stored, it is available to any member of the organization authorized to use the system.

If the user has confidential information to be stored in disk files, it will be his responsibility to take appropriate steps to safeguard against unauthorized access.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

The minimum configuration for the System/3 model 6 is the same as that required for IBM System/3 BASIC, that is, one IBM 5406 Processing Unit model B2 (8K), one IBM 5444 Storage Drive model 1, and one IBM 5213 Printer model 1.

SOFTWARE REQUIREMENTS

Business Analysis/BASIC is written in the BASIC language. To run the program on an IBM System/3 model 6 requires System/3 BASIC (5703-XM1).

DOCUMENTATION

(available from Mechanicsburg)

General Information Manual (GH20-1175) ... Promotional Flyer (G520-2527).

TERMS and CONDITIONS: See PP Index



PROGRAM PRODUCTS

SYSTEM/3 MODEL 15 BASIC ASSEMBLER
5704-AS1; 5704-AS2

PURPOSE

The IBM System/3 model 15 Basic Assembler program is a program product that processes source programs written in the Basic Assembler language, and produces executable object programs. The program is disk resident on an IBM 5444 Disk Storage Drive or 3340 Direct Access Storage Facility or 3344 Direct Access Storage (5704-AS2 only). 5704-AS1 is used with SCP 5704-SC1, and 5704-AS2 is used with SCP 5704-SC2.

DESCRIPTION

The Basic Assembler language is a symbolic programming language used to write programs. Some of the features provided by the program and its language are:

- Mnemonic Operation Codes
- Symbolic Referencing of Storage Addresses
- Automatic Storage Assignment
- Address Displacement Calculation
- Convenient Data Representation
- Operand Field Expressions
- Source Identification - Sequence Fields
- Assembler Instructions
- Source Program Listing
- Cross-Reference Listing
- Error Checking and Diagnostic Messages

The Basic Assembler may be used for assembly of relocatable subroutines for use with model 15 RPG II, COBOL, or FORTRAN. The subroutines, written in the Basic Assembler language, are coded by the user and separately assembled. The process of program linking is accomplished during compilation of the RPG II, COBOL, or FORTRAN source programs by means of the Overlay Linkage Editor.

Source input to the Assembler can be from the system input device (card reader, 3741 directly attached, or 3277 keyboard), from a source library, or from a source file generated by the macro processor. Work files for the Assembler can be on either a 5444 or 5445 Disk Storage Drive, or a 3340 Direct Access Storage Facility or 3344 Direct Access Storage. The Overlay Linkage Editor may be used to generate executable object programs.

Model 15 Basic Assembler Device Support

	Source Assembly	Object Execution
5444 Disk Storage Drive (5704-AS1 only) model A2 or A3	Yes	Yes
5445 Disk Storage (5704-AS1 only) model 1, 2 or 3	Yes	Yes
3340 Direct Access Storage Facility model A2, B1 or B2	Yes	Yes
3344 Direct Access Storage (5704-AS2 only) model B2	Yes	Yes
3410/3411 Magnetic Tape Unit model 1, 2, or 3	No	Yes
1403 Printer model 2, 5, or N1	Yes	Yes
3277 Display Station model 1	Yes**	Yes
5424 MFCU model A1 or A2	Yes	Yes
2560 MFCM model A1 or A2	Yes	Yes
1442 Card Read Punch model 6 or 7	Yes	Yes
2501 Card Reader model A1 or A2	Yes	Yes
3284 Printer model 1	Yes	Yes
1255 MCR model 1, 2 or 3	No	Yes
3881 OMR model 1	No	Yes
3741 (directly attached) model 1, 2, 3 or 4	Yes	Yes
BSCA, 1 or 2 lines, LCA, or DA	No	Yes
Main Storage Requirements		
5704-AS1	10-48K	up to 48K
5704-AS2	10-48K	up to 56K*

- * Object program size can be up to 56K, depending on the CCP, spool and configuration options selected during system generation.
- ** Assembler and system halts are logged on the 3277. Source statements may be entered from the keyboard.

Stand-Alone Programs: The Basic Assembler can be used to create a stand-alone program. The object program is punched into cards. Program loading is performed with an initial program loader through the alternate IPL device (MFCU, MFCM, or 1442). Stand-alone programs are coded entirely by the user with no dependence on other programming support.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: The same as for SCP* (5704-SC1 for 5704-AS1; 5704-SC2 for 5704-AS2).

- * Note: The IBM 1403 printer should be equipped with the Universal Character Set feature and a PN (60-character set) interchangeable train cartridge. A 48-character set (for example, HN or AN arrangement) can be used with the Assembler; however, the user must be willing to accept substitute characters.

SOFTWARE REQUIREMENTS

5704-SC1 for 5704-AS1; 5704-SC2 for 5704-AS2.

COMPATIBILITY

System/3 model 15 Basic Assembler is functionally equivalent to the Basic Assembler programs on other System/3 models. Four mnemonics are unique to model 15: Load CPU (LCP), Store CPU (SCP), Command CPU (CCP), and Supervisor Call (SVC). When converting from another System/3 model, there may be changes required in macro statements.

DOCUMENTATION

(available from Mechanicsburg)

Assembler Reference Manual (SC21-7509) ... Components Reference Manual (GA21-9236) ... S/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP index

**SYSTEM/3 MODEL 15
SUBSET ANS COBOL COMPILER AND LIBRARY
5704-CB1; 5704-CB2**

PURPOSE

Model 15 COBOL is a program product that operates under control of the IBM System/3 model 15 System Control Programming. 5704-CB1 is used with SCP 5704-SC1, and 5704-CB2 is used with SCP 5704-SC2. The compiler and library are disk resident on the IBM 5444 Disk Storage Drive or 3340 Direct Access Storage Facility or 3344 Direct Access Storage (5704-CB2 only). The compiler requires as input a COBOL source language program and produces as output, by means of the system's Overlay Linkage Editor, a System/3 machine language object program, either cataloged in an object library, punched into 80- or 96-column cards, or written onto a diskette.

System/3 COBOL supports Grade 1 Braille for both compiler listings and object program printed output. Minimum requirements include a 132-print position printer with 8 lines/inch spacing (1403 Printer); the compiler requires a 14K partition in order to produce Braille listings. A user-provided elastic strip is attached over the printer hammers to produce the Braille characters.

Source input to the compiler can be from the system input device (card reader, 3741 directly attached, or 3277 keyboard) or from a source library. Work files for the compiler can be on any 5444 or 5445 Disk Storage Drive or on a 3340 Direct Access Storage Facility or 3344 Direct Access Storage (5704-CB2 only). The Overlay Linkage Editor is used to generate object programs.

American National Standard COBOL Considerations

The U.S. Industry standard for COBOL is American National Standard (ANS) COBOL, X3.23-1968, was approved by the American National Standards Institute (ANSI) on August 23, 1968. The following functional processing modules of the ANSI standard are included in the System/3 model 15 Compiler.

1 Nucleus	1, 2
1 Sequential Access	1, 2
1 Random Access	0, 2
1 Library	0, 2
2 Table Handling	1, 3
1 Segmentation	0, 2

The first digit above represents the level of the modules included in the compiler; the second digit represents the lowest level in the American National Standards Institute Standard (0 implies that the module may be completely missing from the standard compilers). The third digit represents the highest level in the ANSI standard.

The international standard for COBOL is ISO Recommendation Number 1989, which was approved by ISO (International Organization for Standardization) in 1972. System/3 model 15 COBOL bears the same relation to the ISO standard as to the ANSI standard, inasmuch as the two standards are identical in technical content.

Additions: In addition to the standard language, the following additional features are provided:

- Extensions to the modules of American National Standard COBOL listed above, comprising:
 - Certain language elements which are defined in higher levels of the American National Standard COBOL than those listed.
 - Certain language elements defined by the CODASYL Programming Language Committee but not yet included by ANSI in American National Standard COBOL.
 - IBM-developed extensions consistent with those supported by the System/360 and 370 OS and DOS ANS COBOL compilers and 1130 ANS COBOL compiler.
- ROLLOUT/ROLLIN support allows a COBOL object program to be interrupted during execution. This is provided by invocation of a supplied program via a CALL statement (CALL "CBROLL"). ROLLOUT/ROLLIN is not supported in 5704-CB2.
- The interval timer is supported for time-of-day functions. This is provided by invocation of a supplied (SCP) subroutine via a CALL 'CFTOD' statement.

Support of 3277 Display Station: A model 15 COBOL object program supports the 3277 as a destination device for the DISPLAY and ACCEPT commands. Record lengths of 1 to 120 characters may be processed by ACCEPT, and records of 1 to 107 characters may be processed by DISPLAY. The 78-key Operator Console Keyboard is used for data input.

Disk File Support: The access methods supported for 5444, 5445, 3340 and 3344 are the same as those supported by other System/3 COBOL compilers, and are as follows:

Sequential Organization

- Consecutive Processing - including updating in place.
- Random Processing - by relative record number including updating but excluding file loading.

Indexed Organization

- Random Processing - by key.
- Sequential Processing - by key including file loading.

Direct Organization

- Random Processing - by relative recording number, including updating and file loading.
- Consecutive Processing.

Standard System/3 disk labels are mandatory for all disk files. Non-standard labels cannot be used except for data records within the file.

Record size can range from 1 byte to 32K bytes, and records may be processed as blocked or unblocked. Logical records may span physical disk sectors, tracks or cylinders.

Multi-volume indexed files are supported.

Tape File Support: The access methods supported for the 3410/3411 Magnetic Tape Subsystem are the same as those supported by other System/3 COBOL compilers. COBOL object programs can process data on magnetic tape; highlights include:

- Consecutive input or output files
- 1 - 4 tape drives
- Fixed length records, blocked or unblocked
- Variable length records, blocked or unblocked
- Record size from 18 to 32,768 bytes
- Block size from 18 to 32,768 bytes
- IBM Standard Labels, ANSI labels, no labels
- Option for two I/O areas
- 9-track, 800/1600 bpi
- 7-track, 200/556/800 bpi
- Single volume or multi-volume files
- Single file or multi-file volumes
- Recording format: EBCDIC (7- or 9-track) or ASCII (9-track only)

Printer Support: COBOL supports the 1403 as follows: Space 0, 1, 2, or 3 before or after printing a line; skip to line number before or after printing a line; overflow detection.

COBOL supports the 3284 Printer the same way it does the 1403, except that space 0 after print is not allowed.

Card I/O Support: Model 15 COBOL supports the MFCU, MFCM, 1442, and 2501 as follows:

	MFCU	MFCM*	1442	2501
Read	Yes	Yes	Yes	Yes
Punch	Yes	Yes	Yes	No
Card Print	Yes	Yes	No	No
Stacker Select (punch only)	Yes	Yes	Yes	No
Associated file	Yes	Yes	No	No
Character set (EBCDIC)	64	256	256	256

* MFCM support is similar to MFCU support; six lines of card printing is possible on the MFCM (optional feature on model A1 only).

Diskette Support: Data can be read from a diskette using ACCEPT verb. In addition, for 5704-CB2 only, a directly-attached 3741 can be specified as an input or output device in the ASSIGN clause of the SELECT statement.

PROGRAM PRODUCTS

Subset ANS COBOL Compiler and Library (cont'd)

Model 15 COBOL Device Support

	Compilation	Execution
5444 Disk Storage Drive (5704-CB1 only) model A2 or A3	Yes	Yes
5445 Disk Storage (5704-CB1 only) model 1, 2 or 3	Yes	Yes
3340 Direct Access Storage Facility model A2, B1, or B2	Yes	Yes
3344 Direct Access Storage (5704-CB2 only) model B2	Yes	Yes
3410/3411 Magnetic Tape Unit model 1, 2, or 3	No	Yes
1403 Printer model 2, 5, or N1	Yes	Yes
3277 Display Station model 1	Yes*	Yes
5424 MFCU model A1 or A2	Yes	Yes
2560 MFCM model A1 or A2	Yes	Yes
1442 Card Read Punch model 6 or 7	Yes	Yes
2501 Card Reader model A1 or A2	Yes	Yes
3284 Printer model 1	Yes	Yes
1255 MCR model 1, 2 or 3	No	No
3881 OMR model 1	No	No
3741 (directly attached) model 1, 2, 3 or 4	Yes	Yes**
BSCA, 1 or 2 lines, LCA, or DA	No	No
Main Storage Requirements		
5704-CB1	12-48K	8-48K
5704-CB2	12-48K	8-56K***

* COBOL and system halts are logged on the 3277. Source statements may be entered from the keyboard.

** 5704-CB2 only. See "Diskette Support".

*** Object program size can be up to 56K, depending on the CCP, spool and configuration options selected during system generation.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: Same as for SCP (5704-SC1 for 5704-CB1; 5704-SC2 for 5704-CB2). For the IBM 1403 Printer, the HN print arrangement is recommended.

SOFTWARE REQUIREMENTS

5704-SC1 for 5704-CB1; 5704-SC2 for 5704-CB2.

COMPATIBILITY

- System/3 COBOL is upward compatible with the DOS and OS ANS COBOL compilers and is a superset of 1130 ANS COBOL providing growth from 1130 through System/3 to System/360 and 370. ROLLOUT support is unique to model 15 COBOL.
- Migration to and from System/3 COBOL requires little source program conversion to effect the transition. Certain 1130 library routines are not included in the System/3 COBOL library, i.e., CALLED subprograms.
- System/3 model 15 COBOL is source language compatible with COBOL on other System/3 models, except for differences due to different hardware. A COBOL source program can be recompiled by a model 15 COBOL compiler without changes to the source program (assuming the same I/O). The resulting object program can be executed under control of the appropriate model 15 SCP and will produce output identical to that on the previous system (assuming equivalent I/O devices and data).
- Any of the disk data files created by any System/3 program using disk system management (e.g., RPG II, Sort and COBOL) can be processed by any System/3 program which uses disk system management to access the file. Scratch files (RETAIN-S) created on other System/3 models are not accessible on the model 15. Files on magnetic tape are similarly compatible between the System/3 models, except only the model 15 supports multi-file tape volumes.

The directly-attached 3741 Data Station or Programmable Workstation is supported only in 5704-CB2.

DOCUMENTATION

(available from Mechanicsburg)

COBOL Reference Manual (GC28-6452) ... Disk Concepts and Planning Guide (GC21-7571). ... S/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 MODEL 15 DISK FORTRAN IV
5704-FO1; 5704-FO2**

PURPOSE

Model 15 FORTRAN IV is a program product that operates under control of the IBM System/3 model 15 SCP. 5704-FO1 is used with SCP 5704-SC1; 5704-FO2 is used with SCP 5704-SC2. The compiler and library are disk resident on the IBM 5444 Disk Storage Drive or the IBM 3340 Direct Access Storage Facility or IBM 3344 Direct Access Storage (5704-FO2 only). The compiler requires as input a FORTRAN source language program and produces as output, by means of the system's Overlay Linkage Editor, a System/3 machine language object program, either cataloged in an object library or punched into 80- or 96-column cards or written onto a diskette. A source program listing, diagnostic messages and main storage map can be requested.

DESCRIPTION

Source input to the compiler can be from the system input device (card reader, 3741 directly attached, or 3277 keyboard) or from the source library. Work files for the compiler can be on any 5444 or 5445 Disk Storage Drive or on 3340 Direct Access Storage Facility or on the 3344 Direct Access Storage. The Overlay Linkage Editor is used to generate object programs.

The model 15 FORTRAN IV language is identical to the FORTRAN IV language for other System/3 models. It contains those features defined in American National Standard Basic FORTRAN, X3.10-1966 and additional language features and capabilities previously available only with certain IBM Full FORTRAN IV Compilers.

The model 15 FORTRAN IV Library contains mathematical and service subroutines required during execution to perform arithmetic operations, input and output conversion, and input and output control.

The model 15 FORTRAN IV Library also includes a Commercial Subroutine Package which is equivalent in function to the 1130 Commercial Subroutine Package insofar as is meaningful in terms of System/3 model 15 devices and data management.

The interval timer is supported for time-of-day functions. This is provided by a supplied SCP subroutine, CFTOD.

Support of 3277 Display Station: A model 15 FORTRAN object program can support the 3277 in either a split-screen or full-screen mode. Using a split-screen, an input file (up to 125 bytes) and/or an output file (up to 125 bytes) can be specified. In full-screen mode, 279 bytes can be read or written. The Operator Console Keyboard is used for data input.

Disk File Support: The access methods supported for 5444, 5445, 3340 and 3344 are the same as those supported by FORTRAN on other System/3 models, and are as follows:

Sequential I/O

Consecutive processing of formatted or unformatted records is supported. Record size of formatted records can range from 1 to 256 bytes. Record size of unformatted records can range from 1 to 32,767 bytes.

Direct Access I/O

Random processing is by relative record number; consecutive processing can also be performed. Record size can range from 1 to 32,767 bytes, formatted or unformatted.

Standard System/3 disk labels are mandatory for all disk files. Non-standard labels cannot be used except as data records within the file.

Indexed files are not supported.

Tape File Support: The access methods supported for the 3410/3411 Magnetic Tape Subsystem are the same as those supported by FORTRAN for other System/3 models. FORTRAN object programs can process data on magnetic tape; highlights include:

- Consecutive input or output files
- 1 - 4 tape drives
- Formatted or unformatted records
- Record size from 18 to 32,767 bytes
- Block size from 18 to 32,767 bytes
- IBM Standard Labels, ANSI Labels, no labels
- 9-track, 800/1600 bpi
- 7-track, 200/556/800 bpi
- Single volume or multi-volume files
- Single file or multi-file volumes
- Recording format: EBCDIC (7- or 9-track) or ASCII (9-track only)

Printer Support: The FORTRAN language supports the 1403 as follows: Space 0, 1, or 2 before or after printing a line ... skip to line 1 before or after printing a line ... overflow detection. Commercial Subroutines support the 1403 as follows: Space immediately 0, 1, 2, or 3 lines ... skip immediately to a specified line number.

FORTRAN supports the 3284 Printer the same way it does the 1403, except that space 0 after print is not allowed.

Card I/O Support: The model 15 FORTRAN supports the MFCU, MFCM, 1442, and 2501 as follows:

	MFCU	MFCM*	1442	2501
Read	Yes	Yes	Yes	Yes
Punch	Yes	Yes	Yes	No
Card Print	Yes	Yes	No	No
Stacker Select**	No	No	No	No
Combined File***	No	No	No	No
Character set (EBCDIC)	64	256	256	256

* MFCM support is similar to MFCU support; six lines of card printing is possible on the MFCM (optional feature on model A1 only).

** Commercial Subroutines support stacker selection of cards from the secondary hopper of the MFCU or MFCM.

*** When using the Commercial Subroutines, the MFCU2, MFCM2, or 1442 may be defined as both input and output.

Diskette Support: 5704-FO1 supports the 3741 directly attached as an input or output device for compilation only. 5704-FO2, in addition to compilation, supports the 3741 as an input/output device during object program execution.

Model 15 FORTRAN Device Support

	Compilation	Execution
5444 Disk Storage Drive (5704-FO1 only) model A2 or A3	Yes	Yes
5445 Disk Storage (5704-FO1 only) model 1, 2 or 3	Yes	Yes
3340 Direct Access Storage Facility model A2, B1, or B2	Yes	Yes
3344 Direct Access Storage (5704-FO2 only) model B2	Yes	Yes
3410/3411 Magnetic Tape Unit model 1, 2, or 3	No	Yes
1403 Printer model 2, 5, or N1	Yes	Yes
3277 Display Station model 1	Yes*	Yes
5424 MFCU model A1 or A2	Yes	Yes
2560 MFCM model A1 or A2	Yes	Yes
1442 Card Read Punch model 6 or 7	Yes	Yes
2501 Card Reader model A1 or A2	Yes	Yes
3284 Printer model 1	Yes	Yes
1255 MCR model 1, 2 or 3	No	No
3881 OMR model 1	No	No
3741 (directly attached) model 1, 2, 3, or 4	Yes	Yes***
BSCA, 1 or 2 lines, LCA or DA	No	No
Main Storage Requirements 5704-FO1	10-48K	8-48K
5704-FO2	10-48K	8-56K**

* FORTRAN and system halts are logged on the 3277. Source statements may be entered from the keyboard.

** Object program size can be up to 56K, depending on the CCP, spool and configuration options selected during system generation.

*** 5704-FO2 only; see "Diskette Support".

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: Same as for SCP (5704-SC1 for 5704-FO1; 5704-SC2 for 5704-FO2).

SOFTWARE REQUIREMENTS

5704-SC1 for 5704-FO1; 5704-SC2 for 5704-FO2.

COMPATIBILITY

System/3 Model 15 FORTRAN IV is source language compatible with FORTRAN IV on other System/3 models. A FORTRAN IV source program can be recompiled by a model 15 FORTRAN IV compiler without changes to the source program (assuming the same I/O). The resulting object program can be executed under control of the appropriate model 15 SCP and will produce output identical to that on the previous system (assuming equivalent I/O devices and data).

The FORTRAN IV compiler accepts source programs written in the IBM System/360 Basic FORTRAN IV language, which encompasses American National Standard Basic FORTRAN as defined in X3.10-1966. The compiler also accepts source programs written in the IBM 1130 Basic FORTRAN IV language with minor modifications.



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PROGRAM PRODUCTS

System/3 Mdl 15 Disk FORTRAN IV (cont'd)

DOCUMENTATION
(available from Mechanicsburg)

*FORTRAN IV Reference Manual (SC28-6874) ... FORTRAN IV
Commercial Subroutines (SC28-6875) ... Disk Concepts and Planning
Guide (GC21-7571) ... S/3 Bibliography (GC20-8080).*

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 MODEL 15 RPG II
5704-RG1; 5704-RG2**

PURPOSE

Model 15 RPG II is a program product that operates under control of the System/3 model 15 System Control Programming. 5704-RG1 is used with SCP 5704-SC1, and 5704-RG2 is used with SCP 5704-SC2. RPG II is disk resident on the 5444 Disk Storage Drive or 3340 Direct Access Storage Facility or 3344 Direct Access Storage (5704-RG2 only). It requires as input an RPG II source language program and produces as output a System/3 model 15 machine language object program, either cataloged in an object library or punched into 80- or 96-column cards, or written onto a diskette. A source program listing, diagnostic messages, and a main storage map can be requested.

DESCRIPTION

To use the RPG II compiler, the user supplies information about the job to be processed. The job can be described on specification sheets prior to entering the source statements into the system. The specification sheets are: Auto-Report, Control Card and File Description, Extension and Line Counter, Telecommunications, Input, Calculation and Output-Format.

Source input to the compiler can be from the system input device (card reader, 3741 directly attached, or 3277 keyboard) or from a source library. Work files for the compiler can be on either a 5444 or 5445 Disk Storage Drive, or on a 3340 Direct Access Storage Facility or 3344 Direct Access Storage (5704-RG2 only). The Overlay Linkage Editor, invoked by the compiler, is used to generate overlays, executable object programs, etc. (On other System/3 models, RPG II uses its own linkage editor rather than the system's Overlay Linkage Editor.) The user can request non-link-edited output from the model 15 RPG II compiler, allowing modification of the control statements prior to the execution of the Overlay Linkage Editor.

In addition to the functions provided by S/3 model 10 Disk RPG II, model 15 RPG II provides the following capabilities:

- Model 15 RPG II includes the following support that is available as separate features in some of the other System/3 models: Telecommunications, Auto-Report, 5445 and Tape support.
- Support of 3340 Direct Access Storage Facility, 2560 MFCM, 2501 Card Reader, 3284 Printer, 1255 Magnetic Character Reader, and 3277 Display Station (with operator console keyboard).
- Support of 3344 Direct Access Storage (5704-RG2 only).
- Support of interval timer for time-of-day function.
- Device Independent Data Management - a sequential file is defined whose assignment to a device can be specified by an OCL FILE statement when the object program is executed. The sequential file can be input (2501, 1442, MFCU, MFCM, 3741 directly attached, 5444, 5445, 3340, 3344 or 3410/3411) or output (1403, 3284, 1442, MFCU, 3741 directly attached, MFCM, 5444, 5445, 3340, 3344 or 3410/3411) but not update, add or combined. Specifications unique to a particular device, such as space, skip, and stacker select are not allowed for this kind of file.
- Additional index space - for 5444, 5445, 3340 or 3344 indexed files, an optional File Description Specification entry, INDEX, permits additional main storage to be used to accommodate more sectors of file index. This is advantageous when sequentially processing indexed files.

Note: 5704-RG2 supports an 'external buffers' option and does not support B-type inquiry programs.

Auto-Report: RPG II Auto-Report enhances the RPG II language by providing functions which eliminate much of the preparation and coding work normally done by the user. It is specifically designed to facilitate report preparation.

Auto-Report executes as a preprocessor to the RPG II Compiler. The input is RPG II source statements and Auto-Report statements. Auto-Report produces a diagnostic listing, replaces the Auto-Report statements with generated or copied RPG II source statements and calls the RPG II compiler for execution.

Support of 3277 Display Station: The 3277 is an integral part of the system and is used as the system console. A model 15 RPG II object program can access the 3277 as an input file (up to 120 bytes), as an output file (up to 120 bytes), as an update file (up to 279 bytes), or as a display file (up to 35 bytes). The 78-key Operator Console Keyboard is used for data input. The program function keys 1-9 can be tested by means of a supplied subroutine, SUBR89.

Disk File Support: The access methods supported for 5444, 5445, 3340 and 3344 are the same as those supported by other System/3 RPG II compilers, and are as follows:

Sequential Organization

- Consecutive Processing - including updating in place.
- Random Processing - by relative record number including updating

but excluding file loading.

Indexed Organization

- Random processing - by key.
- Sequential processing - by key including file loading.

Direct Organization

- Random Processing - by relative record number, including updating and file loading.
- Consecutive Processing

Standard System/3 disk labels are mandatory for all disk files. Non-standard labels cannot be used except as data records within the file.

Record size can range from 1 to 9,999 bytes, and records can be processed as blocked or unblocked. Logical records may span physical disk sectors, tracks or cylinders.

Tape File Support: The access methods supported for the 3410/3411 Magnetic Tape Subsystem are the same as those supported by other System/3 RPG II compilers. RPG II object programs can process data or record address files on magnetic tape. Highlights of tape support include:

- Consecutive input or output files
- 1 - 4 tape drives
- Fixed length records, blocked or unblocked
- Variable length records, blocked or unblocked
- Record size from 18 to 9,999 bytes
- Block size from 18 to 9,999 bytes
- IBM Standard Labels, ANSI Labels, no labels
- Option for two I/O areas
- 9-track, 800/1600 bpi
- 7-track, 200/556/800 bpi
- Single volume or multi-volume files
- Single file or multi-file volumes
- Recording format: EBCDIC or ASCII
- Program options to Rewind or Rewind/Unload at end of job.

Printer Support: RPG II supports the 1403 Printer as follows: Space 0, 1, 2, or 3 before or after printing a line; skip to line number before or after printing a line; overflow detection; first page forms alignment.

RPG II supports the 3284 Printer the same way it does the 1403, except that space 0 after print is not allowed.

Card I/O Support: RPG II supports the MFCU, MFCM, 1442, and 2501 as follows:

	MFCU	MFCM	1442	2501
Read	Yes	Yes	Yes	Yes
Punch	Yes	Yes	Yes	No
Card Print	Yes	Yes	No	No
Stacker Select	Yes	Yes	Yes	No
Combined File	Yes	Yes	Yes	No
Character set (EBCDIC)	64	256	256	256

RPG II support of the MFCM is identical to the System/360 model 20 RPG support, except for certain situations involving stacker selection and combined files.

Card input or output files for which stacker selection is not specified may be double buffered.

Diskette Support: RPG II supports the 3741 directly attached as an input or output device through device independent data management or standard data management.

Telecommunications Support: The first and/or second Binary Synchronous Communications Adapter (BSCA) and the Local Communications Adapter are supported through the use of the RPG II Telecommunications Specifications and the addition of BSCA as a device entry on the RPG II File Description Specification. (The Display Adapter and the BSCC are not supported by the RPG II Telecommunications support.) The support is identical to that provided by other System/3 Telecommunications features, and it includes:

- Modes:** Receive only ... Receive with conversational reply*** ... Transmit only ... Transmit with conversational reply*** ... Alternate transmit and receive file.***
- ***** Not supported in communication with 2770 and 2780, 6670 (as a 2770).

RPG II language features supported: Input, Output and Combined files ... demand files for Transmit and Receive ... Blocking and deblocking of records ... Dual I/O areas.

BSCA features, options, and capabilities supported: Manual call ... manual answer ... Auto-call ... Auto-answer ... Medium Speed ... High Speed ... Station Selection ... EBCDIC data transparency ... intermediate block checking ... EBCDIC or ASCII data and data link control characters. File translation of ASCII data can be accomplished by proper use of the file translation facility of RPG II.

System/3 Model 15 RPG II (cont'd)

For additional information, see the description of the model 10 Disk RPG II Telecommunications feature (5702-RG1, feature #6000/#6002).

Communication with the 5231 model 2 is in Receive mode only. The 5231 model 2 is supported as a 3741 model 2 or 4.

System/3 Model 15 RPG II Device Support

	Compilation	Execution
5444 Disk Storage Drive (5704-RG1 only) model A2 or A3	Yes	Yes
5445 Disk Storage (5704-RG1 only) model 1, 2 or 3	Yes	Yes
3340 Direct Access Storage Facility model A2,B1, or B2	Yes	Yes
3344 Direct Access Storage (5704-RG2 only) model B2	Yes	Yes
3410/3411 Magnetic Tape Unit model 1, 2, or 3	No	Yes
1403 Printer model 2, 5, or N1	Yes	Yes
3277 Display Station model 1	Yes*	Yes
5424 MFCU model A1 or A2	Yes	Yes
2560 MFCM model A1 or A2	Yes	Yes
1442 Card Read Punch model 6 or 7	Yes	Yes
2501 Card Reader model A1 or A2	Yes	Yes
3284 Printer model 1	Yes	Yes
1255 MCR model 1, 2 or 3	No	Yes****
3881 OMR model 1	No	Yes****
3741 (directly attached) model 1, 2, 3 or 4	Yes	Yes
BSCA, 1 or 2 lines, LCA, or DA	No	Yes**
Main Storage Requirements 5704-RG1	10-48K	8-48K***
5704-RG2	10-48K	8-56K*****

* RPG II and system halts are logged on the 3277. Source statements may be entered from the keyboard.

** For a list of terminals supported, see the model 5 SCP pages.

*** When a program generates object code that exceeds the partition size as specified, overlays will be generated to fit. Not all programs - even with overlays - can fit into the stated partition size.

**** Requires SCP subroutine; RPG II SPECIAL exit is used.

***** The discussion of overlays above (***) also applies to 5704-RG2. In addition, object program size can be up to 56K, depending on the CCP, spool and configuration options selected during system generation.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: Same as for model 15 SCP (5704-SC1 for 5704-RG1; 5704-SC2 for 5704-RG2).

SOFTWARE REQUIREMENTS

5704-SC1 for 5704-RG1; 5704-SC2 for 5704-RG2.

COMPATIBILITY

Programs: System/3 model 15 RPG II is source language compatible with RPG II on other System/3 models, except for differences due to different hardware. An RPG II source program can be recompiled by a model 15 RPG II compiler, without changes to the source program (assuming the same I/O). The resulting object program can be executed under control of the appropriate model 15 SCP and will produce output identical to that on the previous system (assuming equivalent I/O devices and data). The System/3 inline inquiry subroutine (SUBR95) is not supported by model 15 RPG II, but the program function keys 1-9 can be tested by using a different subroutine, SUBR89.

Data: Any of the disk data files created by any System/3 program using disk system management (e.g., RPG II, Sort, and COBOL) can be processed by any System/3 program which uses disk system management to access the file. Scratch files (RETAIN-S) created on other System/3 models are not accessible on the model 15. Files on magnetic tape are similarly compatible between System 3 models, except only the model 15 supports multifile tape volumes.

DOCUMENTATION

(available from Mechanicsburg)

Introduction to RPG II (GC21-7514) ... RPG II Reference Manual (SC21-7504) ... RPG II Additional Topics Programmer's Guide (GC21-7567) ... RPG II Disk File Processing Programmer's Guide (GC21-7566) ... RPG II Auto-Report General Information (GC21-7563) ... Auto-Report Reference Manual (SC21-5057) ... RPG II Telecommunications Programming Reference Manual (SC21-7507) ... Disk Concepts and Planning Guide (GC21-7571). ... S/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index

RPG II 3270 DISPLAY CONTROL FEATURE

Feature #6005/#6006

PURPOSE

The RPG II 3270 Display Control feature provides telecommunications services for local or remote 3270 devices. The program can be automatically linked into the RPG II application program via the SPECIAL file exit capability on the RPG II File Description Specification Sheet. Neither the Assembler nor the RPG II Telecommunications feature is required.

DESCRIPTION

The following services are provided by the 3270 Display Control Feature:

- RPG II access to 3270 Display System Terminals attached via the Display Adapter (DA), the Local Communications Adapter (LCA), or the Binary Synchronous Communications Adapter (BSCA).
- Automatic buffering and queuing of terminal data
- A display formatting interface which permits the support of 3270 devices with coding in RPG II
- Complete line control procedures are provided
- Up to 18 terminals may be supported
- Provides the capability of coding one or more applications within one program. No task switching is provided.
- Two subroutines are provided. SUBR13 allows an RPG II program to support 3270s without using CCP. SUBR14 provides upward compatibility with CCP, requiring only program recompilation, assuming the RPG II program meets the CCP requirements.

Terminals Supported

The following terminals and communications facilities are supported under the RPG II 3270 Display Control Feature:

With the Display Adapter

- 3277 Display Station (model 1 or 2)
- 3284 Printer (model 1 or 2)
- 3286 Printer (model 1 or 2)
- 3288 Line Printer (model 2)

With the Local Communications Adapter (LCA) or Binary Synchronous Communications Adapter (BSCA)

- 3275 Display Station and Control, or
- 3271 Display Control Unit (model 1 or 2), with:

- 3277 Display Station (model 1 or 2)
- 3284 Printer (model 1 or 2)
- 3286 Printer (model 1 or 2)
- 3288 Line Printer (model 2)

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Note: The RPG II 3270 Display Control feature is not supported under SCP 5704-SC2 (model 15D).

Minimum System Requirements: In addition to the minimum system requirements of the SCP (5704-SC1), the RPG II 3270 Display Control feature requires one of the following: Display Adapter (DA), the Local Communications Adapter (LCA), or the Binary Synchronous Communications Adapter (BSCA), plus one of the devices listed under "Terminals Supported".

Using SUBR13, approximately 10K-12K bytes are added to the size of the object program. Using SUBR14, approximately 4.3K bytes are added to the size of the object program.

SOFTWARE REQUIREMENTS

5704-SC1; 5704-RG1



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PROGRAM PRODUCTS

System/3 Model 15 RPG II (cont'd)

COMPATIBILITY

The RPG II 3270 Display Control Feature is functionally compatible with the System/3 model 8/10 and System/3 model 12 RPG II 3270 Display Control feature.

DOCUMENTATION

(available from Mechanicsburg)

System/3 RPG II 3270 Display Control Feature Reference and Logic Manual (SC21-5161) ... System/3 Bibliography (GC20-8080).



PROGRAM PRODUCTS

**SYSTEM/3 MODEL 15 DISK SORT
5704-SM1; 5704-SM9****PURPOSE**

The IBM System/3 model 15 Disk Sort program is a program product that sorts a file into ascending or descending sequence. It is resident on an IBM 5444 Disk Storage Drive or an IBM 3340 Direct Access Storage Facility or IBM 3344 Direct Access Storage (5704-SM9 only). 5704-SM1 is used with SCP 5704-SC1, and 5704-SM9 is used with SCP 5704-SC2.

DESCRIPTION

Input file: From 1 to 8 files may be input to the Disk Sort Program. These files may be on 5444 or 5445 Disk Storage drives, 3340 Direct Access Storage Facility, 3344 Direct Access Storage, 3410/3411 Magnetic Tape Subsystem, card reader, or 3741 directly attached. A disk input file can have sequential, indexed or direct organization. For a disk file, the input record size can be from 1 to 9,999 bytes. A tape input file can have fixed length records, either blocked or unblocked; variable length tape records are not supported. The maximum input tape record or block size is 9,999 bytes, and the minimum is 18 bytes. Input tape files can be 9-track 800/1600 bpi or 7-track 200/556/800 bpi. The tape file can be recorded in either EBCDIC or ASCII code. Input can be either a single volume file or a multi-volume file. For a diskette input file, the record size can be only 96 bytes.

Work file: A work file can be resident on a 5444 or 5445 Disk Storage Drive, or on a 3340 Direct Access Storage Facility or 3344 Direct Access Storage. Work space can be specified by the user or can be automatically allocated by the program. Directed auto-allocate references to units D3 or D4 on the 3344 Direct Access Storage is interpreted to mean any of the four logical volumes on the drive.

Output file: The output file can be resident on a 5444 or 5445 Disk Storage Drive, or on a 3340 Direct Access Storage Facility or on 3344 Direct Access Storage, or on a unit of the 3410/3411 Magnetic Tape Subsystem. A disk output file can have sequential organization only. Characteristics of tape output files are the same as for tape input files, described above. The maximum output record size for disk or tape is 4,096 bytes. Output of the program will be in one of three formats: Tag (ADDROUT), tag-along, or summary tag-along.

Features

- Records can be selected or omitted, and reformatted.
- Specified records may be forced ahead of others.
- An alternate collating sequence can be specified.
- Control fields can be in different locations in the records.
- The total length of the control fields can be from 1 to 256 bytes; there is no other limit on the number of control fields.
- Control fields can be sorted in ascending or descending sequence, or mixed (some ascending and some descending).
- Control fields can be sorted using only the digit or zone portion of the character. The fields can be packed or unpacked decimal, or character formats.
- Records containing identical control fields can be combined by summarizing specified fields into one record.

Use: Specifications are described on a simple, RPG-like coding sheet. These specifications are entered into the system using the system input device (card reader, 3741 directly attached, or 3277 keyboard), or they can be stored in the source library on disk. Sort control card diagnostics and messages may be displayed on the system logging device (CRT, 1403 or 3284). The program can be executed in a multi-programming environment and requires from 8K to 48K bytes of main storage, exclusive of SCP requirements.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

Minimum System Requirements: Same as for SCP (5704-SC1 for 5704-SM1; 5704-SC2 for 5704-SM9).

SOFTWARE REQUIREMENTS

5704-SC1 for 5704-SM1; 5704-SC2 for 5704-SM9.

COMPATIBILITY

The System/3 model 15 Disk Sort program is compatible with the Disk Sort programs used on other System/3 models.

DOCUMENTATION

(available from Mechanicsburg)

Disk Sort Reference Manual (SC21-7522). ... System/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 MODEL 15 MAGNETIC TAPE SORT
5704-SM2; 5704-SM8****PURPOSE**

The IBM System/3 model 15 Magnetic Tape Sort Program is a program product that sorts a tape file into ascending or descending sequence. It is resident on an IBM 5444 Disk Storage Drive or an IBM 3340 Direct Access Storage Facility or IBM 3344 Direct Access Storage (5704-SM8 only). 5704-SM2 is used with SCP 5704-SC1, and 5704-SM8 is used with SCP 5704-SC2. A configuration that includes three or four tape units is required.

Input file: The input file resides on any unit of the 3410/3411 Magnetic Tape Subsystem. The input file can have fixed length records, either blocked or unblocked. (Variable length records are not supported). The maximum input record or block size is 9,999 bytes. The minimum input record or block size is 18 bytes. Input tape files can be 9-track 800/1600 bpi or 7-track 200/556/800 bpi. The file can be recorded in either EBCDIC (7- or 9-track) or ASCII (9-track only) code. Input can be either a single volume file or a multi-volume file.

Work files: Three work tapes are required: A fourth can be utilized, if available. Work tapes can be either 7- or 9-track (see restrictions below). Work tapes must be single volume only (not multi-volume).

Output file: The output file resides on any unit of the 3410/3411 Magnetic Tape Subsystem. Characteristics of tape output files are the same as for tape input files, described above. Output is a file of records containing the sort control fields and/or the data fields the user has specified. (The tag (ADDRROUT) and summary tag-along sort capabilities of the Disk Sort are not supported in the Tape Sort.)

Restrictions: To utilize all of the functions of this program, at least three 9-track work tapes must be available. If one or more of the work tapes is 7-track, then only those sort functions that relate to the standard System/3 64-character set (EBCDIC) are supported. As a result, sorts of binary data, packed or unpacked decimal data or sorts on zones are not allowed in these 7-track configurations.

Features

- Records can be selected or omitted, and reformatted.
- Specified records may be forced ahead of others.
- An alternate collating sequence can be specified.
- A checkpoint/restart facility is supported.
- Control fields can be in different locations in the records.
- The total length of the control fields can be from 1 to 256 bytes; there is no other limit on the number of control fields.
- Control fields can be sorted using only the digit or zone portion of the character. The fields can be packed or unpacked decimal, or character formats.
- Control fields can be sorted in ascending or descending sequence, or mixed (some ascending and some descending).

Use: Specifications are described on a simple, RPG-like coding sheet. These specifications are entered into the system using the system input device (card reader, 3741 directly attached, or 3277 keyboard), or they can be stored in the source library on disk. Sort control card diagnostics and messages may be displayed on the system logging device (CRT, 1403 or 3284). The program can be executed in a multiprogramming environment and requires 8K to 48K bytes of main storage, exclusive of SCP requirements.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

Minimum System Requirements: Same as for SCP (5704-SC1 for 5704-SM2; 5704-SC2 for 5704-SM8). In addition, at least three tape drives of the 3410/3411 Magnetic Tape Subsystem are required.

SOFTWARE REQUIREMENTS

5704-SC1 for 5704-SM2; 5704-SC2 for 5704-SM8.

COMPATIBILITY

The model 15 Magnetic Tape Sort Program is functionally compatible with the Disk Resident Magnetic Sort Programs for other System/3 models.

DOCUMENTATION

(available from Mechanicsburg)

Tape Sort Reference Manual (SC21-7572). ... *S/3 Bibliography* (GC20-8080).

TERMS and CONDITIONS: See PP Index



PROGRAM PRODUCTS

**SYSTEM/3 MODEL 15 CCP/DISK SORT
5704-SM7**

PURPOSE

The IBM System/3 model 15 CCP/Disk Sort program is a program product that is used to sort a file into ascending or descending sequence. It is resident on an IBM 3340 Direct Access Storage Facility or IBM 3344 Direct Access Storage. 5704-SM7 is used with SCP 5704-SC2.

With the CCP/Disk Sort program, the user can generate an object module which can be executed as a task under control of the Communications Control Program (CCP) (5704-SC2, feature #6011/#6012), or as a program under control of the SCP in a non-CCP partition.

All Disk Sort functions are available in the CCP/Disk Sort program, including tag, tag-along and summary tag-along sorts, with the following exceptions or requirements:

- For generation, only 12K bytes of main storage is used.
- For the size of the generated program, 12K to 48K can be. However, CCP does not allow a program greater than 32K.
- Only disk input files can be specified. (From 1 to 8 input files may be used.)
- Deferred mount of the output file is not supported, and the output file cannot be written over the input file.
- Automatic work file allocation is not supported.
- Work record lengths cannot be less than 3 bytes.

Use: To use this program, two steps are necessary:

- **Generation:** Using information from OCL FILE statements (for input, work and output files) and sort specifications, this program generates an object module which is cataloged into the object library. Generation is done in a non-CCP partition.
- **Execution:** The CCP system or terminal operator calls the generated object program by entering the name of the program, similar to calling any other program under CCP control. A generated program can be loaded in a batch partition by the system operator.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: Same as for SCP (5704-SC2).

SOFTWARE REQUIREMENTS

5704-SC2.

DOCUMENTATION

(available from Mechanicsburg)

Disk Sort Reference Manual (SC21-7522) ... S/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 MODEL 15
DISK RESIDENT CARD UTILITIES
5704-UT1; 5704-UT3**

PURPOSE

This IBM System/3 program product is resident on an IBM 5444 Disk Storage Drive or an IBM 3340 Direct Access Storage Facility or IBM 3344 Direct Access Storage (5704-UT3 only). 5704-UT1 is used with SCP 5704-SC1 and 5704-UT3 is used with SCP 5704-SC2. It provides the following programs that support 80- or 96-column card files: Sort/Collate, List, Reproduce/Interpret, and Gangpunch. (The following programs are not provided in 5704-UT1 or 5704-UT3 but are available in the model 10 Utilities, 5701-UT1 and 5702-UT1: Data Recording, Data Verifying and 80-96 Conversion Program.)

DOCUMENTATION
(available from Mechanicsburg)

Sort/Collate and Card Utilities Reference Manual (SC21-7529) ... S/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index.

DESCRIPTION

Sort/Collate Program - Functionally identical to the model 10 Sort/Collate Program (see 5701-UT1), the model 15 program also supports the 2560 MFCM.

List Program - Functionally identical to the model 10 96-column List Program (see 5701-UT1), the model 15 program supports input from 5424 MFCU, 2560 MFCM, 1442 Card Read Punch, or 2501 Card Reader. Printed output is directed to the 1403 or 3284 Printer.

Reproduce/Interpret Program - Functionally identical to the model 10 Reproduce/Interpret Program (see 5701-UT1), the model 15 program supports:

- MFCU-1 input and MFCU-2 output, or
- MFCM-1 input and MFCM-2 output, or
- 2501 input and 1442 output.

Gangpunch Program - The model 15 Gangpunch Program provides the following capabilities:

- Interspersed master-card gangpunching: The master and detail cards are intermixed in the primary file.
- Count-controlled gangpunching: A fixed or variable counter may be used to punch a specified number of detail cards. The master card is in the secondary file and the detail cards are in the primary file.
- Match master cards and detail cards on a control field and punch into the detail card if a match occurs: The master card is in the secondary file and the detail card is in the primary file.
- The following functions may be performed with any of the major types of gangpunching described above: Offset gangpunching ... gangpunching consecutive numbers into detail cards ... gangpunching a constant into detail cards ... card interpretation (entire card or only what is punched) ... selection of a single type of master card from many master cards ... selection of a single type of detail card from many detail cards.

The Gangpunch Program supports the following devices:

- For count-controlled and match fields processing
 - MFCU2 input and MFCU1 output, or
 - MFCM2 input and MFCM1 output, or
 - 2501 input and 1442 output.
- For interspersed processing
 - MFCU1 input and output, or
 - MFCM1 input and output, or
 - 1442 input and output.

Use: The programs described above can be executed in a multiprogramming environment and require main storage, exclusive of SCP requirements, as follows: (Note: The minimum partition size is 8K.)

Sort/Collate	8K*
List Program	3K
Reproduce/Interpret	6K
Gangpunch	6K

Additional main storage is used, if available.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: Same as for SCP (5704-SC1 for 5704-UT1; 5704-SC2 for 5704-UT3). The devices required for the particular program (described above) must be available.

SOFTWARE REQUIREMENTS

5704-SC1 for 5704-UT1; 5704-SC2 for 5704-UT3.

COMPATIBILITY

The model 15 Disk Resident Card Utilities that have model 10 equivalents are functionally compatible to the model 10 versions. Operation of the programs is different due to the model 15 system/operator interface.



PROGRAM PRODUCTS

SYSTEM/3 MODEL 12 BASIC ASSEMBLER
5705-AS1

PURPOSE

The IBM System/3 model 12 Basic Assembler program is a program product that processes source programs written in the Basic Assembler language and produces executable object programs. The program is disk resident in a simulation area on the 3340 Direct Access Storage Facility (DASF) and operates under control of the model 12 SCP.

The Basic Assembler language is a symbolic programming language used to write programs. Some of the features provided by the program and its language are:

- Mnemonic Operation Codes
- Symbolic Referencing of Storage Addresses
- Automatic Storage Assignment
- Address Displacement Calculation
- Convenient Data Representation
- Operand Field Expressions
- Source Identification--Sequence Fields
- Assembler Instructions
- Source Program Listing
- Cross-Reference Listing
- Error Checking and Diagnostic Messages

The Basic Assembler can be used to create a stand-alone program. The object program is punched into cards. Program loading is performed with an initial program loader through the 5424 MFCU or the 1442 Card Read Punch. Stand-alone programs are coded entirely by the user with no dependence on other programming support.

The Basic Assembler may also be used for assembly of relocatable subroutines for use with model 12 RPG II, COBOL, or FORTRAN. The subroutines, written in the Basic Assembler language, are coded by the user and separately assembled. The process of program linking is accomplished during compilation of the RPG II source program or by means of the Overlay Linkage Editor, in the case of COBOL or FORTRAN.

Source input into the Assembler can be from the system input device (card reader, 3741 directly attached, or 5471 keyboard), from a source library, or from a source file generated by the Macro Processor. Work files for the Assembler are on the simulation area of a 3340. The Overlay Linkage Editor is used to generate executable object programs.

Model 12 Basic Assembler Device Support

	Source Assembly	Object Execution
3340 Direct Access Storage Facility model C2	Yes	Yes
3410/3411 Magnetic Tape Unit, model 1, 2 or 3	No	Yes
5203 Printer, model 1, 2 or 3	Yes	Yes
1403 Printer, model 2, 5 or N1	Yes	Yes
5424 MFCU, model A1 or A2	Yes	Yes
1442 Card Read Punch, model 6 or 7	Yes	Yes
5471 Printer-Keyboard, model 1	Yes	Yes
1255 MCR, model 1, 2 or 3	No	Yes
3881 OMR, model 1	No	Yes
3741 Data Station/Programmable Workstation, model 1, 2, 3 or 4 (directly attached)	Yes	Yes
BSCA, 1 or 2 lines, ICA, or Local Display Adapter	No	Yes
Main Storage Requirements Program Level Size)	10-56K*	Up to 64K*

* The maximum program level is 64K less supervisor requirements.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: An IBM System/3 model 12 which includes an IBM 5412 Processing Unit model B16 (32K) ... and an IBM 5424 MFCU or an IBM 1442 Card Read Punch or an IBM directly-attached 3741 Data Station/Programmable Workstation ... and an IBM 5203 or 1403 Printer* ... and an IBM 3340 DASF.

* Note: The 5203 or 1403 printer should be equipped with the Universal Character Set feature and a PN (60-character set) print chain/train arrangement. A 48-character set (for example, HN or LC arrangement) can be used with the Assembler; however, the user must be willing to accept substitute characters.

SOFTWARE REQUIREMENTS

5705-SC1.

COMPATIBILITY

The model 12 Basic Assembler program is source language compatible with the model 10 Basic Assembler program. Macro instructions used in model 10 programs (model 10 Macros feature of the SCP) may have to be changed before re-assembling with the model 12 Assembler.

DOCUMENTATION

(available from Mechanicsburg)

System/3 Basic Assembler Reference Manual (SC21-7509) ...
System/3 Basic Assembler Program Product Specifications (GC21-5079) ... System/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**SYSTEM/3 MODEL 12 SUBSET
ANS COBOL COMPILER AND LIBRARY
5705-CB1)**

PURPOSE

IBM System/3 model 12 COBOL is a program product that operates under control of the System/3 model 12 System Control Programming. The compiler and library are disk resident in a simulation area on the 3340 Direct Access Storage Facility (DASF). The compiler requires as input a COBOL source language program and produces as output, by means of the System/3 Overlay Linkage Editor, a System/3 machine language object program, either cataloged in an object library, punched into 80- or 96-column cards, or written onto a diskette. A source program listing, diagnostic messages and a main storage map can be requested.

DESCRIPTION

System/3 COBOL supports Grade 1 Braille for both compiler listings and object program printed output. Minimum requirements include a 132-position printer (5203 or 1403) with 8 lines/inch spacing. A user-provided elastic strip is attached over the printer hammers to produce the Braille characters. The compiler requires a 14K program level in order to produce Braille listings.

Source input to the compiler can be from the system input device (card reader, 3741 directly attached, or 5471 keyboard) or from a source library. Work files for the compiler are in a simulation area of a 3340 Direct Access Storage Facility. The Overlay Linkage Editor is used to generate object programs.

American National Standard COBOL Considerations: The U.S. Industry standard for COBOL is American National Standard COBOL, X3.23-1968, which was approved by the American National Standards Institute (ANSI) on August 23, 1968. The following functional processing modules of the ANSI standard are included in the System/3 model 12 compiler.

1 Nucleus	1, 2
1 Sequential Access	1, 2
1 Random Access	0, 2
1 Library	0, 2
2 Table Handling	1, 3
1 Segmentation	0, 2

The first digit above represents the level of the modules included in the compiler; the second digit represents the lowest level in the American National Standards Institute Standard (0 implies that the module may be completely missing from the standard compilers).

The third digit represents the highest level in the ANSI standard.

The international standard for COBOL is ISO Recommendation Number 1989, which was approved by ISO (International Organization for Standardization) in 1972. System/3 model 12 COBOL bears the same relation to the ISO standard as to the ANSI standard, inasmuch as the two standards are identical in technical content.

Additions: In addition to the standard language, the following additional features are provided:

- Extensions to the modules of American National Standard COBOL listed above, comprising
 - Certain language elements which are defined in higher levels of the American National Standard COBOL than those listed.
 - Certain language elements defined by the CODASYL Programming Language Committee but not yet included by ANSI in American National Standard COBOL.
 - IBM-developed extensions consistent with those supported by the System/360 and 370 OS and DOS ANS COBOL compilers and 1130 ANS COBOL compiler.

Disk File Support: The access methods supported for the 3340 are the same as those supported by System/3 model 10 COBOL and are as follows:

Sequential

- Consecutive Processing - including updating in place.
- Random Processing - by relative record number including updating but excluding file loading.

Indexed (main data area only)

- Random Processing - by key.
- Sequential Processing - by key including file loading.

Direct

- Random Processing—by relative record number, including updating and file loading.
- Consecutive Processing.

Standard System/3 disk labels are mandatory for all disk files. Non-standard labels cannot be used except for data records within the file.

Record size can range from 1 to 32K bytes, and records may be processed as blocked or unblocked. Logical records may span physical disk sectors, tracks or cylinders.

Multi-volume sequential files are supported on the 3340 main data area. Offline multi-volume files are only supported on Drive 2 of the 3340. Neither multi-volume nor indexed files are supported on the simulation areas of the 3340.

Tape File Support: The access methods supported for the 3410/3411 Magnetic Tape Subsystem are the same as those supported by System/3 model 10 COBOL. COBOL object programs can process data on magnetic tape; highlights include:

- Consecutive input or output files
- 1-4 tape drives
- Fixed length records, blocked or unblocked
- Variable length records, blocked or unblocked
- Record size from 18 to 32,768 bytes
- Block size from 18 to 32,768 bytes
- IBM Standard Labels, ANSI labels, no labels
- Option for two I/O areas
- 9-track, 800/1600 bpi
- 7-track, 200/556/800 bpi
- Single volume or multivolume files
- Recording format: EBCDIC (7- or 9-track) or ASCII (9-track only)

Printer Support: COBOL supports the 5203 and 1403 as follows: Space 0, 1, 2, or 3 before or after printing a line; skip to line number before or after printing a line; overflow detection.

Card I/O Support: Model 12 COBOL supports the MFCU and 1442 as follows:

	MFCU	1442
Read	Yes	Yes
Punch	Yes	Yes
Card Print	Yes	No
Stacker Select (punch only)	Yes	Yes
Associated File	Yes	No
Character Set (EBCDIC)	64	256

Diskette Support: COBOL supports the 3741 directly attached as an input or output device for compilation. For object programs, the 3741 is supported only by using the ACCEPT statement.

Model 12 COBOL Device Support

	Compilation	Execution
3340 Direct Access Storage Facility model C2	Yes	Yes
3410/3411 Magnetic Tape Unit model 1, 2 or 3	No	Yes
5203 Printer, model 1, 2 or 3	Yes	Yes
1403 Printer, model 2, 5 or N1	Yes	Yes
5424 MFCU, model A1 or A2	Yes	Yes
1442 Card Read Punch model 6 or 7	Yes	Yes
5471 Printer-Keyboard, model 1	Yes	Yes*
1255 MCR, model 1, 2 or 3	No	No
3881 OMR, model 1	No	No
3741 Data Station/Programmable Workstation model 1, 2, 3 or 4 (directly attached)	Yes	Yes*
BSCA, 1 or 2 lines, ICA, or Local Display Adapter	No	No
Main Storage Requirements (Program Level Size)	12-56K	8-56K

* This device is supported only by using the DISPLAY or ACCEPT statement.

** The maximum program level is 64K less supervisor requirements.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: For source compilation - An IBM System/3 model 12 which includes an IBM 5412 Processing Unit model B16 (32K) ... and an IBM 5424 MFCU or an IBM 1442 Card Read Punch or a directly-attached IBM 3741 Data Station/Programmable Workstation ... and an IBM 5203 or 1403 Printer (the HN print arrangement is recommended) ... and a 3340 DASF.

SOFTWARE REQUIREMENTS

5705-SC1.



PROGRAM PRODUCTS

**System/3 Mdl 12 Subset ANS COBOL
Compiler and Library (cont'd)**

COMPATIBILITY

- System/3 COBOL is upward compatible with the DOS and OS ANS COBOL compilers and is a superset of 1130 ANS COBOL providing growth from 1130 through System/3 to System/360 and 370.
- Migration to and from System/3 COBOL requires little source program conversion to effect the transition. Certain 1130 library routines are not included in the System/3 COBOL library, e.g., CALLED subprograms.
- System/3 model 12 COBOL is source language compatible with System/3 model 10 COBOL, with language differences due to differences in I/O. A System/3 model 10 COBOL source program can be re-compiled on System/3 model 12, without changes to the source, and be executed under control of System/3 model 12 SCP - assuming the same I/O. (Note: A 5444 is equivalent to a simulation area on the 3340; indexed and multi-volume files are supported in the main data areas only; split cylinder files are not supported.)

DOCUMENTATION

(available from Mechanicsburg)

*System/3 Subset ANS COBOL Reference Manual (GC28-6452) ...
System/3 Subset ANS COBOL Program Product Specification
(GC28-6462) ... System/3 Bibliography (GC20-8080).*

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**SYSTEM/3 MODEL 12 DISK FORTRAN IV
5705-FO1**

PURPOSE

System/3 model 12 FORTRAN IV is a program product that operates under control of the System/3 model 12 SCP. The compiler and library are disk resident in a simulation area on the 3340 Direct Access Storage Facility (DASF). The compiler requires as input a FORTRAN source language program and produces as output, by means of the system's Overlay Linkage Editor, a System/3 machine language object program, either cataloged in an object library, punched into 80- or 96-column cards, or written onto a diskette. A source program listing, diagnostic messages and a main storage map may be requested.

DESCRIPTION

Source input to the compiler can be from the system input device (card reader, 3741 directly attached, or 5471 keyboard) or from a source library. Work files for the compiler are in a simulation area of the 3340 Direct Access Storage Facility. The Overlay Linkage Editor is used to generate object programs.

The model 12 FORTRAN IV language is identical to the System/3 model 6 or 10 FORTRAN IV language. It contains those features defined in American National Standard Basic FORTRAN, X3.10-1966 and additional language features and capabilities previously available only with certain Full FORTRAN IV Compilers.

The model 12 FORTRAN IV Library contains mathematical and service subroutines required during execution to perform arithmetic operations, input and output conversion, and input and output control.

The model 12 FORTRAN IV Library also includes a Commercial Subroutine Package which is equivalent in function to the 1130 Commercial Subroutine Package insofar as is meaningful in terms of System/3 model 12 devices and data management.

Disk File Support: The access methods supported for the 3340 are the same as those supported by System/3 model 10 FORTRAN, and are as follows:

Sequential I/O

Consecutive processing of formatted or unformatted records is supported. Record size of formatted records can range from 1 to 256 bytes.

Record size of unformatted records can range from 1 to 32,767 bytes.

Direct Access I/O

Random processing is by relative record number; consecutive processing can also be performed. Record size can range from 1 to 32,767 bytes, formatted or unformatted.

Standard System/3 disk labels are mandatory for all disk files. Non-standard labels cannot be used except as data records within the file.

Indexed files are not supported.

Tape File Support: The access methods supported for the 3410/3411 Magnetic Tape Subsystem are the same as those supported by System/3 model 10 FORTRAN. FORTRAN object programs can process data on magnetic tape; highlights of tape support include:

- Consecutive input or output files
- 1-4 tape drives
- Formatted or unformatted records
- Record size from 18 to 32,767 bytes
- Block size from 18 to 32,767 bytes
- IBM Standard Labels, ANSI Labels, no labels
- 9-track, 800/1600 bpi
- 7-track, 200/556/800 bpi
- Single volume files
- Multivolume files
- Recording format: EBCDIC (7- or 9-track) or ASCII (9-track only)

Printer Support: The FORTRAN language supports the 5203 and 1403 as follows: Space 0, 1, or 2 before or after printing a line ... skip to line 1 before or after printing a line ... overflow detection. Commercial Subroutines support the 5203 and 1403 as follows: Space immediately 0, 1, 2 or 3 lines ... skip immediately to a specified line number.

Card I/O Support: The Model 12 FORTRAN supports the MFCU and 1442 as follows:

	MFCU	1442
Read	Yes	Yes
Punch	Yes	Yes
Card Print	Yes	No
Stacker Select*	No	No
Combined File**	No	No
Character set (EBCDIC)	64	256

* Commercial Subroutines support stacker selection of cards from the 1442 and from the secondary hopper of the MFCU.

** Through use of the Commercial Subroutines, the MFCU or 1442 can support a combined file.

Diskette Support: FORTRAN supports the 3741 directly attached as an input or output device for compilation only.

Model 12 FORTRAN Device Support

	Compilation	Execution
3340 Direct Access Storage Facility model C2	Yes	Yes
3410/3411 Magnetic Tape Unit model 1, 2 or 3	No	Yes
5203 Printer, model 1, 2 or 3	Yes	Yes
1403 Printer, model 2, 5 or N1	Yes	Yes
5424 MFCU, model A1 or A2	Yes	Yes
1442 Card Read Punch, model 6 or 7	Yes	Yes
5471 Printer-Keyboard, model 1	Yes	Yes
1255 MCR, model 1, 2 or 3	No	No
3881 OMR, model 1	No	No
3741 Data Station/Programmable Workstation model 1, 2, 3 or 4 (directly attached)	Yes	No
BSCA, 1 or 2 lines, ICA, or Local Display Adapter	No	No
Main Storage Requirements Program Level Size)	9-56K*	8-56K*

* The maximum program level is 64K less supervisor requirements

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: For source compilation - A System/3 model 12 which includes an IBM 5412 Processing Unit model B16 (32K) ... and an IBM 5424 MFCU or an IBM 1442 Card Read Punch or a directly-attached IBM 3741 Data Station/Programmable Workstation ... and an IBM 5203 or 1403 Printer ... and an IBM 3340 DASF.

SOFTWARE REQUIREMENTS

5705-SC1.

COMPATIBILITY

System/3 model 12 Disk FORTRAN IV source programs are compatible with System/3 Disk FORTRAN IV for System 3 model 6, 8 or 10 except for changes required to accommodate differences in attached I/O. The model 12 FORTRAN compiler accepts source programs written in the IBM System/360 Basic FORTRAN IV language, which encompasses American National Standard Basic FORTRAN as defined in X3.10-1966. The compiler also accepts source programs written in the IBM 1130 Basic FORTRAN IV language with minor modifications.

DOCUMENTATION

(available from Mechanicsburg)

System/3 FORTRAN IV Reference Manual (SC28-6874) ... System/3 FORTRAN IV Commercial Subroutines (SC28-6875) ... System/3 FORTRAN IV Program Product Specifications (GC28-6880) ... System/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index

DATA COLLECTION SYSTEM SUPPORT FOR SYSTEM/3 5705-M31

PURPOSE

The IBM 5230 Data Collection System Support for System/3 program product provides the manufacturer with a convenient, practical means of preparing shop floor data for processing by a user-provided management accounting system. Data collected by the IBM 5230 Data Collection System is edited, consolidated, and formatted on the System/3 for such applications as payroll accounting, inventory management, and production control. By the customer making simple changes in the output formats of both program products, IBM 5230 Data Collections System Support for System/3 can provide input to and use turnaround documents from the System/3 Shop Loading and Control program product (5702-M51).

DESCRIPTION

The 5230 Data Collection System Support for System/3 program product provides two phases of operations: A 5230 personalization phase and a data conversion phase.

The 5230 personalization phase provides a menu of actions from which the user selects those that best fit the operation. Using the menu selections and loop definitions for up to three 5231 controllers with up to four loop each, this phase creates the personalization records required to personalize the 5230 Data Collection System.

The data conversion phase prepares the data received from the 5230 Data Collection System for processing by the user-provided applications. The data can be accepted through the data communications facilities, the 96-column cards, the 80-column cards, or the diskette offered as output options by the 5230 Data Collection System. (Input from 80-column cards or diskette requires minor changes to source).

Both material transactions and labor transactions are prepared by the program product. The material transactions are edited, listed, formatted and stored for later processing by the user-provided inventory management and production control applications. Labor transactions are expanded, edited, checked for accuracy and adjusted for break and lunch times and lunch and shift start-stop time variances. Time and attendance totals are checked against job time totals with warning messages printed for differences that exceed user-prescribed limits. The elapsed time for time and attendance and job time is calculated. Job time applied to overlapping jobs is apportioned to the jobs. A correction procedure is included to allow for changing incorrect labor records. The results of the labor transaction processing are stored for later processing by the user-provided payroll and production control applications.

Reports are printed, at the user's option, for material transactions and for labor transactions. The material transactions report is a single listing. Labor transactions reports provide labor-related information suitable for management review and checking by foremen for correctness.

A *Program Reference Manual* provides installation and planning information such as input and output formats, a description of the processing, control and audit information, and a discussion of the sample problem.

An *Operations Guide* specifies the procedures that must be followed to make any necessary modifications, to compile and include the program in the system library, and to prepare data for the program. A discussion of operating procedures and messages is also included.

HIGHLIGHTS

- Provides needed input to user-provided applications
 - Elapsed time calculation for payroll
 - Material receipt and issue data for inventory management
 - Job elapsed time and location data for production control
- Management reports generated as a byproduct of data entry
 - Jobs started checked against time and attendance record
 - Transaction records checked for complete and accurate entry
- Provides for automatic generation of machine-readable data
 - Uses punched-card turnaround documents from user-supplied applications
 - Reduces transcription errors
 - Eliminates timekeeper calculation of elapsed time

CUSTOMER RESPONSIBILITIES

IBM will provide assistance in many areas pertaining to the installation of IBM program products. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day to day operation lies solely with the customer. Activities, within these areas of customer responsibility, are defined to include, but not be limited to, the following:

Personnel selection and training ... the customer is responsible for selecting at least one person who will be responsible for supervising the installation and at least one person to assume the duties of an operator.

The customer is also responsible for the coordination and education of the various user departments affected by the installation.

Installation ... the customer is responsible for installation of the product. Installation activities include:

- Establishing an installation plan and schedule consistent with the requirements and availability of customer personnel
- Entering control data and compiling the program
- Copying the delivered disk cartridges for backup purposes
- Creation of the badge file and verification of the data
- Modification of existing programs to interface to the program product

Day-to-day system operation ... the customer is responsible for the day to day operation of the system and the results derived from its operation. The customer is also responsible for maintaining controls and audit trails consistent with good business practices and for the security and safekeeping of all machine-readable material and documents which are related to, and/or resulting from, the operation of the system.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

The IBM 5230 Data Collection System Support will execute on any model of the System/3 meeting the following minimum configuration:

System/3 Model 8

- IBM 5408 with 16K of primary storage
- IBM 3741 Data Station directly attached
- IBM 5444 model A1 Disk Storage Drive
- IBM 5203 Printer with 132 print positions and PN or GN print character arrangement

System/3 Model 10

- IBM 5410 with 16K of primary storage
- IBM 5444 model 1 or A1 Disk Storage Drive
- IBM 5424 Multifunction Card Unit
- IBM 5203 Printer with 132 print positions and PN or GN print character arrangement

System/3 Model 12

- IBM 5412 with 32K of primary storage
- IBM 3340 model C2 Direct Access Storage Facility
- IBM 5424 Multifunction Card Unit or IBM 3741 Data Station directly attached
- IBM 5203 Printer with 132 print positions and PN or GN print character arrangement

System/3 Model 15

- IBM 5415 with 48K of primary storage
- IBM 5444 model A2 Disk Storage drive
- IBM 5424 Multifunction Card Unit or IBM 3741 Data Station directly attached
- IBM 3277 Systems Console
- IBM 5421 Printer Control Unit
- IBM 1403 Printer with 132 print positions and PN or GN print character arrangement

If the data communications features of 5230 Data Collection System Support for the System/3 are to be used, the Binary Synchronous Communications Adapter, the Local Communications Adapter, or the Integrated Communications Adapter must be added to the minimum configuration. The processing unit must contain the appropriate expansion and attachments features if required.

SOFTWARE REQUIREMENTS

The IBM 5230 System Support for System/3 is written in RPG II programming language and executes under control of the System/3 System Control Program. The System/3 Disk Sort program is also required for execution of the program. The System/3 RPG II compiler is required for tailoring and compiling the Data Collection System Support for System/3. The program numbers applicable to the different system models are given below.

For System/3 Models 8 and 10

System Control Program	5702-SC1
Disk Sort Program	5702-SM1
RPG II Compiler	5702-RG1

If data communications is used, the RPG II Compiler must have either feature #6000 or feature #6002 installed.

For System/3 Model 12

System Control Program	5705-SC1
Disk Sort Program	5705-SM1
RPG II Compiler	5705-RG1



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PROGRAM PRODUCTS

Data Collection System Support for System/3 (cont'd)

For System/3 Model 15

System Control Program

5704-SC1

Disk Sort Program

5704-SM1

RPG II Compiler

5704-RG1

DOCUMENTATION

(available from Mechanicsburg)

IBM 5230 Data Collection System Support for System/3 General Information Manual (GH30-0204) ... Facts Flyer (G580-0073) ... Data Collection Application Workbook (GH20-0203) ... Executive Guide (G580-0072) ... IBM 5230 Data Collection User's Guide (GA34-0040).

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 MODEL 12 RPG II
5705-RG1**

PURPOSE

IBM System/3 model 12 RPG II is a program product that operates under control of the System/3 model 12 System Control Programming. RPG II is disk resident in a simulation area on the 3340 Direct Access Storage Facility (DASF). It requires as input an RPG II source language program and produces as output a System/3 model 12 machine language object program, either cataloged in an object library or punched into 80- or 96-column cards, or written onto a diskette. A source program listing, diagnostic messages, and a main storage map can be requested.

To use the RPG II compiler, the user supplies information about the job to be processed. The job can be described on specification sheets prior to entering the source statements into the system. The specification sheets are: Auto Report, Control Card and File Description, Extension and Line Counter, Telecommunications, Input, Calculation and Output-Format.

Source Input to the compiler can be from the system input device (card reader, 3741 directly attached, or 5471 keyboard) or from a source library. Work files for the compiler are on a simulation area of a 3340 data module.

In addition to the functions provided by System/3 model 10 Disk RPG II, model 12 RPG II provides the following capabilities:

- Support of 3340 Direct Access Storage Facility.
- Included as standard functions of the model 12 RPG II, the following support that is available as separately priced features in model 6 and/or 10 RPG II: Telecommunications, Auto Report, and Magnetic Tape support.

Disk File Support: The access methods supported for the 3340 are the same as those supported by System/3 model 10 Disk RPG II and are as follows:

Sequential

- Consecutive Processing - including updating in place.
- Random Processing - by relative record number including updating but excluding file loading.

Indexed (main data area only)

- Random processing - by key.
- Sequential processing - by key including file loading.

Direct

- Random Processing - by relative record number, including updating and file loading.
- Consecutive Processing.

Standard System/3 disk labels are mandatory for all disk files. Non-standard labels cannot be used (except as data records within the file).

Record size can range from 1 to 9,999 bytes, and records can be processed as blocked or unblocked. Logical records may span physical disk sectors, tracks or cylinders.

Tape File Support: The access methods supported for the 3410/3411 Magnetic Tape Subsystem are the same as those supported by System/3 model 10 Disk RPG II. RPG II object programs can process data or record address files on magnetic tape. Highlights of tape support include:

- Consecutive input or output files
- 1-4 tape drives
- Fixed length records, blocked or unblocked
- Variable length records, blocked or unblocked
- Record size from 18 to 9,999 bytes
- Block size from 18 to 9,999 bytes
- IBM Standard Labels, ANSI Labels, no labels
- Option for two I/O areas
- 9-track, 800/1600 bpi
- 7-track, 200/556/800 bpi
- Single volume or multi-volume files
- Recording format: EBCDIC (7-or 9-track) or ASCII (9-track only)
- Program options to Rewind or Rewind/Unload at end of job

Printer Support: RPG II supports the 5203 and 1403 Printer as follows: Space 0, 1, 2 or 3 before or after printing a line; skip to line number before or after printing a line; overflow detection; first page forms alignment. The 5203 dual feed carriage is supported.

Card I/O Support: RPG II supports the MFCU and 1442 as follows:

	MFCU	1442
Read	Yes	Yes
Punch	Yes	Yes
Card Print	Yes	No
Stacker Select	Yes	Yes
Combined File	Yes	Yes
Character set (EBCDIC)	64	256

Diskette Support: A directly-attached 3741 is supported as a unit record input/output device for RPG II object programs.

Model 12 RPG II Device Support

	Compilation	Execution
3340 Direct Access Storage Facility, model C2	Yes	Yes
3410/3411 Magnetic Tape Unit, models 1, 2 or 3	No	Yes
5203 Printer, model 1, 2 or 3	Yes	Yes
1403 Printer, model 2, 5, or N1	Yes	Yes
5424 MFCU, model A1 or A2	Yes	Yes
1442 Card Read Punch, model 6 or 7	Yes	Yes
5471 Printer-Keyboard, model 1	Yes	Yes
1255 MCR, model 1, 2 or 3	No	Yes**
3881 OMR, model 1	No	Yes**
3741 Data Station/Programmable Workstation model 1, 2, 3 or 4 (directly attached)	Yes	Yes
BSCA, 1 or 2 lines, ICA, or Local Display Adapter	No	Yes
Main Storage Requirements (Program Level Size)	8-56K*	8-56K*

- * The maximum program level is 64K less supervisor requirements.
- ** Requires SCP subroutine; RPG II SPECIAL exit is used.

Auto Report: Model 12 RPG II Auto Report is functionally identical to the S/3 model 10 Disk RPG II Auto Report feature. Auto Report enhances the RPG II language by providing functions which eliminate much of the preparation and coding work normally done by the user. It is specifically designed to facilitate report preparation.

Auto Report executes as a preprocessor to the RPG II Compiler. The input is RPG II source statements and Auto Report statements. Auto Report produces a diagnostic listing, replaces the Auto Report statements with generated or copied RPG II source statements and calls the RPG II Compiler for execution.

Telecommunications Support: Support of the Binary Synchronous Communications Adapter (BSCA), and the Integrated Communications Adapter (ICA) is achieved through use of the RPG II Telecommunications Specifications Sheet and the addition of BSCA as a device entry on the RPG II File Description Specification. The support is identical to that provided by System/3 model 6 and 10 RPG II Telecommunications features, and includes:

Communication modes: Receive only ... Receive with conversational reply* ... Transmit only ... Transmit with conversational reply* ... Alternate transmit and receive file. (*Not supported in communication with System 32, System/34, 2770, 2780, 3741-2, and 3741-4 or a 5110 Computer System supported as a 3741 model 2 or 4.)

Communication with the 5231 model 2 is in Receive mode only. The 5231 model 2 is supported as a 3741 model 2 or 4.

RPG II language features supported: Input, Output, and Combined files ... Demand files for Transmit and Receive ... Blocking and deblocking of records ... Dual I/O areas.

BSCA and ICA features, options and capabilities supported: Manual Call ... Manual answer ... Auto-call (BSCA only) ... Auto-Answer ... Medium speed ... High speed (BSCA only) ... Station selection ... EBCDIC data transparency ... intermediate block checking ... EBCDIC or ASCII data and data link control characters. File translation of ASCII data can be accomplished by proper use of the file translation facility of RPG II.

For additional information, see the description of the model 10 Disk RPG II Telecommunications feature (5702-RG1, feature #6000/#6002).

COMPATIBILITY

System/3 model 12 RPG II is source language compatible with the System/3 model 10 Disk RPG II (5702-RG1) and System/3 model 6 RPG II (5703-RG1) except for differences due to different hardware. A System/3 model 6 or 10 Disk RPG II source program can be re-compiled on System/3 model 12, without changes to the source, and be executed under control of System/3 model 12 SCP - assuming the same I/O. (Note: 5444 is equivalent to a 5444 simulation area on the 3340; indexed and multi-volume files are supported in the main data areas only; split cylinder files are not supported; shared I/O areas are not supported.)

System/3 Model 12 RPG II (cont'd)

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: For source program compilation - An IBM System/3 model 12 which includes an IBM 5412 Processing Unit model B16 (32K) ... and an IBM 5424 MFCU or an IBM 1442 Card Read Punch or directly-attached IBM 3741 Data Station/Programmable Workstation ... and an IBM 5203 or 1403 Printer ... and an IBM 3340 DASF.

SOFTWARE REQUIREMENTS

5705-SC1.

DOCUMENTATION

(available from Mechanicsburg)

Introduction to RPG II (GC21-7514) ... System/3 RPG Reference Manual (SC21-7504) ... System/3 RPG II Auto Report General Information (GC21-7563) ... System/3 PRG II Auto Report Reference Manual (SC21-5057) ... System/3 RPG II Telecommunications Reference Manual (SC21-7507) ... System/3 RPG II Program Product Specifications (GC21-5081) ... System/3 RPG II Additional Topics Programmer's Guide (GC21-7577) ... System/3 RPG II Disk File Processing Programmer's Guide (GC21-7566) ... System/3 Bibliography (GC20-8080).

RPG II 3270 DISPLAY CONTROL FEATURE

Feature #6003/#6004

PURPOSE

The RPG II 3270 Display Control feature provides telecommunications services for local or remote 3270 devices. The program is automatically linked into the RPG II application program via the SPECIAL file exit capability on the RPG II File Description Specification Sheet. Neither the Assembler nor the RPG II Telecommunications feature is required.

DESCRIPTION

The following services are provided by the Display Control feature:

- RPG II access to 3270 Display System Terminals attached via the Local Display Adapter, the Integrated Communications Adapter (ICA), or the Binary Synchronous Communications Adapter (BSCA).
- Automatic buffering and queuing of terminal data
- A display formatting interface which permits the support of 3270 devices with coding in RPG II
- Complete line control procedures are provided
- Up to 18 terminals may be controlled (up to 12 can be attached via the Local Display Adapter)
- Provides the capability of coding one or more applications within one program. No task switching is provided.
- Two subroutines are provided. SUBR13 allows an RPG II program to support 3270s without using CCP. SUBR14 provides upward compatibility with CCP, requiring only program recompilation, assuming the RPG II program meets the CCP requirements.

Terminals Supported: The following terminals and communications facilities are supported under the RPG II 3270 Display Control feature:

With the Local Display Adapter

- 3277 Display Station (model 1 or 2)
- 3284 Printer (model 1 or 2)
- 3286 Printer (model 1 or 2)
- 3288 Printer (model 2)

Note: A maximum of 12 terminals may be attached via the Local Display Adapter.

With the Integrated Communications Adapter (ICA) or the Binary Synchronous Communications Adapter (BSCA).

- 3275 Display Station and Control, or
- 3271 Display Control Unit (model 1 or 2), with:
 - 3277 Display Station (model 1 or 2)
 - 3284 Printer (model 1 or 2)
 - 3286 Printer (model 1 or 2)
 - 3288 Printer (model 2)

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: The RPG II 3270 Display Control feature requires an IBM System/3 model 12 which includes, as a minimum, an IBM 5412 Processing Unit model B16 (32K bytes) ... an IBM 3340 model C2 DASF ... an IBM 5203 or 1403 Printer ... an IBM 5424 MFCU or an IBM 1442 Card Read Punch or a directly-attached 3741 Data Station/Programmable Workstation ... a Local Display Adapter or an Integrated Communications Adapter or a Binary Synchronous Communications Adapter and one of the devices listed under "Terminals Supported".

Using SUBR13, approximately 10K-12K bytes are added to the size of the object program. Using SUB14, approximately 4.3K bytes are added to the size of the object program.

SOFTWARE REQUIREMENTS

5705-SC1, 5705-RG1.

COMPATIBILITY

The System/3 model 12 RPG II 3270 Display Control feature is functionally compatible with the System/3 model 8/10 and System/3 model 15 RPG II 3270 Display Control feature.

DOCUMENTATION

(available from Mechanicsburg)

IBM RPG II 3270 Display Control Feature Reference and Logic Manual (SC21-5161) ... System/3 Bibliography (GC20-8080).

Programming Service Classification: A.

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 MODEL 12 DISK SORT
5705-SM1****PURPOSE**

The IBM System/3 model 12 Disk Sort program is a program product that sorts a file into ascending or descending sequence. The program is resident in a simulation area on the 3340 Direct Access Storage Facility (DASF) and operates under control of the model 12 SCP.

DESCRIPTION

Input files - Multiple input files are supported - up to eight input files from disk and/or tape. An input file can be resident on a 3340 DASF or on a unit of the 3410/3411 Magnetic Tape subsystem. A disk file can have sequential, indexed or direct organization. For a disk file, the input record size can be from 1 to 9,999 bytes. A tape input file can have fixed length records, either blocked or unblocked; variable length tape records are not supported. The maximum input tape record or block size is 9,999 bytes, and the minimum is 18 bytes. Input tape files can be 9-track 800/1600 bpi or 7-track 200/556/800 bpi. The tape file can be recorded in either EBCDIC or ASCII code. Input can be either a single volume file or a multi-volume file.

Work file - A work file can be resident on a simulation area or main data area of a 3340 DASF. Work space can be specified by the user or can be automatically allocated by the program.

Output file - The output file can be resident on a 3340 DASF or on a unit of the 3410/3411 Magnetic Tape Subsystem. A disk output file can have sequential organization only. Characteristics of tape output files are the same as for tape input files, described above. The maximum output record size for disk or tape is 4,096 bytes. Output of the program will be one of three formats: Tag (ADDRROUT), tag-along, or summary tag-along.

Features

- Records can be selected or omitted, and reformatted.
- Specified records may be forced ahead of others.
- An alternate collating sequence can be specified.
- Control fields can be in different locations in the records.
- The total length of the control fields can be from 1 to 256 bytes; there is no other limit on the number of control fields.
- Control fields can be sorted in ascending or descending sequence, or mixed (some ascending and some descending).
- Control fields can be sorted using only the digit or zone portion of the character. The fields can be packed or unpacked decimal, or character formats.
- Records containing identical control fields can be combined by summarizing specified fields into one record.

Use: Specifications are described on a simple, RPG-like coding sheet. These specifications are entered into the system using the system input device, or they can be stored in the source library on disk. Sort control statement diagnostics and messages may be displayed on the system logging device.

The program can be executed in a dual programming environment and uses from 8K to 56K bytes of main storage, exclusive of SCP requirements.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

Minimum System Requirements: An IBM System/3 model 12 which includes an IBM 5412 Processing Unit model B16 (32K), and an IBM 5424 MFCU or an IBM 1442 Card Read Punch or a directly-attached IBM 3741 Data Station/Programmable Workstation, and an IBM 5203 or 1403 Printer and an IBM 3340 DASF.

SOFTWARE REQUIREMENTS

5705-SC1. (See SCP pages.)

COMPATIBILITY

The model 12 Disk Sort program is source language compatible with the Disk Sort programs for the System/3 models 6, 8 and 10.

DOCUMENTATION

(available from Mechanicsburg)

System/3 Disk Sort Reference Manual (SC21-7522) ... System/3 Disk Sort Program Product Specifications (GC21-5083) ... System/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 MODEL 12 MAGNETIC TAPE SORT
5705-SM2****PURPOSE**

The IBM System/3 model 12 Magnetic Tape Sort program is a program product that sorts a tape file into ascending or descending sequence. It is resident in a simulation area on the 3340 Direct Access Storage Facility (DASF) and operates under control of the model 12 SCP. A configuration that includes three or four tape units is required. The program is functionally identical to the System/3 model 10 Disk Resident Magnetic Tape Sort program (5702-SM2).

Input files - The input file resides on any unit of the 3410/3411 Magnetic Tape Subsystem. The input file can have fixed length records, either blocked or unblocked. (Variable length records are not supported.) The maximum input record or block size is 9,999 bytes. The minimum input record or block size is 18 bytes. Input tape files can be 9-track 800/1600 bpi or 7-track 200/556/800 bpi. The file can be recorded in either EBCDIC (7- or 9-track) or ASCII (9-track only) code. Input can be either a single volume file or a multivolume file.

Work files - Three work tapes are required; a fourth can be utilized, if available. Work tapes can be either 7- or 9-track (see restrictions below). Work tapes must be single volume only (not multivolume).

Output file - The output file resides on any unit of the 3410/3411 Magnetic Tape Subsystem. Characteristics of tape output files are the same as for tape input files, described above. Output is a file of records containing the sort control fields and/or the data fields the user has specified. (The tag [ADDROUT] and summary tag-along sort capabilities of the Disk Sort are not supported in the Tape Sort.)

Restrictions: To utilize all of the functions of this program, at least three 9-track work tapes must be available. If one or more of the work tapes is 7-track, then only those sort functions that relate to the standard System/3 64-character set (EBCDIC) are supported. As a result, sorts of binary data, packed or unpacked decimal data or sorts on zones are not allowed in these 7-track configurations.

Features

- Records can be selected or omitted, and reformatted.
- Specified records may be forced ahead of others
- An alternate collating sequence can be specified.
- A checkpoint/restart facility is supported.
- Control fields can be in different locations in the records.
- The total length of the control fields can be from 1 to 256 bytes; there is no other limit on the number of control fields.
- Control fields can be sorted using only the digit or zone portion of the character. The fields can be packed or unpacked decimal, or character formats.
- Control fields can be sorted in ascending or descending sequence or mixed (some ascending and some descending).

Use: Specifications are described on a simple, RPG-like coding sheet. These specifications are entered into the system using the system input device, or they can be stored in the source library on disk. Sort control statement diagnostics and messages may be displayed on the system logging device. The program can be executed in a dual programming environment and requires 8K to 55K bytes of main storage, exclusive of SCP requirements.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

Minimum System Requirements: An IBM System/3 model 12 which includes an IBM 5412 Processing Unit model B16 (32K), and an IBM 5424 MFCU or an IBM 1442 Card Read Punch or a directly-attached IBM 3741 Data Station/Programmable Workstation, and an IBM 5203 or 1403 Printer, and an IBM 3340 DASF. At least three tape drives of the IBM 3410/3411 Magnetic Tape Subsystem are required.

SOFTWARE REQUIREMENTS

5705-SC1_z (See SCP pages.)

COMPATIBILITY

The model 12 Magnetic Tape Sort program is functionally compatible with the Disk Resident Magnetic Tape Sort program for System/3 model 8 and System/3 model 10.

DOCUMENTATION

(available from Mechanicsburg)

System/3 Tape Sort Reference Manual (SC21-7572) ... System/3 Magnetic Tape Program Planning Manual (GC21-5040) ... System/3 Tape Sort Program Products Specifications (GC21-5138) ... System/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**SYSTEM/3 MODEL 12 DISK RESIDENT CARD UTILITIES
5705-UT1****PURPOSE**

This IBM System/3 program product is resident in a simulation area on the 3340 Direct Access Storage Facility (DASF) and operates under control of the model 12 SCP. The following programs are provided: Sort/Collate, List, Reproduce/Interpret, and Gangpunch. (The following programs, included in the model 10 Utilities, 5701-UT1 and 5702-UT1, are not available for the model 12: Data Recording, Data Verifying, and 80-96 Conversion program.)

DESCRIPTION

Sort/Collate Program - Functionally compatible with the model 10 Sort/Collate program (see 5701-UT1). The model 12 program supports the 5424 MFCU only.

List Program - Functionally compatible with the model 10 96-column List program (see 5701-UT1). The model 12 program supports input from 5424 MFCU, 1442 Card Read Punch, or the directly-attached 3741.

Reproduce/Interpret Program - Functionally compatible with the model 10 Reproduce/Interpret program (see 5701-UT1). The model 12 program supports the 5424 MFCU only.

Gangpunch Program - Functionally compatible with the model 10 Gangpunch program (see 5702-UT1). The model 12 program supports the 5424 MFCU.

Use: Each program described above can be executed in an 8K program level in a dual program environment.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

Minimum System Requirements: An IBM System/3 model 12 which includes an IBM 5412 Processing Unit model B16 (32K), and an IBM 5203 or 1403 Printer, and an IBM 3340 DASF, and the device required for the particular program described above (IBM 5424 MFCU, 1442 Card Read Punch, or a directly-attached IBM 3741 Data Station/Programmable Workstation).

SOFTWARE REQUIREMENTS

5705-SC1. (See SCP pages.)

COMPATIBILITY

The model 12 Disk Resident Card Utilities that have model 10 equivalents are functionally compatible to the model 10 versions.

DOCUMENTATION

(available from Mechanicsburg)

System/3 Sort/Collate and Card Utilities Reference Manual SC21-7529 ... *System/3 Disk Resident Card Utilities Program Product Specifications* (GC21-7535) ... *System/3 Bibliography* (GC20-8080).

TERMS and CONDITIONS: See PP Index

**SYSTEM/3 UTILITY PROGRAM FOR
1255 MAGNETIC CHARACTER READER
5705-UT2****PURPOSE**

This utility program provides the System/3 model 12 user control of document processing on the IBM 1255 Magnetic Character Reader. It provides a means of reading MICR encoded documents from the 1255, accumulating document totals and amount field totals for each pocket, and placing the data from the documents on output disk or tape and printer files. The program is designed to fulfill the basic requirements of the "ON-US" data capture run required for all Demand Deposit Application Programming.

DESCRIPTION

The program reads fields from the documents as specified by the user and then, based on decisions indicated by the user, it will stacker select these documents into user-specified pockets. If requested, Modulus 10 or 11 checking will be performed. Then after each document has been read and stacker selected, the utility will print user-specified fields from that document. Fixed-length disk records will also be created and placed on a disk file or a tape file (3410 or 3411 9-track only).

An additional facility provided by the program is the accumulation of document totals and amount field totals and then printing these at end of job. Subtotals may be printed at any time as indicated by the user during program execution.

Use: The utility requires at least 10K bytes of main storage when disk output is requested and 12K bytes of main storage when tape output is requested (exclusive of SCP requirements). The program will operate in a dual program environment.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

Minimum System Requirements: An IBM System/3 model 12 which includes an IBM 5412 Processing Unit model B16 (32K) with a Serial I/O Channel (#7081), and an IBM 5424 MFCU or a directly-attached IBM 3741 Data Station/Programmable Workstation, and an IBM 5203 or 1403 Printer, and an IBM 3340 DASD, and an IBM 1255 Magnetic Character Reader, model 1, 2 or 3.

SOFTWARE REQUIREMENTS

5705-SC1. (See SCP pages.)

COMPATIBILITY

The model 12 Utility Program for the 1255 MCR is functionally compatible to the model 10 version.

DOCUMENTATION

(available from Mechanicsburg)

System/3 Models 10 and 12 Utility Programs for the 1255 MCR Reference Manual (SC21-7521) ... System/3 1255 Utility Program Product Specifications (GC21-5030). ... System/3 Bibliography (GC20-8080).

TERMS and CONDITIONS: See PP Index



PROGRAM PRODUCTS

**SYSTEM/7 FORTRAN IV
STAND-ALONE COMPILER and LIBRARY
5707-FO1****PURPOSE**

Provides high-level FORTRAN language support for the System/7 user by offering the ease and speed of coding in the FORTRAN language. The Compiler and Library program product is installed on the System/7 and executes as a component under the System/7 Program Preparation Facilities, thereby significantly enhancing stand-alone program preparation capability on the System/7.

The System/7 FORTRAN IV program product is designed to provide users with convenient access to a powerful, easy-to-use higher-level language with which they may write scientific, sensor-based and other applications.

DESCRIPTION

Users will compile their programs with the System/7 FORTRAN IV compiler. The System/7 Linkage Editor under the S/7 Program Preparation Facilities will combine these programs with the FORTRAN library routines, sensor-based routines, and/or other MSP/7 routines to form an executable real-time application program. The FORTRAN programs which are connected to an interrupt on a priority level via MSP/7 facilities gain control whenever the appropriate device or software interrupt occurs.

The user also may utilize the batch DSS/7 nucleus provided as part of the System/7 Program Preparation Facilities. Thus, users need not build their own MSP/7 nucleus, thereby enhancing the installability and usability of FORTRAN. In this environment the user is offered batch compile-and-go facilities and sequential DP I/O device support for the 5028 Operator Station, 5022 Disk Storage Module, 129 Data Recorder and the 7431 Serial Printer.

Some of the features that FORTRAN offers include:

- ANS Basic FORTRAN with major extension
- Syntax checking mode, at substantial compile time savings
- Optimization during compilation for time, space and execution performance
- Sequential Access Method support of the 5028 Operator Station, 5022 Disk Storage Module, 129 Data Recorder, 7431 Serial Printer
- Direct support of the Binary Synchronous Communications Adapter through the Communications Access Method
- Extensive library containing mathematical subprograms, implicitly-called subprograms, service subprograms, and sensor-based subroutines. New sensor-based subroutines have been included conforming to the Instrument Society of America Standard S61.1 providing such functions as:
 - initiation, suspension and termination of user programs based upon time parameters
 - reading analog input points in random or sequential order
 - setting and resetting digital output at specified times
 - reading and writing input and output registers
 - bit manipulation through logical shift complement and inclusive and exclusive OR, AND functions.
- Compatibility with host FORTRAN IV Library and host FORTRAN IV source and object code.
- MSP/7 functions including sensor I/O available through CALL statements

CUSTOMER RESPONSIBILITIES

- Understand the application they wish to perform and provide the appropriate hardware and software design
- Install the System/7 Program Preparation Facilities
- Utilize the batch DSS/7 (8-12K) nucleus or generate the supporting system nucleus for servicing sensor-based devices
- Provide the required user-written programs and link-edit these programs with the MSP/7 nucleus
- Test the resulting object programs

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS****Minimum Hardware for Compilation:**

- IBM System/7 (5010 mdl A, B, or E) with at least 12K words of main storage
- IBM 5022 Disk Storage Module (mdl 1 or 2), with or without cycle steal feature
- IBM 5028 Operator Station

Minimum Hardware for Execution: For stand-alone execution, the minimum requirements are:

- An IBM System/7 (5010 mdl A, B, or E) with at least 6K words of main storage
- IBM 5028 Operator Station

Minimum Hardware for execution under control of the 8-12K version of DSS/7:

- IBM System/7 (5010 mdl A, B, or E) with at least 12K words of main storage
- IBM 5022 Disk Storage Module (mdl 1 or 2), with or without cycle steal feature
- IBM 5028 Operator Station

With this configuration, only the 5028 can be used for I/O.

Service programs for 5707-AA1 are provided on a separate 8-channel paper tape when #9056 is ordered.

SOFTWARE REQUIREMENTS

IBM System/7 FORTRAN IV runs under the control of the IBM System/7 Program Preparation Facilities. The object modules produced by FORTRAN must be link-edited and formatted prior to execution in the IBM System/7. Both the stand-alone Macro Assembler and the Macro Library/Relocatable are required for preparing the real-time nucleus (in lieu of using DSS/7 for non-real time applications) for those user applications utilizing sensor-based subprograms.

COMPATIBILITY

The compiler accepts source programs written in System/7 FORTRAN, which is an extension of ANS Basic FORTRAN, X3.10-1966 and produces object modules that are acceptable to LINK/7 for link-editing. The System/7 FORTRAN IV compiler will also accept source programs written in ANS Basic FORTRAN. The language level is similar with the host FORTRAN program product.

DOCUMENTATION

(available from Mechanicsburg)

Program Product Specifications: IBM System/7 FORTRAN IV (System/7 Compiler and Library) (GC34-0034) ... An Introduction to System/7 FORTRAN IV (GC28-6869).

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

TREND ANALYSIS/370 - (5740-F12)
Color Graphics Support Feature (5707-F12)

DESCRIPTION

Trend Analysis/370 is an easy-to-use, interactive, IMS/VS-based computer application designed to allow presentation of time series data in tabular report form on a 3270 Information Display System. Using the System/7 Color Graphics Support Feature, presentation can be done graphically on a color television monitor. Time series numerical data, either from an organization's internal systems or from the external environment, can be formatted and stored for use by the system.

Information stored for use by Trend Analysis/370 is logically organized by time period (daily, weekly, monthly, quarterly, semi-annually and annually), by organization (such as companies, divisions, departments, subsidiaries, competitors or part numbers) and by data element (such as assets, expenses, net/gross sales or unit price). It is the customer's responsibility to provide the source information, either by writing a simple format conversion program for machine-readable information, or by entering it manually through online data entry terminal facilities provided by Trend Analysis/370.

The Trend Analysis/370 program provides a framework within which time series information can be stored, retrieved, manipulated and presented as required during the process of executive or management decision-making. Users may customize their use of the system by stipulating, interactively, the information content and format of the reports they are creating, or by pre-defining the reports.

In either case, they interact with the system through the use of 'menus'. These are simply terminal displays (3277) of a list of options for users to select from in creating their reports. For a pre-defined report, a single menu suffices (i.e., 'give me standard report number 6') while for an interactively-created report, a series of menus would be required (i.e., to select from lists of available data, manipulation facilities, report formats, time periods of interest, etc.). Data selection menus are created by users themselves; report option menus are provided along with the program.

Trend Analysis/370 also provides for the presentation of decision-supporting information in whatever format the user decides is best suited to the information to be displayed. For example, a report of 'today's closing balances' could be shown in tabular form on a terminal display screen (and a printed copy may be requested). On the other hand, using the System/7 Color Graphics Support Feature, an analysis of the expenses incurred by six departments by month over the past 24 months could be displayed on a standard color television monitor as six lines, each line in a different color against a black background, with white axes and scales. In tabular form, this report might have required several pages from which trends or patterns would be more difficult to discover.

Trend Analysis/370, then, is a major support tool for executive management, providing for the storage, retrieval, manipulation and presentation of time series information to assist and augment the decision-making process.

HIGHLIGHTS

- Trend Analysis/370 provides time series data in tabular report form for comparison of multiple organizations and data elements at a point in time, for comparing the performance of multiple organizations over time and for analysis of the performance of a single organization over time.
- The Color Graphics Support Feature enables the compression of a large tabular report (hundreds of numbers over several pages) into a single color graphical display on a standard television monitor. Time series data is particularly suited to analysis when viewed in graphical form.
- An easy-to-use 'menu' approach permits users, with minimal training, to customize the information content and format of a desired report.

CUSTOMER RESPONSIBILITIES

For Trend Analysis/370 they include:

- Identify the source of required information.
- Assign unique numbers to each organization and data element.
- Assign up to eight-character acronyms and up to twenty-character descriptors to each data element and organization.
- Load the unique numbers, acronyms and descriptors into the description data base using a batch program supplied by Trend Analysis/370.
- Assign a general password, data access password and a data modification password to limit access to this sequence of menus, to limit the information that may be seen by personnel holding the general password, and to limit data modification capability to only authorized people.
- Write conversion programs to reformat existing machine-readable data to meet format requirements of the Trend Analysis/370 interface program for the time series data base. The online data

entry facility can be used to enter non-machine readable data values and subsequently modify them.

- Design menus to reflect the most logical sequencing of the source data and the Trend Analysis/370 facilities that will be used.

For the Color Graphics Support Feature they include:

- The customer must purchase, install and maintain all data interfaces, cabling and equipment not specifically provided and maintained by IBM, in accordance with published System/7 Physical Planning Specifications (see "System Requirements").
- The customer must write the System/7 code to interface with the video display generator or submit a PRPQ to IBM for System/7 interface code for the selected device.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Trend Analysis/370 operates under IMS/VS Version 1 Release 1.0 or later versions, using any version of OS/VS1 or OS/VS2 which supports IMS/VS. This requirement means that the minimum IBM S/370 which can be used, (and also process other transactions) is a mdl 145 with 1,024K bytes of main storage. The product uses 173K in main storage (real or virtual depending upon the customer's installation requirements) and requires a 260K Message Processing Region (real or virtual). Each of the two batch support programs requires 256K in main storage (real or virtual).

The IBM 3270 Information Display System is used to communicate with Trend Analysis/370 and can be attached locally or remotely.

The system and terminal requirements are the IMS/VS requirements (please refer to the IMS/VS pages). However, Trend Analysis/370 requires the large (1,920 characters) Display Station such as the IBM 3277 mdl 2. A Printer such as the IBM 3286 mdl 2 is optional.

The Color Graphics Support Feature operates under the Disk Support System/7 on an IBM System/7. It can operate in a local or a remote environment. In a remote environment, the required IBM System/7 components are:

Type	Feature Code	RPQ Reference Number	Quantity per Machine	Description
5010				Processor Module mdl E28 Minimum
	#1610		1	Asynchronous Communication Control
	#2165		1	Common Carrier Adapter
		D08001	1	Communication Asynchronous 1200 Adapter
5013				Digital I/O Module
	#3284		1	Digital Input Control
	#3289		2	Digital Input Group
	#3296		1	Digital Output Control
	#3422		2	Digital Output Medium Power Group
	#5710		1	Process Interrupt
		D08147	1	Common Attachment 129/5496/7431
		D08150	1	Data Recorder 129 Attachment
5022				Disk Storage Module
5026				Enclosure - 3 Position Minimum
5028				Operator Station
5029				Feature Attachment to System/7
	#3283		2	Digital Input Voltage Sense
	#3410		3	Digital Output Connector



Trend Analysis/370 (cont'd)

129		Card Data Recorder
#3610	1	Expansion Feature
8T0065	1	I/O Attachment for System/7

program product (5740-F12). The program logic manual for the feature contains the interface specifications and guidelines necessary to program the System/7 to utilize a video display generator. It is recommended that the System/7 Host Preparation Program Facility for OS/VS (5744-AF1) be used on the S/370 to compile the code. Alternatively, the S/7 Program Preparation Facilities (5707-AA1) can be used to do the compilations on the System/7.

DOCUMENTATION
(available from Mechanicsburg)

Design Objectives ... Promotional Brochure (G520-3064) ... Slide Set (GV20-0610) ... General Information Manual

RPQs ACCEPTED: Yes

TERMS and CONDITIONS: See PP Index

For all machine types other than the IBM 5010, the model for that machine type may be any that the customer desires. In a remote environment, an IBM 2701 Data Adapter Unit, 2702 Transmission Control, a 2703 Transmission Control, 3704 Communications Controller in 2701/2702/2703 Emulation Mode, or 3705 Communications Controller in 2701/2702/2703 Emulation Mode is required. Appropriate modems, such as the IBM 3872 Modem, are also required.

For a local attachment to a channel, the specifications for the IBM 5013, 5022, 5026, 5028, 5029 and 129 remain the same as that for a remote environment. The specifications for the IBM 5010 and a 2701 Data Adapter Unit are:

Type	Feature Code	RPQ Reference Number	Quantity per Machine	Description
5010				Processor Module mdl E28 Minimum
	#1610		1	Asynchronous Communication Control
		D08000		Communication Asynchronous 50KB Adapter
2701				Data Adapter Unit
		858450		Asynchronous Communication Adapter

The following are not required but recommended to increase the performance of the respective machine types:

Type	Feature Code	RPQ Reference Number	Quantity per Machine	Description
5010	#2662		1	Cycle Steal Basic
5022	#2664		1	Disk Cycle Steal
129		Z04771	1	Skip/Read Double SPD

Additionally, two Original Equipment Manufacturer (OEM) devices are required:

- Video Display Generator.
- Red/Green/Blue (RGB) Television Monitor.

The video display generator is a device whose function is to provide a 30-times-per-second refresh (signal regeneration) to an RGB television monitor or any other device which requires a similar signal regeneration. The OEM RGB television monitor, to meet United States standards, should have 525 scan lines of two interlaced fields, with a 30-times-per-second refresh rate. Of the 525 scan lines on the TV monitor, 480 are usable for display. With a display aperture ratio of four horizontal to three vertical, 640 bits of information can be displayed on each of the 480 lines. The Color Graphics Support Feature is based upon this coordinate display of 480 vertical elements by 640 horizontal elements.

The Color Graphics Support Feature has been tested with one of the commercially available video display generators and two of the commercially available television monitors.

SOFTWARE REQUIREMENTS

The IBM Trend Analysis/370 program product is written in Programming Language/1 (PL/1) and operates under the control of the Information Management System/Virtual Storage (IMS/VS) Version 1 Release 0 or later versions. The prerequisite program products are:

Information Management System/VS	5740-XX2
IMS/VS Data Communication Feature	5740-XX2
PL/1 OS Resident Library	5734-LM4
PL/1 OS Transient Library	5734-LM5

If user exit code is written, then the PL/1 OS Optimizing Compiler (5734-PL1) is required.

The Color Graphics Support Feature is written in MSP/7 and operates under the control of the Disk Support System/7 (5707-AG1) and should only be used in conjunction with the Trend Analysis/370

**MANUFACTURING MONITORING SYSTEM VERSION 2
5707-M33 (OS/VS)
5707-M34 (DOS/VS)****PURPOSE**

The IBM Manufacturing Monitoring System (abbreviated to MMS) is a program product designed for realtime monitoring of plant floor activities and resources.

DESCRIPTION

MMS consists of a base program, the Basic System/7 Code, which resides in a System/7, and a feature, the S/370 Data Feature, which resides in a S/370 and is required for MMS data set generation and teleprocessing capabilities. The System/7 communicates with the plant floor via 2790 terminals operated by plant personnel. User-provided sensors, attached to System/7 digital input and output points, sense status and production count of machines (optional).

MMS accepts, edits, and processes transactions entered by workers, foremen, dispatchers, stock-keepers, and other personnel who report via terminal on setup, operation start and completion, interruptions, delivery to stock, and so on.

Signals received from machine sensors - indicating machine status, failure conditions, and quantities produced - are used to calculate utilization data, report failure conditions, monitor idle times, and check consistency of machine status against job status reported via terminal.

Based on this data, MMS monitors the execution of shop orders, their correct sequence, and timely completion, and the utilization of machines. It also calls for immediate action whenever exceptional conditions are detected. The data collected on System/7 disk files can be transmitted periodically, for additional evaluation, to a S/370 via binary synchronous or asynchronous communication linkages, using the MMS S/370 Data Feature, or to an IBM System/3 via physical disk transfer. When using the binary synchronous communication linkage (BSC), MMS data logging and sensor input processing can be performed in parallel with the transmission of System/7 disk file data to a S/370 host. This function is important for plants with 3-shift operations.

HIGHLIGHTS

MMS assists the user in the following functions:

- Collection of plant activity data, such as reporting on job status and machine status changes, work and operator assignments, maintenance.
- Machine monitoring, by sensing machine status, failure conditions, and quantities produced.
- Realtime information, on workstations, job queues, shop orders, and machine operators.
- Plant communication, with message generation and distribution according to order progress and exceptional conditions detected.
- Feedback for planning and accounting, e.g., for scheduling systems, cost and payroll accounting, quality assurance, material planning.

CUSTOMER RESPONSIBILITIES

To tailor MMS according to the user's environment, the customer must provide specifications and parameters that describe the plant environment and select the MMS functions required.

If users install sensor hardware for machine monitoring and piece counting, a user-written System/7 interface program is required to connect the particular hardware equipment to MMS. An MMS sample problem will be provided as a guide for the user programming effort.

Prerequisite to successful implementation of MMS is an intensive education of the plant personnel operating terminals and using MMS functions.

SOFTWARE REQUIREMENTS

MMS Basic System/7 Code is written in IBM System/7 Assembler language.

The IBM System/7 MSP/7 Host Program Preparation Facilities II, Release (ASM/7, LINK/7, FORMAT/7, MACLIB/R: Group Order Number 5744-AF1 for OS/VS, 5747-AF1 for DOS/VS) are required to generate the MMS System/7.

System generation must be performed on an IBM S/370 processor operating under control of the IBM Operating System (OS/VS or OS/VS2) or the IBM Disk Operating System (DOS/VS).

The MMS System/7 batch programs use the direct-access method of MSP/7 Symbolic File Support for access to disk data sets. The MMS System/7 realtime programs use the Basic Access Support for disk file access.

For initialization of System/7 disks, for definition and deletion of data sets, and for program loading onto System/7 disk, the MSP/7 Disk Support System (5707-SC2 or 5707-AG1) is required.

MMS S/370 Data Feature is written in IBM OS/VS and DOS/VS Assembler language and operates on a host IBM S/370 Virtual Storage system under control of the IBM Operating System (OS/VS1 or OS/VS2) or the IBM Disk Operating System (DOS/VS). For data access and data management it uses QSAM, BSAM, BDAM, and BTAM (under OS/VS) or SAM, DAM, and BTAM (under DOS/VS).

Generation of the Basic System/7 code and compilation and execution of the S/370 Data Feature can also be performed on a S/370 operating under OS/VS1, OS/VS2 or DOS/VS running under the control of VM/370.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

For execution of the MMS Basic System/7 Code, the minimum machine requirements are as follows:

IBM System/7 with:

- 1 IBM 5010 A14 Processor Module with 14,336 words of storage (for MMS without machine monitoring function and without Binary Synchronous Communications Control - BSCA) or
- 1 IBM 5010 A16 or E16 Processor Module with 16,384 words of storage (for MMS with machine monitoring function but without BSCA) or
- 1 IBM 5010 E20 Processor Module with 20,480 words of storage (for MMS without machine monitoring function but with BSCA) or
- 1 IBM 5010 E20 Processor Module with 20,480 words of storage (for MMS with machine monitoring function and BSCA).

Users of the MMS Version 1 who change to Version 2 will experience a storage increase of approximately 1K words due to increased storage requirements of MSP/7 Release 7 even if no functional extensions are installed.

Data transmission between IBM System/7 and an IBM S/370 host can be performed either by the

- Binary Synchronous Communications Control (#2074) with 1,200 to 40,800 bps.

or the

- Asynchronous Communications Control (#1610) with 600 bits/sec.
- 1 IBM 5012 A01 Multifunction Module, or
 - 1 IBM 5013 A01 Digital I/O Module

One or more digital input (DI) and output (DO) groups are required if the user installs direct machine monitoring and/or digital output-driven devices, such as lamp indicator boxes. The number of DI and DO groups depends on the hardware attached and the addressing technique applied.

- 1 IBM 5022 Disk Storage Module mdl 1 or 2, with one removable disk recommended for fast exchange of full disks. Up to three IBM 5022 modules can be supported with or without Cycle Steal features (#2662, #2664).

- 1 IBM 5026 C03 Enclosure or up with Storage Power Addition (#7401).

- 1 IBM 5028 001 Operator Station.

IBM 2790 Data Communication System with:

- 1 IBM 2791 and/or 2793 Area Station.

The following devices can be attached to area stations:

- IBM 2796/2797 Data Entry Unit,
- IBM 1053 Remote Printer, and
- IBM 1035 Badge Reader.

The number and type of devices depend on the user's plant organization, transaction load, and plant layout.

Refer to the System/7 and IBM 2790 documentation for restrictions regarding the number of terminals attachable to the 2790 loop of System/7.

Additional input/output devices, such as the IBM 129 Card Data Recorder and the IBM 7431 Serial Printer, can be supported by MMS if appropriate user-supplied interface programs are attached to MMS user exits.

For generation of the MMS Basic System/7 Code, and for compilation and execution of the S/370 Data Feature, the minimum machine requirements are as follows (in addition to those stated above):

An IBM S/370 Central Processing Unit supported by OS/VS1, OS/VS2, or DOS/VS. Address space requirements for the virtual region or partition are as follows:



MMS V2 (cont'd)

- For generation of the Basic System/7 Code:
128K bytes for the System/7 Host Macro Assembler, ASM/7.
- For compilation of the S/370 Data Feature:
256K bytes for the OS/VS Assembler
128K bytes for the DOS/VS Assembler
- For execution of the S/370 Data Feature:
48K bytes for data set generation and for data transmission.

Any IBM Direct-Access Storage Facility supported by the operating system, Assembler, and access methods used.

If the IBM System/7 is to be connected to the host system via a teleprocessing linkage, an IBM 2701 Data Adapter or equivalent transmission control unit and PTT (Post - Telephone - Telegraph: common carrier) or IBM modems are required.

MMS system generation can also be performed at an IBM Center.

Licensing 5707-M33, MMS with OS/VS Host System: MMS consists of System/7 code required for plant monitoring and communication and of S/370 code required for MMS data set generation and teleprocessing capabilities.

The basic System/7 code offered as MMS Basic Material is assembled on a host S/370, and used on a System/7.

The S/370 code offered as MMS S/370 Data Feature is assembled, and used on a S/370.

The Basic Material (System/7 code) and the S/370 Data Feature (S/370 code) each must be licensed on a designated central processing unit (Designated CPU).

The Basic Material must be licensed on a System/7. The S/370 Data Feature must be licensed on a S/370.

TERMS and CONDITIONS: See PP Index

SYSTEM/7 PROCESS CONTROL PROGRAM (PCP/7)

5707-XN3 (using HPPF-II/OS Systems)

5707-XN4 (using HPPF-II/DOS Systems)

5707-XN5 (using System/7 Program Preparation)

PURPOSE

System/7 Process Control Program (PCP/7) is designed to provide process monitoring, supervisory control, and direct digital control of continuous industrial processes. The program executes in a System/7 and is prepared on a S/360 or S/370 using the MSP/7 Host Program Preparation Facility-II (HPPF-II) or on a System/7 using the System/7 Program Preparation Facility (System/7 PPF). Process operator communication with the program is supported through the RPQ 7414 Interactive Console or 5028 Operator Station used as a Process Operator Console (POC) attached to the System/7. In addition, support is provided for communications to a S/360, S/370, 1800, or 1130 System operating with the appropriate Distributed System Program (DSP).

The program is tailored to specific monitoring or control applications by means of user-specified information, which is stored in tabular form in the program. All of the information required to describe each process variable is specified in this table along with the program steps which must be executed to achieve the required control action. The table (Process Variable Record [PVR] Table) is scanned on a periodic basis and each variable is then processed in accordance with the information in the table. The table is generated by specifying the pertinent parameters of each process variable through a fill-in-the-blanks procedure. The parameters specified include the symbolic variable name, such as T100 to F005; type of measurement, analog or digital; range and units of measurement; and frequency of processing.

In addition, the macro permits the user to specify digital control processing steps for a variable and also the parameters for each step. Control processing options include:

- Two types of Digital Filtering
- Control algorithm selection
- Limits and limit violation action
- Selection of output type and disposition

HIGHLIGHTS

- **Measurement Processing** - Scanning of process variables, measurement conditioning, limit checking, and alarm annunciation. Measured variables are converted to engineering units for display and calculation.
- **Direct Digital Control Processing** - Several control algorithm options, including a five-mode controller and a ratio controller. The five-mode algorithm provides standard three-term (proportional, integral, derivative) control with two additional non-linear modes. The absolute form of the algorithm is used to produce absolute or incremental output on an individual PVR basis.
- **Supervisory Control** - PCP/7 solves a difference equation that computes the appropriate change in the target of a controlled variable based both on the deviation of the current value of a primary variable from its target and on the changes in other related variables. The change to the target of the controlled variable can be staged over a period of time.
- **Setpoint Adjustment** - The ability to adjust the setpoint of an external analog controller.
- **Operator Communication** - Support for up to two RPQ 7414 Interactive Consoles or one 5028 Operator Station when used as a Process Operator Console (POC). Two console-selectable modes of information access are provided. In the operator mode, the process operator is restricted to accessing only that information with which he must be concerned. In the engineer mode, nearly unlimited information access is possible.
- **Error Analysis and Control** - The ability to detect and take control on system errors. If the System/7 configuration includes the optional 5022 disk, the PCP/7 program and data can be stored on disk and used for restart purposes.
- **Multiple Utilities** - The ability to load and dump System/7 process data in the form of the PVR table via the 5028 Operator Station.
- **Process Data Preparation** - Users specify the characteristics of their process data to the system through fill-in-the-blanks forms. APG/7, if installed on the host preparation system, not only provides forms for specifying process data, but also for specifying system characteristics.

CUSTOMER RESPONSIBILITIES

To install PCP/7 on a System/7, the user must perform the following:

- **Define the Application** - Users must first determine the scope of the application and the control strategy to be used. Also, they must identify instrumentation and cabling, including sensors and computer output stations that will interface the process with the System/7.

- **Determine System/7 Configuration** - The computer system equipment necessary to satisfy the application scope must be identified.
- **Specify PCP/7 System Generation Options** - Depending on the specific System/7 configuration and scope of application, PCP/7 will require different modules and/or will take different action within the modules. Users tailor PCP/7 to meet the needs of their specific application by a user-oriented specification procedure that identifies the equipment they have and the program options they require. This requires extensive knowledge of the application but minimal knowledge of MSP/7 and programming.
- **Prepare Any User Additions** - Any processing routines added to PCP/7 must be prepared by the user. These routines may require MSP/7 specification macros in addition to those generated by PCP/7 as a result of the specification procedure. APG/7, if used, includes a high-level procedural language facility for coding user routines. PCP/7, in turn, provides an interface that allows APG/7 or System/7 FORTRAN IV to access and modify the PVR Table. User routines that compete with PCP/7 for such System/7 resources as the disk and the host communication adapter, require special consideration. In order to ensure maximum PCP/7 performance, users should be aware of the way in which PCP/7 uses these resources and organize their additions in the complementary manner. A good knowledge of programming and MSP/7 is required for any additions.
- **Generate PCP/7 Storage Load** - This may be done using either the MSP/7 Host Program Preparation Facility II on any S/370 that meets the minimum machine requirements, or the System/7 Program Preparation Facilities on a System/7 that meets the minimum machine requirements.
- **Generate Process Variable Record Table** - The user generates the PVR Table by using fill-in-the-blanks facilities to define each measured or controlled variable. The table, once loaded into System/7 storage, can be modified online using the POC in either operator or engineer mode.
- **Load Storage Module and PVR Table** - If PCP/7 is generated on a S/370 host and the System/7 is not host-connected, both the PCP/7 program and the PVR Table must be punched onto paper tape and loaded to System/7 using the 5028 Operator Station. If the System/7 is host-connected, the storage load and PVR Table can be loaded directly from the host system. In the case of a host 1800 or 1130 System, the appropriate DSP or Disk Monitor facility is used to load System/7 object code, generated on a S/360 or S/370, to 1800 or 1130 disk storage. DSP is subsequently used to transmit a storage load to the System/7.

SPECIFIED OPERATING ENVIRONMENT
HARDWARE REQUIREMENTS

The minimum IBM System/7 configuration for PCP/7 program execution is:

- One IBM 5010 Processor, mdl A14 or B14 (14K words of storage).
- One 5012 Multifunction Module with sufficient sensor-based features to measure the variables and output control signals.
- One 5026 Enclosure
- One 5028 Operator Station.

The 5012 Multifunction Module provides the following:

- As many as 32 analog input points
- As many as 128 digital input points
- As many as 64 digital output points
- One or two analog output points

This system supports a useable group of digital control functions, including five-mode control of 50 process variables. (Storage requirements increase by approximately 25 words for each control variable added.) The complete set of input processing, control processing, and console functions, requires additional storage. Selection of certain user program options, disk support, or host communication support (DSP) also increases the storage requirement.

PCP/7 provides more user-selectable processing options than are likely to be used in a single process control system. The inclusion of the full range of these options, within any one application of PCP/7, together with the disk support and host communication functions, would result in a program exceeding 22K of System/7 storage. The detailed storage requirements for system options are available in the appendix of the *IBM Process Control Program (PCP/7) Operations Guide*.

The following components allow implementation of additional PCP/7 functions:

System/7 PCP/7 (cont'd)

- 5014 Analog Input Module, which handles up to 128 analog inputs.
- RPQ 7414 Interactive Consoles (without buffer of character set expansion), each of which includes a TV monitor (black and white display), alphanumeric keyboard (block style), function keyboard and 1053 Console Printer (optional). (7414 can be located up to 2,000 feet from the System/7).
- Asynchronous Communications Control Attachment (ACCA) for host communication (except for 1130 host).
- 1130 Host Attachment for 1130 host communication.
- 5022 Disk for checkpoint and restart.
- RPQ Bipolar Analog Output in a 5012 Multifunction Module.
- 5013 Digital I/O Module which provides up to 128 digital input and 64 digital output points. (PCP/7 does not support RPQ's housed in the 5013 Module).

DOCUMENTATION
(available from Mechanicsburg)

General Information Manual (GH19-7007) ... Program Product Specifications (GH19-7008). ... System/370 Distributed System Program General Information Manual (GH20-1171) ... System/370 Distributed System Program - Program Reference Manual (GH20-9500) ... 1130 Distributed System Program - Program Reference Manual (GH20-1144) ... 1800 Distributed System Program - Program Reference Manual (GH20-1143) ... Application Program Generator General Information Manual (GH20-1162) ... Application Program Generator Program Reference Manual (SH20-9502)

TERMS and CONDITIONS: See PP Index

See *IBM System/7 Functional Characteristics (GA34-0003)* and *IBM 7414 Model 1 Control Unit Custom Feature Description and Physical Planning Information (GA27-2743)* for details on these components.

The minimum configuration (S/360, S/370, or System/7) needed to assemble, format, and link-edit PCP/7 is satisfied by the configuration specified for MSP/7 Host Preparation Facilities II or System/7 Program Preparation Facilities, except that PCP/7 under DOS and DOS/VS requires an address space of 40K. The user requires enough direct access storage to support three work files, an MSP/7 library, and a PCP/7 library. 65 cylinders of 2314 space, or its equivalent will suffice. For the minimum configuration specified for stand-alone System/7 program preparation, the MSP/7 Source Library Editor must be used to minimize program listing requirements. The system configuration requirements for both host and stand-alone program preparation are specified in *IBM System/7 Macro Assemblers (GC34-0018)*.

For use with the System/7 Program Preparation Facilities, an additional 5022 Disk Storage Module (mdl 1, 2, 3, or 4) is recommended if the complete MSP/7, PCP/7, and FORTRAN IV Libraries are required to remain online at all times for the user's stand-alone System/7. In this case, the additional disk storage module will provide substantial additional storage for user source and object modules and application program data files.

Since support for the 129 Data Recorder and the 7431 Matrix Printer (see RPQ D08147) is included under the System/7 Program Preparation Facilities, it is strongly recommended that these devices be used for faster and easier PCP/7 preparation.

SOFTWARE REQUIREMENTS

The modules that comprise PCP/7 are written using MSP/7 system macros and ASM/7 Assembler Language instructions. PCP/7 can be prepared on an IBM S/360 or an IBM S/370 using the MSP/7 Host Program Preparation Facility II (HPPF II) operating under OS, OS/VS1, OS/VS2, DOS, or DOS/VS, or on an IBM System/7 using the System/7 Program Preparation Facilities (System/7 PPF). Users tailor their PCP/7 system according to the IBM System/7 configuration and the PCP/7 features desired by selecting the appropriate PCP/7 specification macro parameters. The application program preparation facility uses this information to prepare an object module. This nucleus module is then combined with other PCP/7 object modules and user-written modules in object form as input to LINK/7, to produce a link-edited load module. The load module will be processed by FORMAT/7 or \$UDFMT into final executable form.

The PCP/7 load module may be loaded into the IBM System/7 using the facilities of DSS/7 if prepared using the System/7 PPF. If prepared using HPPF-II, the module may be transmitted over a teleprocessing line to the IBM System/7, or it may be punched into 8-track paper tape for input through the operator station's paper tape reader.

IBM programs that can be used in support of PCP/7 are:

- Host Program Preparation Facilities II (HPPF II)
 - OS 360A-TX-020, 360A-TX-026
 - OS/VS1 5744-AF1
 - DOS 360A-TX-010, 360A-TX-016
 - DOS/VS 5745-AF1
- System/7 Program Preparation Facilities (S/7 PPF)
 - 5707-AA1
- System/7 FORTRAN IV
 - OS 5734-FO4
 - DOS 5736-FO1
 - S/7 PPF 5707-FO1
- System/7 Application Program Generator (APG/7)
 - OS 5734-XC3
 - DOS 5736-XC3
- Distributed System Program (DSP)
 - OS 360A-TX-032
 - 1130 1130-SV-002
 - 1800 1800-SV-003

SYSTEM TRANSACTION GENERATOR SYSTEM (TGS/7)

5707-XR1 - Stand-Alone

5740-XR3 - Host Preparation (OS, OS/VS1, OS/VS2)

PURPOSE

TGS/7 is a System/7 - 2790 program designed to increase the user's efficiency and productivity. It provides pre-coded transaction processing modules common to most data collection applications, and will support the 2790, disk and teleprocessing facilities available to the System/7. The data collection transaction modules provided include input checking, basic calculations, disk processing, message processing, and inquiry processing.

Users interface to TGS/7 through forms. The users fill in these forms to specify the particular data collection modules they want to employ and to provide parameters for tailoring them to their application environment. The actual selecting and tailoring of these application modules is performed by facilities provided by APG/7, a prerequisite to TGS/7.

TGS/7 first edits the TGS/7 forms data for correctness. The APG/7 program generation facilities then select and tailor the specified application modules and combine them with supervisory nucleus modules to produce an entire application system of System/7 programs. For the last step, the generated programs are assembled, linked, and formatted, and the object programs are ready for loading and execution.

HIGHLIGHTS

- TGS/7 can be a significant productivity aid in installing, supporting, and modifying System/7 - 2790 data collection applications.
- The TGS/7 application prototype file provides pre-coded and tested data collection transaction processing modules.
- TGS/7 forms enable the users to select and tailor the particular modules required for their specific data collection application.
- The user need not be an MSP/7 or APG/7 programmer to install a System/7 - 2790 data collection system using TGS/7.
- The *User's Guide* provides an easy to follow sequence of steps for APG/7 and MSP/7 use.
- TGS/7 edit facilities check the forms data for correctness and guide the user in correcting form data errors when they occur.
- APG/7 is a prerequisite to TGS/7 and provides program generation, compiler, and operating system facilities.
- TGS/7 supports the APG/7 Statement of Direction in emphasizing APG/7 as the major IBM application tool for the development and installation of System/7 programs.
- TGS/7 provides the user with a growth vehicle which is compatible with APG/7.

Use: The users fill in TGS/7 forms to specify the particular TGS/7 data collection processing modules they want to employ and to provide parameters for tailoring them to their application environment. TGS/7 edits the forms data for correctness and, when errors occur, generates messages to guide the users in correcting their forms input. The APG/7 program generation facilities then select and tailor the specified TGS/7 application procedures and combine them with supervisory nucleus modules to produce an entire application system of System/7 programs.

When using the TGS/7 BSCA and ACCA support to transmit to a remote computer system, receiving and processing transmitted data on the remote system is the user's responsibility.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

An IBM 5010 processor with 20K words of storage ... one IBM 5022 Disk Storage Module mdl 1 or 2 ... IBM 5028 Operator Station... one IBM 5026 Enclosure mdl C3 ... one IBM 5013 Digital Input/Output Module (with one 2790 Control #8195).

Notes:

1. For host preparation, an IBM S/370 is also required which will support System/7 HPPF and APG/7.
2. For stand-alone preparation, an IBM 129 and 7431 are recommended for entering specification forms input data and for printing intermediate output listings.
3. For generated program execution, at least one IBM 2790 Control feature and at least one 2790 data entry device are required.
4. To determine overall device, feature, and storage requirements for specific system configurations, see the *IBM System/7 Transaction Generator System (TGS/7) User's Guide* (SH20-9511).
5. For the inclusion of online batch program preparation, add an additional 12K words of storage for the batch partition and one more 5022 Mdl 1 or 2 disk storage module. (Also, the 5026 Enclosure mdl C3 will have to be changed to a Mdl C6.)

SOFTWARE REQUIREMENTS

For TGS/7 Stand-alone, the following program system is a prerequisite:

Stand-alone APG/7 - 5707-XC1

For TGS/7 Host Preparation (OS, OS/VS1, OS/VS2), the following programming system is a prerequisite:

Application Program Generator (APG/7) - 5734-XC3

Refer to APG/7 and Stand-alone APG/7 in the program product pages for subsequent prerequisite programming systems.

When using the System/7 BSCA feature to transmit to a remote computing system, the remote system must use the following teleprocessing access methods:

For System/370:
 DOS/VS - BTAM
 OS/VS1 - BTAM or TCAM
 OS/VS2 - BTAM or TCAM

For System/3:
 System/3 MLMP

For System/7:
 MSP/7 Communications Access Method

When using the System/7 ACCA feature to transmit to a remote system (S/360 or S/370 only) the remote system must use teleprocessing access methods as specified in the programming section (see System/7 Macro Library/Relocatable).

DOCUMENTATION (available from Mechanicsburg)

General Information Manual (GH20-9510) ... *Program Product Specifications* (GH20-9530)

Specification Forms Pad (50 forms per pad) as follows:

Configuration Definition (GX26-3702) ... Transaction Definition (GX26-3703) ... Data Definition (GX26-3704) ... Procedures Control (GX26-3705) ... Update Disk Files (GX26-3706) ... Output to All Devices (GX26-3707).

TERMS and CONDITIONS: See PP Index

**5280 ASSEMBLER LANGUAGE
5708-AS1****PURPOSE**

The 5280 Assembler Language is a licensed program which provides a symbolic programming language used to write programs for the 5280 system. This licensed program consists of an assembler and the 3740 ACL Conversion Aid program.

DESCRIPTION

Source programs written in Assembler language are processed into 5280 machine language. Input to the assembler is a source program data set. If desired, this data set may be created by entering source statements through a user-written DE/RPG or Assembler language program, or the Key Entry Utility program [included in 5280 Utilities (5708-UT1)]. Output of the assembler is an object program written to a diskette data set.

Some of the features provided by the 5280 Assembler Language are:

- Mnemonic Operation Codes
- Symbolic Referencing of Storage Addresses
- Automatic Storage Assignment
- Address Displacement Calculation
- Symbolic Data Representation
- Binary and Decimal Arithmetic
- Operand Expressions
- Source Program Listing
- Cross-Reference Listing
- Error Checking and Diagnostic Messages

3740 ACL Conversion Aid Program: Assists the user in converting existing 3740 ACL (Application Control Language) programs into 5280 Assembler language. The program will not convert CRDR, CRDP, EXEC A, COMM, IF CRD or CKPT instructions. Some converted instructions may not function as on the 3740*.

* For details, see *IBM 5280 Assembler Language Reference Manual* (SC21-7790).

Input to this program is a diskette data set with ACL source code. Output is a data set containing 5280 Assembler Language source code. Assembler source code requires the 5280 Assembler Language licensed program for assembly.

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of IBM licensed programs is a customer responsibility.

Program Use During Customer Pre-installation Testing: 5280 Assembler Language (5708-AS1) will be available to customers for pre-installation testing on IBM Test Center Systems in accordance with IBM's Program Testing Policy.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

The IBM 5280 Assembler will run on any IBM 5280 system which has, as a minimum, either 2 diskette 1 drives, or 1 diskette 2D drive. The IBM 3740 ACL Conversion Aid Program will run on any IBM 5280 system. Minimum main storage partition size requirements are as follows: for the 5280 Assembler - 9K; for the 3740 ACL Conversion Aid Program - 16K.

SOFTWARE REQUIREMENTS

The Assembler, Assembler object programs, and the IBM 3740 ACL Conversion Aid Program require the IBM 5280 System Control Programming (5708-SC1).

DOCUMENTATION

(available from Mechanicsburg)

IBM 5280 Assembler Language Licensed Program Specifications (GC21-7801) ... *IBM 5280 Assembler Language Reference Manual* (SC21-7790) ... *IBM 5280 Functions Reference Manual* (GA21-9353).

TERMS and CONDITIONS: See PP Index

**5280 COBOL-OS/V5 HOST COMPILER AND LIBRARY
5708-CB1****PURPOSE**

5280 COBOL-OS/V5 Host Compiler and Library is a licensed program that compiles on a S/370, 30XX or 4300 under VM/SP, OS/VS1 or OS/VS2 (MVS). Output of the compiler is a 5280 machine-language object program that will execute on a 5285, 5286 or 5288. This object program may be copied to diskette (except for VM/SP) for transfer to a 5280 system or transmitted via communications directly to a 5280 system.

5280 COBOL provides customers with a powerful, comprehensive, easy-to-use language for use in preparation and execution of commercial application programs. The language offers a wide range of commercial features, plus facilities for handling input and output, structuring the source programs and debugging COBOL programs. 5280 COBOL allows the development of interactive applications by supporting functions that enable users to accept data from and display data on a 5280 keyboard/display.

5280 COBOL is designed for an interactive commercial environment where users can perform transaction processing applications such as order entry, as well as applications that run in a background batch environment.

HIGHLIGHTS

- Language
 - Support of American National Standard (ANS) COBOL X3.23-1974.
 - Support of 1975 Federal Information Processing Standard for COBOL.
- Extensive User Options
 - Source listings
 - Cross-reference
 - Storage map of variables
 - Statement offset listing
 - Object listing
 - Object program record size of 80 or 128 bytes
- Program Development and Productivity Aids
 - Symbolic debug
 - Flow trace
 - Extensive error checking
 - FIPS Flagger
 - Generalized CALL
 - A job-to-job facility

DESCRIPTION**I/O Capabilities**

5280 COBOL programs can work with SEQUENTIAL, RELATIVE and INDEXED I/O files.

The access methods supported are as follows:

- Sequential Organization
 - Sequential processing
 - Relative Organization
 - Sequential processing
 - Random processing by relative record number
 - Indexed Organization
 - Sequential processing
 - Random processing by record key using index file or in-memory index
- The new COBOL Transaction I/O extension by IBM provides a set of verbs and syntax for controlling a keyboard/display. Users can write interactive programs which allow an operator to perform functions such as entering data, performing inquiries and updating files. The capability is provided for defining display formats and operator-entered fields. Field editing functions, which are a subset of the DE/RPG functions, are also available. Formats are stored within members of a partitioned data set and copied into the source program as needed.

Table Handling

Define and process fixed length tables of up to three dimensions.

Segmentation

The Segmentation feature permits:

- Dividing the Procedure Division of a COBOL program into a series of segments.
- Specifying that some segments (fixed segments) must be resident in main storage while the program is running, and cannot be overlaid, while others (independent segments) are loaded into an overlay area when needed.

- Reducing main storage requirements during program execution.

Interprogram Communication

This facility allows transferring of control from one COBOL program to another within a partition. Programs can access the same data.

Data Communications

Data communications support for COBOL is via a CALL interface to the 5280 Communications Utilities licensed program (5708-DC1) access methods.

Industry Standards

5280 COBOL is designed in accordance with the following industry standards as understood and interpreted by IBM as of January 1980.

- American National Standard (ANS) COBOL, X3.23-1974. ANS COBOL is identical to ISO 1989-COBOL, approved February 1978 by the International Organization for Standardization. The following processing modules are supported:

1 NUC 1,2
 1 TBL 1,2
 1 SEQ 1,2*
 1 REL 0,2*
 1 INX 0,2*
 1 SEG 0,2
 1 LIB 0,2
 1 DEB 0,2
 1 IPC 0,2

* RERUN clause is checked for syntactic correctness only.

The first digit above represents the level of the modules included in the compiler; the second digit represents the lowest level specified for American National Standard COBOL (0 implies that the module may be completely missing from a standard compiler); the third digit represents the highest level specified in the Standard.

In addition to the above, the following Level 2 features are also supported:

- COMPUTE statement
- Qualification
- Arithmetic operators
- Complex conditions
- CORRESPONDING phrase
- ACCEPT and DISPLAY verbs
- Multiple operand support for arithmetic statements
- Nested IFs
- Nested REDEFINES
- PERFORM UNTIL
- 01 through 49 and 88 level numbers
- LINAGE
- START verb
- December, 1975 Federal Information Processing Standard (FIPS Pub 21-1), Low-Intermediate Level. The RERUN clause is checked for syntactic correctness only. Additional support is provided for many features of higher FIPS levels.

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation and continued day-to-day operation lies solely with the customer.

Installation of IBM licensed programs is a customer responsibility.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

Compilation: The IBM 5280 COBOL-OS/V5 Host Compiler and Library (5708-CB1) executes on an IBM S/370, 30XX or 4300 with at least 192K bytes of virtual storage as well as a configuration sufficient to run the selected operating system.

Object Program Execution: COBOL object programs will run on any IBM 5280 system with a minimum of 48K bytes of main storage capacity. COBOL object programs require a minimum partition size of 16K bytes. Actual partition size requirements are a function of the COBOL source program. If data communications is used, a minimum of 64K bytes of main storage capacity is required.

SOFTWARE REQUIREMENTS

IBM 5280 System Control Programming (5708-SC1) is required. The IBM 5280 Communications Utilities licensed program (5708-DC1) is required when using data communications via COBOL and will require a communications partition.



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PP 5708-CB1.2

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Major Revision

PROGRAM PRODUCTS

5280 COBOL-OS/VS Host Compiler and Library (cont'd)

CONVERSION/COMPATIBILITY

A high degree of upward compatibility does exist between the 5280 COBOL compiler and the OS/VS COBOL Compiler and Library (5740-CB1). However, differences do exist and some conversion will be necessary. These differences include transaction I/O support and communications support. Also, computational data will be incompatible with System/370.

DOCUMENTATION

(available from Mechanicsburg)

IBM 5280 COBOL-OS/VS Host Compiler and Library Licensed Program Specifications (GL23-0033) ... IBM 5280 COBOL Language Reference (GL23-0031) ... IBM 5280 COBOL Programmer's Guide (SL23-0032) ... IBM 5280 COBOL Host Compilers Problem Determination Manual (SL23-0043).

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**5280 COBOL-DOS/VSE HOST COMPILER AND LIBRARY
5708-CB2**

PURPOSE

5280 COBOL-DOS/VSE Host Compiler and Library is a licensed program that compiles on a System/370, 30XX or 4300 under DOS/VSE. Output of the compiler is a 5280 machine language object program that will execute on a 5285, 5286 or 5288. This object program may be copied to diskette for transfer to a 5280 system or transmitted via communications directly to a 5280 system.

5280 COBOL provides customers with a powerful, comprehensive, easy-to-use language for use in preparation and execution of commercial application programs. The language offers a wide range of commercial features, plus facilities for handling input and output, structuring the source programs, and debugging COBOL programs. 5280 COBOL allows the development of interactive applications by supporting functions that enable users to accept data from and display data on a 5280 keyboard/display.

5280 COBOL is designed for an interactive commercial environment where users can perform transaction processing applications such as order entry, as well as applications that run in a background batch environment.

HIGHLIGHTS

- Language
 - Support of American National Standard (ANS) COBOL X3.23-1974.
 - Support of 1975 Federal Information Processing Standard for COBOL.
- Extensive User Options
 - Source listings
 - Cross-reference
 - Storage map of variables
 - Statement offset listing
 - Object listing
 - Object program record size of 80 or 128 bytes
- Program Development and Productivity Aids
 - Symbolic debug
 - Flow trace
 - Extensive error checking
 - FIPS Flagger
 - Generalized CALL
 - A job-to-job facility

DESCRIPTION

I/O Capabilities

5280 COBOL programs can work with SEQUENTIAL, RELATIVE and INDEXED I/O files.

The access methods supported are as follows:

- Sequential Organization
 - Sequential processing
- Relative Organization
 - Sequential processing
 - Random processing by relative record number using index file or in-memory index
- Indexed Organization
 - Sequential processing
 - Random processing by record key using index file or in-memory index

The COBOL Transaction I/O extension by IBM provides a set of verbs and syntax for controlling a keyboard/display. Users can write interactive programs which allow an operator to perform functions such as entering data, performing inquiries, and updating files. The capability is provided for defining display formats and operator-entered fields. Field editing functions, which are a subset of the DE/RPG functions, are also available. Formats are stored within books of the source statement library and are copied into the source program as needed.

Table Handling

Define and process fixed length tables of up to three dimensions.

Segmentation

The Segmentation feature permits:

- Dividing the Procedure Division of a COBOL program into a series of segments.
- Specifying that some segments (fixed segments) must be resident in main storage while the program is running and cannot be overlaid, while others (independent segments) are loaded into an overlay area when needed.

- Reducing main storage requirements during program execution.

Interprogram Communication

This facility allows transferring of control from one COBOL program to another within a partition. Programs can access the same data.

Data Communications

Data communications support for COBOL is via a CALL interface to the 5280 Communications Utilities licensed program (5708-DC1) access methods.

Industry Standards

IBM 5280 COBOL is designed in accordance with the following industry standards as understood and interpreted by IBM as of January 1980.

- American National Standard (ANS) COBOL, X3.23-1974. ANS COBOL is identical to ISO 1989-COBOL, approved February 1978 by the International Organization for Standardization. The following processing modules are supported:

- 1 NUC 1,2
- 1 TBL 1,2
- 1 SEQ 1,2*
- 1 REL 0,2*
- 1 INX 0,2*
- 1 SEG 0,2
- 1 LIB 0,2
- 1 DEB 0,2
- 1 IPC 0,2

- * RERUN clause is checked for syntactic correctness only.

The first digit above represents the level of the modules included in the compiler; the second digit represents the lowest level specified for American National Standard COBOL (0 implies that the module may be completely missing from a standard compiler); the third digit represents the highest level specified in the Standard.

In addition to the above, the following Level 2 features are also supported:

- COMPUTE statement
- Qualification
- Arithmetic operators
- Complex conditions
- CORRESPONDING phrase
- ACCEPT and DISPLAY verbs
- Multiple operand support for arithmetic statements
- Nested IFs
- Nested REDEFINES
- PERFORM UNTIL
- 01 through 49 and 88 level numbers
- LINAGE
- START verb
- December 1975 Federal Information Processing Standard (FIPS Pub 21-1), Low-Intermediate Level. The RERUN clause is checked for syntactic correctness only. Additional support is provided for many features of higher FIPS levels.

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation and continued day-to-day operation lies solely with the customer.

Installation of IBM licensed programs is a customer responsibility.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Support will be provided for this licensed program when it is operated in the following specified operating environment:

Compilation: The IBM 5280 COBOL-DOS/VSE Host Compiler and Library (5708-CB2) executes on an IBM S/370, 30XX or 4300 with at least a 168K byte partition plus the GETVIS space as well as a configuration sufficient to run the selected operating system.

Object Program Execution: COBOL object programs will run on any IBM 5280 system with a minimum of 48K bytes of main storage capacity. COBOL object programs require a minimum partition size of 16K bytes. Actual partition size requirements are a function of the COBOL source program. If data communications is used, a minimum of 64K bytes of main storage capacity is required.

SOFTWARE REQUIREMENTS

IBM 5280 System Control Programming (5708-SC1) is required. The 5280 Communications Utilities Licensed Program (5708-DC1) is required when using data communications via COBOL and will require a communications partition.



5280 COBOL-DOS/VSE Host Compiler & Library (cont'd)

CONVERSION/COMPATIBILITY

Some compatibility does exist between the 5280 COBOL compiler and DOS/VS COBOL Compiler and Library (5746-CB1). Both compilers are designed in accordance with American National Standard COBOL. The 5280 COBOL supports the 1974 standard (X3.23-1974), while the DOS/VS COBOL supports the 1968 standard (X3.23-1968). Therefore, differences do exist and some conversion will be necessary.

DOCUMENTATION

(available from Mechanicsburg)

IBM 5280 COBOL--DOS/VSE Host Compiler and Library Licensed Program Specifications (GL23-0034) ... IBM 5280 COBOL Language Reference (GL23-0031) ... IBM 5280 COBOL Programmer's Guide (SL23-0032) ... IBM 5280 COBOL Host Compilers Problem Determination Manual (SL23-0043).

TERMS and CONDITIONS: See PP Index

5280 PROCEDURE CONTROL LANGUAGE 5708-CL1

PURPOSE

The 5280 Procedure Control language is a licensed program which provides 5280 users with job stream capability and the ability to execute a program with little or no operator intervention. The licensed program consists of a control program and supporting programs. Use of this licensed program is optional for 5280 users.

HIGHLIGHTS

Control Language: The control language consists of a set of statements which are used to identify a job and its processing requirements to the system. The language provides a method of describing a job stream, together with all associated prompts and program specifications. A series of related control language statements is referred to as a 'procedure'. A procedure is used to provide control for a job or series of jobs. Control language facilities include:

- Specification of the name of the program(s) to be compiled and/or executed.
- Specification of the device from which a program is to be loaded.
- Specification of the data sets to be processed and the location of the data sets.
- Control language statement and error logging. Control language statements can be logged in order to provide a history or to provide a diagnostic aid in the event of abnormal procedure termination.
- A logical IF statement, which provides for intelligence within procedures. It is possible to execute different jobs based on tests performed within a procedure.
- Specification of default responses with optional operator override capability. Responses can be made to specific user program generated prompts or to prompts from IBM-supplied programs, such as a utility or a sort.
- Ability to provide default responses or operator-keyed responses to error messages.
- Internal subroutines and variables.

DESCRIPTION

Procedure Data Sets: Control language statements required to control a specific job or sequence of jobs are stored on a source procedure data set. The source procedure data set can be created in two ways:

1. During standard (not controlled) execution of a job, the source procedure data set can be automatically created through use of the Procedure Build Initiator Program. The data set will contain all the information required to repeat that job sequence, including all program load specifications and prompt responses.
2. The data set can be created by directly entering each control language statement via a data entry program. The data entry program can be a user-written program or an IBM-supplied program such as the Key Entry utility (part of the 5280 Utilities licensed program).

The source procedure data set must be translated into object form in order to be utilized in a 'controlled' environment. The Procedure Preprocessor program converts the source data set into an object procedure data set. The object procedure data set is used by the Controller program to control execution of a specific program or series of programs.

Controlled Program Execution: Programs running in a controlled environment execute under control of the Controller program. The Controller program provides the link between controlled programs and object procedure data sets. It detects and services requests from controlled programs. An interface to the operator is available via a set of operator commands.

In a controlled environment, the Controller program supplies program load parameters and keyboard responses. A sequence of program prompts can be answered without operator intervention. The only time an operator is required to enter input to a controlled program is when an operator response is specifically requested by a control language statement, an error occurs that is not handled by the object procedure data set, or keyboard entry is required by a data entry program such as DE/RPG.

The Controller program resides in a background partition and must remain in main storage during execution of controlled programs. Standard, 'not controlled' 5280 programs can be concurrently executed in other partitions. These programs are functionally unaffected by and do not interface with the Controller Program.

Operator Commands: The keyboard operator can communicate with the Controller Program via a set of commands. The commands allow the operator to restart or terminate procedure execution and to update system parameters such as the system date or default Controller program prompt responses.

Program Support: The following IBM programs can operate under control of the Controller Program:

- 5280 System Control Programming (5708-SC1)
- 5280 COBOL Host Compilers and Libraries (5708-CB1, 5708-CB2, 5708-CB3, 5708-CB4) (object programs)
- 5280 Communications Utilities (5708-DC1)
- 5280 DE/RPG (5708-DE1) (compiler and object programs)
- 5280-3270 Emulation (5708-EM1)
- 5280 Sort/Merge (5708-SM1)
- 5280 Utilities (5708-UT1)
- 5280 Assembler Language (5708-AS1) (Assembler and object programs*)

* Keyboard accesses in Assembler language programs will not be controlled.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

The IBM 5280 Procedure Control Language will run on any 5280 system which has, as a minimum, 48K bytes of main storage capacity and one diskette drive. Minimum main storage partition size requirements are as follows: 6K for the Procedure Build Initiator program; 12K* for the Controller Program; 14K for the Procedure Preprocessor program. The common functions area SYSJJCF A requires 22K.

- * 12K will control one partition, with the Controller program and object procedure data sets both residing on a diskette with formats 1, 2, 4, 5, or 7. The Controller program partition size will vary between 12K and 23K depending up on the number of partitions controlled and the diskette format used. The Controller program diskette must remain resident while the Controller Program is running. See the *IBM 5280 Procedure Control Language Reference Manual* for specific requirements for the Controller program partition size.

SOFTWARE REQUIREMENTS

IBM 5280 System Control Programming (5708-SC1) is required. A customer-created IPL diskette containing the SYSJJCF A data set is also required. SYSJJCF A is included in this licensed program.

DOCUMENTATION

(available from Mechanicsburg)

IBM 5280 Procedure Control Language Licensed Program Specifications (GC23-0753) ... *IBM 5280 Procedure Control Language Reference Manual* (SC23-0706).

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

**5280 COMMUNICATIONS UTILITIES
5708-DC1**

PURPOSE

The 5280 Communications Utilities licensed program, used with the Communications Adapter feature (#2500) consists of Communications Access Method (CAM) support, a set of communications utility programs, and an interface to the access method for communications application programs written in 5280 COBOL, 5280 DE/RPG, or 5280 Assembler language.

HIGHLIGHTS

- MULTI-LEAVING Remote Job Entry (MRJE)
- SNA Remote Job Entry (SRJE)
- Batch Data Transfer and Inquiry
- Communications Configuration and Job Description
- General support includes:
 - Communications Access Methods (CAM)
 - Systems Network Architecture/Synchronous Data Link Control (SNA/SDLC)
 - Binary Synchronous Communications (BSC)
 - Application program interface to DE/RPG, COBOL and Assembler Language
 - BSC Multipoint Monitor
 - Direct Device Support
 - Diskette Data Management
 - Concurrent Program Operation
 - Diagnostics (BSC Online Test, Trace Capability, Communications Job Statistics)

DESCRIPTION

MULTI-LEAVING Remote Job Entry (MRJE): The 5280 Communications Utilities permit a 5280 system to function as a Remote Job Entry (RJE) workstation for submission of jobs to a S/370 under OS/VS1 RES, OS/VS2 JES2, OS/VS2 JES3 or VM/370 RSCS. The MRJE Utility communicates with the host system over a point-to-point (switched or nonswitched) communication line via the Binary Synchronous mode of the communications adapter. Host system RJE programming support should be generated specifying System/3 as the supported terminal with:

- One Console (input and output)
- One Reader
- One Printer
- One Punch

Highlights of the MRJE workstation are:

- MULTI-LEAVING support permits taking advantage of concurrent 5280 device operation.
- Card I/O operation is simulated by diskette storage.
- Expansion of blanks and duplicate characters may be performed to increase host output line utilization.
- Job streams can originate at either the 5280 diskette or keyboard.
- Punch data streams are written to diskette.
- Print data streams can be directed to either diskette or printer.
- Supports special printer forms
- Operates with detached keyboard/display.
- Supports transmission of multivolume data sets.
- Console data streams are used for sending and receiving commands and operator messages between the 5280 and the host.
- MRJE utility control statements can be entered from the keyboard or from a diskette data set.
- Job statistics are maintained which are displayed at the end of the session.

SNA Remote Job Entry (SRJE): The 5280 Communications Utilities enable the 5280 system to submit RJE jobs to a host S/370 using SNA/SDLC link protocol. The utility supports a single LU-LU session with the following host subsystems using ACF/VTAM and ACF/NCP/VS:

- OS/VS1 Remote Entry Service (RES)
- OS/VS2 Job Entry Subsystem 2 (JES2)
- OS/VS2 Job Entry Subsystem 3 (JES3)
- DOS/VSE/POWER

SRJE has the following functions available to the host system:

- One Console (Input and Output)
- One Reader
- One Printer
- One Punch

Highlights of the SRJE workstation support are:

- Job streams can originate at either the 5280 diskette or keyboard.
- Card I/O operation is simulated by diskette.
- Job output from the host is sent to the 5280 as a print or punch data stream.
- Punch data streams are written to diskette.
- Print data streams can go to either the diskette or printer.
- Special printer forms are supported.
- Console data streams are used for sending and receiving commands and operator messages between the 5280 and the host system.
- SRJE Utility Control Statements can be entered from the keyboard or from a diskette data set.
- Job statistics for each session are maintained which are displayed at the end of the session.

Batch/Inquiry Data Transfer: The capability to perform batch data transfer and interactive inquiries with various host systems using either BSC or SNA/SDLC protocol is supplied as part of the communications utilities. These batch data transfer and inquiry utilities use the information created/maintained by the preparation utilities for program execution.

The utilities permit the user to easily transfer information over the communications line with minimum operator involvement.

Binary Synchronous Communications (BSC)

These utilities provide the interface to support data communications with S/370 models 115 to 168 and 30XX, 4331 and 4341 processors operating under DOS/VSE, VSE/Advanced Function, OS/VS1 and OS/VS2 (MVS) accordingly. Attachment is through 3704/3705 with Emulation Program (EP) or the Partition Emulation Program (PEP) extension to 3704/3705 ACF/NCP/VS or the Integrated Communications Adapter for S/370, 115, 125 and 138 or the Communications Adapter of the 4331.

Using the 5280 Communications Utilities, the 5280 system appears as a:

- 3741 to CICS/VS and IMS/VS
- 3780 to VSE/POWER

The preferred 5280 support to CICS/VS and IMS/VS is SNA LU1. The 3741 line protocol of the BSC Data Communications Utility (SYSBDCU) would normally be used when replacing a 3741.

SYSBDCU is also used to interface the 5280 to DOS/VSE/POWER using 3780 line protocol.

SYSBDCU should not be considered as providing 3741 or 3780 emulation capabilities.

The 5280 system also appears as a 3741 to:

- System/3 with CCP or RPG II
- System/32 with RPG II
- System/34 with RPG II or SSP-ICF
- System/38 with RPG III or COBOL
- Series/1 RPS Version 3/4
- 3741 models 2 and 4
- 3747
- 5265
- 5280

The 5280 communications configuration utility allows the user to describe certain communication characteristics, prior to program execution, such as terminal type, terminal address and timeouts.

5280 as a Terminal (LU TYPE1) to S/370 CICS/VS and IMS/VS Using SNA/SDLC Protocols

The 5280 communicates with IMS/VS applications under OS/VS1 or OS/VS2 (MVS) or CICS/VS applications executing under DOS/VSE, VSE/Advanced Function, OS/VS1 or OS/VS2 (MVS) in S/370 models 145 to 168 for IMS/VS, and models 138 to 168 for CICS/VS. The

PROGRAM PRODUCTS

5280 Communications Utilities (cont'd)

5280 communicates with IMS/VS or CICS/VS applications in 30XX, 4331 and 4341 processors. Multiple (up to 4) LU-LU sessions with ACF/VTAM are supported by IMS/VS or CICS/VS.

The 5280 communications configuration utility allows the user to describe certain communication characteristics, prior to program execution, such as station address, pacing counts and Logon.

Communications Configuration and Job Description: The primary functions of the communications configuration and job description utilities are to:

- Describe the communications environment.
- Describe the transmit, receive and/or inquiry functions that make up a job.

Users of the 5280 system describe the communications jobs for execution by running easy-to-use keyboard/display prompt/response preparation utilities. The responses to the prompts are saved on diskette and identified by name. The information is then supplied to the appropriate utilities at execution time to control the communication session with the remote host or terminal system.

Multiple job records may be maintained to provide communications flexibility within the 5280 system.

Diskette Support: Diskette support is an integral part of the 5280 Communications Utilities. It permits users to maintain and control a diskette data set(s) in a variety of ways. Included in the support is the capability to transmit and receive single and multiple data sets from/to one or more physical diskette drives; to support data sets spanning one or more diskettes; to allocate and write received data to a new data set, add received data to the end of an existing data set and replace received data in an existing data set.

Direct Device Support: The 5280 Communications Utilities provide direct device support as to the origin and destination of the data transferred over the communications line.

To the Line	From the Line
Data Set(s)	Data Set(s)
Magnetic Stripe Reader (for BSC support only)	Printer
Keyboard	Display

In addition, certain combinations of multiple 5280 output devices are allowed.

Application Program User Interface: The 5280 Communications Utilities provide an interface to the Communication Access Methods (CAM) for a user to write DE/RPG, COBOL or 5280 Assembler language programs. As an example, this could provide 5280 users additional communications capabilities for those applications requiring random inquiries to remote host master files with the response data processed by the 5280 application.

BSC Multipoint Monitor: The BSC Multipoint Monitor provides, for the communicating 5285 Programmable Data Station and the 5288 Programmable Control Unit residing on a BSC multipoint network, the ability to respond to host polling and selection without the requirement to have a Communications Access Method (CAM) loaded into main storage. The Multipoint Monitor resides in the common functions area.

Use of the Multipoint Monitor prevents the host from removing the 5280 from polling lists, which would thereby require reactivation at the host when communications are desired.

Concurrent Program Operation: The 5280 Communications Utilities require a minimum of two partitions: one for a Communications Access Method (CAM) and one for an IBM-supplied 5280 Communications Utility or a user communications application program.

For concurrent program operation, the system may be running other application programs concurrent with a Communications Utility. The limitation is the amount of main storage available, number of partitions and possible performance considerations.

Diagnostics (BSC Online Test, Trace Capability, Communications Job Statistics): The Communications Utilities maintain information and provide statistics on the job just executed, such as the number of input/output records processed. Additional communications information such as status indicators, counters, error logs and communications trace table is available.

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of IBM licensed programs is a customer responsibility.

Program Use During Customer Pre-installation Testing: The IBM 5280 Communications Utilities (5708-DC1) will be available to customers for pre-installation testing on IBM Test Center Systems in accordance with IBM's Program Testing Policy.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

The minimum system configuration required to support communications in a BSC network is:

AN IBM 5285 with 32K bytes of main storage capacity, the Communications Adapter (#2500) and a display size(s) of 960 characters. Because the SNA support requires either the Elapsed Time Counter (#3610) or the Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4960), the customer should carefully evaluate his future requirements when installing a BSC system.

OR:

An IBM 5288 with 32K bytes of main storage capacity, the Communications Adapter (#2500), and an auxiliary data station (5281 or 5282) with a display size(s) of 960 characters. Because the SNA support requires either the Elapsed Time Counter (#3610) or the Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4955), the customer should carefully evaluate his future requirements when installing a BSC system.

The MRJE has the same requirements as above except that it requires 48K bytes of main storage capacity on the 5285 and 64K bytes of main storage on the 5288.

The minimum system configuration required to support communications in an SNA network, including the SRJE utility, is:

An IBM 5285 with 64K bytes of main storage capacity, the Communications Adapter (#2500), a display size(s) of 960 characters, and either the Elapsed Time Counter (#3610) or the Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4960).

OR:

An IBM 5288 with 64K bytes of main storage capacity, the Communications Adapter (#2500), an auxiliary data station (5281 or 5282) with a display size(s) of 960 characters, and either the Elapsed Time Counter (#3610) or the Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4955).

One communications line can be connected (via the appropriate line interface) to the adapter.

Optional hardware that is available for use with the Communications Utilities is:

- IBM 5222 Printer
- IBM 5224 Printer
- IBM 5225 Printer
- IBM 5256 Printer
- IBM 3270 Emulation Communications Adapter
- IBM Magnetic Stripe Reader

SOFTWARE REQUIREMENTS

5280 System Control Programming (5708-SC1).

DOCUMENTATION

(available from Mechanicsburg)

IBM 5280 Communications Utilities Licensed Program Specifications (GC34-0387) ... IBM 5280 Communications Reference Manual (SC34-0247).

TERMS and CONDITIONS: See PP Index

**5280 DE/RPG
5708-DE1**

PURPOSE

DE/RPG is a licensed program that provides advanced data entry and associated processing capability for the 5280 system. DE/RPG uses the Data Description Specifications (DDS) form, which is also supported on the System/38. An RPG subroutine capability is included which is a subset of RPG III calculation operation codes. The DE/RPG licensed program consists of a Compiler and a Source Entry Program.

A broad range of capability is provided to allow the user to perform jobs ranging from simple, transcriptive key entry, to high-function data entry requiring extensive editing, data set access and user-defined processing. User-defined formats, presented on the display, constitute the framework for entering data, creating a record and writing that record to a diskette data set. Extensive data editing is available to maximize productivity of the data entry process and reduce the need for expensive error correction procedures. Using General Utility Specification forms and Data Description Specification forms, the user can define a data entry program by simply specifying which edits and checks are required.

DE/RPG uses DDS forms for specification of data entry formats. A format or series of formats provide the framework for a data entry job. Sequence of execution of formats is determined by job definition, operator selection, or dynamically, based on analysis of current data.

Basic function is expanded through use of the RPG Calculation Specifications. This provides the user with the capability of defining specialized routines, such as complex arithmetic calculations, array handling, device I/O operations or initiate/terminate and read/write to communications. This RPG subroutine capability can also be used to create a stand-alone batch DE/RPG program.

HIGHLIGHTS

- **Display Screen Design**
 - Prompts and data fields can be positioned anywhere on the screen below the status line (Line 1 of the display).
 - Multiple formats can be displayed on a single screen.
 - Display attributes for prompts and data fields include highlight, blink, reverse image, underline, nondisplay and column separators.
- **High-Function Editing**

Provides the capability of checking and performing operations on data as it is entered. Edits can be performed on a character, field, or record basis, and include:

 - Character check - alpha, alpha only, numeric, numeric only, signed numeric, digits only, hexadecimal
 - Mandatory enter
 - Mandatory fill
 - Data required
 - Exit key required
 - Duplication - from previous record or named field
 - Right adjust with blank or zero fill
 - Self check/generate - Modulus 10/11 or user-defined
 - Counter arithmetic
 - Automatic field insert - constant, named field or results of an arithmetic expression
 - Comparison test - compare to constant, named field or arithmetic expression
 - Substitute table data for keyed data
 - Table lookup - test for matching table entry
 - Range test - compare to constants, named fields or table entries
 - Reformat field position - resequence fields for output record
 - Set indicators on/off
 - Exit to user subroutine
 - User-written error messages
 - Crosscheck - compare values of two fields against a table to ensure valid combination
 - Sequence check - compare current value of field with previous value
 - Picture check - multiple keyboard shifts in a single data field
- **Production Statistics**

All DE/RPG programs will maintain production statistics on a job basis and on a station basis. Statistics that can be maintained include: Keystrokes, records, elapsed time, marked records, verify correction keystrokes, number of jobs (on a station basis).
- **User-Written Subroutines**

Through use of the RPG Calculation Specifications, capability is provided to create subroutines for DE/RPG programs. In addition, this capability allows the user to write a non-interactive, stand-alone DE/RPG program that can run in any partition. The operation codes available are a subset of System/38 RPG III Calculation Specification operation codes. This capability can be used for such functions as complex edit routines, extensive arithmetic calculations, master data set access and report printing. Simple read/write statements provide access to communications via a

direct interface to the 5280 Communications Utilities licensed program (5708-DC1) and the 3270 Emulation licensed program (5708-EM11). Sequence of instruction execution is user-defined - the RPG 'cycle' does not apply. The following operation codes are available:

- Arithmetic and data manipulation - ADD, Z-ADD, SUB, Z-SUB, MULT, DIV, MVR, LOKUP, MOVE, MOVEA, MOVEV, COMP
- Branching - CABxx, GOTO, TAG
- Indicator testing - SETON, SETOF, BITON, BITOF, TESTB
- Subroutine operations - EXSR, BEGSR, ENDSR
- Special I/O operations:
 - Diskette - OPEN, CLOSE, READ, READP, WRITE, CHAIN, SETLL, UPDAT, DELET
 - Printer - OPEN, CLOSE, WRITE
 - Keyboard/display - EXFMT, WRITE
 - Communications - OPEN, CLOSE, READ, WRITE
 - Assembler subroutine exit - CALL
- Diskette Data Set Support

The 5280 system supports the sequential data set organization. The access methods available are: sequential, direct by relative record number and key indexed. Data sets can be shared by multiple programs on a read or write/update basis. Concurrent update of a record by multiple programs is prevented.

- **Modes of Operation**

The four basic modes of operation of a DE/RPG program are:

 - Enter: Initial data entry. The record created is written to a diskette data set.
 - Update: Review and modification of selected records in an existing data set.
 - Verify: Verify data in an existing data set for accuracy.
 - Rarun: Sequential processing of an existing data set performing all field edits and checks without operator intervention (that is, normal key input is bypassed).

- **Special Functions**

During operation of a DE/RPG program, the operator can select from a number of available special functions. These special functions include:

- Search Data Set - locate and retrieve a record in a data set by its position within the data set, or by record content.
- Manual Format Selection - operator selection of a format within the current job.
- Record Insert/Delete - insert a record into or delete a record from a data set.
- Copy - transfer a record from a data set to the current transaction data set.
- Print - an unformatted printing of the current record.
- Mark Field - mark a field in error to facilitate later correction.
- Edit Release - suspend editing of a field.

- **Device Support**

All devices available on the 5280 system are supported by DE/RPG:

- Keyboard/display
- Diskette 1 drive
- Diskette 2D drive
- Magnetic Stripe Reader (#4950)
- 5222 Printer
- 5224 Printer
- 5225 Printer
- 5256 Printer

- **DE/RPG Source Entry Program**

The DE/RPG Source Entry program is used to create a DE/RPG source statement data set, which becomes input to the DE/RPG compiler. Operating through the keyboard/display, the user selects the required statement type and is prompted to enter the parameters required to complete the statement. The parameters are entered via the keyboard, the program automatically formats the statement into the form required by the DE/RPG compiler, and the record is written to diskette. Three modes of operation are normally used:

- Enter Mode - for the original entering of statements for a source program.
- Update Mode - for making corrections or additions to an existing DE/RPG source statement data set.
- Verify Mode - for verifying data in an existing source statement data set for accuracy.

- **Program Use**

5280 DE/RPG (cont'd)

Input to the compiler is a DE/RPG source statement data set. This data set may be created by the DE/RPG Source Entry Program, a DE/RPG user-defined data entry program or the 5280 Key Entry Utility program (part of the 5280 Utilities licensed program - 5708-UT1). During compilation, a source listing is optional, and if requested, can be directed to a printer or diskette. Output of the compiler is an object program data set written to diskette. For object program execution, when the requirement exists for multiple operators to perform the same job, each operator must have an individual copy of the program, executing in a separate partition.

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation and continued day-to-day operation lies solely with the customer.

Installation of IBM licensed programs is a customer responsibility.

Program Use During Customer Pre-installation Testing: 5280 DE/RPG (5708-DE1) will be available to customers for pre-installation testing on IBM Test Center Systems in accordance with IBM's Program Testing Policy.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

The DE/RPG compiler will run on any IBM 5280 system which has, as a minimum, either two diskette 1 drives or one diskette 2D drive. The DE/RPG Source Entry Program will run on any IBM 5280 system. Minimum main storage partition size requirements are as follows: 9K for the DE/RPG compiler; 13K for the DE/RPG Source Entry program. The compiler will take advantage of additional main storage capacity if it is available.

If the user desires to maintain the elapsed time production statistic, the Elapsed Time Counter or the Magnetic Stripe Reader Adapter/Elapsed Time Counter (special features) is required as follows: For the IBM 5285 - #3610, #4955 or #4960; for the IBM 5286 - #3610 or #4955; for the IBM 5288 - #3610 or #4955.

SOFTWARE REQUIREMENTS

The DE/RPG compiler, DE/RPG object programs and the DE/RPG Source Entry Program require the IBM 5280 System Control Programming (5708-SC1). In addition, DE/RPG object programs and the DE/RPG Source Entry program have, as a prerequisite, the IBM 5280 Utilities licensed program (5708-UT1). DE/RPG object programs and the DE/RPG Source Entry program require a customer-created IPL diskette containing the SYSCFA or SYSHELP data set (part of the 5280 Utilities).

DOCUMENTATION

(available from Mechanicsburg)

IBM 5280 DE/RPG Licensed Program Specifications (GC21-7798) ... IBM 5280 DE/RPG Reference Manual (SC21-7787) ... IBM 5280 DE/RPG User's Guide (SC21-7804) ... IBM 5280 Introduction to DE/RPG (SC21-7803) ... IBM 5280 DE/RPG Problem Determination Procedures for the Programmer (SC21-7852).

TERMS and CONDITIONS: See PP Index

5280 - 3270 EMULATION 5708-EM1

PURPOSE

5280 - 3270 Emulation allows the 5280 Distributed Data System to appear as selected 3270 control units and devices. The operating environments supported are:

- 3270 Device Emulation under System Network Architecture/Synchronous Data Link Control (SNA/SDLC) and Binary Synchronous Communications (BSC). The 3270 Device Emulation Utility allows the 5280 to appear as selected 3270 control units and devices to existing host applications.
- 3270 Batch Transfer - BSC. Using this utility program, the 5280 user can transmit and receive batch data over a 3270 BSC network using 3270 line protocols. An appropriate user-written program is required at the host. Only graphic data (hex characters '40'-'FF') can be transmitted.
- 3270 Program Interface - BSC. This provides an interface for a user-written program in the 5280, written in DE/RPG or COBOL, to exchange records with a user-written program in a host system using 3270 BSC protocols. Only graphic data can be transmitted.

HIGHLIGHTS

3270 Device Emulation

Control Unit:

- The 5280 appears to the host as a 3274 model 1C Control Unit under SNA/SDLC or as a 3271 model 2 Control Unit under BSC.

Display/Keyboard:

- The 1,920-character 5281 Data Station (attached to a 5288 Programmable Control Unit) and the 1,920-character 5285 Programmable Data Station appear to a host system as a 3277 model 2 Display Station with selected features.
- Typewriter, data entry, and data entry with proof arrangement keyboards are supported. 3270 Program Function keys are supported.
- The Local Print Key function is supported in SNA/SDLC and BSC.

Printer:

- The 3270 Printer Emulation Utility allows the 5222, 5224, 5225, and 5256 Printers to appear as the 3284 model 2, 3286 model 2, or 3288 model 2 Printer in BSC, or the 3287 model 1 and 2 Printer in SNA/SDLC.

3270 BSC Batch Transfer Utility Program

- Data on a 5280 diskette can be sent to (or received from) an appropriately written host application program. Only graphic data can be transmitted.
- This utility is designed for batch transfer and limits the interference to other interactive sessions on the line. As a result, transfer of a data set can take more time than a normal batch transfer operation.
- The transmission and reception of multivolume diskette data sets is supported.
- Unsolicited host operator messages are handled by the 5280 display while the utility program is in operation.
- Logon to an interactive host is allowed prior to starting Batch Transfer.
- The use of a user-provided record identifying character in the data stream permits distinguishing user data from system messages.
- Fixed length, blocked or unblocked records up to 1,918 bytes are supported.

3270 BSC Program Interface

- Read/write level of interface on a logical record basis is available in an interactive mode using DE/RPG and COBOL.
- The DE/RPG or COBOL application program provides a 1,920-character Device (Image) Buffer and 4,096-character, or less, Data Stream Buffer.
- User-written programs must be provided at both ends of the communications link with careful consideration given to the application design and the characteristics of the communications subsystem.

DESCRIPTION

The 5280 - 3270 Emulation licensed program consists of the following six basic parts:

- 3270 Device Emulation Program - BSC and SNA/SDLC
- 3270 Batch Transfer Utility - BSC
- 3270 Program Interface - BSC
- Communications Access Method - BSC

- Communications Access Method - SNA/SDLC
- Communications Access Method - 3270/SRJE

3270 Device Emulation Program - BSC and SNA/SDLC

Host system communication subsystems that are supported are: S/370 IMS/VS, CICS/VS, TSO, and System/3 model 15D CCP.

Control Unit:

The 3270 Device Emulation Program allows the 5280 to appear to a host system as a 3274 model 1C (SNA/SDLC) or a 3271 model 2 (BSC) Control Unit.

Device emulation of the 3270 allows the 5280 to reside on the same communications link that supports a 3274 model 1C or 3271 model 2 Control Unit. Since this program provides data stream translation, host application programs will generally require little or no changes to support the 5280 as a 3270. Performance, however, may be degraded.

Display/Keyboard:

The 1,920-character 5281 Data Station (attached to a 5288 Programmable Control Unit) and the 1,920-character 5285 Programmable Data Station appear to a host system as a 3277 model 2 Display Station with selected features. Features not supported include: ASCII, Magnetic Stripe Reader, Light-Pen, and the Copy Command (from the host).

Certain keys are in different locations on the 5280 keyboards. The EBCDIC typewriter, data entry, and data entry with proof arrangement keyboards and the EBCDIC transmission codes are supported. Function keys on the 3277 will be mapped onto the 5280 keyboard to provide for equivalent function: that is, Field Mark, Erase Input, PA, and PF keys. Up to 24 PF keys are supported. The host initiated local copy (print) is supported for SNA/SDLC. The local print key function is supported for SNA/SDLC and BSC. The magnetic stripe reader and the light-pen are not supported.

Printer:

The 3270 Printer Emulation utility provides to the 5280 user a method of using a 5280 printer as if it were a 3270 printer. The data to be printed is transmitted from the host system. The 3270 printers emulated are 3284 model 2, 3286 model 2, and 3288 model 2 in BSC. The 3287 Printer (models 1 and 2) is supported in SNA/SDLC. Special features available on these printers are not supported.

The 5280 printers supported are the 5222, 5224, 5225, and 5256. They will print characters that match 3270 printer characters where it is physically possible. Characters that do not match will print a standard default character. Users that must print all characters exactly as on a 3270 printer can do so by using a printer with the multinational character set. Upper and lower case printing is supported on all printers and vertical forms control is supported as on the 3287 and 3288 Printers.

The Printer Emulation Utility operates in either a foreground or background partition, and a maximum of five printer emulations may be active at one time.

The printers may operate in local mode, systems mode (entirely under host control) or shared mode.

3270 Batch Transfer - BSC

The 3270 Batch Transfer Emulation Utility will enable the user to transmit and receive batch data when communicating with a host system via 3270 BSC. Record lengths can be a maximum of 1,918 bytes. Transaction IDs and how they are to be used during transmission may be specified. It is possible to transmit and receive single or multiple volume data sets containing graphic text (hex characters '40'-'FF') only. Unsolicited messages and interactive logon/logoff can also be handled. The utility executes in a foreground partition. A user program is required at the host to send or receive batch data.

3270 Program Interface - BSC

This function provides the 5280 user with a program-to-program interface that uses 3270 BSC protocols. The 5280 application program that uses this function appears to the host system as a 3271 model 2 device. Up to seven concurrent sessions are supported. Each session represents a different 3270 device address.

The user application interface for this function is through DE/RPG and COBOL. The DE/RPG support for the 3270 program interface will provide a new parameter on the DEVICE keyword. The user will specify 'COMM3270' as the device type. A file defined with this device code may be accessed from the calculation specifications using READ, WRITE, OPEN, and CLOSE operations.

The COBOL support is implemented by use of the COBOL CALL routines. A COBOL program interfaces to the 3270 CAM through library routines. Communications are initiated by activating the CALL verbs that open and close data sets and read or write records.

5280 - 3270 Emulation (cont'd)

BSC Considerations: Primary operation is on nonswitched multipoint communications facilities. Switched network backup (SNBU) may be utilized if the associated modems and application programs support this capability.

The following BSC host system support is provided for 5280 - 3270 Device Emulation:

- IMS/VS with BTAM under OS/VS1 or OS/VS2 (MVS)
 - IMS/VS with ACF/VTAM under OS/VS1 or OS/VS2 (MVS)
 - IMS/VS with ACF/TCAM under OS/VS1 or OS/VS2 (MVS)
 - CICS/VS with BTAM under OS/VS1 or OS/VS2 (MVS)
 - CICS/VS with ACF/TCAM under OS/VS1 or OS/VS2 (MVS)
 - CICS/VS with BTAM-ES or ACF/VTAM or ACF/VTAME under DOS/VSE
 - CICS/VS with ACF/VTAM under OS/VS1 or OS/VS2 (MVS)
 - TSO with ACF/VTAM under OS/VS2 (MVS)*
 - TSO with ACF/TCAM under OS/VS2 (MVS)*
 - RSCS with VM/370 (printer emulation)
 - CMS with VM/370 (display emulation)
 - System/3 model 15D under CCP
- * TSO does not support printers.

Notes:

1. All of the above systems (except System/3) are also supported when under control of VM/370.
2. The 3270 Batch Transfer - BSC and the 3270 Program Interface - BSC functions are not supported by IMS or CICS/VS. Support for these functions is limited to those specific interfaces described in the *IBM 5280 - 3270 Emulation Reference Manual* (SC34-0384).

SNA/SDLC Considerations: Operation is on point-to-point switched as well as nonswitched point-to-point or multipoint communications facilities. The point-to-point switched capability is a function of the 5280 - 3270 Emulation licensed program (not a function of the 3274).

The following SNA/SDLC host system support is provided for 5280 - 3270 Device Emulation:

- IMS/VS with ACF/VTAM under OS/VS1 or OS/VS2 (MVS)
 - IMS/VS with ACF/TCAM under OS/VS1 or OS/VS2 (MVS)
 - CICS/VS with ACF/VTAM under OS/VS1 or OS/VS2 (MVS)
 - CICS/VS with ACF/TCAM under OS/VS1 or OS/VS2 (MVS)
 - CICS/VS with ACF/VTAM or ACF/VTAME under DOS/VSE
 - TSO with ACF/VTAM under OS/VS2 (MVS)*
 - TSO with ACF/TCAM under OS/VS2 (MVS)*
 - VSPC (Version 2 of later) with ACF/VTAM under OS/VS2 (MVS)
- * TSO does not support printers.

Note: All of the above systems are also supported when under control of VM/370.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

The minimum 5280 system configuration required to support the 5280 - 3270 Device Emulation capabilities is:

An IBM 5285 with 64K* bytes of main storage capacity, the 3270 Emulation Communications Adapter (#3270), and Optional 1,920-Character Display Size (#3505). SNA support requires, in addition, either the Elapsed Time Counter (#3610) or the Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4960).

OR

An IBM 5288 with 64K* bytes of main storage capacity, the IBM 3270 Emulation Communications Adapter (#3270), and an IBM 5281 Data Station with a display size of 1,920 characters. SNA support requires, in addition, either the Elapsed Time Counter (#3610) or the Magnetic Stripe Reader Adapter/Elapsed Time Counter (#4955).

Refer to the *IBM 5280 - 3270 Emulation Reference Manual* (SC34-0384) for required main storage requirements of other functions.

SOFTWARE REQUIREMENTS

The current release of IBM 5280 System Control Programming (5708-SC1) and the current release of IBM 5280 Communications Utilities (5708-DC1)

- * 96K bytes if a printer is used in conjunction with the keyboard/display

96K bytes may be required depending upon the host system network parameters effect on the SNA CAM buffer size. Refer to the *IBM 5280 - 3270 Emulation Reference Manual* (SC34-0384).

160K bytes is required if the 3270/SRJE CAM is to be run with two utilities, (96K with one utility), such as the IBM 3270 SNA Display Emulation program and the SNA Remote Job Entry Utility (part of the 5280 Communications Utilities licensed program), executing concurrently.

COMPATIBILITY

5280 Communications Support Compatibility: The 5280 - 3270 Emulation licensed program can co-exist on a 5280 system with other non-communicating programs. Running a 3270 Emulation program concurrently with Transcriptive (that is, high keying rate) Key Entry (TKE) may degrade TKE performance. No other 5280 communications programs can run concurrently.

DOCUMENTATION

(available from Mechanicsburg)

IBM 5280 - 3270 Emulation Licensed Program Specifications (GC34-0382) ... *IBM 5280 - 3270 Emulation Reference Manual* (SC34-0384).

TERMS and CONDITIONS: See PP Index

**5280 SORT/MERGE
5708-SM1****PURPOSE**

The 5280 Sort/Merge licensed program consists of a Sort Program and a Merge Program. The Sort and Merge programs support any diskette data set organization supported by the 5280 system. The Merge Program supports multivolume data sets.

Sort Program: The 5280 Sort program sorts a single diskette data set into ascending or descending sequence.

HIGHLIGHTS

- Sort parameters are entered at the keyboard or read from a 'Command' data set which contains previously recorded parameters. Use of the 'Command' data set allows easier execution of most frequently desired sort functions.
- Records are sorted by a control field which can consist of from one to six subfields from different locations of the record.
- Control fields can be sorted in ascending or descending sequence or mixed (some ascending and some descending).
- Records can be selected, omitted, or reformatted.
- An alternate collating sequence can be specified.
- Records can be in EBCDIC or ASCII code.
- Work space and data sets are automatically allocated by the program.
- The order of records with identical control fields is preserved.
- Output from the sort program will be 1 of 4 formats:
 1. Full record
 2. Address Out - A data set of 4-byte relative record numbers.*
 3. Record Subset - A data set containing user-specified data fields.
 4. Index/Key - A data set with records consisting of a key and a relative record number.* The key is a user-specified input record data field.

* The relative record number corresponds to the position of the input record in the input data set.

DESCRIPTION

Merge Program: The 5280 Merge program will combine records from two sequentially-ordered diskette data sets into another diskette data set. The records can be in ascending or descending order. An alternate collating sequence can be specified. Multivolume data sets are supported for both input and output. Merge parameters are entered at the keyboard or read from a 'Command' data set which contains previously recorded parameters. Use of the 'Command' data set allows easier execution of most frequently desired merge functions.

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of IBM licensed programs is a customer responsibility.

Program Use During Customer Pre-installation Testing: The 5280 Sort/Merge (5708-SM1) will be available to customers for pre-installation testing on IBM Test Center Systems in accordance with IBM's Program Testing Policy.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

The Sort/Merge will run on any IBM 5280 system. Minimum main storage partition size requirements for the Sort and Merge Programs is 16K. The Sort and Merge Programs will take advantage of additional main storage capacity if it is available.

SOFTWARE REQUIREMENTS

IBM 5280 System Control Programming (5708-SC1).

DOCUMENTATION
(available from Mechanicsburg)

*IBM 5280 Sort/Merge Licensed Program Specifications (GC21-7800)
... IBM 5280 Sort/Merge Reference/Operation Manual (SC21-7789).*

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**5280 UTILITIES
5708-UT1**

PURPOSE

The 5280 Utilities licensed program provides the following utilities for the 5280 user.

DESCRIPTION

Diskette Initialization Utility Formats the diskette according to user requirements. The program will initialize diskettes 1 and 2 with sector sizes of 128, 256 or 512 bytes, and diskette 2D with sector sizes of 256, 512 or 1,024 bytes.

Diskette/Data Set Clear Utility: Performs the following functions:

- **DROP:** Clears the data set(s) in preparation for the recording of new data.
- **FREE:** Deletes the data set(s) and its header label from the diskette so that space is no longer assigned to that data set.

Diskette Label Maintenance Utility: Provides the user with the capability to allocate new data sets, delete old data sets, and to modify volume and data set labels. The following capabilities are provided:

- **ALLOCATE:** Used to establish space for a new data set on a diskette.
- **DELETE:** Offers capability to either drop or free a header label.
- **MODIFY VOLUME LABEL:** Can be used to alter the Volume ID, Owner ID and accessibility field.
- **MODIFY DATA SET LABEL:** Provides the user with the capability to modify header label fields.

Diskette Label List Utility: Provides the user with the capability to display, print, or write to diskette: Diskette volume labels, data set labels, data set names, and data set directories.

Diskette Copy Utility: Allows the user to copy all or a portion of a diskette onto the same or another diskette. Multivolume data sets are supported. The following functions are provided:

- **IMAGE COPY:** Copies the entire contents of an input diskette onto an output diskette. Input and output diskettes must be the same type and format.
- **VOLUME COPY:** Copies a group of data sets or the entire contents of an input diskette onto an output diskette. Input and output diskettes can be different types and have different formats. Deleted data sets are not copied.
- **DATA SET COPY:** Copies the contents of up to four input data sets to an output data set.
- **SPECIFY RECORD COPY:** Copies the contents of a data set between 'from-to' relative record numbers to an output data set.
- **SPECIFY KEY COPY:** Allows the user to specify by key(s) which records are to be copied.
- **SINGLE DRIVE DATA SET COPY:** Copies a data set from one diskette to another using only one diskette drive.

Diskette Print Utility: Allows the user to print all or selected records on a diskette. The program provides the following options:

- Print all records in a data set.
- Print all records from a group of data sets or all data sets.
- Print all records in a data set between user-specified relative record numbers.
- Print all records in a data set matching a user-specified key(s).

Records are printed exactly as recorded on diskette without reformatting or editing.

The program also provides the capability to print a data set consisting of printer output previously directed to diskette. The data set must have been created from printer output (such as a DE/RPG compiler output listing) directed to a diskette or from data transmitted over a communications line, and must be a valid Standard Character String (SCS) data set with appropriate printer format control.

SCS/BSC (3741) Print Utility: Provides the following print functions:

- Print BSC (3741 protocol) data sets that have not undergone the Standard Character String (SCS) mapping process. The utility will perform the SCS processing and provide a halt when an invalid escape sequence is encountered.
- Print a single SCS data set which contains valid printer format control characters.
- Print a group of SCS data sets having a common forms type identified. This capability supports data sets transmitted to a 5280 in the form 'PRINTsss' or 'Asssxxxx'.

Other features of this utility include:

- Printer format information for SCS processing may be supplied from the keyboard or from a printer format record on diskette.
- Printer forms alignment option. The first line of output may be reprinted multiple times.
- Print restart capability. For SCS data sets, the operator can halt printing and restart at any point in the data set.
- Multivolume input.

Resource Allocation Utility: Allows the user to display, alter, or delete the logical device identifier and physical address of an existing entry, or add an entry to the resource allocation table. The resource allocation table contains physical device addresses with corresponding logical identifiers, and is originally built using the System Configuration Program [part of 5280 System Control Programming (5708-SC1)].

3740 Format Conversion Utility: Allows the user to convert 3740 key entry program levels into source DE/RPG jobs. This utility converts basic field definitions such as right adjust, skip, dup, bypass, self check, field totals and their associated prompts. 3740 functions that are not converted by this utility can be implemented by adding appropriate DE/RPG statements to the DE/RPG program. Input to this utility is 3740 key entry string language from a diskette data set.

Diskette Compress Utility: Permits the user to rearrange data sets to make one contiguous space out of the unused space between data sets. Deleted data sets are removed from the diskette.

Key Entry Utility: Provides the capability to create formats for basic key entry functions using the 3740 key entry string language. The key entry functions are functionally and operationally similar to the 3740 for enter, update, and verify operations.

This program takes advantage of 5280 ease-of-use characteristics to provide improvements in data set allocation, searches, and production statistics. Basic 3740 key entry functions are provided, except for self check, auxdup, 'numbers only' switch, online field totals, and non-key entry functions, such as printing and offline field totals.

The 3740 string language is entered at the keyboard and the resulting formats are immediately available or may be saved on diskette for later use.

This utility is intended for simple key entry with little editing. It is not a 3740 emulator.

The Key Entry Utility requires an IPL diskette containing the SYSCFA or SYSHELP data set (part of this licensed program).

System Status Utility: Provides the user with the capability to retrieve certain system status information. Current system status can be displayed, providing information on each main storage partition. This information includes partition number, name of program currently being executed (if any), partition size, and partition type (foreground or background).

System configuration parameters, stored on an IPL diskette, can be retrieved and displayed or printed. These parameters define the configuration of the system for which the IPL diskette was generated, and include: System size (main storage), common function area size, printer type(s) and address(es), partition definitions (number, type and size) and type and number of keyboards.

Menu Configuration Utility: Provides the programmer with the means to create and maintain a menu for a set of programs or procedures. A menu provides a displayed list of items (for example, job descriptions) from which an operator makes a selection. Menu selection allows the operator to start a job (or procedure) by simply selecting a menu item number. This utility creates a data set which contains the menu(s) and all information necessary to access, load, and initiate execution of the associated programs and/or procedures. The data set is stored on the diskette which contains the programs and/or procedures associated with the menu(s).

Menu Utility: Provides the operator with the means to display and use menus. Initial execution of this utility provides a menu containing an entry for each online diskette which contains a menu data set. The operator can then select a menu for a specific set of programs and choose a specific job to be executed. The program will automatically be loaded and executed in a pre-selected background partition, the smallest available background partition, or the partition in which the Menu Utility is executing.

Data Set Display Utility: Provides the user with an easy way to review the contents of a data set. The unformatted records are presented on the display, one line per record. For records with more than 80 characters, the user can move the display right or left to view the entire record. Up to 22 lines of records (depending on display size) are displayed on each screen. The user can scroll forward and backward through the data set. Each successive display will index through the data set a user-specified number of records.

CUSTOMER RESPONSIBILITIES



PROGRAM PRODUCTS

5280 Utilities (cont'd)

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of IBM licensed programs is a customer responsibility.

Program Use During Customer Pre-installation Testing: The 5280 Utilities (5708-UT1) will be available to customers for pre-installation testing on IBM Test Center Systems in accordance with IBM's Program Testing Policy.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

The IBM 5280 Utilities (except Volume Copy, the write-to-diskette option of the Label List Utility, and the Menu Utility) will run on any IBM 5280 System. Volume Copy and the write-to-diskette option of the Label List Utility will run on any IBM 5280 System which has, at a minimum, two diskette drives. The Menu Utility will run on any IBM 5280 system which has a display size of 960 or 1,920 characters.

Minimum main storage partition size requirements are as follows: 8K for the Key Entry Utility; 9K for the Diskette/Data Set Clear, Diskette Label Maintenance, Diskette Label List, System Status*, Diskette Initialization, Diskette Copy, Diskette Print, Resource Allocation, Diskette Compress and 3740 Format Conversion Utilities; 12K for the Data Set Display Utility; 16K for the Menu Utility; 20K for the Menu Configuration Utility; and 22K for the SCS/BSC (3741) Print Utility. Each of the Utilities (except Diskette Initialization, Resource Allocation, Menu Configuration, and Menu) will take advantage of additional main storage capacity if it is available.

*16K for the IPL diskette option

For the Key Entry Utility, if the user desires to maintain the elapsed time production statistic, the Elapsed Time Counter or the Magnetic Stripe Reader Adapter/Elapsed Time Counter (special features) is required as follows: For the 5285 - #3610, #4955, or #4960; for the 5286 - #3610 or #4955; for the 5288—#3610 or #4955.

SOFTWARE REQUIREMENTS

5280 System Control Programming (5708-SC1).

DOCUMENTATION
(available from Mechanicsburg)

IBM 5280 Utilities Licensed Program Specifications (GC21-7799) ...
IBM 5280 Utilities Reference/Operation Manual (SC21-7788).

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

S/38 RPG III (cont'd)

one or more KFLD operation codes to designate those fields comprising the composite key.

Documentation Aids: Documentation enhancements include a cross-reference allowing easy access to determine where fields, files, and indicators are used.

DDS text descriptions are available to source documentation.

The SEU (or source file) sequence number is used as the default number method for statements and diagnostics and is carried into the object code to assist in execution time debugging. In addition, for any statement found in error, Position 1 of the compiler listing will show an asterisk. Asterisks will also appear under each field in error in the listing of the source.

Nested level indication shows each statement level in a nest of DO loops and IF/ELSE processing.

RELEASE 5.0 ENHANCEMENTS

System/38 RPG III is being enhanced in Release 5.0 to include support for CPF commitment control, local data area, and for multiple devices in a display or mixed file. CPF commitment control is a mechanism for the user to code restart into interactive programs to assure the integrity of changes made to one or more files. Multiple device and local data area support provides functions similar to System/34.

HIGHLIGHTS

- New operation codes and commitment file designation are being added to support CPF commitment control.
- New operation codes and file specification continuation options have been added to provide multiple device support of display and mixed files.
- Access to the CPF Local Data Area provides function similar to that provided for the System/34.

DESCRIPTION

Definition of files under CPF commitment control and operation codes to cause commitment or return to the prior commitment boundary are being added to RPG III. This support provides the programmer with greater flexibility in designing interactive sessions and greater ease in backing out undesired transactions.

The operation codes (ACQ, REL, POST and NEXT) and file specification continuation options (NUM, IND, SAVDS and ID) are being added for display and mixed file support of multiple devices. These additions will provide functions similar to those provided by the System/34.

The CPF Local Data Area can be read in at the start of an RPG III program and written back at program termination. In addition, the IN and OUT operation codes can be used with other data areas. This support will provide a function similar to that provided by System/34.

CUSTOMER EDUCATION

System/38 RPG III Education is available as follows:

Title	Course	Code
Fundamentals of RPG II Programming	D2005*	
RPG II Programming Workshop	Q1005*	
RPG III Structured Programming Workshop	A2004	

* Not required for the experienced RPG II Programmer

COMPATIBILITY

Usually with minor source changes, batch System/32, System/34, and System/3 RPG II programs can be compiled and executed on System/38. The changes principally involve the Header (H) specification and File Description (F) specification.

CONVERSION REQUIREMENTS

Conversion requirements appear in the *S/38 Installation Manual - Conversion Planning* (GC21-7732).

PLANNING INFORMATION

For existing users, Release 4.1 must be installed prior to installing Release 5.0.

Program Use During Customer Preinstallation Testing: The System/38 RPG III licensed program (5714-RG1) is available to customers for preinstallation testing on IBM Test Center Systems in accordance with IBM's Program Testing Policy.

CUSTOMER RESPONSIBILITIES

Installation of System/38 licensed programs is a customer responsibility. IBM may provide marketing assistance, in accordance with Marketing and Service Guidelines in the GI Section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

IBM System/38 RPG III runs on all models of IBM System/38.

SOFTWARE REQUIREMENTS

IBM System/38 RPG III and/or System/38 COBOL is designed to operate with the IBM System/38 CPF (5714-SS1).

DOCUMENTATION
(available from Mechanicsburg)

IBM System/38 RPG III Licensed Program Design Objectives (GC21-7760).

The following documents are scheduled to be updated and available in June 1983:

S/38 Guide to Publications, Glossary and Master Index (GC21-7726)
... *S/38 RPG III Reference Manual and Programmer's Guide* (SC21-7725).

RPOs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**SYSTEM/38 CONTROL PROGRAM FACILITY (CPF)
5714-SS1**

PURPOSE

The IBM System/38 Control Program Facility (CPF) licensed program, used with IBM System/38 machine functions, provides these major capabilities:

- Work Management
- Data Management
 - Data Base Data Management (DBDM)
 - Device Support (DS)
 - Data Description Specifications (DDS)
- Control Language (CL)
 - Control Language Programming
 - Single Consistent Interface
- Security
- Message Facilities
- Spooling
- Communications
 - System/38 as a terminal to System/370 IMS/VS or CICS/VS (SNA/SDLC)
 - System/38 as a host for remote 5250 Information Display System devices
 - System/38 Binary Synchronous Communications (BSC) facilities
 - Point-to-point
 - Multipoint tributary
- System/38 as a Peer to CICS OS/VS and CICS/DOS/VS Version 1 Release 6 and another System/38 using New SNA (LU6.2 and PU2.1).
- Installation (System Specialization)
- System Services
 - Test and Debug Facilities
 - Library Facility
 - Journal Facility
 - Save/Restore Facility
 - Service Facilities
 - File Reference Facility
 - Copy Facility
 - Power Warning Feature

DESCRIPTION

Work Management: The primary functions of the System/38 CPF Work Management are to:

- Accept and process, concurrently, work from multiple users of the system.
- Support batch, interactive, and spooling functions.
- Allocate and control the usage of system resources in a multitasking environment.

Users from any 5250 System display device (or the system console) may initiate work, either interactive or batch. Work Management processes the job requests, acquires the system resources required for the jobs, executes, and terminates the jobs. Work Management supports transaction processing functions.

Work Management handles the contention resulting from multiple jobs competing concurrently for system resources. In order to accomplish this, it manages the scheduling and queuing necessary to share the system resources among all jobs. The user may control the job processing requirements and priorities through the Control Language.

All work is managed concurrently in subsystems (a defined operating environment such as batch, interactive, and spool), and jobs may be allocated to pools (a logical division of main storage) within a subsystem. These features permit the user to establish special operating environments, and control the execution of high priority jobs.

Data Management

- Data Management access methods support sequential, indexed, and direct (relative record number) file organization, and permit multiple user-defined indices per file.
- Data Management provides the support for disk data file handling such as create, add, delete, and traditional data I/O operations like read and write.
- Data Management provides the I/O management for all I/O devices. (Note that disk storage is not considered I/O on System/38.)
- Data Management provides support enabling the user to describe data and device files external to the application programs.
- Data Management includes support for:

- Data Base Data Management
- Device Support
- Data Description Specifications (DDS)

Data Base Data Management: Data Base Data Management support is integrated within the System/38. The relationship between physical data files is independent. Each file may be created, modified, or deleted without effect on other physical files.

The primary features of Data Base Data Management (DBDM) are:

- Data Independence
- Journal Facility
- Data Security
- Data Maintenance
- Data Sharing

System/38 Data Base Data Management is designed to simplify operations and increase user productivity. The user need only describe, create, and store the data once in a physical data file. System/38 Data Base Data Management provides the capability for multiple users to concurrently access that data logically in various organizations, sequences, and formats (logical file), regardless of the actual physical structure of that data. This provides a high degree of data independence to individual programs and users. Options are available to specify the type of maintenance to be performed to the sequencing of data including immediate, delayed, and rebuild.

A journal facility exists to allow for forward or backout recovery. Once a file is specified to be journaled, all changes are implicitly captured by the system. The journal may also be of benefit for such functions as faster daily backup, security, audit trail, activity reporting, and debugging. Commands are provided for recovery, display, and management of the journal objects.

Data security is provided by controlling ownership, authorization to use the data, and is actually a function of System/38 Security. (See "Security" for more information on Security features.)

With physical data only residing in one place and in one physical structure, it is easier to maintain. When data is altered in the physical file, the same program or any other program which subsequently retrieves that data, receives the updated version. Records added to the files are available to users when they are written to the file.

Data Base Data Management permits multiple users to access data. For updates, it will lock the record being updated until the update is done, to assure that all update requests are serially handled. It also provides the capability to lock data files for exclusive use until relinquished.

Device Support: System/38 Device Support will support the following devices:

- System Console
- 5250 Information Display System devices including local and remote displays and printers (5256/5224/5225)
- Diskette Magazine Drive
- 5424 MFCU
- 5211 model 2 Printer
- 5219, 5224, 5225 Printers
- 3262 Printer
- 3203 model 5 Printer
- 3370 Direct Access Storage Device
- 3410/3411 Magnetic Tape

System/38 Device Support is similar to data management and I/O supervisor routines for devices on other IBM systems, but with enhanced capability.

System/38 provides device independence by permitting the user to define device files (via DDS) external to the program. The user then has increased flexibility to direct and control device I/O through Control Language overrides independent of program instruction. For example, a program may have output coded for a workstation printer but selection of a specific printer could be made upon program execution. Also, devices may be dynamically allocated, or deallocated, to active processes. System/38 Device Support will support device file definitions whether coded in the program or defined to the device data management, and relieve the programmer of device attachment method (local or remote).

Subfile capability is provided for display devices. This reduces the programming effort for the user to group records of like format, for concurrent display, modification, or input. For example, a display device operator may enter an entire screen of order entry line items

PROGRAM PRODUCTS

System/38 Control Program Facility (CPF) (cont'd)

before submitting them to the system for processing by the program one record at a time.

Also extensive data manipulating functions such as screen formatting, editing, and validity checking are supported for display devices.

Data Description Specification: The Data Description support in System/38 Data Management is the user's means to describe files for the data base and devices independent of application programs.

The files may be described once external to the application program. The external description is automatically added to the program at compile time. This reduces redundant I/O coding for programs using the same data. It also gives a consistent view of the structure of the data to each using program, thus reducing transcription, and associated errors in repetitious I/O coding.

Display device formats for display I/O are entered via DDS. During format description, data base field definitions can be used, and editing and validity checking features are available. These capabilities greatly simplify the application programming.

The user enters source description information on a Data Description Specification Form, similar in approach to RPG coding. For syntax checking while entering the source description, the user may optionally use the Source Entry Utility on the System/38.

Data records are stored in online auxiliary disk devices in the order they are received by the system. These physical files may be accessed in arrival sequence or by field(s) defined to produce a composite key. All records in a physical file have the same format.

A logical file is the vehicle to allow the user to change the presentation of the data in a physical file. For example, with logical files the user may:

- Specify a different format than the physical file. These formats can specify field reordering, omission, concatenation, and different field attributes.
- Select or omit records from the physical file.
- Specify a different ordering (key) than the physical file.
- Specify records from multiple physical files sequenced together by a composite key (similar to RPG matching record logic).
- DDS supports SNA/SDLC LU-1, SNA/SDLC LU6.2 and BSC communications device file record formats similar to the method used for data base files. Functional control of communication operation is managed through use of communications-specific DDS keywords.

Control Language: To request system function, the user enters CL commands, which are abbreviations of words for each command. Parameters are also entered to tailor the functions performed by the command.

The System/38 Control Program Facility through the Control Language (CL) provides:

- An easy-to-learn and use, consistent interface for the user to request and control system and application function.
- Commands executable from console, workstation, or batch job stream.
- CL programs callable by RPG III, COBOL, or other CL programs.
- A tailorable interface, with user-created commands to meet varying requirements.
- Compilable control language capability.

Control Language for the System/38 is described in three sections:

- **Ease-of-Use Facilities**
 - User command selection from menus
 - Prompting by the system for parameters
 - Free form syntax
- **Control Language Programs**
 - Compiled commands
 - Manipulation of variables
 - Call command with parameter capability
 - User-defined logic flow
 - Access to DDS (for display formats)
 - System program testing support
 - Interprogram communication (via message queues and data areas)
- **User-Created Commands**
 - To fulfill special needs
 - To control parameter selection

Ease-of-Use Facilities: System/38 supports both the inexperienced and the experienced Control Language user. CL supports the inexperienced user in the learn-as-you-go mode. Authorized users unfamiliar with the Control Language can be guided through command

entry by the system. Commands may be selected from a menu and then displayed, along with the parameter options, from which the user can enter, select, or default.

The experienced user may learn and enter the commands to execute a job. There is ease-of-use for the experienced user also. Command statement structure is free form, no fixed position requirements for parameters. Parameters may be positional or keyword form, and most of the parameters have default values.

Special menus are provided for the system operator and the programmer. These menus are designed to simplify the typical requests and also allow the entry of any command.

Workstation users without data processing experience can work from application menu displays (user-coded). This means reduced need for them to have detailed knowledge of the Control Language or the system, and their access to the system can be easily limited and controlled.

Another aid permits the user to get additional description of an error message by depressing the 'HELP' key on the keyboard.

Control Language Programs: A CL program is a group of CL commands converted to an executable program by the CL compiler. CL programs allow the user to group CL commands and application programs together. CL programs permit the definition of data as variables (fields), and can pass data (parameters) to other programs. The 'IF' command allows conditional execution of commands based on the result of logical expressions. Branching is also supported.

The user can define screens (menus and prompts) and display them under control of a CL program.

Values for parameters for commands in CL programs can be supplied at execution time via a prompt to the user. Most commands are valid within CL programs.

The system's program debug support is available for CL programs.

User-Created Commands: The System/38 users can define their own commands to invoke system function or a user program. Associated parameters can be defined and validity checked during execution. This feature is useful for those users who need a specialized operating environment, or those who wish to reduce or restrict the parameter entry choices for users of the system.

The character set used for the Control Language is EBCDIC (Extended Binary Coded Decimal Interchange Code). All 256 EBCDIC characters can be used within comments and quoted character strings (literals), but only the following subset of EBCDIC characters can be used to code CL commands:

- 26 letters (A through Z)
- 10 numbers (0 through 9)
- 3 alphabetic extenders (\$, #, @)
- Special characters

(For the special characters and their function, see the *IBM System/38 CPF Reference Manual - Control Language*, SC21-7731.)

Message Facilities: Message facilities can be used to exchange information among users of the system or among programs (system and application) and users.

Message Handling on System/38 provides for creation, storage, queuing, routing, and authorizing messages for:

- Information
- Broadcast
- Reply

Message Handling provides support for establishing a message, providing a path for it to travel, controlling traffic on the path, and getting it to its destination. Messages can be displayed immediately or queued for display when requested.

Specific system level messages are placed in the system history file. All entries are logged with date and time, identify the source of the message, and have an identification number. The user may process the system history file.

Users of message facilities can create impromptu or predefined messages. Impromptu messages will usually be simple text strings created to handle specific situations, such as messages between workstation users. Predefined messages are created as message descriptions, with a unique identification number, and stored in a message file for subsequent retrieval. They will usually be error messages sent by programs encountering certain defined conditions.

PROGRAM PRODUCTS

System/38 Control Program Facility (CPF) (cont'd)

SNA-ALERT Facility: The System/38 alert function notifies an SNA remote S/370, 30XX, or 43XX host network operator of conditions detected by the System/38. The alert support provides significant function to be used for centralized remote host problem determination. The following support includes:

- Alert generation by the System/38 upon certain failing conditions.
- The alert and associated information are sent via SNA/SDLC to the remote host system.
- The companion host programs support processing of the alert data to enable the user to centralize network problem determination.

The required host programs that support the System/38 alert consist of the Network Communications Control Facility (NCCF) and Network Problem Determination Application (NPDA). Also required is one SNA communications line to the host system.

Spooling: Spooling enhances device I/O by controlling device contention, decreasing process execution time, and increasing user control of jobs in the system. Since programs get their input from, and direct their output to, spool queues (instead of directly interacting with the I/O device), multiple concurrently executing programs can appear to be using the same device. This also means that program execution time is not restricted to the speed of the I/O device.

The significant features of System/38 Spooling are:

- Multiple input/output queues
- Multiple output copies
- One program can output to multiple files
- Workstation control of queues
- Display of spooled output
- Output spool queues can be directed to any device

Input job streams from external devices (card, diskette) or from the data base can be processed by spool readers or entered directly onto an input queue. Output to printers, punches, and diskettes is processed by spool writers. Multiple spool queues can be established, and spooling provides the capability for the system or workstation operators to display or modify their spool queue attributes.

Spool support permits interleaving of output from multiple jobs to a spool queue, and from a single job to multiple spool files.

Communications

SNA/SDLC as a terminal: System/38 communicates as a terminal to System/370 CICS/VS and IMS/VS using Synchronous Data Link Control (SDLC) as a part of Systems Network Architecture (SNA).

System/38 communicates to IMS/VS applications executing under OS/VS1 or OS/VS2 (MVS), or CICS/VS applications executing under DOS/VSE, OS/VS1, or OS/VS2 (MVS) in System/370 models 145 to 168 for IMS/VS, and models 135 to 168 for CICS/VS, and 3031, 3032, 3033, 4331 and 4341 processors. Communication to any of these operating systems when running under VM/370 is also supported. Communication is via the levels of VTAM, ACF/VTAM, ACF/VTAME, TCAM or ACF/TCAM supported by IMS/VS or CICS/VS at the time of shipment. NCP/VS or ACF/NCP/VS will be required as appropriate.

Binary Synchronous Communications (BSC): System/38 Release 4 CPF Binary Synchronous Communications (BSC) support provides the facilities which allow the user to write application programs to communicate with other systems and devices which are compatible with 3780 BSC implementation.

For all devices listed below, it is the user's responsibility to provide the application program which uses the System/38 BSC support, and to ensure compatibility with supported protocols and/or unique data formats required by the attached devices.

System/38 Binary Synchronous Communications (BSC) program-to-program over point-to-point switched or point-to-point nonswitched facilities

Communications to the following systems and devices are supported:

System/3	3741
System/32	5110/5120
System/34	5230
System/38	5260
Series/1	5280
System/370, 30XX, 43XX	
DOS/VSE	BTAM-ES
OS/VS1	BTAM/TCAM
OS/VS2	BTAM/TCAM
CICS/VS (Version 1.5.0)	OS/VS or DOS/VSE BTAM

System/38 Binary Synchronous Communications (BSC) As A Multipoint

Tributary are:

- **Multipoint Tributary** - The System/38 will act as one, or several, terminals (or tributaries) on a nonswitched multipoint BSC line. The BSC line is scheduled by a BSC control station or host. The host may be a System/3 with CCP, a Series/1, or a System/370, 30XX, or 43XX. The System/38 can recognize up to 32 poll and selection addresses for each line.
- **Multiple Session Support** - The System/38 will support up to 32 sessions per line when attached as a multipoint tributary station. This is accomplished by assigning one of the 32 polling and selection addresses to each session. The support will provide for multiple logical sessions to occur concurrently over a single link. A maximum of 256 logical sessions per system is allowed.
- **Additional Systems/Devices Supported** - The System/38 acting as a multipoint tributary supports BSC attachment of the following systems and devices:
 - 3776/3777 Batch Terminals
 - 5520 Administrative System
 - 6240 Communicating Mag Card Typewriter
 - 6580 Displaywriter System
 - 6640 Document Printer
 - 6670 Information Distributor
 - OS/6 Office System
 - CMCII Communicating Mag Card Typewriter II

Other BSC Features

- **Component Selection** - Some BSC terminals have several attached I/O devices or components. System/38 provides support through DDS and Function Management for the user to select the device or component to which the data is to be transmitted. This function is accomplished by inserting the component selection characters inside of the outbound text. The component selection function is a program-to-terminal protocol which operates only on point-to-point lines and only on WRITE operations.
- **Compression/Decompression** - This constitutes a technique for utilizing line time more efficiently.
 - **Compression:** Sequence of three or more blanks, X'40', are replaced by a two-character sequence for transmission.
 - **Decompression:** Data that has been received from the BSC line is scanned for controls in the data stream that define how to reconstruct the original data.

Note: Compression and Decompression are mutually exclusive with transparent data, user-blocked data, and ASCII.

- **Trailing Blank Truncation** - This permits the System/38 to utilize communications line time more efficiently. In some applications, the fixed length record has a variable amount of data at the beginning of each record and the end is filled with blanks. The trailing blank truncation facility removes the trailing blanks when creating a transmission block. The trailing blanks are replaced with a blocking character such as IRS or ITB or a BSC ending character, ETX or ETB, as appropriate.

Note: Trailing blank truncation is mutually exclusive with transparency, user-blocked data, and blocked data with *NOSEP.

System/38 Release 5.0 CPF Binary Synchronous Communications (BSC) support provides additional function which allows the System/38 to appear as a 3270 Information Display System to a remote host computer.

System/38 3270 Device Emulation consists of two offerings:

- The System/38 5250, 5291 and 5292 displays and printers will emulate the functions of a 3270. No System/38 user programming is required.
- A 3270 program interface is provided which allows a System/38 application program to communicate with application programs operating on a remote host system.

System/38 as a Host for Remote 5250 Information Display System Devices: The System/38 CPF also provides remote communication support for the 5250 System family of terminals. (As described in the M5381 pages, the 5250 system is supported locally by the workstation controller.)

The 5250 System is supported as an SNA device. Although the remote communication attachment of the 5250 System devices may be by switched or leased line, the devices have the same capabilities as local directly-attached devices.

When featured for nonswitched multipoint communications facilities, the System/38 Communications Attachment feature provides hardware Autopoll for up to eight (8) control units (5251 mdls 2 and 12) per TP line. Anytime a TP line has more than eight (8) control units varied online, polling is automatically transferred to system microcode. The system microcode supports a maximum of fifty (50) control units varied online (being polled) per line.

System/38 Control Program Facility (CPF) (cont'd)

System/38 as a Peer to CICS/OS/VS and CICS/DOS/VS Version 1 Release 6 and to another System/38. The System/38 Peer support is based on new SNA definitions (SNA LU6.2 and PU2.1).

Attachment to a S/370 is as an SDLC secondary. Attachment to another System/38 requires SDLC primary on one System/38 and SDLC secondary on the other System/38(s). The link configuration can be either point-to-point nonswitched, point-to-point switched, or multipoint nonswitched. The link speeds supported are all of the standard speeds, up to 57.6K bps.

These SNA extensions are designed to provide common session protocols for both document interchange and distributed data processing. This provides the base by which users can establish a single network definition for distributed processing.

These new SNA extensions now allow System/38 to participate in a transaction processing environment as well as in the batch and interactive environment. Within a network, the System/38 can serve as either the front-end processor or the back-end processor.

Communications Error Recovery Procedure (ERP): The enhanced ERP will enable users to recover from many communication errors with little or no operator intervention. When the recovery process begins after an error is encountered, jobs will not need to be canceled, nor will the communications objects need to be varied off. The application will need to either release the device or close the file. If communications are to be resumed, the applications will acquire the device (if it was released) or open the file (if it was closed). All communications (BSC and SDLC) devices, local workstations, and multidropping of 5250 and Advanced Program-to-Program Communications (APPC) devices on the same line will be supported.

Installation (System Specialization): The Installation facility of System/38 CPF provides the means for the user to install the Control Program Facility. This substitutes for the traditional system generation which is not required on the System/38.

To install, the user loads CPF through the diskette device or a tape device attached to the system. This establishes default libraries, user profile definitions, basic I/O definitions, etc. The system is ready to use, but the user may want to do some additional system specialization such as:

- Describe additional I/O devices.
- Define additional subsystems.
- Define additional user profiles.
- Modification of the supplied definitions.

System specialization can be done anytime and does not require a system generation function.

System Services

Test And Debug Facilities: The Test and Debug Facilities offer System/38 users significant productivity in the testing and training area.

The user can copy production files and programs to a 'test' library to create a test environment nearly identical to the production environment. The user still has the full range of system function and can observe and control operation of the program, but the user is prevented from updating production files. This also permits testing to occur concurrent to other operations.

For complete protection of the production environment, the security features of the system can be used to prevent any access of the production objects by the development planner.

This test environment is also useful for training operators because:

- It duplicates the real environment.
- It protects production files.

Debug support provides error diagnosis tools for the programmer. Debug requires no special statements in the source program. Through CL commands the user may:

- Halt execution at a specified statement number (source listing).
- Trace the sequence of statement execution.
- Display and modify program variables (fields).
- Obtain a printed copy of the interactive dialog with the system.

The CL command for program debug places programs in debug mode. In debug mode, breakpoints to halt execution (source program statement numbers) may be specified. For trace, ranges of statement numbers may be entered to determine the sequence of statement execution. Commands for breakpoint or trace do not affect any other concurrent operation of that same program.

Library Facility: Library support on the System/38 provides the user the means to operationally group related objects. Objects are programs, file definitions, data files, etc. Libraries are used to logically (not physically) group objects in any division meaningful to the user, such as by application or by ownership. An object is an item of a library and no two objects of the same name and type may be a member of the same library. Although a system library is installed with the system, multiple user-defined libraries are permitted. The user controls object maintenance in the libraries.

Save/Restore Facility: The Save/Restore Facility on System/38 supports the 3410/3411 tape drive and the diskette magazine drive and the magnetic tape drives in the following functions:

- Back-up of user libraries and objects
- Keeping seldom used or sensitive information offline
- Data interchange between System/38s
- Back-up of the system library

The SAVE commands are used to write a copy of a library, all libraries, an object, or a group of objects in a library to the save device. The RESTORE commands are used to restore to the system saved objects and libraries. The system maintains a directory of saved objects and can identify the most recent copy of a saved object. The system can identify by date and time when an object was last changed. To provide for faster daily backup, a command is provided to save only those objects which have changed after a specific date.

Service Facilities: CPF supports servicing of CPF, the System/38, and workstations. Many service functions can be done concurrent to other system operations enhancing productivity for IBM and our customers. (Note: Concurrent servicing is accomplished through the Concurrent Service Monitor (CSM) which is a part of CPF.)

Some of the service facilities available, through Control Language commands, to support CPF and the System/38 are:

- For CPF
 - Problem analysis and diagnosis through dumps of internal job information and traces of processing flow.
 - Problem reporting by producing diagnostic documentation on a diskette for IBM service use.
 - Problem resolution by installing IBM-supplied program changes.
- For the System/38
 - Providing the machine error log for print or display.
 - Production of a trace of internal machine activities.

The CPF provides support through which workstation device operation can be checked and workstation printer operation can be verified.

File Reference Facility: The File Reference facility provides the user with information about the definition, organization and usage of the data base. It also provides information about the definition and usage of device files. It will provide significant aid in two areas:

- Documentation of the system.
- Supplying information to help determine the effect of planned changes.

Some functions providing information on file and field usage throughout the system can be output to a disk file for subsequent access and manipulation by the user. The following information is available:

- Files currently using a specified format.
- Files dependent on a specified file and type of dependency.
- File members dependent on a specified file member and type of dependency.
- Field descriptions by file.
- Data file usage by compiled program.

File Reference Facility functions can be invoked in interactive or batch mode. Output can be directed to a display or a printer, and in most cases to a data base file.

Copy Facility: The System/38 copy function provides some enhancements to the traditional file copying capabilities. The copy support can:

- Copy data from diskette, card, magnetic tape, or data base files to diskette, card, printer, magnetic tape, or data base files.
- Provide selection of records to be copied by the value of:
 - Fields within records
 - Characters within fields
 - Record formats
- Provide for adding records to an existing file member.
- Provide for the copying of an output spool file to a data base file to allow conversion of these files to microfiche applications, transmission to other systems, or processing of spooled output.

PROGRAM PRODUCTS

System/38 Control Program Facility (CPF) (cont'd)

- Provide for the selection of a record format when a multiformat (logical file) is being copied.
- Provide for reorganization of a data base file.
- Provide for a high speed copy of data base files which reads and writes disk sectors as opposed to individual records.

Power Warning Feature: CPF provides programming support for user-supplied Uninterruptable Power Supply devices. A system value will control which message queue will be sent a message if normal power is lost or restored. This allows user program logic to control termination/continuation of the System/38 operation.

Program Use During Customer Pre-installation Testing: The System/38 Control Program Facility (5714-SS1) is available to customers for pre-installation testing on IBM Test Center Systems in accordance with IBM's Program Testing Policy.

CUSTOMER RESPONSIBILITIES

Installation of System/38 licensed programs is a customer responsibility. IBM may provide marketing assistance, in accordance with Marketing and Service Guidelines in the GI Section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

The IBM System/38 CPF runs on all models of the IBM System/38.

All IBM licensed programs for System/38 are designed to operate in an environment that includes the System/38 CPF (5714-SS1) or its equivalent. The licensed program order should be entered via AAS at the same time as the system order. IBM's ability to provide concurrent hardware maintenance is dependent upon functions provided by the CPF or its full equivalent support.

SOFTWARE REQUIREMENTS: None

CPF Main Storage Usage: All Control Program Facility instructions are pageable, and therefore, invoked by the system as needed. The amount of main storage occupied at any given time is greatly dependent upon system functions concurrently and dynamically invoked by multiple system users.

SECURITY

Security on System/38 provides the user a selectable degree of protection of the system and data that can be increased by stages. Its major features are:

- User-controlled level of security
- Security Officer to provide security control
- Ownership/Authorization of objects (such as data files and programs) is user-controlled.

The degree of security exercised on the system can range from minimal security, to authorization for use to each individual data file, program, and device. The security officer 'owns' the system objects, has full rights of access across the system, and controls enrollment of users of the system. All users of the system are enrolled and have a user profile which controls their access to system and data resources. Security is based on ownership and authorization of objects in the system. Objects are data files, programs, formats, device descriptions, etc. All objects in the system have an owner. The owner has all rights to the object and may authorize various classes of access and usage of these objects to other enrolled users of the system.

Security support is divided into two types of functions - the definition and the enforcement of security procedures. Definition functions of Security are:

- The Security Officer - This person has full authority across the system and controls the installation security procedures.
- The User Profile - All users enrolled on the system have a user profile. It is a collection point for all security information related to each user.
- User Identification - All users of the system must identify themselves to the system.
- Object Authorization - Specifies the individual user's rights of use of the system resources.

Enforcement functions of Security are:

- User Verification - Verifies a user's identity to control access to the system.
- Object Verification - Assures user's right to access system devices, programs, and data objects.

- Security Information Displays - Provides security status displays to the security officer to aid controlling security.

Security may be controlled by library and/or the objects within a library. A special function exists to allow the owner of a program to allow authorized users of the program to use their authorizations. This can be used to minimize the number of detail specifications and ensure that certain functions and file accesses are performed only under the control of specific application programs. Data Base allows specific file formats to be created to provide a form of field level security.

DOCUMENTATION
(available from Mechanicsburg)

IBM System/38 Control Program Facility Licensed Program Specifications (GC21-7763).

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

**SYSTEM/38 CONTROL PROGRAM FACILITY (CPF)
 RELEASE 5.0 ENHANCEMENTS
 5714-SS1**

PURPOSE

IBM System/38 CPF is enhanced in Release 5.0 to include: Support for additional devices, communication enhancements, a commitment control (recovery/restart) function and many other functional improvements.

Release 5.0 HIGHLIGHTS

- **Communications Support**
 - Advanced Program-to-Program Communications (APPC)
 - SNA-Alert Support
 - Mixed file and High-Level Language (HLL) Multiple Device Support
 - Error Recovery Procedure Enhancements
 - High-Speed Line Enhancements
 - 3270 Device Emulation
- **Device Support**
 - Existence check on media (diskette, tape)
 - Diskette command improvements
- **Commitment Control**
 - A commitment boundary restart aid, which assists in restarting following abnormal job or system termination.
- **Spool Enhancements**
 - DSPOUTQ identification of forms type and number of copies
 - Start a writer to a forms type
 - Support of change writer
- **Save/Restore**
 - Save/Restore of logical file access paths
 - Save/Restore of message, job and output queue descriptions
 - Option to prevent incomplete saves
 - Optional listing for restore objects
 - Improved allocation of source members
 - Improved tape error recovery
- **Journal**
 - Protection against deletion of unsaved journal receiver
 - New default for Apply Journal Change command
 - Retrieve Journal Entry command
 - Compare Journal Images command
 - Enhanced journal displays
- **Work Management**
 - Local data area
 - Change of a job's execution attributes
 - Option to control job log creation
 - DSPJOB enhancements
 - Job start/completion message enhancements
 - Display Active Job (DSPACTJOB) and Display System Status (DSPSYSSTS) enhancements
 - Job description parameter in user profile
 - Retaining once active batch jobs on job queues
- **Security**
 - Operations from the DSPOBJAUT display
 - Generic grant/revoke of authority
 - Revoke object authority feedback
 - Display user profile option for changes
 - Authority checking from system menus/displays
- **Library Support**
 - Add and remove from library list commands
 - Delete by generic name
 - Library display command enhancements
- **CL/Prompter**
 - Inquiry message capability on unmonitored messages
 - Send user message command
 - Data base sequential input in CL programs
 - Retrieve job attributes command enhancements
 - Selective prompting
 - Noninteractive commands used with the prompter
 - Return resulting command from prompter without executing
- **Data Base**
 - Rename member command
 - User notification of access path rebuild at open
 - Access path rebuild options at IMPL
 - Option to force access paths more frequently
 - Freeing of space with CLRPFM
- **Other Enhancements**
 - Conditional defaults for inquiry messages

- Copy file enhancements and new copy commands
- Most create commands will use source text as a default
- Display file description command option for outfile
- Increase in number of values for the DDS VALUES keyword
- Messages used as constants in DDS
- Command selection menu enhancements
- Programmer and systems operator menu prompting for SBMJOB option
- Option to preserve edit codes and system values at install
- Multidimension array support in debug functions
- RPG auto report added to programmer menu
- Forty-eight character names in debug functions
- **Ease of conversion from System/34**
 - Several of the previously described native functions will provide a simpler conversion from System/34.

DESCRIPTION

Communications

- **Advanced Program to Program Communications (APPC)**

APPC is a CPF enhancement that provides a program-to-program protocol between two applications in different products. APPC is based on SNA architecture and provides a peer relationship between the interconnected products. This support allows System/38 to function as a departmental node with the ability to duplicate systems between departments. Additionally, it provides horizontal growth capability.
- **SNA-Alert Support**

This enhancement allows the remote host network operator to be notified of certain system conditions to assist in problem determination.
- **Mixed File and High Level Language (HLL) Multiple Device Support**

This enhancement provides new function and an improved interface for multiple device applications.
- **Communications Error Recovery Procedures (ERP)**

This function enables users to recover from many communication errors with little or no operator intervention.
- **High-speed Lines Enhancement**

Allows high-speed (57.6K bps) local attachment of System/38 to 3705.

Allows high-speed (56.0K bps) remote communication to 3705, 4331 Communications Adapter, and System/38.
- **3270 Device Emulation**

This enhancement allows the System/38 and locally or remotely attached 5250 Information Display System devices to appear as a 3270 control unit and devices.

For more information on the Communications Enhancements for Release 5.0, see Programming Announcement Letter dated January 14, 1983.

DEVICE SUPPORT

- **Existence Check on Media Commands**

The new commands CHKDKT and CHKTAP are provided to allow the user to check for the existence of a specific volume (or file) label on a diskette or tape. For example, this allows a program to precheck the existence of the correct media before proceeding on a specific function using that media.
- **Diskette Command Improvements**

The SUFFIX parameter has been added to the CLRDKT, INZDKT, RNMDKT, and DLTDKTLBL commands. The RNMDKT command now supports a range of diskettes within a magazine thus allowing an entire magazine to be renamed.

Commitment Control

Commitment control is a function designed to assist the user in recovery/restart of applications. The most difficult aspect of restart in a complex transaction environment is ensuring that restart will occur when all files are at a specific point. Commitment control ensures that a job is at a specific point (called a commitment boundary) in the event of a system or job abnormal termination.

The user defines his commitment control environment in CL statements and specifies the files to be under commitment control in RPG or COBOL. New operations are supported in RPG, COBOL, and CL to allow the user to request a group of data base changes to be committed or rolled back. The rollback function allows the user to easily cancel a group of data base changes when the application program senses a need to cancel the effect of a transaction. Through commitment

System/38 CPF R5.0 (cont'd)

control, the system will implicitly roll back any uncommitted changes in case of a system or job failure.

Restart can normally be provided by user coding which would access the last transaction record entered by an operator or by using a commitment control notify object. The notify object allows the program to store information about the last transaction before a failure in a data base file, a message queue, or a data area.

Data base files used in a commitment control environment must be journaled to the same journal.

All data base changes which are part of a commitment boundary will be locked until either a commit or rollback occurs. Optionally, records can also be locked in read-only files where the contents of a record should remain static until a commit or rollback occurs.

Commitment control functions will also allow the user to retain locks on multiple records in a single file.

Because the commitment control function will cause data base records to be locked until a commit or rollback occurs, the user must consider the frequency of issuing a commit or rollback. A commitment boundary which can span multiple enter keys can cause other users to wait until the commitment boundary is reached. In the event of a record lock timeout, the message which occurs will be enhanced to include the job name which has caused the record to be locked. The DSPJOB menu will provide an option to show the commitment control status.

SPOOL

- DSPOUTQ support of Forms Types and Copies

The DSPOUTQ display will add columns for forms type and number of copies. This information will be truncated if displayed at the 64-character console device.

- Start a Writer to a Forms Type

A new parameter will be added to STRPRTWTR to allow the user to control what form types in an output queue should be output. A CHGWTR command will also be available to allow formtype and output queue to be changed for an active printer writer without ending the writer. These functions should allow better control when dealing with special form types and help minimize the overhead associated with canceling and starting a writer multiple times to the same device.

- Support of Change Writer

A CHGWTR command will be available to allow form type and output queue to be changed for an active printer writer without ending the writer.

SAVE/RESTORE

- Save/Restore of Logical File Access Paths

An option on the save commands will allow associated logical file access paths to be saved. An access path will only be saved or restored when all related physical files are saved or restored. This option will cause an increase in the amount of save time and media usage, but will decrease the amount of time necessary to complete a restore operation since the associated access paths will not have to be rebuilt.

- Save/Restore of Message, Job and Output Queue Descriptions

The object types of *MSGQ, *JOBQ, and *OUTQ may be saved and restored. Only the description (not the contents) will be saved and restored. This facilitates the transfer and recovery of libraries. All object types are now supported by Save/Restore.

- Option to Prevent Incomplete Saves

An option will be added to the SAVOBJ/SAVCHGOBJ/ SAVLIB commands to ensure that all objects can be saved prior to saving them. This precheck function will allow the user to easily determine that all objects requested to be saved are available before any media is written. This can eliminate situations where a file is bypassed by the save function because the file is open for update by another user.

- Optional Listing of Restored Objects

An option will be provided on the restore commands to list each object that is being restored and its associated security-related information. The existing low level messages for a successful restore of each object will be removed to improve the performance when a large number of objects are being restored. The listing should allow a better means of security control when new objects are restored to the system.

- Improved Allocation of Source Members

An internal option will be supported by SEU and Text Management to determine the exact number of records to be written to the member after creation or maintenance is performed. This will allow the system to tailor the allocation needed for the specific member instead of using a default allocation method. This should benefit

save operations since each member will have only a single disk allocation.

- Improved Tape Error Recovery

Tape error recovery has been improved to allow the user to mount a new tape when media errors occur during a save operation. This will eliminate most situations where the save function must be aborted due to media errors, by allowing the user to continue on a new tape.

JOURNAL

- Delete Journal Receiver Protection

If an attempt is made to delete a journal receiver that has never been saved, an inquiry message will be sent to the user allowing the option to cancel or ignore. The message should assist in preventing the user from destroying his means of backup or audit trail.

- New Default for Apply Journal Change Command

The default for the TOENT parameter will be changed to *LASTRST. This will allow the defaults of the command to be used in a normal recovery environment where the user restores his last backup and reapplies the entries in the journal from the last save up to the restore.

- Retrieve Journal Entry Command

A RTVJRNE command will be provided to retrieve a specific journal entry and return the entry into CL variables. Similar selection criteria as with the current DSPJRN command may be used. This simplifies determining the journal sequence number of journal entries which may be used to automate certain recovery or backup functions.

- Compare Journal Images Command

A command will be available to compare the before and after images for record level changes recorded in a journal and highlight the differences. A listing form of output is provided. This can assist in problem determination.

- Enhanced Journal Displays

The journal displays will be enhanced to include such things as an explanation of the code and type of journal entries and the ability to switch from a character to hex display.

WORK MANAGEMENT

- Local Data Area

Each job will have an implicitly defined 512-byte character data area. This can be used for intrajob communication and it is also implicitly submitted to any batch jobs when SBMJOB is used. The local data area will have a name of *LDA and may be accessed by CHG/RTV/DSPDTAARA commands. The DSPDTAARA command is enhanced to support hex values. The local data area is an alternative means of passing variables within a job and can also be used to pass variables to batch jobs.

- Changing of a Job's Execution Attributes

New options on the CHGJOB command will allow a change to the execution attributes of EXCPTY, TIMESLICE, PURGE, and DFTWAIT. The user making the change may change any job on the system, but must have the special *JOBCTL authority defined in his user profile. This allows improved control over execution attributes.

- Option to Control Job Log Creations

A new job attribute will exist to control whether a job log should be produced if the job completes in a normal manner. This allows the user to eliminate the output of job logs except when a problem occurs.

- DSPJOB Enhancements

A new DSPJOB option will allow the display of the current library list. This output will also be supplied in the DSPJOB dump described later.

- Job Start/Completion Message Enhancements

The job start message (CPF 1124) will be enhanced to include the subsystem and the time the job entered the system (e.g., the submitted time for batch jobs). The job completion message (CPF 1164) will be enhanced to include such things as total response time, the number of interactions, the number of disk I/O operations and the type of job. Both of these messages appear in the job log and in the QHST log. This information can be useful in analyzing system workload, providing job analysis statistics, and problem determination data.

System/38 CPF R5.0 (cont'd)

- Display Active Job (DSPACTJOB) and Display System Status (DSPSYSSTS) Enhancements

The DSPACTJOB display will provide an improved description of certain wait conditions and an indication of whether a job's execution priority has been downgraded because the time-slice has been exceeded. The DSPSYSSTS internal fields, which are used to calculate page fault rates, have been increased in size to greatly reduce wrapping.

- Job Description Parameter in User Profile

A job description parameter will be added to the user profile and *USRPRF may be specified on ADDWSE/CHGWSE to assign job attributes to communications jobs. This also allows job attributes to be specified for work station users (instead of the current approach, by device).

- Retaining Once Active Batch Jobs on Job Queues

A new command (similar to TFRJOB) will allow a currently executing batch job to be placed on a job queue. Unlike the TFRJOB command, the new command will allow the job to remain on the job queue in the event of an IMPL.

SECURITY

- Operations from the DSPOBJAUT Display

If the user has appropriate authority, a CF key option will appear on the DSPOBJAUT display to allow the user to redisplay the information as input capable fields. This allows the simple changing of authorization rights, as well as allowing new users to be added and existing users to be totally removed.

- Generic Grant and Revoke of Authority

The GRT/RVK commands will allow a generic function or will allow all objects in a library to be specified. This will simplify the specifying of security authorizations.

- Revoke Object Authority Feedback

The RVKOBJAUT command will provide a diagnostic message when the user whose authority is being revoked does not have the specific authority being revoked.

- Display User Profile Option for Changes

A CF key option will be added to the DSPUSRPRF command to allow the user to display the CHGUSRPRF prompt for the same user with the current values displayed. This simplifies changing the values for the various parameters.

- Authority Checking from System Menus/Displays

Authority checking will be performed on all command functions attempted from CPF menus/displays. This will allow better security control when utilizing system menus/displays.

LIBRARY SUPPORT

- Add and Remove from Library List Commands

ADDLIBLE/RMVLIBLE commands will be provided to allow the user to add a library before or after the existing libraries on the user portion of the library list, or remove a library from the user portion of the library list. This will offer a simple means of adding specific user libraries to the existing library list without having to know what the current list is.

- Delete by Generic Name

Most of the DLT commands are enhanced to allow use of a generic name. This will simplify operations when generic object types must be deleted.

- Library Display Command Enhancements

When the DSPLIB command is used without specifying a library, the user will be presented with a list of library names to select from. Both the DSPLIB and DSPOBJD displays will provide an entry per object to allow access to the full or service attributes provided by the DETAIL parameter of the DSPOBJD command. The DSPLIBL command has been enhanced to include the text description of the libraries.

CL/PROMPTER

- Inquiry Message Capability on Unmonitored Messages

CL programs will now issue an inquiry message on an unmonitored escape and let the user request ignore and retry, in addition to the cancel and dump options already supported for the CPA 0701 message. CL programs can now report errors similar to RPG or COBOL programs where inquiry messages are sent to the interactive user or system operator (depending on the type of job) when an unexpected condition occurs.

- Send User Message Command

A command will be provided for use in communicating from CL programs to users or the system operator. This will provide for simple inquiry messages to be handled in one command. A pause function is also provided. A VALUES keyword is supported to allow checking of responses and a translate table option is provided to allow conversion from lowercase to uppercase. This command should simplify the applications where a CL program needs a minimal amount of dialog with a user.

- Data Base Sequential Input in CL Programs

CL programs will support data base sequential input files. This simplifies working with files created by functions such as DSPOBJD. The support uses the existing DCLF and RCVF commands. MONMSG may be used for the end of file condition. Only one DCLF is allowed per CL program.

- Retrieve Job Attributes Command Enhancements

The RTVJOBA command will support new parameters to allow retrieval of additional job attributes such as EXCPTY, OUTQ, LOGLVL, and USRLIBL. This will simplify the changing of these job attributes and storing/ replacing them when a subprogram with unique requirements is called.

- Selective Prompting

Selective prompting allows a CL program to use the prompter facility at execution time to prompt for a command, and control:

- Which parameters are prompted
- Which defaults appear
- If the user is allowed to change specific parameters

This allows use of the prompter to directly invoke command functions, while allowing the programmer to control what is prompted and what may be changed by the user.

- Noninteractive Commands used with the Prompter

Noninteractive commands (e.g., JOB, ENDJOB, etc.) will be prompted when PF4 is pressed. A warning message will be sent, but the user will be allowed to see the prompts for these commands.

- Return Resulting Command from Prompter Without Executing

New Program QCACHEK (similar to QCAEXEC), may be called to either syntax check or prompt a command, and have the results returned without executing the command. This may be used in prompting for commands to be submitted or logged.

DATA BASE

- Rename Member Command

A RNMM command will be provided to simplify operations when a member must be renamed.

- User Notification of Access Path Rebuild At Open

When the user opens a file, causing an access path to be rebuilt, a message will be sent to the external message queue stating the cause for the delay in proceeding to the function. This should minimize the need for problem determination in this circumstance.

- Access Path Rebuild Options at IMPL

Following an abnormal IMPL in which access paths have been invalidated, a display will be available to the operator. This will describe each access path which must be rebuilt, show the number of records which must be read to rebuild the access path, and allow the operator to temporarily change the value of the RECOVER option that was specified for the file. The operator will have better control over whether the system should be brought up quickly or not brought up until certain access paths are rebuilt.

- Option to Force Access Paths More Frequently

An option will be provided on CRT/CHG data base file commands to cause the access paths and underlying data to be forced to disk on every access path update. This will minimize (but will not eliminate) the exposure to an access path rebuild in case of an abnormal termination. This function can be of value in certain large file/low activity environments, but performance should be carefully considered.

- Freeing of Space with CLRPFM

When the CLRPFM command is issued, any space associated with the physical access path is reset and the file allocation is reset to its initial value. This will help provide better allocation of storage on the system.

System/38 CPF R5.0 (cont'd)

OTHER ENHANCEMENTS

- **Conditional Defaults for Inquiry Messages**
 A job attribute will be added to the JOB, CHGJOB, and SBMJOB commands, and may be placed in a job description to determine automatic action when an inquiry message is sent by a program such as CL, RPG, or COBOL. The user may choose to:
 - Send the inquiry message
 - Send a default reply
 - Use a new system-defined object for system reply values
 Commands exist to maintain the system reply list which allows entries for specific or generic messages. An option exists to allow a DSPJOB dump prior to replying to the message. This may be used for many functions such as:
 - Automatically taking a DSPJOB dump and a program dump, and cancelling the program when an inquiry occurs. This can be used to eliminate operator intervention and ensure that problem determination information exists.
 - Automatically responding to some messages which are sent to the system operator (messages relative to mounting the proper print belt, for example).
- **Copy File Enhancements and New Copy Commands**
 Enhancements to the CPYF command support have been made to allow such functions as creating the TOMBR when it does not exist, copying zero records, better handling of packed keys, and generic FROMMMBR support. A new CPYSRCF command is provided which is designed to work with source members and provide a formatted listing. Four new commands (CPYFRMDKT, CPYTODKT, CPYFRMTAP, and CPYTOTAP) are available to simplify use of copy functions using diskette or tape. These commands support most of the device parameters found on the corresponding OVRDKTF and OVRTAPF commands.
- **Most Create Commands Which Use Source Will Default TEXT**
 Most of the CRT commands which use source members will change the default of the TEXT parameter to default to the text description of the source member. This will simplify the creation and retention of text descriptions on various objects.
- **Display File Description Outfile Option**
 The DSPFD command will provide an OUTFILE option which will allow the attributes of the various file types to be placed in a data base file. A new parameter will control the subtype of file output. This output file option will allow many applications to take advantage of the attributes and statistics stored in the file descriptions to create reports and control various functions.
- **Increase in Number of Values of DDS VALUES Keyword**
 The DDS keyword VALUES will accept up to 100 entries instead of the current limit of 20. This should simplify the validity checking of certain fields.
- **Messages Used as Constants in DDS**
 A new DDS keyword (MSGCON) will allow the contents of a message description to be compiled into a device file. This can be used to simplify certain standard text functions used in multiple files.
- **Command Selection Menu Enhancements**
 A new command will be supported and will be an option on the programmer and system operator's menus to allow the user direct access to an enhanced version of the command selection menu. This will allow the user who knows a verb (e.g., CNL), or an object (e.g., SBSB), or a common abbreviation (e.g., JOB) to access all the commands with the same letter combinations. Over 175 additional menus will exist to simplify the process of selecting the proper command.
- **Programmer and System Operator Menu Prompting for SMBJOB Option**
 The programmer and system operator menus will allow access to the prompter for the entry of RQSDTA when Option 6 is requested. In addition, the value in the RQSDTA field will be syntax checked as if it is a command. This will allow the full use of the prompter when submitting jobs from these menus.
- **Install Options for Edit Codes and System Values**
 Additional options will appear on the install prompt to allow retention of installed edit codes or system values. This will simplify the installation of a new release.
- **Multidimension Array Support in Debug Functions**
 The debug commands will allow changing and displaying of variables with up to three dimensions. This is specifically designed for COBOL support.

EASE-OF-CONVERSION From System/34

The release includes general enhancements which can make it easier to convert from System/34. This includes such functions previously discussed as:

- Messages used as constants in DDS.
- CHKDKT command to check for the existence of a volume ID or file label on diskette.
- Display output queue of a forms type.
- Start a writer to a forms type.
- Local data area.
- Delete by generic name.
- Inquiry messages on unmonitored escape messages in CL programs.
- Send user message command.
- Rename member command.
- Copy file enhancements and new commands.
- Mixed file and HLL multiple device support.

Customer Education: System/38 CPF education is available as follows:

Title	Course Code
System/38 Concepts	A2510
System/38 Application Analysis	A2003
System/38 Application Programming Workshop	A2004
System/38 Implementation I	A2001
System/38 Implementation II	A2501

These courses will be updated to reflect the Release 5.0 enhancements.

PLANNING INFORMATION

For existing users, Release 4.1 must be installed prior to installing Release 5.0.

CUSTOMER RESPONSIBILITIES

Installation of System/38 licensed programs is a customer responsibility. IBM may provide marketing assistance, in accordance with Marketing and Service Guidelines in the GI Section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

The IBM System/38 CPF runs on all models of the IBM System/38.

All IBM licensed programs for System/38 are designed to operate in an environment that includes the System/38 CPF (5714-SS1) or its equivalent. The licensed program order should be entered via AAS at the same time as the system order. IBM's ability to provide concurrent hardware maintenance is dependent upon functions provided by the CPF or its full equivalent support.

SOFTWARE REQUIREMENTS: None

DOCUMENTATION

(available from Mechanicsburg)

The following documents are scheduled to be updated and available in June 1983:

- S/38 Guide to Publications, Glossary and Master Index (GC21-7726)*
- ... S/38 Installation Manual - Conversion Planning (GC21-7732) ...*
- S/38 Guide to Program Product Installation and Device Configuration (GC21-7775) ... S/38 Operator's Guide (SC21-7735) ... S/38 Programming Reference Summary (SC21-7734) ... S/38 Messages Guide: CPF, RPG III and IDU (SC21-7736) ... S/38 Problem Determination Guide (SC21-7876) ... S/38 Control Language Reference Manual (SC21-7731) ... S/38 Control Program Facility Licensed Program Specifications (GC21-7763) ... S/38 Control Program Facility Programmer's Guide (SC21-7730) ... S/38 Control Program Facility Reference Manual - Data Description Specifications (SC21-7806) ... S/38 Programmer's/User's Work Station Guide (SC21-7744) ... S/38 Data Communications Programmer's Guide (SC21-7825) ... S/38 3270 Emulation Utility Reference Manual and User's Guide (SC21-7961).*

RPOs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

**SYSTEM/7 ASSEMBLER
5718-SC2 (Features #7027, #7029, #9005)****PURPOSE**

System/7 Assembler language is a symbolic programming language for use with the System/7. This language provides the programmer with a convenient means of writing machine instructions, designating registers, and specifying format and addresses of storage areas, data, and constants. All operational capabilities of the System/7 can be expressed in System/7 Assembler language programs.

DESCRIPTION

The System/7 Assembler is a paper tape-oriented, one pass, one-for-one Assembler program which translates source programs written in System/7 Assembler language into machine loadable object programs on paper tape.

The most significant features provided are briefly summarized in the following paragraphs:

- **One-pass:** By resolving forward referenced symbols as overlay patches, the assembly is completed in one pass.
- **Forward Referencing:** Symbolic names may be referenced prior to definition.
- **Renaming Symbols:** A symbolic name can be equated to another symbol so that both refer to the same storage location, register, etc.
- **Convenient Data Representation:** Constants can be specified as alphabetic characters, decimal digits, and storage addresses for ease of definition.
- **Optional Program Listing:** Program listings can be provided, at assembly time, of source and resulting object program. This is a programmer option.
- **Error Checking:** Source programs are examined by the assembler for possible errors arising from incorrect usage of the language. A message is printed on the printer describing the error discovered. This occurs even if the above program listing was not requested.
- **Subroutine Entry:** Subroutine names that are still undefined symbols at the end of assembly are printed on the keyboard printer. The source for these subroutines can then be entered and the assembly completed.
- **Multiple Assemblies:** Multiple assemblies may be done without reloading the assembler program.
- **Minimum System Requirements:** A System/7 with at least 4K words of storage and an Operator Station.

Although this assembler offers a subset of the resources that are available with the macro assemblers, a programmer can prepare an effective program to control an application. (The Functional Subroutines, with the exception of multiply and divide, are not available in Paper Tape Format.)

System/7 Utilities: Included with the System/7 Assembler are utility programs to provide the user with tested and maintained programs to assist in program maintenance and debugging on System/7. The following utilities require 128 words of storage and reside in the System/7 IPL area.

- **Storage Dump:** Output the contents of storage to the keyboard printer or paper tape punch.
- **Storage Patch:** Alter storage locations via the Operator Station keyboard.
- **IPL Loader:** Reads the storage load paper tape produced by the System/7 Assembler, Host Program Preparation Facilities, or storage dump. This loader will construct the necessary storage load in the System/7.
- **Storage Initialization:** Initializes both System/7 storage and registers. This function must be performed after power-on of the System/7.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

Minimum System Configuration: System/7 Assembler requires a System/7 with a minimum of 4K of storage and an Operator Station. (Program preparation cannot be accomplished on a 2K system.)

DOCUMENTATION

(available from Mechanicsburg)

MSP/7 Program Logic Manual (GY34-0003).

TERMS and CONDITIONS: See PP Index

1800 CHROMATOGRAPH MONITORING 5718-XX1

PURPOSE

IBM 1800 Chromatograph Monitoring provides advanced data acquisition and fused peak analysis techniques for the simultaneous monitoring of multiple chromatographs in realtime. The program scans the signals from the chromatographs, analyzes the peak spectrum, and produces the reports. It is particularly well suited to the quality-control laboratory environment.

DESCRIPTION

The Chromatograph Monitoring Program operates either under the 1800 Time-Sharing Executive (TSX) or the 1800 Multiprogramming Executive (MPX). Time-sharing jobs may execute concurrently in the TSX version, and background jobs in the MPX version.

The advantages are reduced turn-around time on chromatograph runs, greater accuracy and better reproducibility than manual methods, better utilization of analyst time, and greater chromatograph utilization through automatic control.

The maximum number of chromatographs that can be monitored is a function of 1800 core size and speed, and the scanning frequency desired. Typical systems have 10 to 60 chromatographs wired, with 10 to 30 operating simultaneously.

Extensive digital filtering techniques are employed to minimize noise problems, including spike rejection of raw data. First and second curve derivatives are calculated using a least squares technique. Exponential smoothing is applied to raw data and curve derivatives. Dead bands and confirming counts are used to insure that only significant, persistent changes in the derivatives are considered. All filter parameters are adjustable and can be changed during a run.

Backflushing, and column-switching can be controlled by the program.

The rate of scanning each chromatograph can be varied individually, and can be changed during a run.

Analytical methods (for example, run parameters, peak decomposition method, type of run) can be defined and updated in real time by a series of data cards without interrupting the routine operation of the system.

Multiple reference peaks can be used to improve the estimation of expected peak times.

Peak areas can be calculated by several methods including a least squares curve fitting technique.

Use: The lab analyst initiates scanning of the chromatograph by entering information about the analytical method to be used, the chromatograph number, date and time of the sample, and other experimental parameters through a 1092 Keyboard, and then closing the start switch on the chromatograph. The chromatograph start light is turned on confirming computer monitoring. No further attention by the analyst is required to record the spectrum and produce the report. Offline or background jobs can be executed during the monitoring of the chromatographs.

CUSTOMER RESPONSIBILITIES

The customer is responsible for performing the following functions:

Installing start buttons and lights at each chromatograph with cabling to the 1800 PI and ECO terminals.

Providing low-noise, low-impedance chromatograph analog signals to the 1800.

Generating a suitable TSX or MPX operating system.

Defining system equates which specify the machine configuration addressing.

Executing the customizer program to modify the source programs for the particular installation.

Generating the required COMMON/INSKEL/cards using a utility program provided.

Compiling or assembling the package programs supplied in source form and building the core loads and data files.

Maintaining suitable listings and core maps for the use of system maintenance personnel.

As with other systems, customers are responsible for providing adequate protection against accidental loss or misuse of their data. This includes an adequate review of the system's security provisions by the user.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

- IBM 1801 Processor-Controller model 1C or 2C (16K) for TSX, model 1CB or 2CB (24K) for MPX
- IBM 1810 Disk Storage model A1 or B1
- One IBM 1442 Card Read/Punch model 6 or 7
- One IBM 1816 Printer Keyboard or 1053 Printer model 3
- IBM 1828 Enclosure model 2
- Analog-Digital Converter model 1 (#1231)
- Two IBM 1851 Multiplexer Terminals model 1
- Three Differential Amplifiers (#3246)
- One IBM 1092 Matrix Keyboard model 1 with 1051 Attachment (#7915) and RPQ C08735 (1800 attachment)
- IBM 1894 model 10 (RPQ C08056), 1092 Keyboard Attach Basic with #3612, ECO-one group, #5715, PIC-one group, and #3285, DIC-one group (Option A) or #5715, PIC-one group (Option B)
- IBM 1894 model 1, 1092 Keyboard Attach, Adapter (RPQ C08057).

The following is required for each chromatograph wired to the system: Four analog input MPX/R points; one on each of four input voltage levels (10 mv, 50 mv, 500 mv, 5 volt) (#5252) ... one point of Process Interrupt-Contact (#5715) ... one point of Electronic Contact Operate (#3612).

Additional devices that are supported and recommended are: A 1443 printer if much offline work is to be done. It is also helpful in system installation for online monitoring of the scan program ... additional 1810 Disk Drive if more than 472 sectors are required for data files in TSX or 571 sectors in MPX ... additional 1053 Printers if chromatographs are widely separated ... additional 1092 Keyboards if chromatographs are widely separated.

Note: The CNP programs may only use the 12 standard interrupt levels.

The TSX Version requires a Variable Core of 5,600 words, 1,880 words for skeleton programs, and 2,626 words of skeleton COMMON (20 chromatographs and one 1092). The MPX version requires a Variable Core of 5,186 words, a core load area of 2,192 words, 3,592 words of skeleton programs including system routines, and 1,918 words of skeleton COMMON (14 chromatographs and one 1092). The core load area may be eliminated by operating an interrupt core load in variable core, at some increase in system overhead.

To compile and build the program requires the above configuration without the Process I/O and 1092 Matrix Keyboard and its attachments.

SOFTWARE REQUIREMENTS

The IBM 1800 Chromatograph Monitoring Program is written in IBM 1800 Assembler language and 1800 FORTRAN. It operates under either the IBM 1800 Time-Sharing Executive (TSX) or the 1800 Multiprogramming Executive (MPX). The calculation routines, and the analysis report output programs, are written in FORTRAN to facilitate modification.

This program product is released to work with Version 3 of TSX, or Version 3 of MPX, and all subsequent versions and modifications unless so stated in a future revision of this document.

The Error Alert Control program (EAC) within the TSX operating system masks all interrupt levels during the processing of an error. Since EAC uses a series of overlays from the disk, the time involved can be as much as several seconds. The Chromatograph Monitoring program cannot operate under these conditions because data would be lost. A change is therefore made to EAC to allow the level(s) of the timers and analog input to remain unmasked during EAC operation. Any errors on the unmasked level(s) can result in a double entry into EAC with a resultant unrecoverable MLTP EAC message. The multiple EAC, however, is probably due to hardware problems on the unmasked level(s) and should not be considered a TSX problem. The Interval Timer Control program in TSX is also modified to allow timer A to continue running after a timer interrupt is processed. Customer Engineering involvement in these areas of code is potentially billable.

DOCUMENTATION

(available from Mechanicsburg)

Application Description Manual (GH20-0724).

TERMS and CONDITIONS: See PP Index

**7361 FASTDRAFT LICENSED PROGRAM
5719-GP1**

PURPOSE

This IBM licensed program supports the IBM 7361 FASTDRAFT System. The IBM 7361 Fastdraft licensed program supports the maximum 7361 Fastdraft System configuration. This program is intended to satisfy requirements for general purpose interactive drafting using 2D cartesian coordinates. It has been developed for use by non-computer oriented drafters. The overall purpose of the 7361 system and the Fastdraft software is to provide an easy-to-learn and use system to enable drafters to improve drafting productivity.

HIGHLIGHTS

- Has capabilities for Isometric drawings and assemblies for clearer visualization of a part and an expanded range of drawing disciplines.
- Provides drafters with graphics systems equivalents for all the conventional tools (i.e., drawing instruments, templates, drafting board) required for general drafting tasks.
- Drafting functions are selected by a drafter using a light-pen, from menus displayed on the 3251 mdl 2 Display Station component of the 7361 system.
- Prompting messages on the 3251 mdl 2 guide the user through drafting functions requiring multiple steps.
- Drawings are saved on diskettes (one drawing per diskette) and can be restored to disk working storage for editing or plotting purposes at any time.
- Emphasis is on ease-of-learning and use. A *User's Manual* guides the drafter step-by-step through the use of prompting messages, from simple to more complex functions.
- Supports separate workstation areas on disk for each display station. Each action is written to disk. Therefore, minimal recovery is required in the event of a power outage.
- User can create his own templates (as pattern library symbols).
- Fastdraft software offers a choice of the level of detail for creating/editing drawings. The level selected is highlighted and changes are restricted to that level. The five hierarchical levels are:
 - Points
 - Lines
 - Shapes
 - Patterns
 - Views

DESCRIPTION

Three function menus are provided. The drafter selects a menu, and follows with the selection of the functions needed from the displayed menu, by use of the light-pen and the keyboard. The keyboard is primarily used to select the menu and to input measurement and other alphanumeric data.

Main Menu consists of four parts:

- Drawing and Diskette Options.
- Drawing Identification.
- Drawing Parameters.
- Notation Area.

Provides the capability to get and save drawings, clear storage, identify jobs, format diskettes, plot, create notes, etc.

Customizing Menu is used to:

- Specify metric or inch units for the drawing.
- Set or change the values for drawing and dimensioning the work.
- Set up the Edit Menu screen and text formatting.
- Select different pens for the plotter.

The Fastdraft options from the Edit Menu use the specifications or attributes set up on the Customizing Menu.

Edit Menu has four areas:

- Display Window.
- Coordinate Readout Area.
- Instruction Area.
- Edit Menu Options.

Provides the capability to create, structure, copy, rotate, delete and modify drawings in working storage.

The 7361 Fastdraft system operates as a dedicated drafting system.

FUNCTIONAL CHARACTERISTICS

For initial construction of shapes:

- Mathematical/Construction Options
 - Edit Menu options provide for the construction of lines, circles, ellipses, boxes, etc.
- Editing Options (for use on existing shapes)
 - Menu options are provided for Window, Restore, Delete, Intersect, Rotate, Move, Scale, Measure, etc.
- Drafting Options
 - Isometrics, dimensioning, cross hatching, filleting, etc.

Drafting Requirements of the following standards organizations are supported:

- American National Standards Institute (ANSI)
- International Standards Organization (ISO)

CUSTOMER RESPONSIBILITIES

To install and use the 7361 Fastdraft licensed program, the customer will:

- Order, as a minimum, the basic 7361 system shown under "Devices Supported".
- Order the Fastdraft licensed program (5719-GP1) from IBM.
- Follow site preparation guidelines found in the *IBM 7361 Fastdraft System Guide*.
- Read the following publications to acquire a knowledge of the graphics functions provided and the installation procedures:

IBM 7361 Fastdraft System Guide (SC34-0514) introduces the system and gives instructions for software installation, operation and maintenance. It also includes physical installation planning information.

IBM 7361 Fastdraft Training Guide (SC34-0515) is a self-study manual that explains how to use the functions offered, plot a drawing, create pattern libraries, etc. No knowledge of computers or programming is required.

After the user has become initially familiar with the system, a review of the *IBM Fastdraft Workstation Reference* (SC34-0516) will provide in depth information about each of the drafting functions available.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Devices Supported: The IBM 7361 Fastdraft licensed program is specifically designed for use with the IBM 7361 Fastdraft System. Components of the 7361 system are:

Basic

- The IBM 7361 Graphics Processor Unit mdl 001.
- The IBM 3251 mdl 2 Display Station with two special features: Alphanumeric Keyboard (#4631) and Light-Pen (#4750).
- The IBM 3101 mdl 10 Display Terminal (used as the system console for program installation and for DPCE Service Representative use in diagnostic testing).

Optional

- A second 3251 mdl 2 Display Station (with #4631 and #4750 features).
- An IBM 7374 Color Plotter mdl 001.

SOFTWARE REQUIREMENTS (None)

DOCUMENTATION
(available from Mechanicsburg)

IBM 7361 Fastdraft System Guide (SC34-0514)* ... *IBM 7361 Fastdraft Training Guide* (SC34-0515)* ... *IBM Fastdraft Workstation Reference* (SC34-0516) ... *IBM 7361 Licensed Program Specifications* (GC34-0513).**

* Available by May 31, 1983

** Describes the IBM 7361 Fastdraft licensed program and warrants that it conforms to its specifications (as contained in the document).

RPQs ACCEPTED: Yes

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**IBM SERIES/1 REALTIME PROGRAMMING SYSTEM
ADVANCED REMOTE JOB ENTRY
5719-RJ6**

DESCRIPTION

The IBM Series/1 Realtime Programming System Advanced Remote Job Entry (ARJE) Licensed Program executes as an application program on the Realtime Programming System (RPS). The ARJE Licensed Program supports the use of an IBM Series/1 as a remote job entry workstation using either Systems Network Architecture (SNA) or Multileaving Binary Synchronous Communications (BSC).

Advanced Remote Job Entry supports:

- **MRJE**
Multileaving Remote Job Entry (MRJE) support for Binary Synchronous Communications (BSC).
- **SNA RJE**
Multiple Logical Unit Systems Network Architecture (SNA) support for Synchronous Data Link Control (SDLC).
- **Unattended Operation**
ARJE allows unattended operation by having ARJE commands on disk/diskette, and support for dynamic punch file allocation, and auto answer.
- **Full Function RJE**
In addition to standard RJE capabilities, ARJE has full function console support with status reporting and journaling, data decompression, and printer form support.
- **ARJE Commands**
ARJE commands have been designed for ease of use and are identical for MRJE or SNA RJE operation.
- **Host Remote Job Entry Subsystems**
ARJE supports the following:

BSC	SDLC
OS/VS2 JES2	OS/VS2 JES2
OS/VS2 JES3	OS/VS2 JES3
VM/370 RSCS	DOS/VSE VSE/POWER

HIGHLIGHTS

The ARJE licensed program is an application program loaded by the terminal operator or another RPS application program. The purpose of the program is to provide the RPS user with the ability to participate in an SNA network or BSC environment as an RJE workstation. It will allow the user who has created a job stream via RPS edit facilities to transmit that job stream to a host job entry subsystem for processing. Upon completion, the output from the job stream(s) will normally be sent back to the workstation for punching (routed to an RPS data set) and/or printing.

- **MRJE**
The Binary Synchronous Support for point-to-point (switched or nonswitched) communication is with the ARJE Multileaving Remote Job Entry (MRJE) option. Multileaving is a term which describes a computer-to-computer communications technique developed for use by the HASP system. It has since been implemented by other IBM RJE programming systems. It permits the intermixing of input and output data streams on the communication lines. It is fully synchronized, two directional transmission of a variable number of data streams between the Series/1 and a host system. The Series/1 appears as a System/3 with console support to the host job entry subsystems.
- **SNA RJE**
The Systems Network Architecture (SNA) RJE option of ARJE supports (switched or nonswitched) point-to-point or multipoint Synchronous Data Link Control protocol. The Series/1 ARJE has Multiple Logical Unit support under a single workstation providing up to four LU to LU sessions. ARJE uses Logical Unit Type 1 protocols for session communication with the host job entry subsystems.
- **Unattended Operation**
Three ARJE capabilities, i.e., ARJE commands in a disk/diskette data set, dynamic punch file allocation, and auto answer, enable the workstation to operate without the user being physically present.
The ARJE user can place ARJE commands in a disk/diskette data set in addition to entering them at his workstation display terminal. These ARJE commands will be read in and processed just as if they were entered at the display.
The user can also activate ARJE in a "wait" state (auto answer), to establish the connection with the host job entry subsystem when a call is received from the host. Thus, Series/1 site personnel can perform other functions while ARJE is executing.
The punched output received by ARJE is always placed in a Realtime Programming System disk/diskette data set. This data set is allocated by ARJE (dynamic allocation).

• **Full Function RJE**

The workstation console function gives the user the ability to query the host system as to the status of a submitted job and/or query the host for any other normally allowed information (i.e., system status etc.). Facilities are also provided to allow a user to record ARJE console activity to an RPS data set for subsequent printing (called journaling).

The print output received by ARJE may be either printed directly on an available physical printer or, through the use of the RPS spool function, placed in a disk/diskette spool data set for printing at a later time. The use of the spool facility to store output on a diskette allows the user to transport that data to another RPS Series/1 for printing. Facilities exist in the RPS spool function to allow the user to control the printing of specific jobs from the spool processor output queue. ARJE supports 3211/3203-4 Forms Control Blocks for printed data. The FCB parameters are: Lines per inch, form end (page length), and page line to channel assignments (i.e., for each "select vertical channel" command received from the host, ARJE will skip to a specific line on the current printer page). A utility will be provided with ARJE to allow the user to define FCBs corresponding to the FCB/forms requests that may be sent by the host.

• **ARJE Commands**

The ARJE commands are single line commands with parameters that can be specified by the user. These commands are summarized below:

- Help -- Print a list of the commands
- Readfile -- Identify a command/data file to be processed
- Printer -- Alter current ARJE printer assignment
- Punch -- Modify punch specifications
- Library -- Change library environment
- Attend -- Change operational mode (attended/unattended)
- Status -- Report current ARJE status
- Journal -- Turn on/off journal activity
- Operator -- Transmit host operator command

CUSTOMER RESPONSIBILITIES

The customer is responsible for the installation and use of this licensed program.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

The Series/1 Realtime Programming System Advanced Remote Job Entry requires the following hardware for installation:

- A Series/1 4954 or 4955 processor.
- One of the following disk/diskette devices:
 - 4962 Disk Storage Unit (all models).
 - 4963 Disk Storage Unit (all models).
 - 4964 Diskette Storage Unit.
 - 4965 Diskette and I/O Expansion Unit.
 - 4966 Diskette Magazine Unit.
- One of the following interactive devices:
 - 4978 Display Station.
 - 4979 Display Station.
 - 3101 Display Terminal Model 1 or 2 or Typewriter Models ASR33/ASR35 or equivalent teletypewriter device attached by any of the following:
 - #7850 Teletypewriter Adapter (3101 or ASR33/35 or equivalent).
 - #2095/ #2096 Feature- Programmable Adapter D02350 (3101 only)
 - #1610 Asynchronous Single Line Adapter (3101 only).
 - #2091/ #2092 Asynchronous Multi-line Adapter (3101 only).
- One of the following adapters:
 - #1310 Multi-function Attachment (BSC mode).

PROGRAM PRODUCTS

Series/1 Advanced Remote Job Entry (cont'd)

- #2074 Binary Synchronous Communications Single Line Control.
- #2075 Binary Synchronous Communications Single Line Control.
- #2080 X.21 Adapter (BSC/SDLC mode) under V.35 Interface.
- #2093 Binary Synchronous Communications 8-Line Control
- #2094 Binary Synchronous Communications 4-Line Adapter
- #2090 Synchronous Data Link Control - Single Line Control

• Optionally, one of the following:

- 4973 Line Printer.
- 4974 Matrix Printer.
- 4975 Matrix Printer (via #1310 MFA).

SOFTWARE REQUIREMENTS

The following IBM licensed programs or functionally equivalent programs are prerequisites for the installation of the IBM Series/1 Realtime Programming System Advanced Remote Job Entry Licensed Program (5719-RJ6):

- IBM Series/1 Realtime Programming System Version 5 (5719-PC5).

For SNA RJE option only of ARJE:

- IBM Series/1 Realtime Programming System Systems Extended Network Architecture Support Licensed Program (5719-SN1).

The Series/1 Realtime Programming System Advanced Remote Job Entry Licensed Program requires an additional 26K bytes of storage.

DOCUMENTATION

IBM Series/1 Realtime Programming System Advanced Remote Job Entry Licensed Program Specification ... IBM Series/1 Realtime Programming System Advanced Remote Job Entry User's Guide ... IBM Series/1 Realtime Programming System Advanced Remote Job Entry Reference Card.

PROGRAMMING RPQs

PRPQs will be accepted. Response time will depend upon complexity.

PROGRAM PRODUCTS

**5110 PRINT PLOT/PROBLEM SOLVER LIBRARY
5721-DC3 (BASIC) and 5721-DC4 (APL)****PURPOSE**

IBM 5110 Print Plot/Problem Solver Library is an interactive program. When used in conjunction with the printer control function support provided (also available via RPQ S40161), it allows the IBM 5110 to plot data generated by BASIC or APL programs, or to plot data entered from the keyboard onto an IBM 5103 Printer. (Note: All further references to the Print Plot/Problem Solver Library assume the printer control function support is that provided with the Print Plot program and not the RPQ.) In addition, the Print Plot/Problem Solver Library, through the use of the Serial I/O Adapter, can be used with these types of peripheral devices:

- Absolute Vector Plotters
- Storage Display Terminals

The present implementation will be compatible only with certain peripheral devices of the above generic device types. Peripheral device support programs are the user's responsibility. See *User's Manual* for more detail.

Print Plot/Problem Solver Library will provide the capability for generating the most used types of graphs such as line graphs, bar charts, histograms, point plotting, etc. The user may write a program to generate the data or enter the data directly from the keyboard.

HIGHLIGHTS

Print Plot/Problem Solver Library supports the following functions:

- Plot of horizontal and vertical lines given starting point and length.
- Automatic plotting of axes.
- Automatic plotting of grid.
- Automatic plotting of scale numbers and tick marks including logarithmic.
- Connect two points with straight line or connect more than two points with straight lines between points in the order given.
- Automatic plotting of histogram.
- Automatic plotting of bar charts.
- Plot of curve identifying characters (from standard character set).
- Built-in routine for scaling to compensate for dot density differences horizontally and vertically so that a square will be square and a circle will be round.
- Variable density of plot.
- Reversible platen so that the paper can move backward as well as forward.
- Standard 5103 character set printed horizontally for chart identification or title.
- Calculate and plot curve fits for given points.

DESCRIPTION

Print Plot/Problem Solver Library consists of a series of modules, that when loaded into the system, will provide a wide range of plotting capabilities. In generating a graph using Print Plot, the user would generally invoke processing as follows:

- Specify, interactively, metric or inch plotting.
- Specify the size and location of graph within the plot limits.
- Specify the location of the origin within the graph, the user X value and Y value at the origin, and the horizontal and vertical scaling factors. The scaling factors can be either linear or logarithmic.
- If axes are to be plotted, either specify automatic plotting of axes, or use Print Plot commands to plot axes to user specifications.
- If grids are to be plotted, invoke the grid plotting functions.
- Specify horizontal and vertical dot density.
- Specify a symbol to be printed at all user-defined points.
- Input user coordinates for all points to be plotted indicating whether each individual point should or should not be connected to the last point provided. In addition to keyboard entered and user program-generated points, the data for plotting points may be provided via a data file.

When generating special types of graphs (bar charts or histograms), the user may utilize the Print Plot routines which are tailored to these specific applications.

CUSTOMER RESPONSIBILITIES

The Print Plot/Problem Solver Library is distributed on cartridge or diskette for loading into the user's system. A *User's Guide* is also provided. The customer should use the test data supplied in the *User's*

Guide to test the system and 5103 Printer, and to make sure the programs work properly.

It is the customer's responsibility to provide sufficient backup cartridges or diskettes (see license agreement for limitations) to ensure continued operation in case of a failure. It is the customer's responsibility to provide sufficient security for these licensed programs.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

Print Plot/APL requires a minimum of 32K of processor storage (IBM 5110 models A12 or C12 [tape], A22 or C22 [diskette]).

Print Plot/BASIC also requires a minimum of 32K of processor storage (IBM 5110 models B12, C12, B22 or C22).

The printer control function support will be automatically provided with any Print Plot/Problem Solver Library ordered. The printer control function support is separately available via RPQ S40161.

SOFTWARE REQUIREMENTS None

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**5110 STAT/PROBLEM SOLVER LIBRARY (BASIC)
5721-DC7****PURPOSE**

The IBM 5110 STAT/Problem Solver Library is an interactive program encompassing commonly used statistical techniques for the analysis of numerical data. The library is available in BASIC only for the IBM 5110.

STAT/Problem Solver Library helps the problem solver to utilize the computer directly for statistical analysis. A statistically-oriented user should have no difficulty in quickly learning the capabilities of the programs. The interactive mode of the package allows a non-data processing-oriented professional to readily utilize the programs.

Because of the interactive nature of the STAT/Problem Solver Library the user can sit at the keyboard and see the result of the analysis as it is developed. Delays and some of the sources of error associated with batch processing and time sharing usage are eliminated.

HIGHLIGHTS

- A comprehensive set of statistical procedures.
- A user with a knowledge of statistics can learn the program with a minimum of effort.
- Interactive mode simplifies usage.
- Error checking with correction facilities.
- Instructional messages clarify procedures or options available.

DESCRIPTION

STAT/Problem Solver Library consists of a series of routines covering a wide range of capabilities under the following categories:

- **Data Generation** - Read, Print, Edit, Transform
- **Elementary Statistics** - Cross Tabulation, Histogram, Tally, Moments, T-Test, Chi-Square
- **Regression and Correlation Analysis** - Correlation, Simple Regression, Stepwise Regression, Multiple Regression, Polynomial Regression
- **Multivariate Analysis** - Discriminant Analysis, Canonical Correlation, Factor Analysis
- **Analysis of Variance** - One-way Analysis of Variance, Factorial Design
- **Non-Parametric Statistics** - Kendall Ranks Correlation, Sign Test, Wilcoxon's Matched-pairs Signed Ranks Test, Cochran Q-Test, Freedman Two-way Analysis of Variance, Mann-Whitney U-Test, Kendall Coefficient of Concordance Biserial Correlation, Point Biserial Correlation, Tetrachoric Correlation, Phi-Coefficient.
- **Time Series Analysis** - Moving Average, Seasonal Analysis, Cyclical Analysis, Auto-Covariance and Auto-correlation, Cross-Covariance and Correlation, Triple Exponential Smoothing.
- **Biostatistics** - Survival Rate, Probit Analysis

CUSTOMER RESPONSIBILITIES

The STAT/Problem Solver Library is distributed in machine-readable form for loading into the user's system. A *User's Guide* is also provided. Customers should use the procedures outlined in the *User's Guide* with their own data to test the machine-readable code to make sure the programs are working properly.

It is the customer's responsibility to provide sufficient backup cartridges or diskettes (no more than 5 are permitted under the license agreement) to ensure continued operation in case of a failure. It is the customer's responsibility to provide sufficient security for these licensed programs.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

STAT/BASIC will operate on an IBM 16K 5110 system. The library is able to automatically adjust the minimum-maximum entries to fit various storage sizes and input/output options.

SOFTWARE REQUIREMENTS: None

TERMS and CONDITIONS: See PP Index

ACCOUNTING APPLICATIONS For The 5120 COMPUTING SYSTEM

5120 BILLING ... (5721-XB1)
 IBM 5120 PAYROLL ... (5721-XB2)
 IBM 5120 ACCOUNTS PAYABLE ... (5721-XB3)
 IBM 5120 ACCOUNTS RECEIVABLE ... (5721-XB4)
 IBM 5120 INVENTORY REPORTING ... (5721-XB5)
 IBM 5120 GENERAL LEDGER ... (5721-XB6)

PURPOSE

The IBM 5120 Computing System licensed programs for accounting applications are cross-industry programs, applicable to many different business types, which provide the user with powerful tools for running and managing a business.

The levels of support provided for these programs include: Documentation designed to increase ease-of-use and productivity; an Installation Support Center (ISC) Hotline available to all customers for assistance; Responsive Program Temporary Fix (PTF) - an enhancement to the distribution and applying of program fixes.

HIGHLIGHTS

- Interrelated applications through generation and passing of transaction data on diskettes for direct input, as appropriate.
- New approach to program documentation designed to significantly increase ease-of-use and customer self-sufficiency during installation and operation.
- Installation Support Center (ISC), with a direct customer hotline for questions related to the installation and operation of these applications.
- Central Service from the Application Development Center for error correction, including rapid distribution of PTFs and the capability for users to automatically apply the fixes through Responsive PTF facility.
- Enhanced ease-of-use through appropriate use of menu-driven procedure selection and/or screen prompting.
- Built-in auditability and control through such techniques as zero balancing and control totals.
- Installation-time tailoring to select key options and user specific control and report data.
- BRADS II (5798-NXT) file definitions provided with the programs for selected portions of the application files.

DESCRIPTION

BILLING (5721-XB1)

IBM 5120 Billing is a post-billing application providing the user the ability to create invoices for customer orders already shipped. The customer name and address, item descriptions and prices are automatically obtained from the customer and item files if the 5120 Accounts Receivable and Inventory Reporting programs are installed. If these programs are not installed, the data can be keyed in directly for each invoice. Extensions and discounts are automatically applied and transaction records created for direct input to 5120 Accounts Receivable and Inventory Reporting programs.

Functions and Features

- Post-billing.
- Automatic price extensions.
- Broken Case pricing.
- Discounts optionally applied based on invoice total.
- Availability of four customer class prices per item controlled by a price code in the Customer Master File.
- Up to 2 sales taxes (State, local) plus Federal Excise tax.
- Up to 3 classes of special charges (packing, freight, etc.).
- Handles cash sales.
- Billing of non-inventoried items.
- Optional handling of back order, back order shown on invoice.
- Invoice by single order, specified orders, or batch orders.
- Credit memos for returns and adjustments.
- Daily sales information from Billing is summarized in the order file and available to user as input to a user sales history file.
- Auditability and control through edit lists and control totals for Invoice Register, Accounts Receivable and Inventory transaction files.
- Interactive data entry and edit of customer orders.
- Can override any fixed data during data entry (that is, price, discounts, cost, etc.)

- Creates transaction data on diskette for direct input to the 5120 Accounts Receivable and Inventory Reporting.
- Installation-time tailoring including selection of Accounts Receivable/Inventory interface, back order, general ledger account numbers for use with accounts receivable input and automatic invoice numbering.

PAYROLL (5721-XB2)

5120 Payroll provides an application that performs basic payroll computations and produces payroll checks with earnings statements and deduction reports. It accommodates both hourly and salaried payrolls. Additional program flexibility and options are provided to satisfy many special customer needs.

Functions and Features

- Weekly, biweekly, semimonthly or monthly pay periods.
- Provides payroll register, payroll checks with Earnings Statements, Deduction Report (with exceptions) and Distribution Journal.
- Preparation of the 1979 W-2 forms with subtotals and 941-A showing excess wages for SUI.
- Vacation, holiday and sick time processing and reporting.
- Pay for regular employees on hourly basis, with additional capability for
 - Payment of special wages only (for example, piecework).
 - Two overtime rates set by user.
 - A shift differential premium handled as percent of hourly rate or flat amount per hour, set at user option. Shifts 2 and 3 may differ.
 - Pay rates based on "skill" codes.
- Pay for salaried employees, with additional capability for
 - Payment of commission only.
 - Recording overtime hours, with or without pay.
- Provides for processing special payments such as awards and bonuses.
- Allows additional Federal Income Tax withholding at employee's request.
- Provides user a specified tax table for Federal and State/Local tax computation with one state and one local tax deduction per pay period per employee. Up to four state/local changes allowed per year per employee.
- Non-statutory deductions allowed, with capability for:
 - Up to eight per employee, with a total system capacity of 40 non-statutory types.
 - Specifying deduction frequency, and continuing until stopped or predefined limit is reached.
 - Deduction amount may be percent of gross, amount per period, or amount per hour.
 - Stock/bond deduction with a certificate value and balance forward.
- Inquiry to any employee record.
- Security provisions with user pre-set passwords.
- Interactive data entry for file creation/maintenance and transactions.
- Auditability and control through payroll data batch proof and zero balancing general ledger distribution.
- Creation of summary job/department cost distribution data for input to the 5120 General Ledger program.
- Installation-time tailoring, including company name/address, security password and various processing options such as pay rates based on skill, interface to the 5120 General Ledger, job costing and distribution.

ACCOUNTS PAYABLE (5721-XB3)

The 5120 Accounts Payable is an interactive solution designed to assist the user in controlling cash outflow, while maintaining accurate and detailed records of vendor invoices and credits.

Information is provided to help management take advantage of vendor discounts. Accounting controls, audit trails, a menu facility and operator prompting can assist the user in maximizing productivity. Data validity is provided through zero balancing of debits and credits by voucher number at entry time.

Functions and Features

- Multicompany support.
- Payment options by "due date", "on demand", or "within date".

5120 Accounting Applications (cont'd)

- Allows for expedited payments when necessary to deviate from regular payment cycles.
- Optionally allows generated standard recurring payable items for several payment cycles.
- Handles partially prepaid vendor invoices, adjustments, transfer, reversals, and vendor debit and credit memos on an accrual basis.
- Credit memo tracking through key reports.
- Use of up to nine specified cash bank account numbers for cash disbursements.
- Allows accounting for and deduction of cash discounts.
- Supports open payables and cash disbursements.
- Auditability and control functions including zero balancing by voucher and control totals for batch input and update.
- Provides for vendor master file inquiry through file maintenance facility.
- Interactive data entry and correction capability with fast response screen for efficient data entry.
- Use of specified general ledger accounts for payables, discounts earned, cash and expense distributions.
- Creation of journal entry data to be used for input to general ledger or optionally create journal entry on diskette for input to the 5120 General Ledger.
- Installation-time tailoring includes selection and definition of report titles, payment options, interface to 5120 General Ledger and use of security feature.
- Handling of broken-case quantities
- On-demand stock status reporting with flagging of exception items (for example, out of stock, below reorder level, etc.) which may optionally be restricted to selected vendors, item classes, or inventory items
- Comprehensive inventory analysis report
- Perpetual inventory maintenance
- Item costing - both average cost and last cost
- Maintenance of month-to-date and year-to-date sales and cost of items sold for all items
- Displayed inquiry of the contents of Inventory Master File records using the File Maintenance process
- Physical inventory list - in sequence by warehouse and location
- Auditability and control functions including Master File update sequence numbering and dating, and control totals for transaction entry
- Installation-time tailoring

GENERAL LEDGER (5721-XB6)

The 5120 General Ledger System is an application designed to accomplish the basic bookkeeping functions of posting journal entries to general ledger and creating financial statements. The programs are based on double-entry bookkeeping principles in accordance with established professional standards. The system has been designed for easy implementation and installation, allowing a user to be productively operational in a short time.

Functions and Features

- Accommodate up to eleven major divisions of accounts.
- Account structure within each division can be tailored by the user to meet their specific requirements.
- Produces General Ledger, General Ledger Trial Balance, Chart of Accounts and Transaction Listings.
- Produces Balance Sheet and Income Statement on 8 1/2" x 11" format.
- Auditability and control through edit of data input formats, entry of debit and credit transactions under systems guidance, batch total control and zero balancing for input transactions.
- Use of master menu screen, with optional return after each procedure.
- Accepts transactions, direct from diskette, generated by the 5120 Payroll, Accounts Payable and Accounts Receivable programs.

Program Documentation: A documentation approach is provided to help customers install these IBM accounting applications. The materials offer significant improvements in the following areas:

- They are written in user-oriented language.
- The material within each book is presented in an easy-to-follow, step-by-step structure that guides the customer through the installation of the application.
- Hands-on operator training is provided. This training is self-paced and can be used with or without accompanying audio cassettes, depending upon the experience level of the user.
- The materials are designed to interface with the 5120 Operator Training providing a coordinated prerequisite for the specific operator training.
- They are designed to work in conjunction with the ISC customer hotline.
- The books are visually attractive.

The following materials are available for each application.

Getting Ready: This book steps the customer through the implementation process. It spells out, in simple terms, what has to be done to get the application up and running.

Operator Training: Complete instructional materials are provided for training the operator. This training program uses both audio and workbook to bring operators up to speed quickly. After training, the operator workbook and a *Ready Reference Guide* are used as needed.

Reports and Information: This book helps management take full advantage of the reports and information provided by the application. It describes, in detail, the reports produced and how they are used.

In addition, a separate program detail manual will be optionally available for each application.

ACCOUNTS RECEIVABLE (5721-XB4)

The 5120 Accounts Receivable is an application designed to provide the user with timely information to help improve cash flow, and reduce bad debt losses by control of the accounts receivable. The accounts receivable transactions are summarized into debits and credits to the general ledger accounts. The system provides a summarized journal report and optionally creates a general ledger transaction file on diskette, summarized by account, for entry to the user's general ledger.

Functions and Features

- Open-item accounting or balance forward accounting selectable by customer.
- Accounts receivable aging including three aged, one current, and one future period, with aged Trial Balance on demand.
- Customer account information may be selectively printed for credit checking and cash application.
- Automatic creation of late charge transactions which may be reviewed and edited before posting. Late charge rate and first late period can be specified.
- Deferred statement printing.
- Suppression of statements and/or late charges on an individual customer basis, as required.
- Credit limit reporting.
- Past due reporting.
- "Sundry" entries for which general ledger account numbers may be specified at transaction entry time.
- Auditability function including control totals for batch input and update.
- Interactive entry and correction capability for invoice, debit memo, credit memo, payment, adjustment data and late charge data. Fast response screen for efficient data entry.
- Creation of journal summary transactions for input to general ledger, with optional diskette output for input to the 5120 General Ledger program.
- Installation-time tailoring includes user company name and report titles, general ledger account numbers, interface to the IBM 5120 General Ledger and Billing programs, choice by customer of balance forward or open item accounting, and others.

INVENTORY REPORTING (5721-XB5)

The 5120 Inventory Reporting offers small enterprises the management reports to help appropriate optimization of inventory levels. The user is assisted in purchasing decisions by up-to-date reports reflecting stock movement, on-hand and on-order quantities, as well as sales and cost data.

Functions and Features

- Quantity on-hand and warehouse location kept separately for up to three warehouses

5120 Accounting Applications (cont'd)

Installation Support:

Atlanta National Market Support Center

Customer telephone service to the Atlanta National Market Support Center, formerly the ACSC, is available only for selected 5120 licensed programs as follows:

- IBM will provide 90 days of no-charge telephone service to 5120 customers who are installing their first 5120 licensed program. These programs are:
 - Billing (5721-XB1)
 - Payroll (5721-XB2)
 - Accounts Payable (5721-XB3)
 - Accounts Receivable (5721-XB4)
 - Inventory (5721-XB5)
 - General Ledger (5721-XB6)
 - BRADS II (5796-NXT)
- Customers may purchase 12 months of continuing telephone service for all of the above licensed programs.
- Telephone service for the 5100, 5110, and 5120 BASIC programming languages is no longer available.

Responsive Program Temporary Fix (PTF): Responsive PTF is a diskette system designed to have customers automatically install program fixes for the 5120 Accounting Applications and BRADS II.

It consists of a single diskette containing program fixes and a program which prompts the customer to apply the required fix or fixes. The diskette will contain all known fixes to the supported applications. Central Service, at the West Coast Application Development Center, is responsible for developing fixes, maintaining the Responsive diskette, and shipping it to a customer at the request of the ISC. The customer will also receive information on how to initiate the system to the point where screen prompts are provided for further guidance.

Responsive PTF does not replace the normal methods of periodic update releases, as required, through PID. It is meant to serve as an enhanced level of support for use between releases.

Use of Accounting Applications with BRADS II (5798-NXT): BRADS II provides the facility for a non-programmer to define files, create and maintain the files, build file inquiries and generate reports from the file data. The 5120 Accounting Applications (except General Ledger) will further support that capability by providing selective BRADS II file definitions with the applications. Thus, the task of definition, file creation, and maintenance is accomplished as part of the application. A user who has BRADS II can then build inquiries and develop additional reports for the defined files. This facility can help meet user unique inquiry and report requirements not contained in the applications.

In addition, with BRADS II, the user can extend the usefulness and value of the 5120 by developing additional simple applications (that is, asset inventory, company phone book, price lists, mailing lists, bills of material, etc.), without requiring a knowledge of BASIC programming.

BRADS II is also a highly productive application development tool. Thus the user, who also has BASIC language programming experience, can productively develop additional applications of varying complexities.

CUSTOMER RESPONSIBILITIES

IBM may provide normal marketing assistance and guidance. The responsibility for personnel selection and training, installation and continued day-to-day operation lies solely with the customer.

The customer is responsible for error detection and analysis and submission of APARs, but can obtain hotline assistance from the ISC.

IBM Central Service is responsible for the development and distribution of program fixes, but the customer has the responsibility to apply fixes to the program and can obtain hotline assistance from the ISC and use of the Responsive PTF diskette and program.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for these licensed programs when they are operated in the following specified operating environment:

HARDWARE REQUIREMENTS

The IBM 5120 Accounting Applications (General Ledger, Accounts Payable, Payroll, Billing, Inventory Reporting, Accounts Receivable) are designed to operate on an IBM 5120 Computing System or a 5110 Computer with the following minimum configurations:

<p>5110</p> <p>5110 B22 Computer (32K BASIC) Feature #3200 Diskette Sort (except Payroll)</p> <p>5103 mdl 11 Printer</p> <p>5114 Diskette Unit Feature #3240 (Second Diskette Drive)</p>	<p>5120</p> <p>5110 B32 Computer (32K BASIC) Feature #3200 Diskette Sort (except Payroll)</p> <p>5103 mdl 11 Printer</p>
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Each of the applications operates individually, with its own diskettes, on a dedicated 5120 or 5110. Though there is data-passing, via diskette, between selective applications, there is no system or file co-residency.

SOFTWARE REQUIREMENTS

The IBM 5110 Accounting FDPs [General Ledger (5798-NPH), Accounts Payable (5798-NPK), Payroll (5798-NPJ), Inventory Reporting (5798-NXK), Accounts Receivable (5798-NPN)] were used as a base for development of the 5120 Accounting Applications. Enhancements, extensive changes to the interfaces, the addition of Billing with an interface to the enhanced Accounts Receivable and Inventory, and the development of a new documentation approach have resulted in major changes. Because of these changes operational problems can occur if the 5110 and 5120 programs are used together. Therefore, IBM cannot support the intermixing of the 5110 and the 5120 applications.

DOCUMENTATION (available from Mechanicsburg)

Marketing Publications

The following program documentation is provided as part of the Basic Material shipped with the programs from PID. It is also available from Mechanicsburg, and includes the following:

IBM 5120 Billing (5721-XB1)
Getting Ready Binder (SB30-0438) contains: ... *Getting Ready Manual* (SB30-0439) ... *Getting Ready Planner Form* (SB30-0441) ... *Reports and Information Manual* (SB30-0440) ... *Operator Training Binder* (SB30-0442) contains: ... *Operator Training Manual* (SB30-0443) ... *Operator Training Cassette* (SV30-0236) ... *Ready Reference Manual* (SB30-0444) ... *Program Detail Manual* (LB30-2519) ... *Application Extension Booklet* (LB30-2527).

IBM 5120 Payroll (5721-XB2)
Getting Ready Binder (SB30-0403) contains: ... *Getting Ready Manual* (SB30-0404) ... *Getting Ready Planner Form* (SB30-0406) ... *Reports and Information Manual* (SB30-0405) ... *Operator Training Binder* (SB30-0407) contains: ... *Operator Training Manual* (SB30-0408) ... *Operator Training Cassette* (SV30-0231) ... *Ready Reference Manual* (SB30-0409) ... *Program Detail Manual* (LB30-2516) ... *Application Extension Booklet* (LB30-2524).

IBM 5120 Accounts Payable (5721-XB3)
Getting Ready Binder (SB30-0424) contains: ... *Getting Ready Manual* (SB30-0425) ... *Getting Ready Planner Form* (SB30-0427) ... *Reports and Information Manual* (SB30-0426) ... *Operator Training Binder* (SB30-0428) contains: ... *Operator Training Manual* (SB30-0429) ... *Operator Training Cassette* (SV30-0234) ... *Ready Reference Manual* (SB30-0430) ... *Program Detail Manual* (LB30-2518) ... *Application Extension Booklet* (LB30-2525).

IBM 5120 Accounts Receivable (5721-XB4)
Getting Ready Binder (SB30-0431) contains: ... *Getting Ready Manual* (SB30-0432) ... *Getting Ready Planner Form* (SB30-0434) ... *Reports and Information Manual* (SB30-0433) ... *Operator Training Binder* (SB30-0435) contains: ... *Operator Training Manual* (SB30-0436) ... *Operator Training Cassette* (SV30-0235) ... *Ready Reference Manual* (SB30-0437) ... *Program Detail Manual* (LB30-2515) ... *Application Extension Booklet* (LB30-2523).

IBM 5120 Inventory Reporting (5721-XB5)
Getting Ready Binder (SB30-0417) contains: ... *Getting Ready Manual* (SB30-0418) ... *Getting Ready Planner Form* (SB30-0420) ... *Reports and Information Manual* (SB30-0419) ... *Operator Training Binder* (SB30-0421) contains: ... *Operator Training Manual* (SB30-0422) ... *Operator Training Cassette* (SV30-0233) ... *Ready Reference Manual* (SB30-0423) ... *Program Detail Manual* (LB30-2520) ... *Application Extension Booklet* (LB30-2526).

IBM 5120 General Ledger (5721-XB6)
Getting Ready Binder (SB30-0410) contains: ... *Getting Ready Manual* (SB30-0411) ... *Getting Ready Planner Form* (SB30-0413) ... *Reports and Information Manual* (SB30-0412) ... *Operator Training Binder* (SB30-0414) contains: ... *Operator Training Manual* (SB30-0415) ... *Operator Training Cassette* (SV30-0232) ... *Ready Reference Manual* (SB30-0416) ... *Program Detail Manual* (LB30-2517).

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

**SYSTEM/32 BASIC ASSEMBLER LANGUAGE
and MACRO PROCESSOR
5725-AS1****PURPOSE**

The Basic Assembler language is a symbolic programming language used to write programs for the System/32. Source programs written in this language are processed by the Basic Assembler licensed program to produce relocatable object programs which are converted to executable format by the System/32 System Control Programming-Overlay Linkage Editor facility. The Basic Assembler can be used to create a stand-alone program. The object programs are stored in the System/32 Library. Program loading is performed through System/32 OCL.

Programs may be coded entirely by the user with no dependence on any other programming other than System/32 System Control Programming (5725-SC1).

Basic Assembler may also be used for assembly of relocatable subroutines for use with System/32 RPG II. The subroutines written in the Basic Assembler language are coded by the user and separately assembled. The process of program linking is accomplished during compilation of the RPG II source program.

HIGHLIGHTS

Some of the features provided by the Basic Assembler licensed program and its language are:

- Mnemonic Operation Codes
- Symbolic Referencing of Storage Addresses
- Automatic Storage Assignment
- Address Displacement Calculation
- Convenient Data Representation
- Operand Field Expressions
- Source Identification - Sequence Fields
- Assembler Instructions
- Cross-Reference Listings
- Error Checking and Diagnostic Messages

System/32 macros provide support to the Assembler user through the Macro Processor for the following System Control Program facilities: Disk functions, printer operations, keyboard and display screen access and binary synchronous communications.

The macros are supplied to provide an interface to existing SCP support. Additional macros may be written by the user using the macro definition language provided.

By referring to macro definitions, the Macro Processor expands macro instructions coded by the user. The macro definitions are coded in a macro language. The macro definitions may be supplied by either the user or IBM. See the related System/32 SCP macros. All macro instructions are expanded into assembler source language statements that in turn can be processed by the Basic Assembler.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

IBM System/32 Basic Assembler, language and Macro Processor licensed program supports all models and features of the IBM 5320.

SOFTWARE REQUIREMENTS

A concurrent version of IBM System/32 System Control Programming (5725-SC1) is required to support IBM System/32 Basic Assembler language and Macro Processor licensed program.

TERMS and CONDITIONS: See PP Index

SYSTEM/32 CLIENT ACCOUNTING and FINANCIAL REPORTING SYSTEM (CAFRS) 5725-C21

PURPOSE

The System/32 Client Accounting and Financial Reporting System (CAFRS) offers the public accounting profession a comprehensive aid to solving the problems of client accounting. It assists the Certified Public Accountant, Public Accountant, or bookkeeper in operating a more profitable and productive practice.

HIGHLIGHTS

CAFRS can be installed without in-house programming capability:

- File sizes may be changed, within limits, as needed, by the system tailoring procedure to allow additional clients to be serviced or to offer optional processing features to more clients
- File load and maintenance procedures provided
- System-controlled master and transaction file backup procedures
- Easy-to-use runbook is available
- Step-by-step installation activity plan and detail user's information supplied by *Application Reference Manuals*

CAFRS provides ease-of-use options to the user

- Designed to fit industry requirements
- OCL procedures, Sort specifications, and processing programs are packaged into logical work units which simplify system operation
- Monitoring of procedures prevents execution of a program until preceding programs have been completely and successfully executed
- Compatible online/offline file maintenance and transaction data entry via the System/32 keyboard or diskettes created on the 3740 Data Entry System
- Dynamic Backup and Recovery System forces periodic backup of master files and edited transactions and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files
- Reprint options are possible because file updating is separated from report writing functions
- Selective printing options are available for many report functions

CAFRS uses recognized accounting techniques and terminology to provide a solid accounting system:

- Sample user-oriented forms for data preparation, file creation, audit and control are provided
- Clear audit trails and control techniques are provided
- Standard types of accounting reports, such as journals, ledger, trial balance, and financial statements plus special supporting analyses and lists, are provided

DESCRIPTION

The Client Accounting and Financial Reporting System is a ready-to-execute application for the small accounting firm.

It combines two data entry approaches - operator-oriented and batch-oriented. Support is provided for transaction entry through the System/32 keyboard or through a diskette created on a 3740 Data Entry System.

The application has certain records within a control file which contain questionnaire responses. These records allow the application to select file sizes and functions to suit each firm's needs. The questionnaire responses are keyed during initial installation and may be changed as needed. The System Tailoring Procedure allows these responses to be entered.

The System Tailoring Procedure utilizes the answers to a series of questions regarding the firm's requirements. It provides the following:

- Tailoring the application on-site at installation time.
- Allows users to activate and deactivate provided functions as their requirements change.
- All provided functions are included in the programs but only required functions are executed.
- File sizes may be expanded or contracted, as needed, by rerunning the System Tailoring Procedure.

An *Application Reference Manual* provides a step-by-step installation activity plan including sample numbering systems, sample input and maintenance data forms, file loading sequences, control forms with suggested procedures. Volume II of the *Application Reference Manual* provides information on the day-to-day use of the application.

The *Runbook* provides the operator with a detailed and easy-to-use set of instructions showing all the activities necessary to run the programs

on a System/32. The Operator Reference Summary Card is provided for the operator as a reminder of the major operational functions of each procedure. It is intended to be used once the operator is thoroughly trained in the particular application.

Instructional material in the form of a self-study course is provided for the operator for training in the use of the runbook.

An *Application Logic Manual* is provided, as optional licensed material, for use by the self-sufficient customer and for systems engineering continuing support. It describes the architecture of programs, procedures, data base cross-references, data dictionary, and detailed descriptions of each program.

Application Description: The Client Accounting and Financial Reporting System is a full-function ready-to-execute application. It includes application reference manuals, a runbook, source code, object code, execution procedures, and an application logic manual, if ordered as optional base material.

It is designed to allow flexibility in the options included to meet an individual client's special needs:

- Up to 13 periods per fiscal year
- Automatically calculated journal entries based upon algorithms previously defined by the accountant
- Multiple special-purpose journals with source code, related accounts, and headings specified by client
- Ability to correct prior periods
- Extensive chart of account flexibility to provide desired heading and account description information, up to 9 levels of subtotals for combining accounts, spacing and paging control
- Optional titles and formats for financial statements

Support is provided for the optional consolidation of multiple clients. Maintenance is provided for eliminating entries. Controls are included to force fiscal period alignment of clients being consolidated. The same processing capabilities are available for the consolidated client as for others.

Optional features and reports are available for any client, such as:

- Last year comparative data on financial statements
- Print-suppression of zero-balance accounts on financial statements
- Balance sheet
- Income and expense statement
- Combined department income and expense reporting
- Income and expense comparison to budget
- Income and expense account balance comparison to a specified account balance, by department
- Income and expense account balance comparison to a client-specified base, such as number of rooms, square feet, or miles driven
- Supporting schedules
- Statement of Changes in Financial Position with related worksheet and ability to process adjustments
- Reporting of financial ratios, defined by client with comparison to industrial averages
- Employee payroll register
- Printing of presently formatted 941a and W-2 forms
- Accountant's transmittal letter
- Notes to the financial statements
- Annual General Ledger

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day to day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

This IBM System/32 program will execute on all models of the IBM System/32. The programs are compiled assuming a 16K minimum system. Because of volume and time constraints, there may be a requirement for providing offline keying on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-character record features (128-character - #5455, and feature group A - #4004).

For presentation purposes on the reports, left and right parentheses have been included to indicate a dollar amount opposite an account's normal balance. The 64-character set feature is required for the System/32 to print the parentheses.

PROGRAM PRODUCTS

System/32 CAFRS (cont'd)

Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries. Because of this, no other user-written program may co-reside with this application unless stringent coding requirements for these programs are met to insure compatibility with the Client Accounting and Financial Reporting System. The *Application Logic Manual* discusses in detail the coding conventions used for the development of CAFRS.

SOFTWARE REQUIREMENTS

These programs are written in IBM System/32 RPG II Programming language and execute under control of the IBM System/32 System Control Program (5725-SC1). IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the programs. The IBM System/32 RPG II Compiler (5725-RG1) is required if modifications to the source code are necessary.

DOCUMENTATION

(available from Mechanicsburg)

... *Design Objectives* (GH30-0306) ... *Education Flyer* (G580-0108) ... Seminar Slide Set

RPGs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

SYSTEM/32 LUMBER DEALERS MANAGEMENT ACCOUNTING SYSTEM

BILLING ... 5725-D4F
ACCOUNTS RECEIVABLE ... 5725-D4B
INVENTORY CONTROL ... 5725-D4D
SALES ANALYSIS ... 5725-D49

PURPOSE

These modular applications are available for either a 16K or 24K System/32. The application function and data base are exactly the same. Performance improvements in the larger memory size versions for each system come from the reduction of overlays, incorporation of larger blocking factors, and use of dual I/O areas.

When all four applications are installed they constitute an interrelated application set with an integrated data base. They can help users manage their two largest business assets, accounts receivable and inventory, and give them profit performance data on their products, customers, and salesmen. They can also help the user increase operational efficiency and customer service.

The Payroll, Accounts Payable, and General Ledger licensed programs of the Distribution Financial Accounting System (DFAS) can co-reside with the Lumber Dealers Management Accounting System.

DESCRIPTION

BILLING (5725-D4F)

A post-billing system with data entry from the System/32 keyboard and/or diskettes keyed on a 3740 Data Entry System. Editing, invoice printing, invoice register, and sales summary. Features include:

- Ship-to address file
- Variable price selection methods
 - Operator entry of price
 - Contract price file
 - Customer code selects either the list price, or, one of six prices, discounts from list price, or markups from cost
- Price conversion, with computations for square foot, lineal foot, and board foot items
- Estimate preparation
- Price list printing - six prices in addition to list price
- State sales tax and one local sales tax
- Customer code selects 1 of 6 payment terms

ACCOUNTS RECEIVABLE (5725-D4B)

A combined balance forward and open item method, with data editing, monthly statements, and delinquency notices. Features include:

- Balance forward or open item selectable by account
- Lien expiration date checking
- Late charge capability for both open item and balance forward accounts
- Credit limit checked during order edit if Billing is installed
- Variable statement format - two options
- Aged trial balance monthly or on-demand
- Statement by job for contractors or by branch for multi-location wholesalers

INVENTORY CONTROL (5725-D4D)

A system which allows management to obtain the information needed for purchasing and profitability analysis, including reports to assist in taking inventory. Features include:

- Stock Status Review - on demand, selectable for
 - All items, item within limits, active items only
 - Sequence by vendor (optional), item class, or item
 - Exceptions only: Below minimum or cost deviation
 - Current stock position: On hand, on order, and available
 - Sales and cost information: This month and year-to-date
- Stock Status Report - monthly
 - Current stock position
 - Activity during the month
 - Year-to-date drop shipped quantities
- Inventory Analysis Report - on demand in sequence by
 - Item number
 - Date of last use or sale
 - Months supply on hand
 - Extended cost on hand
 - Vendor number
 - Item class
 - Vendor/item class

- Alternate cost on hand
- Year-to-date sales
- Basic Unit Cost - Standard cost method
- Alternate Cost - average cost
- Multiple Warehouses

SALES ANALYSIS (5725-D49)

Sales and profitability figures by salesman, customer, item, and item class. Availability of the information in the following reports is dependent upon the applications selected and their installation sequence.

- Daily sales recap by salesman (Data from Billing or Accounts Receivable)
- Monthly salesman sales analysis (Data from Billing or Accounts Receivable)
- Monthly customer within salesman sales analysis (Data from Billing or Accounts Receivable)
- Monthly customer sales analysis (Data from Billing or Accounts Receivable)
- Monthly item and item within item class sales analysis (Data from Billing or Inventory)
- Monthly item class within customer sales analysis (Data from Billing)
- The ability to report sales information for groups of items which do not have inventory records on file
- If Sales Analysis is the first or only Lumber Dealers application installed, the customer must provide data entry and edit programs.

System Functions

- Integrated data base which simplifies file maintenance and provides for more efficient disk utilization
- User-maintained constants file is used in most programs which allows operator to modify data subject to change, such as late charges rate, tax rates, terms, or aging dates, without the need to change and recompile programs
- Specific file load and maintenance programs are included for each master file
- Easy-to-use printed *Runbook* for each application
- Contains additional space in item and customer master records for customer use
- OCL procedures, sort specifications, and processing programs are cataloged into logical work units which optimize system utilization
- Automatic monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed.
- Dynamic backup and recovery system provides for periodic backup of master files and edited transactions and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files.
- Reprint options are possible because file updating is separated from report printing functions.
- Selective printing allows the operator to control the printing mode for reports.
- Inquiry programs
- Offline 3741 data entry diskette formats

File Size and Application Function Tailoring Capability

Programs and procedures for file allocation are included. The customer can allocate file space during installation and change file space allocations as business volumes change. Also, customers may control the operation of some application functions by file maintenance and by operator-controlled run-time options.

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 programs is a customer responsibility.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

The 16K options of these IAPs will execute on all models of the IBM System/32. The 24K option will execute on all models of the IBM

System/32 Lumber Dealers Management Accounting System (cont'd)

System/32 except the 16K model. There may be a requirement for providing offline keying on an IBM 3740 Data Entry System.

SOFTWARE REQUIREMENTS

The LDMAS programs are written in IBM System/32 RPG II programming language.

The 16K and 24K IBM System/32 options are executed under control of the IBM System/32 System Control Program (5725-SC1 Version 5 and above). IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the system. The RPG II Compiler (5725-RG1) is required if modifications are anticipated.

Instructional Materials**Operator Introduction and Exercises**

These materials, consisting of a *Student Guide*, audio cassettes, and System/32 diskettes, will help the operator learn and practice operations without using the customer data files. One copy will be provided at no charge to the customer.

One copy of the following material is supplied via SLSS when program number and initial library are specified. Additional copies may be obtained by ordering them individually from Mechanicsburg.

Audio Cassettes (2) (SV30-0002) ... System/32 Diskettes (3) (SV30-0003) ... *Student Guide* (SR30-0171) ... *Advisor Guide* (SR30-0169) ... *Runbook* (SR30-0170) ... Binder (SV30-0024).

DOCUMENTATION

(available from Mechanicsburg)

Executive Guide (G580-0121) ... *General Information Manual* (GH30-0166) ... *IAP Specifications* (GH30-0167) ... *Application Reference Manual* (SH30-0168).

TERMS and CONDITIONS: See PP Index

**SYSTEM/32 FOOD DISTRIBUTORS
MANAGEMENT ACCOUNTING SYSTEM**

BILLING ... 5725-D6A
ACCOUNTS RECEIVABLE ... 5725-D66
INVENTORY CONTROL ... 5725-D68
SALES ANALYSIS ... 5725-D6C

PURPOSE

These modular applications are available for either a 16K or 24K System/32. The application function and data base are exactly the same. Performance improvements in the larger memory size versions for each system come from the reduction of overlays, incorporation of larger blocking factors, and use of dual I/O area.

When all four applications are installed, they constitute an interrelated application set with an integrated data base. They can help users manage their two largest business assets, accounts receivable and inventory, and give them profit performance data on their products, customers, and salesmen. They can also help the user increase operational efficiency and customer service.

The open order file, slot sequenced picking lists and automated pricing and discounting methods can help improve order processing speed and accuracy. Inventory Control provides information to the buyer that will help optimize inventory investment through identification of the obsolete, slow moving, and unprofitable items; and help increase inventory turns and service levels. Automatic credit limit checking, variable credit terms, late charges on open item and balance forward accounts, delinquency notices, and aged receivables reports provide tools for reducing bad debt losses and increasing cash flow. Daily, monthly, and on-demand sales reports help monitor the attainment of the distributor's sales objectives.

The Payroll, Accounts Payable, and General Ledger licensed programs of the Distribution Financial Accounting System (DFAS) can co-reside with Food Distributors Management Accounting System. If Billing is used in the prebilling mode, a compatible inventory control system must be installed before or with Billing.

DESCRIPTION

BILLING (5725-D6A)

A prebilling system (when used with a compatible inventory control system) with postbilling capability, with data entry from the System/32 keyboard and/or from diskettes keyed on a 3740 Data Entry System, with editing, invoicing, invoice register, and a salesman's recap. Features include:

- Open orders file with listing by customer and/or item that allows either case labels or picking list in warehouse (slot) sequence
- Ship-to address file
- Variable pricing methods, including:
 - Contract pricing
 - Customer class pricing (six classes)
 - Cost plus pricing
 - Catchweight pricing
 - Broken case pricing and surcharge
 - Special charges and allowances
 - Case label charges
 - Cash and trade discounts
- Sales and tobacco tax
- Credit limit checking
- Automatic invoice numbering
- Special deals
- Automatic substitution
- Suggested retail price on invoice and case labels

ACCOUNTS RECEIVABLE (5725-D66)

Accounts Receivable provides for the recording, controlling, and reporting of money owed for merchandise sold or services rendered. Recognizing that a major portion of a wholesale food distributor's assets may be tied up in accounts receivable, the procedures are designed to provide timely information that helps your customer:

- Maximize profit and return on investment through tight control over all accounts due
- Minimize losses from bad debts through appropriate attention to slow-paying accounts
- Maintain customer goodwill through prompt, accurate record keeping

The major features of Accounts Receivable include:

- Balance forward or open item selectable by account
- Late charges for both open item and balance forward accounts on monthly statements
- Credit limit checked during order edit if Billing installed

- Monthly or weekly statements and delinquency notices
- Aged trial balance monthly or on demand - Summary or detail
- Aging into four aging periods

INVENTORY CONTROL (5725-D68)

Inventory control involves the recording of items received, sold, and on hand, the updating of item costs and the recording of activity dates.

Inventory Control can provide accurate, periodic reviews of the status of each item, while identifying any exception conditions, to assist management in deciding what to buy, how much to buy and how often to buy.

Inventory Control provides information that helps:

- Maintain records of all items physically in stock as well as on order, providing control and auditing for this major investment
- Arrange for timely, economical ordering of stock
- Minimize investment required to meet a specific service level, by highlighting overstocked or slow-moving items.

The major features of Inventory Control include:

- Two cost figures - last cost and burdened cost
- Maintenance of broken case quantities
- Warehouse location (slot)
- Physical inventory aids
- An array of reports to assist in:
 - Buyer ordering
 - Inventory Management
 - Transaction recording and control
 - Inventory Accounting

SALES ANALYSIS (5725-D6C)

Sales Analysis offers sales and profitability figures by salesman, customer, item, and item class. Availability of the information in the reports is dependent upon the applications selected and their installation sequence. Major Sales Analysis Reports include:

- Daily sales recap by salesman (data from Billing or Accounts Receivable).
- Monthly salesman sales analysis - current and year-to-date (Data from Billing or Accounts Receivable).
- Monthly customer sales analysis - current and year-to-date (Data from Billing or Accounts Receivable).
- Monthly salesman/customer sales analysis - current and year-to-date (Data from Billing or Accounts Receivable).
- Monthly item and item within item class sales analysis - current and year-to-date (Data from Billing or Inventory).
- Monthly item class, within customer, within salesman sales analysis - current and year-to-date (data from Billing).

If Sales Analysis is the first or only application installed, the customer must provide data entry and edit programs.

Functions

- Integrated data base which simplifies file maintenance and provides for more efficient disk utilization.
- User-maintained constants file is used in most programs which allows operator to modify data subject to change, such as late charge rate, tax rates, terms, or aging dates, without the need to change and recompile programs.
- Specific file load and maintenance programs are included for each master file.
- Easy-to-use printed *Runbook* for each application.
- Contains additional space in item and customer master records for customer use.
- OCL procedures, sort specifications, and processing programs are cataloged into logical work units which optimize system utilization.
- Automatic monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed.
- Dynamic backup and recovery system provides for periodic backup of master files and edited transactions and keeps track of what procedures need to be rerun from the last backup point to re-create up-to-date master files.
- Reprint options are possible because file updating is separated from report printing functions.

**System/32 Food Distributors
Management Accounting System (cont'd)**

- Selective printing allows the operator to control the printing mode for reports.
- Inquiry programs, with data retrieval options selectable at program run time, provide current information from the customer and item master files.
- Offline 3741 data entry diskette formats.

File Size and Application Function Tailoring Capability: Programs and procedures for file allocation are included. Customers can allocate file space during installation and change file space allocations as business volumes change. They may control the operation of some application functions by file maintenance and by operator controlled run-time options.

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

The 16K option of these IAPs will execute on all models of the IBM System/32. The 24K option will execute on all models of the IBM System/32 except the 16K mdl. There may be a requirement for providing offline keying on an IBM 3740 Data Entry System.

SOFTWARE REQUIREMENTS

The FDMAS IAPs are written in IBM System/32 RPG II programming language.

The 16K and 24K IBM System/32 options are system-executed under control of the IBM System/32 Control Program (5725-SC1 Version 5 and above). IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the system. The RPG II Compiler (5725-RG1) is required if modifications are anticipated.

Instructional Materials**Operator Introduction and Exercises**

These materials, consisting of a *Student Guide*, audio cassettes, and System/32 diskettes, will help the operator learn and practice operations without using the customer data files. One copy will be provided at no charge to the customer.

One copy of the following material is supplied via SLSS when program number and initial library are specified. Additional copies may be obtained by ordering them individually from Mechanicsburg.

Audio Cassettes (2) (SV30-0002) ... System/32 Diskettes (3) (SV30-0003) ... *Student Guide* (SR30-0171) ... *Advisor Guide* (SR30-0169) ... *Runbook* (SR30-0170) ... Binder (SV30-0024)

DOCUMENTATION

(available from Mechanicsburg)

Executive Guide (G580-0120) ... *General Information Manual* (GH30-0156) ... *IAP Specifications* (GH30-0157) ... *Application Reference Manual* (SH30-0158).

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

**SYSTEM/32 DISTRIBUTORS MANAGEMENT
ACCOUNTING SYSTEM (DMAS)**

BILLING ... 5725-D41
ACCOUNTS RECEIVABLE ... 5725-D43
INVENTORY CONTROL ... 5725-D45
SALES ANALYSIS ... 5725-D47

PURPOSE

These modular applications are available for either a 16K or 24K System/32. The application function and data base are exactly the same. Performance improvements in the larger memory size versions for each system come from the reduction of overlays, incorporation of larger blocking factors, and use of dual I/O areas.

When all four applications are installed they constitute an interrelated application set with an integrated data base. They can help users manage their two largest business assets, accounts receivable and inventory, and give them profit performance data on their products, customers, and salesmen. They can also help the user increase operational efficiency and customer service.

The open order file, warehouse sequenced picking lists and automated pricing and discounting methods can help improve order processing speed and accuracy. The inventory control system provides information to the buyer that will help optimize inventory investment through identification of the obsolete, slow moving, and unprofitable items; and help increase inventory turns and service levels. Automatic credit limit checking, variable credit terms, late charges on open item and balance forward accounts, delinquency notices, and aged receivables reports provide tools for reducing bad debt losses and increasing cash flow. Daily, monthly, and on-demand sales reports help monitor the attainment of the distributor's sales objectives.

The Payroll, Accounts Payable, and General Ledger licensed programs of the Distribution Financial Accounting System (DFAS) can co-reside with the DMAS licensed programs.

DESCRIPTION**BILLING (5725-D41)**

A postbilling system with data entry from the System/32 keyboard and/or from diskettes keyed on a 3740 Data Entry System, with editing, invoicing, invoice register, and salesman's recap. Features include:

- Open orders file allows printing of either order acknowledgements or packing lists
- Ship-to address file
- Variable price selection methods
- Variable item discount or markup flexibility
- Variable payment terms and cash discounts
- Broken case pricing with surcharge
- Pricing unit conversion - when inventory unit differs from selling unit
- Container charges automatically applied
- Price list
- Daily backorder slips
- Federal Excise tax calculated
- State sales tax (standard) plus two local sales taxes
- Monthly tax totals report

ACCOUNTS RECEIVABLE (5725-D43)

A combined balance forward and open item method, with data editing, monthly statements, and delinquency notices. Features include:

- Balance forward or open item selectable by account
- Late charges for both open item and balance forward accounts
- Future dating
- Credit limit checked during order edit if Billing is installed
- Monthly statements and delinquency notices
- Aged trial balance monthly or on demand - summary or detail
- Statements by job or branch location
- Aging of customer invoices with three past due periods

INVENTORY CONTROL (5725-D45)

A system which allows management to obtain the information needed for purchasing and profitability analysis, including a perpetual inventory system and a physical inventory system. Features include:

- Stock Status Review - on demand
- Stock Status Report - monthly

- Inventory Analysis Report - on demand
- Basic Unit Cost - average cost method
- Alternate Cost - last cost method
- Multiple Warehouses

SALES ANALYSIS (5725-D47)

Sales profitability figures by salesman, customer, item, and item class. Availability of the information in the following reports is dependent upon the applications selected and their installation sequence.

- Daily sales recap by salesman (data from Billing or Accounts Receivable)
- Monthly salesman sales analysis - current and year-to-date (data from Billing or Accounts Receivable)
- Monthly customer sales analysis - current and year-to-date (data from Billing or Accounts Receivable)
- Monthly salesman/customer sales analysis - current and year-to-date (data from Billing or Accounts Receivable)
- Monthly salesman/customer/item class sales analysis - current and year-to-date (data from Billing)
- Monthly item and item within item class sales analysis - current and year-to-date (data from Billing or Inventory)

If Sales Analysis is the first or only DMAS application installed, the customer must provide Data Entry and Edit Programs.

System functions

- Integrated data base which simplifies file maintenance and provides for more efficient disk utilization.
- User-maintained constants file is used in most programs which allows operator to modify data subject to change, such as late charge rate, tax rates, terms, or aging dates, without the need to change and recompile programs.
- Specific file load and maintenance programs are included for each master file.
- Easy-to-use printed RUNBOOK for each application
- Contains additional space in item and customer master records for customer use.
- OCL procedures, sort specifications, and processing programs are cataloged into logical work units which optimize system utilization.
- Automatic monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed.
- Offline 3741 data entry diskette formats.
- Dynamic backup and recovery system provides for periodic backup of master files and edited transactions and keeps track of what procedures need to be rerun from the last backup point to re-create up-to-date master files.
- Reprint options are possible because file updating is separated from report printing functions.
- Selective printing allows the operator to control the printing mode for reports.
- Inquiry programs provide current information from the customer and item master files.

File Size and Application Function Tailoring Capability: All necessary programs and procedures for file allocation are included with the DMAS programs. The customer can allocate file space during installation and change file space allocations as business volumes change. Also, the customer may control the operation of some application functions by file maintenance and by operator-controlled run-time options.

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

The 16K option will execute on all models of the IBM System/32. The 24K option will execute on all models of the IBM System/32 except the 16K model. There may be a requirement for providing offline keying on an IBM 3740 Data Entry System.

SOFTWARE REQUIREMENTS

System/32 DMAS (cont'd)

The DMAS licensed programs are written in IBM System/32 RPG II programming language.

The 16K and 24K System/32 options are executed under control of the IBM System/32 System Control Program (5725-SC1 Version 5 and above). IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the system. The RPG II Compiler (5725-RG1) is required if modifications to the IAPs are anticipated.

Instructional Materials**Operator Introduction and Exercises**

These materials, consisting of a *Student Guide*, audio cassettes, and System/32 diskettes, will help the operator learn and practice operations without using the customer data files. One copy will be provided at no charge to the customer.

One copy of the following material is supplied via SLSS when program number and initial library are specified. Additional copies may be obtained by ordering them individually from Mechanicsburg.

Audio Cassettes (2) (SV30-0002) ... System/32 Diskettes (3) (SV30-0003) ... *Student Guide* (SR30-0171) ... *Advisor Guide* (SR30-0169) ... *Runbook* (SR30-0170) ... *Binder* (SV30-0024)

A prerequisite to these exercises is the System/32 Operator Training Self-study Course (SR30-0004).

DOCUMENTATION
(available from Mechanicsburg)

Executive Guide (G580-0112) ... *General Information Manual* (GH30-0093) ... *Specifications* (GH30-0095) ... *Application Reference Manual* (SH30-0141)

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**SYSTEM/32 DISTRIBUTION
FINANCIAL ACCOUNTING SYSTEM (DFAS)****GENERAL LEDGER ... 5725-D61
ACCOUNTS PAYABLE ... 5725-D62
PAYROLL ... 5725-D63****PURPOSE**

These three applications provide distributors with a powerful aid in managing their business.

HIGHLIGHTS

- Independent or interrelated application approach:
 - Modular design facilitates sequential application installation
 - Single data entry results in multiple application updates
 - Modular design allows users to choose the applications that address their problem areas
- Wide variety of reports and report options included:
 - Management reporting is a byproduct of normal data entry
 - The 941-As and W-2s are saved on diskette and may be printed later
 - Detail or summary listings within a range of keys is supported in many reports
- Uses recognized accounting techniques and terminology to provide a solid accounting system:
 - Clear audit trails and control techniques are provided
 - Sample user-oriented forms for data preparation, file creation, audit and control are provided
 - Security code deters unauthorized execution of key programs in each application
 - A journal reference numbering system supplies an audit trail for any application that generates transactions into the General Ledger
- The System/32 product may co-reside, but not interact, with the System/32 Distribution IAPs written up elsewhere in this section.
- Can be installed without customer programming capability:
 - System tailoring procedure facilitates account growth by allowing on-site changes to file sizes and determination of functions used
 - File maintenance and audit procedures provided
 - Easy-to-use runbook
 - Operator self-study course is available
 - Step-by-step installation activity plan provided by the *Application Reference Manuals*
 - User's information supplied to the supervisor by the *Application Reference Manuals*

SPECIAL SALES INFORMATION

Each application offers opportunities for growing installed System/32s. Each is primarily intended for the distributor with 20-250 employees.

Key accounting and management reports are provided to allow selling and installing without a requirement for Systems Engineering Services or customer programming capabilities.

Each application is a customer requirements-oriented system, and caution should be used in changing the system design, function, or data base layout. Exercise care in proposing these applications to large distributors. Make an extensive study of the large distributor's needs to determine the applicability, throughput, and the extent of any needed modification to the programs, procedures, or file sizes.

DESCRIPTION

These three applications are independent yet interrelated, ready-to-execute applications for the small distributor:

- General Ledger
- Accounts Payable
- Payroll

The system combines two data entry approaches - Operator-Oriented and Batch-Oriented. Support is provided for transaction entry through the System/32 keyboard or through a diskette keyed offline on a 3740 Data Entry System. The three easy-to-operate applications can be installed in separate stages at different times and still be an interrelated system.

Each application has certain requirements for records within a cross-application Constants File which contains questionnaire responses. These records allow the application to select certain fields for editing, file sizes, and functions to suit each customer's needs. The questionnaire responses are keyed during initial installation and may be changed as needed. The System Tailoring Procedure allows these responses to be entered.

The System Tailoring Procedure utilizes the answers to a series of questions regarding a distributor's requirements. It provides the following:

- Tailoring the application on site at installation time.
- Allows users to change the selection of provided functions as their business changes.
- All provided functions are included in the programs but only required functions are executed.
- File sizes may be expanded or contracted as needed by rerunning the System Tailoring Procedure.

An *Application Reference Manual* Volume 1 provides a step-by-step installation activity plan including sample numbering systems, sample input and maintenance data forms, file loading sequences, and control forms with suggested procedures. Volume 2 of the *Application Reference Manual* provides information on the day-to-day use of the application.

The *Runbook* provides the operator with a detailed and easy-to-use set of instructions showing all the activities necessary to run the programs on a System/32. The Operator Reference Summary Card is provided for the operator as a reminder of the major operational functions of each procedure. It is intended to be used once the operator is thoroughly trained in the particular application.

Instructional material, with exercises, is provided for operator training in the use of the *Runbook*. The course is not application-dependent. Therefore, only one copy of the course is needed per customer no matter how many DFAS applications are installed.

An *Application Logic Manual* is provided, as optional licensed material, for use by the self-sufficient customer and for systems engineering continuing support. It describes the architecture of programs, procedures, data base cross-references, data dictionary, and detailed descriptions of each program.

Applications Description: The three applications are ready-to-execute applications. Each includes samples of all input forms and control forms. Also included are the *Application Reference Manuals*, a *Runbook*, Source Code, Object Code, execution procedures, and the *Application Logic Manual*, if it is ordered as optional basic material.

These are some general features which all three applications have:

- Designed to fit industry requirements
- Security codes to deter unauthorized use of master files
- In-house inclusion/exclusion of functions to be executed
- OCL procedures, Sort specifications, and processing programs are packaged into logical work units which simplify system operation
- Monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed
- Compatible online/offline file maintenance and transaction data entry via the System/32 keyboard or diskettes created on the 3740 Data Entry System
- Dynamic Backup and Recovery System forces periodic backup of master files and edited transactions, and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files
- Reprint options are possible because file updating is separated from report writing functions
- Some report printing can be deferred to a more convenient time
- Selective printing options are available for many report functions

GENERAL LEDGER (5725-D61)

This application combines all the transactions affecting the financial status of the company during the period. They may be entered directly as a General Journal Entry or may have been previously entered through interface with Accounts Payable or Payroll. Support is provided for either a 13-period or 12-month fiscal year. At period-end closing time, audit listings and the Financial Statement Worksheet are provided to help verify that the user is still in balance before proceeding into the actual closing. The reports will also aid in generation of any necessary closing entries.

An Income Statement and Balance Sheet are standard report outputs. The user can design the format of these reports with an easy-to-use format description procedure. The financial reports can illustrate current financial data as compared to historical information, also to budget information on the Income Statement. The capability is provided to format Income Statements by subdivisions of a company, such as department. Several companies' financial information may be combined into one Balance Sheet and Income Statement. A Statement of Changes in Financial Position Worksheet is provided.

Users may define their own Chart of Accounts or use a suggested account structure provided with the application. The fiscal year start period or month is user-defined. Multiple company support for up to ten companies is included. Any transactions passed from Payroll are applied to company number one only.

System/23 DFAS (cont'd)**ACCOUNTS PAYABLE (5725-D62)**

The Accounts Payable application provides an Open Payables and Cash Disbursements function on either an accrual or cash basis. Invoices and credit memos entered may be multi-lined and distributed by General Ledger account number. Entries may be for standard or one-time vendors and may be open or pre-paid. Credit memos may be entered manually or initiated automatically by referencing a prior entered invoice. Invoice payments may be assigned to a vendor other than the original vendor. Invoices may be controlled through the application based upon a voucher number entered with the invoice.

A Purchase Journal provides the audit trail for cost transactions entering into the General Ledger system and into the Open Payables File. An Open Payables Report is provided in due date or vendor sequence. This turnaround document provides a way to select for payment by date, vendor, or invoice, including partial payments, for Cash Disbursements. Invoices may be entered or placed in hold status to prevent inadvertent payment. A Cash Requirements Report is used to assist in insuring sufficient funds are available and proper invoice selection was made before the checkwriting procedure begins. The Cash Disbursements Journal provides an audit trail for its transactions entering the General Ledger application and acts as the Check Register. Checkwriting and reconciliation are also provided.

A Vendor Analysis Report indicates key business volumes and discounts lost and taken by previous year and current year. An additional analysis report by business volume per vendor is also provided. Multiple company support for up to 10 companies is provided.

PAYROLL (5725-D63)

This hourly/salary/executive payroll provides for regular, overtime, premium, vacation, and sick pay. It may be run weekly, biweekly, semimonthly, monthly. Hours may be entered daily or by pay period. Exception hours provide time and one-half, double-time, double-time and one-half, and triple time capabilities. Rates may be selected from the Employee Master Record or keyed in as an override. Shift differential capabilities are provided for second and third shift. The differential may be defined as a percentage of the rate or cents to be added to the rate.

Vacation/Holiday pay may be part of a regular pay check or on a separate check. A bonus payment is paid on a separate check with a flat percentage of income tax deducted. Sick pay may be fully non-taxable or only liable for income tax. Wages subject to Federal Unemployment Insurance (FUI) and State Unemployment Insurance (SUI) are determined.

The ability to handle taxable or non-taxable adjustments, pay advances, and employer-paid union benefits (taxable and non-taxable) is also provided. Once the gross earnings is calculated, deductions will be taken to reach net pay. In addition to calculating present Federal and FICA taxes, a standard tax algorithm is provided to calculate most present state taxes based upon customer-provided data. Local taxes may also fit the standard tax algorithm provided. The state disability insurance deductions also use a standard algorithm based upon customer-provided data. Miscellaneous deductions may be taken by percent, fixed amount, hourly rate, upper limit, or cyclic within a user-specified frequency. Union deductions may be taken by percent, hourly rate, or fixed amount within a user-specified frequency.

Handwritten paychecks and paychecks never cashed (reversals) are also supported by the application. Once the payroll register and checks are printed, many analysis reports are produced: Labor Distribution, Miscellaneous Deductions, Union Deductions, YTD/QTD Earnings, Workmen's Compensation Worksheet, and Payroll Journal. The presently formatted W-2 and 941A reports are also provided.

The capability is provided to pass transactions to the General Ledger application, if installed. These transactions will be applied towards company one only. Payroll may be on either a cash or accrual basis. If the cash basis is selected, no transactions are passed to the General Ledger.

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 programs is a customer responsibility.

SPECIFIED OPERATING ENVIRONMENT

The three applications are intended to be independent yet interrelated. Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries.

Each application may co-reside, but will not interact, with the Distribution IAPs but may also operate as stand-alone applications.

The Distribution IAP must have a Constants File with a record length of 255 characters. The original shipments of the Food and Paper IAPs for 34K machines had 59-character records. The customers that received

these original shipments will have to update their IAPs to the larger record size before they will co-reside with DFAS.

HARDWARE REQUIREMENTS

Each of these IBM System/32 Industry Application Programs will execute on all models of the IBM System/32. The programs are compiled assuming a 16K system. Because of volumes and time constraints, there may be a requirement for providing offline keying on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-character record features (128-character - #5455 and feature group A - #4004).

SOFTWARE REQUIREMENTS

The application programs for the IBM System/32 are written in IBM System/32 RPG II Programming language and execute under control of the IBM System/32 System Control Programming (5725-SC1 Version 3). The IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the programs. The IBM System/32 RPG II Compiler (5725-RG1) is required if modifications to the source code are necessary.

Instructional Materials

DFAS Operator Instructions (SBOF-3584).

One copy is supplied via SLSS when program number and initial library are specified. Additional copies can be obtained by specifying SBOF-3584 which includes the following:

Binder (SR30-0120) ... *Study Guide* (SR30-0117) ... *Sample Run Book* (SR30-0118) ... *Advisor Guide* (SR30-0119) ... Cassette (SV30-0073) ... Diskette (SV30-0074) ... Plastic Insert (SR30-0166)

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

**SYSTEM/ 32 STUDENT RECORDS (5725-E31),
STUDENT ACCOUNTING (5725-E32),
STUDENT SCHEDULING (5725-E33)**

PURPOSE

Each program offers opportunities for new name and first systems account sales in small school districts. These applications are primarily intended for small school districts, or large secondary schools.

The Student Records IAP, which provides the data base and file maintenance functions, is a prerequisite for either or both of the other packages.

These three applications provide the school with a powerful aid in managing its student record keeping functions.

The system design of these packages incorporates many significant features:

- General - System tailoring to the schools' unique requirements for number of periods in a school day, number of terms (or semesters) in a year, state reporting cycles, etc. All input specifications are described in terms familiar to school administrators and require no detailed knowledge of data processing techniques. Data files are shared among applications.
- Student Records - provides common data base and file maintenance functions for the other applications. Basic record keeping and reporting functions essential for secondary schools are also included.
- Student Accounting - consists of an Attendance Accounting Application and a Mark Reporting Application.
- Student Scheduling - supports both machine scheduling and "arena" scheduling of students to classes. Provides many reports to assist the principal and counselor in the scheduling process.

HIGHLIGHTS

- Interrelated applications approach:
 - Modular design allows users to choose applications that address their problem areas
 - Modular design facilitates sequential application installation
 - Single data entry results in multiple application updates
- Wide variety of reports and report options included:
 - Management reporting is a byproduct of normal data entry
 - Optional sequences and selection within a range is supported in many reports
- Uses recognized accounting techniques and terminology to provide a solid student accounting system:
 - Clear audit trails and control techniques are provided
 - Sample user-oriented forms for data preparation, file creation, audit and control are provided
 - Security codes deter unauthorized execution of key programs in each application
- Can be installed without customer programming capability:
 - Designed to fit industry requirements
 - System tailoring procedure facilitates account growth by allowing on-site changes to file sizes and determination of functions used
 - File maintenance and auditability provided
 - Easy-to-use runbook
 - Operator self-study course
 - Step-by-step installation activity plan and detailed user information provided by the *Application Reference Manual*

DESCRIPTION

These three applications are an interrelated and ready-to-execute set of applications for the small school district or large secondary school:

- Student Records
 - Data Base and Maintenance
- Student Accounting
 - Attendance Accounting and Mark Reporting
- Student Scheduling
 - Assignment of Students to Classes

The system combines two data entry approaches - operator-oriented and batch-oriented. Support is provided for transaction entry through the System/32 keyboard or through a diskette keyed offline on a 3740 Data Entry System. Student Records is a prerequisite to the other applications which can be installed at different times.

Each application has certain requirements records within a cross-application Constants File which contain questionnaire responses. These records allow the application to select certain fields for editing, file sizes, and functions to suit each customer's needs. The questionnaire responses are keyed during initial installation and may be changed

as needed. The System Tailoring Procedure allows these responses to be entered and maintained.

The System Tailoring Procedure utilizes the answers to a series of questions regarding a school's requirements. It provides the following:

- Tailoring of the application at installation time.
- Allows users to change the selection of provided functions as the environment changes.
- All provided functions are included in the programs but only required functions are executed.
- Files may be resized as needed by rerunning the System Tailoring Procedure.

Application Reference Manual Volume 1 provides a step-by-step installation activity plan including sample input and maintenance data forms and file loading sequences. *Application Reference Manual* Volume 1 is delivered with the Student Records application. It contains information pertinent to all three applications. Each Volume 2 of the *Application Reference Manual* provides information on the day-to-day use of the application.

The *Runbook* provides the operator with a detailed and easy-to-use set of instructions showing all the activities necessary to run the programs on a System/32. The *Procedure Reference Summary* is provided for the operator as a reminder of the major operational functions of each procedure. It is intended to be used as a quick reference once the operator is thoroughly trained in the particular application.

Instructional material with exercises is provided for System/32 operator training in the use of the *Runbook*. The course is not application dependent. Therefore, only one copy of the course is needed per customer no matter which of the student applications is installed.

An *Application Logic Manual* is provided, as optional licensed material, for use by the self-sufficient customer and for systems engineering continuing support. It describes the architecture of programs, procedures, data base cross-references, data dictionary, and detailed descriptions of each program.

Applications Description: The three applications are ready-to-execute. Each includes source code, object code, execution procedures, and the *Application Logic Manual*, if it is ordered as optional basic material.

These are some general features which all three applications have:

- Designed to fit industry requirements
- Security codes to deter unauthorized use of master files
- In-house inclusion/exclusion of functions to be executed
- OCL procedures, Sort specifications, and processing programs are packaged into logical work units which simplify system operation
- Monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed
- Compatible online/offline file maintenance and transaction data entry via the System/32 keyboard or diskettes created on a 3740 Data Entry System
- Dynamic Backup and Recovery System forces periodic backup of master files and edited transactions and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files
- Reprint options are possible because file updating is separated from report writing
- Selective printing options are available for many reports

STUDENT RECORDS (5725-E31)

The Student Records area represents a systems solution to the problems of recording, retrieving, manipulating, and reporting student data. The student record is the key to the school's student accounting system. It is a vital source of information necessary to the implementation of the other applications. In addition to providing data to and collecting data from the scheduling, mark reporting, and attendance accounting applications, it contains student personal data for counseling. This data includes the student's name, school code, year of graduation, current grade level, sex, birth date, address, and a number of other data elements. It also contains student attendance information, the student's current schedule and mark reporting information, and the school's curriculum for the current school year. From these files, many reports can be provided for the school administration, teacher, counselors and parents.

As the Student Records system is designed to be an ongoing system, it is not necessary to recreate all of the basic files at the beginning of each school year. Programs are provided to accomplish a year-to-year

Student Records, Accounting, Scheduling (cont'd)

transition by indicating the promotion of qualified students to the next grade level, and their new school, if that is indicated at promotion time. An important aspect of the student records application is the file maintenance functions. Programs are provided to update information in each of the files in the student records application as well as performing the year-end transition functions (student transfers between schools, promotions of students from one grade level to the next, etc.).

The integrity of the data in the files is maintained through the use of extensive editing of the data when it is entered into the system and through complete backup and recovery procedures which are an integral part of the package.

Output reports include:

- Student Listings
- Name and Address Labels
- Ethnic Distribution Report
- Student Profiles
- Student Schedules
- Room Schedules
- Instructor Schedules
- Class Rosters

STUDENT ACCOUNTING (5725-E32)

The Student Accounting package consists of two applications, Attendance Accounting and Mark Reporting. The Student Records package, which provides the data base and file maintenance functions, is a prerequisite to this package.

A. Attendance Application

The maintenance of attendance records is an important aspect of Student Accounting. In many states the amount of state aid for public education is based on average student attendance. Under manual methods, a considerable amount of time is expended by teachers and staff personnel in keeping records and accumulating data for state reports. The Attendance Accounting application simplifies such tasks by collecting original data at the source through the use of attendance data gathering documents, enabling reports to be prepared accurately and rapidly, and reducing clerical transcriptions.

Output reports include:

- Daily Absence Phone List
- Daily Absence Report
- Unresolved Absence Report
- Student Attendance Register
- Student Category Register
- School Category Register

B. Mark Reporting Application

The Mark Reporting application provides a means of recording student progress data for reports to parents and to school personnel. The prime data processed by this application are the student marks, which may be either numeric marks or alphabetic marks with optional plus or minus signs. In addition, up to two comments may be selected from a list of 99 user-defined comments and associated with each student's graded course. The Mark Reporting application is designed to fit the needs of many schools by providing a selection of reports and processing methods from which to choose. Output reports include:

- Report Card
- Labels for Permanent Records
- GPA Listings
- Mark Analysis
- Exception Reports

STUDENT SCHEDULING (5725-E33)

The Student Scheduling package (Student Records (5725-E31) is a prerequisite) processes student course requests against a manually prepared master schedule of classes to produce a schedule of classes for each student. To assist the school administrator in preparing this master schedule of classes, the following reports are produced from the student course requests: Student Verification Report, Course Verification Report, Course Request Tally Report, and Potential Conflict Matrix.

Once the master schedule of classes has been prepared, student requests are processed by the Main Scheduler programs, or schools may wish to use the arena scheduling option. Whether the class assignments are accomplished through machine scheduling or arena scheduling, the results are the same: A data base reflecting each

student's class assignments. For those students who could not be completely scheduled because of a conflict in their course requests, a Student Conflict report can be printed to assist the school administrator in resolving that student's conflict. Once a final scheduling run has been processed, the school may optionally run the study hall scheduler which will assign the student to study halls during any unassigned time in the school day.

Output reports include:

- Student Request Verification
- Course Request Verification
- Course Request Tally Report
- Potential Conflict Matrix
- Student Conflict Report
- Student Schedules

Programs are provided to pass basic student identifying information from the Student Records package to the Scheduling package and then, once scheduling is completed and the scheduled term is about to begin, the student data records will be updated to reflect the student's current schedule of classes. One of the primary objectives of the Student Scheduling package is to provide for the variety of scheduling philosophies present in today's secondary school environment. This flexibility is accomplished by offering a number of basic scheduling features and options which include:

- Scheduling of up to 4 terms, or semesters
- Up to 24 periods in a school day
- Up to 20 requests per student
- Flexibility in course requests - section requests, instructor requests, term requests, free time requests, and alternates
- Add-on scheduling
- Study hall scheduling option
- Arena scheduling option

Student scheduling is far more than a clerical chore. The basic educational philosophy of an institution is reflected in the manner in which students are assigned to a class section. For example, many school systems permit varying degrees of student-elected alternates and teacher preferences. This example illustrates the need for flexibility in a student scheduling system to accommodate a wide spectrum of educational policies. The student scheduling package provides the administrator with a large variety of optional system features which can be used to tailor the scheduling system to coincide with the policies of the school.

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

The minimum system configuration requirements are an IBM System/32 with:

- 24K bytes of main storage
- 5.0 MB of disk storage
- Character or line print capability with 132 print positions and the 48-character set.

The IAPs are designed to process data recorded on the IBM System/32 keyboard, or data from a diskette recorded by the IBM 3740 Data Entry System. Because of volumes and time constraints, there may be a requirement for providing offline key entry on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-character record features (#5455) and Feature Group A (#4004).

The three applications are interrelated. Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries. Because of this, no other IAP or user-written programs may co-reside unless stringent coding requirements for these programs are met to insure compatibility with the Student Administration System. The *Application Logic Manual* discusses in detail the coding conventions used for the development of the Student Administration System.

Because of the printing volumes and timing constraints involved in the Mark Reporting applications, an 80 cps printer is recommended as a practical minimum.



PROGRAM PRODUCTS

Student Records, Accounting, Scheduling (cont'd)

SOFTWARE REQUIREMENTS

The application programs are written in IBM System/32 RPG II Programming language and execute under control of the IBM System/32 System Control Programming (5725-SC1) Version 5. The IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the programs. The IBM System/32 RPG II Compiler (5725-RG1) is required if modifications to the source code are necessary.

DOCUMENTATION

(available from Mechanicsburg)

Student Records Runbook (SB30-0127) ... Student Records Reference Manual Volume 1 (SB30-0128) ... Student Records Reference Manual Volume 2 (SB30-0129) ... Student Accounting Runbook (SB30-0131) ... Student Accounting Reference Manual (SB30-0132) ... Student Scheduling Runbook (SB30-0134) ... Student Scheduling Reference Manual (SB30-0135) ... Student Records Logic Manual (LB30-0130) ... Student Accounting Logic Manual (LB30-0133) ... Student Scheduling Logic Manual (LB30-0136)

TERMS and CONDITIONS: See PP Index

**SYSTEM/32 FORTRAN IV
5725-FO1****PURPOSE**

System/32 FORTRAN IV processes programs written in the System/32 FORTRAN IV language, producing output suitable for execution with the System/32 System Control Programming (5725-SC1).

DESCRIPTION

The System/32 FORTRAN IV language contains those features defined in American National Standard Basic FORTRAN, X3.10.1966; language extensions supported by IBM 1130 Basic FORTRAN; and additional features and capabilities previously available only with certain IBM Full FORTRAN compilers. These features include:

- Logical data, logical expressions, and logical IF are supported.
 - Logical elements (that is, constants, variables, and arrays) contain true or false values.
 - Operation symbols are used in logical and relational expressions
- | | |
|---------------------|----------------------------|
| .NOT. (negative) | .LT. (less than) |
| .AND. (conjunction) | .LE. (less or equal to) |
| .OR. (union) | .EQ. (equal) |
| | .GT. (greater than) |
| | .NE. (notequal) |
| | .GE. (greater or equal to) |
- Logical expressions evaluate elements to obtain true or false values.
 - Logical assignment statements define a relationship - placing the value of a logical expression in a variable or array element.
 - The logical IF statement evaluates an expression and executes or skips an associated statement, depending upon whether the value of the expression is true or false, respectively.
 - Logical variables and arrays can be initialized to true or false using the DATA statements.
 - Logical elements can be used as arguments of a CALL statement.
- Integer 2-byte constants are provided to facilitate IBM 1130 to System/32 FORTRAN IV conversion.
 - Source Entry Utility [Utilities licensed program (5725-UT1)], although not a part of the FORTRAN licensed program, may be used to enter and maintain FORTRAN source programs.
 - IBM FORTRAN IV language extensions INVOKE, PROGRAM and GLOBAL allow FORTRAN main programs to be loaded successfully into main storage and executed, while permitting these programs to share a common data area. These language extensions provide function equivalent to 1130 FORTRAN CALL LINK.
 - The Overlay Linkage Editor will automatically create overlays which reduces the amount of storage required to run System/32 FORTRAN IV programs but may increase the execution time.
 - The DEBUG facility enables the user to locate errors in a FORTRAN source program. By use of four basic statements, the DEBUG facility provides for tracing flow within a program and between programs and for checking the validity of subscripts.
 - List directed input/output permits reading and writing of formatted data without a FORMAT statement.
 - The GENERIC statement enables the user to specify a single name for a FORTRAN built-in or library function having several names. Depending on argument type, the correct function is selected by the compiler with each appearance of the name.

The System/32 FORTRAN IV library contains mathematical and service subprograms required during execution to perform arithmetic operations, input and output constant conversions and input/output control.

System/32 FORTRAN IV is supplemented by a commercial subroutine package which is equivalent in function to the 1130 Commercial Subroutine Package insofar as is meaningful in terms of System/32 devices and data management.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

FORTRAN IV compiler and its generated programs will execute on any model of IBM System/32. Object programs will support Additional Support (#1005) and Data Recorder Attachment (#3200). Control Storage Increment (#1500) is required on the IBM 5320 for execution of object programs. It is not required for compilation. On IBM 5320 B and C models, FORTRAN graphics are provided by a 64-character EBCDIC print belt or a 48-character FORTRAN print belt.

SOFTWARE REQUIREMENTS

A current version of IBM System/32 System Control Programming (5725-SC1) is required to execute the FORTRAN IV compiler and its generated programs.

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**SYSTEM/32 FINANCIAL INSTITUTIONS
CUSTOMER ACCOUNTING SYSTEM**

**CUSTOMER INFORMATION FILE ... 5725-F11
DEMAND DEPOSIT ACCOUNTING ... 5725-F12
SAVINGS ACCOUNTING ... 5725-F13
INSTALLMENT LOAN ACCOUNTING ... 5725-F14**

PURPOSE

The Customer Information File IAP (CIF) includes the data base, the application conversion procedures, and the file maintenance procedures for the system. It is a prerequisite for the Demand Deposit Accounting, Savings Accounting and Installment Loan Accounting IAPs, which may be installed independently of each other.

The applications provide broad application support for the small commercial bank. The Customer Information File IAP enables the bank to associate all of a customer's checking, savings, and installment loan accounts with a single record that contains common information about the customer and the customer's relationship to the bank. This enables the bank to make decisions based on a broader knowledge of the status of the customer's accounts. Account and customer information is accessed by account number for daily transaction processing, and by customer name for management reports, inquiries, etc. The Demand Deposit Accounting, Savings Accounting and Installment Loan Accounting IAPs support the three most important data processing applications in a commercial bank. Each of these IAPs contains a variety of functional options, enabling the bank to tailor the application to its own requirements.

These applications offer an opportunity for new name and first system account sales to small commercial banks. While the applications are primarily intended for commercial banks with deposits of \$5 to 25 million, the size of the bank deposits is not by itself an accurate indicator of proper IAP fit at any given bank.

HIGHLIGHTS

- Can be Installed without Customer Programming Capability:
 - Step-by-step installation activity plan and detailed user guidance is provided in the *Application Reference Manual*
 - System Tailoring Procedure accommodates account growth by allowing on-site changes to file sizes and functions used.
 - Application conversion procedures are provided.
 - Conversion aids are provided to assist in consolidating the master data from a customer's account records into a single CIF record.
 - Strict DP controls are enforced during conversion.
 - File maintenance is provided.
 - Operator self-study course is provided.
- Accounting and Control Techniques
 - Two levels of security codes help deter unauthorized access to programs and data.
 - Sample audit trail and control techniques are documented.
 - Sample user-oriented forms for data preparation, file creation, audit and control are provided.
- Interrelated Application Design
 - Data base design reduces file space requirements.
 - Common procedures add new accounts and provide file maintenance for all installed applications.
 - Access to all application accounts through the CIF Master Record.

DESCRIPTION

These four applications are an interrelated and ready-to-execute set of applications for the small commercial bank:

- Customer Information File
 - Data Base, File Maintenance, Application Conversion and Customer-oriented reports.
- Demand Deposit Accounting
 - Processing of checking accounts with optional functions of Overdraft Banking, Automatic Funds Transfer, and Combined Statements.
- Savings Accounting
 - Processing of savings accounts, both regular savings accounts and time deposit open accounts.
- Installment Loan Accounting
 - Processing of installment loan accounts, including simple interest, add-on, and discount loans.

The system provides transaction and file maintenance data entry through the System/32 keyboard or through a diskette keyed offline on a 3740 Data Entry System. The bank may optionally elect to use the 1255 Magnetic Character Reader (MICR) to capture transactions for Demand Deposit Accounting, Savings Accounting, and Installment Loan Accounting. An installation questionnaire and data capture programs are provided to support the 1255 MICR.

At installation time the options provided in the systems are selected through a System Tailoring Procedure which allows the user to:

- Tailor the application to use only the functions wanted.
- Change selection of functions to be executed as the environment changes.
- Resize files as the bank's business expands, or if the bank wishes to revise its original estimates.

There is only one *Application Reference Manual, Volume 1*, provided with the System/32 Financial Institutions Customer Accounting System. It is shipped with CIF and provides instructions for installing and converting all of the Financial Institutions Customer Accounting System IAPs. It contains guidance on installation planning, data gathering, and the use of the installation and conversion procedures. Samples of all required input data and control forms are included. A separate Volume 2 of the *Application Reference Manual* is provided for each of the four IAPs. These manuals contain information on the daily operations of the application. Included is information on procedure scheduling, the operating of each procedure and the implementation of sound operational controls.

A runbook and a procedure reference summary is provided for each application. The *Runbook* provides the operator with an easy-to-use set of instructions showing all the activities necessary to run the procedures on a System/32. The *Procedure Reference Summary* is provided for the operator as a reminder of the functions and use of each procedure. It is intended to be used as a quick reference once the operator is thoroughly trained in the particular application.

An *Operator Instruction Manual* with exercises is provided for operator training in the use of the runbook. The course is not oriented specifically to financial applications. Therefore, only one copy of the course is needed per customer regardless of which of the IAPs are installed.

An *Application Logic Manual* is provided for each application as licensed material. It is mainly useful for the self-sufficient customer and for systems engineering support. The manual describes the architecture of the Financial Institutions Customer Accounting System, and the logic of the programs and procedures. Data base cross references and a data dictionary are also included.

The four applications are ready-to-execute. Each includes the source code, object code, execution procedures and the *Application Logic Manual*. Some general features common to all four applications are:

- Two levels of security codes help deter unauthorized access to programs and data.
- Customer tailors application processing by including or excluding functions to be executed.
- OCL procedures, Sort specifications, and processing programs are packaged into logical work units which simplify system operation.
- Monitoring of execution sequence prevents execution of a program until the required preceding programs have been successfully executed.
- File maintenance and monetary transactions may be entered via the System/32 keyboard or diskettes created on a 3740 Data Entry System.
- Monetary transactions may be entered via the 1255 Magnetic Character Reader.
- A single set of CIF procedures enters and edits application conversion data for all IAPs and creates the master files.
- A single set of CIF procedures establishes new accounts and performs master file maintenance for all IAPs.
- The Backup and Recovery design forces periodic backup of master files and transactions. This provides for tracking of what procedures need to be rerun in recovery to re-create the master files. Three generations of backup diskettes can be maintained, each containing a complete set of master files and transactions.
- Reprint options permit printing multiple copies of reports.

CUSTOMER INFORMATION FILE (5725-F11)

The Customer Information File IAP supports three general functions of the System/32 Financial Institutions Customer Accounting System:

- Application Conversion
- Master File Maintenance
- Cross-Application Reports

Customer Information File is a prerequisite for Demand Deposit Accounting, Savings Accounting, and Installment Loan Accounting, and is installed in conjunction with the installation and conversion of each of those IAPs. The conversion process creates a CIF Master File, (which contains customer-related data for each of the bank's customers) and separate Account Master Files for DDA, Savings, and Installment

System/32 Financial Institutions Customer Accounting System (cont'd)

Loans. The Account Master Files contain account-related data for each account in the three applications. The system maintains linkage from each customer's Customer Information File record to the account master record for each account - checking, savings, and installment loan accounts. In addition a cross-reference file provides an access path from each account master record to all of the customers associated with the account, based on the account number.

HIGHLIGHTS

Application Conversion: Separate programs are provided to enter and edit the customer and account data and to build the data base during application conversion. A two-phase conversion procedure is established for each application. During the first phase the data that is less subject to change (such as customer name and address, account type, etc.) is entered. The master data from each customer's account records is consolidated into a single Customer Information File record. A unique access key is developed for each customer and all master records are created. At this stage the records can be maintained, but monetary transactions cannot be processed. This phase may take place over several weeks or months.

During the second phase the remaining data, such as account balances are entered, edited and loaded into the master records created in the first phase. The records are placed in active status and the application is ready for daily processing.

Strict batch controls are implemented for both phases of conversion. The controls will not permit either phase to proceed if edit errors exist in any records or if the monetary controls do not balance.

File Maintenance: All maintenance of inter-application master files is performed by Customer Information File programs. A single operator procedure is provided to add new customers or new accounts to any converted application. Another procedure is used to change the data in these master files - including status, etc. Monetary data can only be changed through application transaction processing. A separate procedure is provided to change the operator and supervisor security codes.

Cross-Application Reports: A basic set of cross-application reports is provided. The advanced customer may wish to extend the use of the Customer Information File data base through additional user-written report programs. (If these programs are to co-reside with the Financial Institutions Customer Accounting System IAPs, they must, however, meet stringent coding requirements to insure complete compatibility.)

The following items are provided:

- A Customer Services Report, summarizing the number of customers using installed applications or combinations of applications.
- Mailing labels, to assist the bank in selective marketing of its services, may be printed according to customer selection criteria established by the execution of the Customer Services Report.
- A Customer Profile showing information for an individual customer, and the account status.
- A customer inquiry, display on the console CRT, and containing a subset of the information printed for a Customer Profile. Inquiry may be by full or partial customer name, customer key, or an account number.
- A Spread Report showing the distribution of accounts and the total deposits for up to five user-supplied ranges of DDA and Savings account balances.
- A Master File List, in customer key sequence, to assist in the maintenance of customer and account data.

DEMAND DEPOSIT ACCOUNTING (5725-F12)

The Demand Deposit Accounting (DDA) IAP provides daily transaction processing and reporting for checking accounts for a commercial bank. The IAP includes broad support for the standard processing functions and for two major optional functions - Overdraft Banking and Automatic Funds Transfer (AFT).

The Customer Information File (5725-F11), which provides the data base and file maintenance functions, is a prerequisite for this IAP.

Standard DDA Functions: Transactions can be entered from the operator console, a diskette created on a 3740 Data Entry System, or a 1255 Magnetic Character Reader.

Transactions can be posted against the current, available or collected balance in the account. The bank must select one of these options at installation time to apply to all DDA accounts.

Either one or two classes of float may be used for deposits to calculate the collected balance for accounts. The bank specifies the number of days it requires to collect each class.

The bank must assign one of the supported service charge options to each DDA account. In addition, if the Savings Accounting Application (5725-F13) is installed, the service charge may be waived based on

either a minimum or average balance maintained in the customer's savings account. The supported service charge options are:

- Free Checking
 - No service charge.
- Single Plan
 - A fixed monthly service charge.
- Special or Thrift
 - A fixed monthly charge plus an extra charge for each item designated by the bank as "service chargeable".
- Minimum Balance and Charge Per Item
 - The same as the Special or Thrift Option except that provision is made for a charge for each item in a deposit; and the service charge is zero if a bank-specified minimum or average current balance is maintained in the account during the statement period.
- Three-Two-One
 - The service charge for the account will be one of three fixed monthly charges, or will be zero, depending on the relationship of the minimum current balance for the period to three ascending balance levels designated by the bank. The account will be charged amount 1 if the minimum current balance is below level 1, amount 2 if it is between level 1 and level 2, amount 3 if it is between level 2 and level 3, and no charge if it is above level 3.
- Volume Earnings
 - The service charge is determined by calculating the cost of servicing the account, subtracting from this amount a credit for the amount the bank earned on the average collected balance, and charging the account the difference. The bank may include a fixed monthly cost, a cost per service-chargeable item, and a cost per item deposited in the cost computation. The earnings credit is a specified percentage of the average collected balance for the statement period. If the earnings credit exceeds the cost, the service charge is zero

Stop payment actions may be ordered against a check, based on check amount or serial number. In addition a "stop all" action may be initiated to prevent the posting of any checks to the account.

A hold for a specific amount may be specified against an account, or the account may be frozen - in which case all transactions against it are rejected.

The bank may specify a short list factor which applies to all accounts. When the daily number of checks for an account reaches the specified level, the checks are added together to form a single item for account posting and statement printing. A list of the checks that were combined to produce this single item is printed for filing in the customer's account folder. The short list factor may be overridden to always short list or never short list an account regardless of the number of checks.

The bank must select one of two procedures for determining how to handle an account when there are not sufficient funds to post all checks that are presented. They may choose to, (1) post each item individually until the balance is insufficient and then reject those items that cannot be posted; or, (2) add all checks together and either post them or reject them.

Overdraft Banking: The overdraft banking function may be invoked for any specific account. If a check would normally cause the posting balance to fall below zero, a loan sufficient to cover the check is automatically advanced. Loans are always advanced in user-defined increments, with a credit limit specified for each account. The loan balance is maintained separate from the checking account balance, and deposits do not reduce the loan balance. Finance charges are accrued daily and added to the loan balance when the monthly statement is printed. A user-defined minimum payment is also calculated at statement time and automatically deducted from the DDA account balance. The overdraft banking format of the standard statement shows the running balance of the overdraft loan, its associated transactions, and the loan status.

Automatic Funds Transfer (AFT): The AFT function provides periodic transfers of funds from a checking account to another account - such as a savings or installment loan account. If the Savings Accounting IAP (5725-F13), or the Installment Loan Accounting IAP (5725-F14) is installed, the deposit or payment is automatically credited. If the credit is to some other account, it is listed on a report and must be credited offline. The account holder may designate a frequency of weekly, biweekly, monthly or quarterly for the transfer. A number of transfers may be established against a single account.

Customer-Oriented Reports: These reports are all produced on pre-printed forms. The sample forms shown in the documentation may be ordered from the Systems Supplies Division.

**System/32 Financial Institutions
Customer Accounting System (cont'd)**

Account statements are printed monthly. One of the five service charge options, or free checking, must be assigned to each account. The bank may offer each customer either the standard statement or a "combined" statement. The combined statement includes the balances of selected customer savings and installment loan accounts, if they exist on an installed Savings Accounting IAP, (5725-F13) or Installment Loan Accounting IAP (5725-F14).

The NSF Notice is a combination form which is used to notify the customer either of checks drawn on insufficient funds, or of an overdraft loan advance.

Auditor Confirmation Notices are generated on request, based on a multiple start point systematic sample technique. The random start points are selected by the auditor.

Internal Reports: The reports produced for use within the bank include:

- Transaction entry and edit reports
- Trial balance and Activity Journal
- Unposted Items Report
- Service Charge Journal
- Overdrawn and Drawing Against Uncollected Funds Report
- Significant Balance Change Report
- Inactive and Dormant Accounts List
- Inactive and Dormant Accounts Activity Report
- Account Status Change Report
- Stopped Items List
- Closed and Zero Balance Accounts List
- Short Lists
- Overdraft Banking Trial Balance Report
- AFT Debits List and AFT Credits List
- AFT Journal
- Stop/Hold Journal

SAVINGS ACCOUNTING (5725-F13)

The Savings Accounting IAP provides daily transaction processing and reporting for regular savings accounts and time deposit open accounts.

The Customer Information File (5725-F11), which provides the data base and file maintenance functions, is a prerequisite for this IAP.

Standard Functions: Transactions may be entered from the operator console, a diskette created on a 3740 Data Entry System, or a 1255 Magnetic Character Reader. If the Demand Deposit Accounting IAP (5725-F12) is installed, Automatic Funds Transfer (AFT) to savings accounts will be merged by the system into the daily transactions and automatically credited to the designated accounts.

A hold for any amount may be specified against an account, all withdrawals may be stopped, or the account may be frozen - in which case all transactions against it will be rejected.

Up to eight different account plans, based on combinations of the interest calculation techniques, and the compounding and crediting options discussed below, may be offered at one time.

Interest Calculation Techniques: The IAP supports both regular saving deposits and time deposit open accounts. The Low Reference Balance and Day of Deposit to Day of Withdrawal (DOD-DOW) interest calculation techniques may be selected for savings deposit account plans. Time deposit open account plans may be based on either, (1) a requirement that the funds be on deposit for at least one complete calendar quarter, or, (2) a requirement that they be on deposit for at least ninety consecutive calendar days.

For Low Reference Balance accounts, interest is calculated and compounded either quarterly or semi-annually. Grace periods at the beginning of each month and end of the period may be defined, and either the LIFO or FIFO posting option must be selected for each plan.

For all except Low Reference Balance accounts, interest is accrued daily, and the bank may elect to compound interest continuously, daily, quarterly or semi-annually.

The bank may elect to credit interest to the account (add it to the account balance) either quarterly or semiannually.

Customer-Oriented Reports: For both regular savings deposit and time deposit open accounts, the bank may choose to provide pass-books, periodic statements, or may do both. The system records and reports "no-book" transactions against a passbook account.

Interest earned during the preceding year may be reported to the customer each January on 1099 forms.

Auditor Confirmation Notices are generated on request, based on a multiple start point systematic sample technique. The random start points are selected by the auditor.

Internal Reports: The reports produced for internal use within the bank include:

- Transaction entry and edit reports.
- Trial Balance
- Activity Journal
- Unposted Items Report
- Special Activity Report
- Earnings Journal
- Inactive and Dormant Accounts
- Closed Accounts
- No-Book Transactions List
- Transaction History Report
- Accrual Report
- Account Status Change Report
- Stop/Hold Journal

INSTALLMENT LOAN ACCOUNTING (5725-F14)

The Installment Loan Accounting IAP provides daily transaction processing for installment loan accounts for a commercial bank. The IAP includes broad support for the handling of the common interest calculation types, accrual and refund methods, and provides a variety of other features.

The Customer Information File (5725-F11), which provides the data base and file maintenance functions, is a prerequisite for this IAP.

Standard Functions: Transactions may be entered from the operator console, a diskette created on a 3740 Data Entry System, or a 1255 Magnetic Character Reader. If the Demand Deposit Accounting IAP (5725-F12) is installed, AFT payments to installment loan accounts will be merged by the system into the daily transactions and automatically applied to the designated accounts.

For simple interest loans, interest is accrued daily. For precomputed (add-on and discount) loans, interest is accrued monthly on the loan's anniversary day (the day of the month on which payment is scheduled) by either the rule of 78s or straight-line accrual methods or on a cash basis.

Early payoff calculations for precomputed loans use either the rule of 78s or straight-line method. They are performed monthly on, or up to 15 days after, the anniversary day. These calculations are performed monthly for all loans including those on a quarterly payment schedule. A loan paid off prior to the first regular monthly accrual will earn either one full month's interest or interest computed at a daily rate for the number of days outstanding.

Credit life and accident and health insurance are supported. Earnings and collections on each type of insurance are maintained and reported separately. Early payoff calculations include insurance earnings.

Dealers can be associated with a loan and earn a portion of the interest. Dealers will earn by the same schedule and method that the bank earns. Banks earnings and dealers earnings are reported separately on a daily and monthly basis. The bank's recourse to dealer is identified.

The bank may choose to print reminder notices and late notices and to assess late charges for accounts missing a payment. A percentage of the payment may be allowed to fulfill the payment obligation and prevent late charges from being assessed.

Payments may be applied first to either past due amounts or to the current payment, based on a bank-selected option. Late charges are assessed only if the current payment has not been paid. The bank has the option to permit automatic deduction of late charges from a payment. The late charges will only be deducted after the current month's payment obligation is fulfilled, past due amount is satisfied, and full payments are applied to the loan balance. A separate late charge payment is also accepted.

Loan extensions may be granted, thereby deferring payments for some number of months. The bank may require a fee for extensions.

Notices of Interest can be produced on request for all or selected accounts. These notices are also produced automatically at the end of each month for accounts closed during the month.

Payment notices can be printed for simple interest loans, advising customers of payments due.

Auditor confirmation notices are generated on request based on a multiple start point systematic sample technique. The random start points are selected by the auditor.

**System/32 Financial Institutions
Customer Accounting System (cont'd)**

Internal Reports: The reports produced for use within the bank include:

- Transaction entry and Edit reports
- Trial Balance
- Update Totals
- Earnings Update Summary
- Transaction Journal
- Unposted Items Report
- Suspected Closed Report
- Special Activity Report
- Exception Report
- New Loans Report
- Late Charge Assessments Report
- Collection Report
- History Merge
- Monthly Earnings Report
- Dealers Monthly Earnings Report
- Monthly Insurance Company Report
- Closed Loans Report
- Transaction History Report
- Aged Delinquency Report
- Dealers Trial Balance
- Loan Class Report
- Loan Plan Report
- Collateral Insurance Expiration Report

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

Each of these IBM System/32 Industry Application Programs is compiled assuming a 24K (#9041) or 32K (#9141) system and will execute on all models of the IBM System/32 equipped with a minimum of 24K or 32K of memory. Because of volumes and time constraints, there may be a requirement for offline keying on an IBM 3740 Data Entry System and/or transaction entry IBM 1255 Magnetic Character Reader. If an IBM 3741 is to be used, it must have Feature Group A - #4002. If an IBM 3742 is to be used, it must have 128-Character feature - #5455 and Feature Group A - #4004. In addition, the Proof Keyboard feature (#5901 or #5902) is desirable but is not required.

All models of the IBM 1255 Magnetic Character Reader (MCR) that can be attached to the IBM System/32 are supported by these IAPs. The Dash Symbol Transmission feature (#3215) cannot, however, be installed if the customer wishes to use the MICR data capture programs supplied with the IAPs. Consult the appropriate pages for ordering instructions and any restrictions that pertain to attachment of the IBM 1255 MCR to the IBM System/32.

The four applications are closely interrelated. Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries. Because of this, no other IAP or user-written programs may co-reside unless stringent coding requirements for these programs are met to insure compatibility with the Financial Institutions Customer Accounting System. The *Application Logic Manual* discusses in detail the coding conventions used.

SOFTWARE REQUIREMENTS

- IBM System/32 System Control Program (5725-SC1) (Version 6 or above)
- IBM System/32 Utilities Licensed Program (5725-UT1)
- RPG II Compiler (5725-RG1) is required if modifications to the RPG programs are required.

Customer Information File (5725-F11) is a prerequisite for Demand Deposit Accounting (5725-F12), Savings Accounting (5725-F13), and Installment Loan Accounting (5725-F14).

**DOCUMENTATION
(available from Mechanicsburg)**

Customer Information File Runbook (SB30-0137) ... *Customer Information File Reference Manual Volume 1* (SB30-0138) ... *Customer Information File Reference Manual Volume 2* (SB30-0139) ... *Demand Deposit Accounting Runbook* (SB30-0141) ... *Demand Deposit Accounting Reference Manual* (SB30-0142) ... *Savings Accounting Runbook* (SB30-0144) ... *Savings Accounting Reference Manual* (SB30-0145) ... *Installment Loan Accounting Runbook* (SB30-0147) ... *Installment Loan Accounting Reference Manual* (SB30-0148) ... *Customer Information File Logic Manual* (LB30-0140) ... *Demand Deposit Accounting Logic Manual* (LB30-0143) ... *Savings Accounting Logic Manual* (LB30-0146) ... *Installment Loan Accounting Logic Manual* (LB30-0149).

Additional Support Materials

... *Licensed Program Design Objectives*: ... *Installment Loan Accounting* (GH30-0362) ... *Licensed Program Specifications*: ... *Customer Information File* (GH30-0358) ... *Demand Deposit Accounting* (GH30-0359) ... *Savings Accounting* (GH30-0360).

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

**SYSTEM/32 HOSPITAL FINANCIAL
MANAGEMENT SYSTEM (HFMS)**

PATIENT BILLING ... 5725-H11
ACCOUNTS RECEIVABLE ... 5725-H12
PAYROLL ... 5725-H13

GENERAL LEDGER/ACCOUNTS PAYABLE ... 5725-H14

PURPOSE

The Hospital Financial Management System offers the small hospital a disk data-based system comprised of a series of programs and procedures that perform the accounting, management reporting and statistical functions for patient billing, accounts receivable, payroll and general ledger/accounts payable.

Presentation of timely information enables management to observe trends and deviations from the hospital's planned financial position. This enables Hospital Management to quickly spot problems and initiate corrective action. More important, it provides a basis upon which to institute plans to improve the financial position. The accuracy of the accounting information is mandatory because of reporting requirements placed upon the hospital by regulatory agencies.

Completeness of hospital operating information provides the basis for review, analysis, and cause-and-effect relation studies of such things as rate setting, reimbursement analysis, patient mix, and services performed. A comprehensive information base provides the justification for decisions regarding future operations and services.

Four applications are supported in HFMS. They are Patient Billing, Accounts Receivable, Payroll, and General Ledger/Accounts Payable. General Ledger and Accounts Payable are marketed together as one offering. Each of the other applications is a separate offering. Each application may be installed and operated independently or as an integrated system.

A description of the four offerings follows the general highlights of the system.

HMS is designed for the small hospital, in general 50 to 150 beds.

HIGHLIGHTS

- An integrated series of offerings that can be installed in any sequence for stand-alone or integrated operation.
- The HFMS offering consists of:
 - Source Code and Object Code
 - Ready-To-Execute Procedures
 - Predefined File Sizes
 - Installation Guides
 - Operator Runbooks
 - Installation Supervision Self-Study Instructions
 - Operator Self-Study Courses With Machine Exercises
 - Hospital Application-Oriented Specifications for Data Entry and Control Forms
 - Technical Documentation for problem determination
- Simplicity of operation characterized by application-oriented commands, prompting, responses, and messages
- Complete hospital disk data base
- Complete file load and maintenance programs
- Backup/recovery procedures imbedded in the application flow
- Comprehensive data entry editing with errors explained to facilitate correction
- Inquiry facility for Patient Billing and Accounts Receivable
- Optional entry of batch transaction input through diskettes prepared on the 3740 Data Entry System
- Comprehensive accounting controls through a defined audit trail
- User-defined system control file entries for adapting HFMS to customer requirements

DESCRIPTION**PATIENT BILLING (5725-H11)**

The system provides for accurate and timely posting of inpatient and outpatient charges to produce patient bills and provides the basis for the revenue statistics needed for third-party reporting, cost reimbursement, internal rate setting and revenue analysis. The offering has five logical subsystems: Census, posting, billing, and revenue usage, and statistics.

The census subsystem tracks the location of inpatients and processes all outpatient activity. Census reports are produced in various sequences which serve the needs of different users in the hospital. The census reports and the daily recap are used to verify the accuracy of the reported day's activity. The generation of the final census triggers the automatic generation of room charges to the posting subsystem.

The posting subsystem enters all routine and ancillary charges (including room charges from the census subsystem) into the inpatient and outpatient billing files. Charges can be automatically priced by the

system or overridden by keyboard entry. It produces reports necessary to verify the accuracy of the information, automatically prepares the daily revenue entries for General Ledger (5725-H14), and updates the detail revenue file records.

All detail posted charges are saved by the system on an accumulated charges file, which is used by the billing subsystem to prepare detail patient bills. Accounts Receivable (5725-H12) will post payments against accounts not yet final billed into the accumulated charges file.

The billing subsystem uses the information in the inpatient and outpatient billing files and the accumulated charges file to print patient bills. The detail bills for both inpatients and outpatients include a complete chronological detail of charges and a summary of charges at the end of the bill. Inpatients' final detail bills are automatically produced after discharge. Outpatient emergency (one-time visit) detail final bills are automatically produced after the patient visit, while recurring outpatient final detail bills are produced when requested by the hospital. After the detail final bill is produced, the billing file record is deleted. Prior to this deletion, it is transferred to the accounts receivable file if HFMS Accounts Receivable (5725-H12) is installed.

Detail cycle bills can also be requested for any current inpatient account. This bill shows the balance as of the last cycle bill and a detailed summary of current charges. Requesting cycle bills does not alter the processing or format of the detail final bill which will eventually be produced.

Summary bills can be printed on demand (inquiry) for any inpatient or outpatient account not yet final billed. The bill is in summary format containing all charges as of the last posting period.

The revenue usage subsystem is driven by the inpatient and outpatient charges from the posting subsystem. Daily and monthly revenue reports are produced in detail or in summary by departments showing usage of individual services within the current period and year-to-date.

The statistics subsystem maintains and reports patient statistics by medical service and patient category for both inpatients and outpatients, ancillary utilization statistics by department for all inpatients and for five outpatient categories, and departmental revenue by six financial classes.

ACCOUNTS RECEIVABLE (5725-H12)

Managing the Hospital's Accounts Receivable has become an increasingly complex task. Required interaction with patients and many third parties (including private and public insurance companies and various governmental agencies) has created an explosion in clerical tasks. This has resulted in a difficult control problem in the hospital business office. The offering has three logical subsystems to aid in the collection of accounts receivable and in controlling the large volume of data involved. They are daily posting, statement writing, and reporting.

The posting subsystem creates receivable accounts either through keyboard entry or by accepting transferred inpatient and outpatient accounts which have been final billed from the HFMS - Patient Billing offering (5725-H11). The subsystem accepts a full range of transactions such as payments, adjustments, late charges, and bad debt recoveries. If HFMS - Patient Billing (5725-H11) is installed, payments can be accepted against active billing accounts and posted as credit charges. Controls, procedures, edit and audit reports assist the accounts receivable department in making sure transactions are posted to the correct accounts. This automated posting procedure eliminates many clerical tasks and frees business office personnel to concentrate the majority of their time analyzing and pursuing collection of open accounts.

The posting subsystem maintains a separate account for each patient for each hospital visit. However, the ability to assign a guarantor number (family number) is provided. The facility enables the system to group all accounts for one family together for statement writing and accounts receivable reporting. The system has further facilities to handle both active and bad debt accounts with separate controls, to transfer from patient to insurance and from insurance to patient, and to generate entries for the General Ledger (5725-H14).

The Statement Writing Subsystem generates balance-forward statements and includes a number of options that allow the user to operate the system to meet unique requirements. Statements can be written on a weekly, biweekly, or monthly cycle to smooth the business office workload. Statements can be written for all financial classes or only selected financial classes (financial class denotes primary method of payment, such as self-pay, Medicare, Blue Cross, Welfare, etc.). Finance charges can be assessed at the option of the user. Statements can be either family statements or individual account statements.

The Reporting Subsystem provides the user with a flexible information system to be used in handling the unique patient and third-party collection problems encountered in a hospital receivables system. Aged receivables reports can be produced in varying sequences or as various exception reports to help hospital personnel zero-in on specific collection problems or to satisfy specific information needs. The age of accounts can be calculated based on discharge date, date of last

System/32 HFMS (cont'd)

payment, or date insurance was filed. Reports can be produced for all open accounts or selected accounts based on financial class, range of dollar balances, and age since discharge date, last payment date, or date insurance was filed. If patient number is assigned to all accounts, the aging reports can be printed for all accounts for a patient alphabetically by patient name.

A selective Detail Status Report facility is provided in the system for the user to retrieve reports showing all detail transactions for any specific account or group of accounts, based on financial class or patient number.

The system handles the processing for both Active and Bad Debt Accounts. A report showing all accounts that have been transferred to bad debt can be run at any time.

Account Balance Inquiry can be requested at any time to be displayed on the System/32 Display Unit or printed or both. This allows the business office to retrieve the most current information regarding any account when it is required.

The Patient Account record and all Detail Transactions for an account are maintained in the system until a user-specified number of days after the account zero balances or until the account is deleted from the system as an uncollectable bad debt. At the time an account is deleted from the system, a one page report is printed showing all the detailed information for the account. This report is then filed for reference purposes.

PAYROLL (5725-H13)

Within the hospital, personnel represents the most valuable and most expensive resource. While an efficient mechanism for prompt employee payment and bookkeeping is essential, the emphasis today is necessarily on astute management - planning, scheduling, and monitoring - to ensure the most productive use of this valuable and costly resource. This application addresses these needs through four logical subsystems: Payroll Processing, Labor Distribution, Benefits Analysis, and Personnel Reporting.

The biweekly Payroll Processing subsystem calculates hourly and salaried employee earnings, calculates statutory and voluntary deductions, accrues vacation and sick leave, accumulates quarter and year-to-date totals needed for 941-A and W-2 reports, and prints the employee's check. It also provides necessary reports to show a complete audit trail of each payroll run and to perform check reconciliation. The system calculates and deducts tax sheltered annuities, federal withholding taxes, and Federal Insurance Compensation Act (FICA) withholding. Rates are supplied to the programs from a system control file to avoid program recompilation as rates change. The data fields needed to calculate existing state, county, or city withholding taxes are included in the data base and an exit point is provided in the program for the inclusion of a user-written subroutine to calculate these taxes. However, the earnings statement and reports have provisions to print only one non-federal withholding tax.

Vacation and sick-leave hours are accrued based on actual hours worked and a hospital-defined accrual rate that can vary by employee.

The system will handle up to 10 types of voluntary deductions that can vary among employees regarding the frequency and method of calculation. These hospital-defined voluntary deductions are calculated, deducted, and reported each pay period on both a current period and year-to-date basis.

The labor distribution subsystem produces current and year-to-date reports each pay period by using the extended employee time records and budgeted and year-to-date balances from the position control file. These reports show hours and dollars (actual, budget, and variance) categorized by productive and non-productive time. This subsystem produces the departmental expense entries for General Ledger (5725-H14).

The benefits analysis subsystem produces reports for both included and contributory benefits each pay period. Included benefits are generally those that are completely paid by the hospital, such as vacation, sick leave and holidays. Contributory benefits are generally those that are partly paid by the hospital and partly by the employee, such as life insurance and health insurance.

The Included Benefits Report shows vacation and sick leave hours carried over, accrued, taken and remaining for each employee and department. Holidays taken are also noted on this report. The Contributory Benefits Report provides an analysis of the amount paid by the hospital for life and health insurance on a total cost basis and cost per hours basis for each employee, position classification, and department.

The personnel reporting subsystem provides reports to assist the personnel department in effectively using the people resource of the hospital.

An up-to-date Employee Status Report for each employee in the hospital is produced by the system whenever a change is made on an employee's record. All additions, changes, or deletions of employee information are thoroughly edited by the system and printed on Maintenance Reports. An Employee Personnel Profile is produced for

employee verification of pertinent data. It serves as a turnaround document for entering changes into the system.

Employee listings by name and number are printed for reference purposes. An Annual Employee Benefits Report is produced for each employee showing total earnings, included benefits, and contributory benefits. The Turnover Report provides an analysis of employee terminations by department showing the reason for each termination. Union Listings by employee within union can be produced when required.

GENERAL LEDGER/ACCOUNTS PAYABLE (5725-H14)

In order to provide increased patient care, hospitals must work from a sound financial base. In order to develop that base, the hospital executive must have detailed hospital operating information that is accurate, timely, and complete. The hospital must establish a plan, and since they are controlled to cost-dependent prices, they must work within that plan. The general ledger application provides the information that is key to more effective management through three logical subsystems: Daily processing, accounting period-end updating, and accounting period-end financial reporting.

The daily processing subsystem produces a journal of the day's valid transactions and adds them to the accumulated transaction file. Transaction validity is established through the use of the batch proof report. All transactions can be entered as miscellaneous journal entries. However, other offerings of the Hospital Financial Management System automatically provide journal entries from Patient Billing (5725-H11), Accounts Receivable (5725-H12), Payroll (5725-H13), and General Ledger/Accounts Payable (5725-H14) which will substantially reduce keying time. All transactions from whatever source are thoroughly edited by the system.

The accounting period-end updating subsystem provides the detail and summary trial balances. They are produced at the close of each accounting period. The system is designed to handle either 12 or 13 accounting periods per fiscal year. The trial balances can be run as many times as necessary to insure that all closing and correcting entries for that accounting period have been processed and the ledger is in balance. The system then updates the General Ledger Accounts file by extracting all entries for the accounting period (from the Accumulated Transaction File and summing these entries with the balance as the end of the last accounting period) to obtain the new year-to-date balance of each account in the General Ledger Accounts File. The updated General Ledger Accounts File is then used to produce the Financial and Management reports by the accounting period-end reporting subsystem.

Comparative schedules of Patient Revenue, Miscellaneous Revenue, Deductions from Revenue, and Expenses are produced showing variances on a current month and year-to-date basis for either this year versus last year or this year versus budget or both.

The format of the Balance Sheet, Income Statement, Pre-Cost Allocation Schedule, Per Diem Revenue Report, and Per Diem Expense Report can be tailored to the user's requirements through the use of the Report Description Master file. This file contains a record for each physical line that appears on each of the reports. By adding, changing or deleting records in this file, characteristics of the reports such as the number of lines, levels of total, and line and total descriptions, can be changed to meet the needs of the user. This feature, along with the ability to define the chart of accounts desired, provides a flexible financial information system that can be defined by the user to produce financial reports for assistance in creating and maintaining financial stability for the hospital.

Accounts Payable: Inflation has caused a rapid increase in the cost of supplies in all departments of the hospital. An accurate, efficient Accounts Payable system has become a requirement. It is one of the basic tools needed by hospital management to assist in reducing and controlling the cost of providing health care because most of the hospital's supplies expense originates through Accounts Payable. Approved vendor invoices must be accurately recorded, efficiently analyzed, and accurately distributed to affected cost centers.

The key element of expense control can only be obtained if the proper departments are given the information they need. For example, the purchasing agent requires information regarding standard vendor terms and volume of the business. The financial officer needs timely information regarding open Accounts Payable to analyze cash requirements. Available cash must be used effectively to take advantage of all discounts through prompt payment. The business office needs an efficient method of recording items, reporting to management, and accurately distributing supplies expense to appropriate cost centers.

The Accounts Payable application meets these objectives and satisfies these needs through four logical subsystems: Transaction entry, check writing, expense distribution, and reporting.

The transaction entry subsystem performs an extensive edit on all approved invoices and credit memos. The required information is keyed into the system and a Proof Report is printed to balance to controls. Any errors are corrected prior to further processing. These transactions

System/32 HFMS (cont'd)

are accumulated with any prior unpaid items and a Cash Requirements Report is printed to provide a current listing of all unpaid items listed by invoice within vendor. The items to be paid are noted on the Cash Requirements report and control totals are developed. Items to be paid can be selected in either of two ways: All invoices for a vendor or only certain invoices within a vendor can be selected. The computer operator uses this report to enter a notification of items to be paid into the system. A Payment Journal is printed by the system showing all transactions selected to be paid. This report is used to balance to the control totals and any keying errors are corrected prior to the writing of checks.

Further flexibility is provided by the system because a check for any items may be typed at any time and entered into the system with a different code to designate a demand check. The transactions for these demand checks flow through to the expense distribution, but no computer checks are prepared. This facility provides the hospital maximum flexibility for taking advantage of discounts and creating of special checks such as travel advances.

The check writing subsystem produces the Check Registers, Checks, and Remittance Advices for those items checked on the cash requirements report. The system allows for multiple check-writing runs during the month which, in conjunction with the ability to handle demand checks, provides the flexibility needed to control the payment of outstanding accounts payable items. Check reconciliation reports are included to allow the user to control the reconciling of checks and produce an Aged Outstanding Check Register.

Once each accounting period, the Accumulated Transaction file is sorted by General Ledger number and the expense distribution subsystem is run. An Accounts Payable Distribution Report is produced and summary expense entries are created for entry into the General Ledger System.

The reporting subsystem provides analysis of year-to-date purchases and discounts taken based on information in the Vendor Master file. This file contains one record for each permanent or temporary vendor used by the system to obtain vendor name, address, and discount terms information. The amount of purchases, credit memos and discounts for each vendor are also maintained in this file and Vendor Analysis Reports can be printed whenever desired.

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

These IBM System/32 Industry Application Programs will execute on all models of the IBM System/32.

Information regarding disk allocation and usage (master and transaction files) and recommended backup levels and diskette requirements are available in the *HFMS Installation Guide*.

The OCL and file sizes, as distributed, will be fixed at the maximum capacity, assuming all five applications are to be installed on a 5 megabyte file.

Any changes to file sizes other than those shown above should be carefully reviewed by the customer and IBM System Engineering to determine the necessity for more storage, estimate time required to convert OCL procedures, and estimate throughput performance.

SOFTWARE REQUIREMENTS

The IBM HFMS System/32 program is written in IBM System/32 RPG II and operates under control of IBM System/32 System Control Program (5725-SC1). In addition, the IBM System/32 Utilities licensed program (5725-UT1) must be available for sorting of data (SORT), entering transactions with the Data File Utilities (DFU) and for making source program corrections with Source Entry Utility (SEU). If compilation of the RPG HFMS source programs is required, the IBM System/32 RPG II Compiler (5725-RG1) and Source Entry Utility (SEU), for making RPG II program corrections, must be available.

DOCUMENTATION

(available from Mechanicsburg)

Patient Billing Installation Guide (SB30-0008) ... *Patient Billing Runbook* (SB30-0014) ... *Accounts Receivable Installation Guide* (SB30-0009) ... *Accounts Receivable Runbook* (SB30-0015) ... *Payroll Installation Guide* (SB30-0010) ... *Payroll Runbook* (SB30-0016) ... *Accounts Payable Installation Guide* (SB30-0011) ... *Accounts Payable Runbook* (SB30-0017) ... *General Ledger Installation Guide* (SB30-0012) ... *General Ledger Runbook* (SB30-0013) ... *Patient Billing Reference Manual* (LB30-0004) ... *Accounts Receivable Reference Manual* (LB30-0005) ... *Payroll Reference Manual* (LB30-0006) ...

Accounts Payable Reference Manual (LB30-0007) ... *General Ledger Reference Manual* (LB30-0019).

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

SYSTEM/32 MEDICAL GROUP MANAGEMENT SYSTEM 5725-H15

PURPOSE

The application provides the medical group with a powerful aid in managing its business.

The Medical Group Management system is primarily intended for a group of up to 20 doctors using a single accounting system.

Key accounting and management reports are provided to allow selling and installing without a requirement for services or customer programming capabilities.

HIGHLIGHTS

- Wide variety of reports and report options included:
 - Management reporting is a byproduct of normal data entry
 - Detail or summary listings within a range of options is supported in many reports
- Uses recognized accounting techniques and terminology to provide a solid accounting system:
 - Clear audit trails and control techniques are provided
 - Sample user-oriented forms for data preparation, file creation, audit and control are provided
 - Security code deters unauthorized execution of all programs in the application
 - A Reference Number may be used to supply an audit trail for any transaction entered into the system
- Designed to be installed without customer programming capability:
 - System tailoring procedure facilitates account growth by allowing on-site changes to file sizes and determination of functions used
 - File maintenance and audit procedures
 - Easy-to-use runbook
 - Operator self-study course is available
 - Step-by-step installation activity plan provided by the *Application Reference Manual*
 - User's installation and daily operating information supplied to the supervisor by the *Application Reference Manual*

DESCRIPTION

The system combines two data entry approaches: Operator-oriented and batch-oriented. Support is provided for transaction entry through the System/32 keyboard or through a diskette created on a 3740 Data Entry System.

The application has requirements records which contain Questionnaire responses stored in a Constants File. These records allow the system to select certain fields for editing, report formats, file sizes, and functions to suit each customer's needs. The Questionnaire responses are typed in during initial installation and may be changed as needed. The System Tailoring Procedure allows these responses to be entered.

The System Tailoring Procedure uses the answers to a series of questions regarding a medical group's requirements to build the system. It provides the following:

- Tailoring the application and Operational Control Language (OCL) on site at installation time.
- All provided functions are included in the programs but only required functions are executed.
- Allows the user to activate and deactivate provided functions as the user's business changes.
- File sizes may be increased or decreased as needed by rerunning the System Tailoring Procedure.

Application Reference Manual Volume I provides a step-by-step installation activity plan including sample numbering systems, sample input and maintenance data forms, file loading sequences, and control forms with suggested procedures. Volume II of the *Application Reference Manual* provides information on the day-to-day use of the application.

The *Runbook* provides the operator with a detailed and easy-to-use set of instructions stating all the activities necessary to run the programs on a System/32. The *Procedure Reference Summary* is provided for the operator as a reminder of the major operational instructions for each procedure. It is intended to be used once the operator is thoroughly trained in the application.

Instructional material in the form of a self-study guide is provided to train the System/32 operator in the use of the *Runbook*.

An *Application Logic Manual* is provided, as optional licensed material, for use by the self-sufficient customer and for systems engineering continuing support. It describes the architecture of programs, procedures, data base cross-references, data dictionary, and detailed descriptions of each program.

DESCRIPTION

The application is ready-to-execute. It includes source code, object code, and execution procedures as basic material. The *Application Logic Manual* is included if it is ordered as optional licensed material.

There are some general features included in the application:

- Designed to fit business requirements
- Security codes to deter unauthorized use of master files
- In-house inclusion/exclusion of functions to be executed
- OCL procedures, Sort specifications, and processing programs are packaged into logical work units which simplify system operation
- Monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed
- Compatible online/offline data entry through the System/32 keyboard or by means of diskettes created on a 3740 Data Entry System
- Dynamic Backup and Recovery System forces periodic backup of master files and edited transactions and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files.
- Reprint options are possible because file updating is separated from report writing functions
- Some report printing can be deferred to a more convenient time
- Selective printing options are available for many report functions

The Medical Group Management System IAP is intended to provide a balance forward accounts receivable system for a group of up to 20 doctors using a single accounting system.

The IAP provides the ability to bill patients on a monthly basis. Third parties (insurance companies) can be billed as required. It provides accounts receivable information including status reports and aged trial balances in order to control accounts receivable.

An optional Daily Charge Slip system is provided to print an appointment list showing patient appointment information and patient charge slips for recording patient charges, diagnoses and procedures. The charge slips can then be used as turnaround documents for input into A/R.

A practice analysis system is also optional and provides statistical reports for each doctor on a calendar year basis.

Inquiry is provided allowing the user to locate a guarantor record by keying either the guarantor's last name and first initial or the guarantor's account number.

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Each of these IBM System/32 Industry Application Programs will execute on all models of the IBM System/32. The programs are compiled assuming a 16K system. Because of volume and time constraints, there may be a requirement for providing offline key entry on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-character record feature (#5455) and Feature Group A (#4004).

Many functions have been included to protect the integrity of the master files, programs, procedures and libraries. Because of this, no other IAP or user-written programs may co-reside unless stringent coding requirements for these programs are met to insure compatibility with the Medical Group Management System. The *Application Logic Manual* discusses in detail the coding conventions used for the development of the Medical Group Management System.

SOFTWARE REQUIREMENTS

The application programs for the IBM System/32 are written in IBM System/32 RPG II Programming language and execute under control of the IBM System/32 System Control Program (5725-SC1 Version 3. IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the programs. The IBM System/32 RPG II Compiler (5725-RG1) is required if modifications to the source code are necessary.

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

SYSTEM/32 MEMBERSHIP and MAILING LIST SYSTEM 5725-K11

PURPOSE

Associations are constituted to serve their memberships. Their prime functions are information retrieval and dissemination, establishment of standards and ethics, research, and representing their members to external agencies. Items of general interest are disseminated through association publications sent through the postal service. However, the need often exists to make specialized mailings to selected members with specific characteristics. Information exchange also takes place at events sponsored by associations. Associations, then, have data processing needs characterized by large data bases which must be processed in total but with the ability to process individual records or groups of records on a selective or exception basis.

The Membership and Mailing List System is designed for associations of up to approximately 15,000 members if optional files are not used.

HIGHLIGHTS

The Membership and Mailing List System provides an economical approach for the needs of business and professional associations. It addresses the following areas:

Data Base Management

- Interrelates up to 10 master files into a single data base
- Non-redundant data base (duplicate records eliminated)
- Can be installed as:
 - Single-file system (members are individuals)
 - Dual-file system (members are companies with mailing sent to and events attended by individuals). Usage of other master files is optional as needed.
- Full maintenance procedures

Cash Accounting

- Invoices generated for dues and publications
- Balance forward accounts maintained for dues
- Cash application through file maintenance runs

Mailing Labels

- One-up or four-up
- Names and addresses vertically and horizontally aligned
- Produced from the data base on user-defined selection criteria
- Zip code changes noted and count shown
- Includes zip codes and circulation reporting

Membership and Association Services

- Membership cards
- 3 x 5 information cards
- Membership rosters, dynamic listings, and profiles
- Data file inquiry

Analyze Procedure

- Provides a means to select and sequence subsets from the data base
- Used for statistical profiles; input to all of the above runs; input to a preformatted dynamic listing program - for management review and analysis.

The Membership and Mailing List System also includes the following features:

- Installation through a System Control File which allows implementation of user options and printed descriptions without recompilation
- Inquiry capability to display or print individual member's records

DESCRIPTION

The Membership and Mailing List System organizes the vital records of an association into a comprehensive data base. The data base is modular in design so that only those portions which are required for user-desired functions need to be implemented. For example, if the association does not maintain its membership in a chapter structure, the chapter file is not used. Similarly, if it has no interest in knowing who sponsored a member for membership, the sponsor file is not used. The basic decision to be reached regarding the optionality of files, however, concerns the manner in which the association structures its membership and what dues functions are required. A typical difference between business associations and professional organizations is that business associations tend to have companies as members while professional organizations tend to have individuals as members. The Membership and Mailing List System accounts for this difference by separating the dues function from the mail function. Data required to

implement these two functions is separated into two discrete files: the dues file and the mail file.

If your customer has company members with individuals within the company receiving mail, both files would be used (dual-file system). If, however, the members of the association are individuals, either the dues file or the mail file, or both, may be used. If partial payments are to be accepted and the association has only one publication that it distributes, the dues file should be implemented. If the association has multiple publications with different payment rates and accepts full payment only, the mail file should be implemented. However, whichever file is implemented, the basic cash accounting and mailing function are provided. The optional nature of the data base files is implemented through a Systems Control File without need for recompilation. Consult the Membership and Mailing List System *Installation Guide* for further information.

The following sections describe system highlights in three important functional areas: Accounting, mailing, and service.

Accounting Functions

Invoicing: Invoices are generated for both dues and publications. The dues invoice shows the balance brought forward, the current dues amount, and a new total owed. An optional special charge amount (such as an initiation fee) can also be included. First dues billing for new members can be pro-rated. Publication invoices can handle amounts for two separate publications (mail file). Both types of invoices as well as follow-up notices are prepared on user-defined billing cycles and frequencies.

Cash Application: Cash can be applied to dues on a partial payment basis (dues file only) or on a full-payment required basis. Payments for publication subscription can be applied in even increments of the base subscription rate with automatic calculation of the "paid to" date. Cash receipts can also be applied for registration fees for association-sponsored events.

Mailing Functions

Mailing Labels: Mailing labels are prepared for user-defined subsets of the data base. The selection is dynamic. User-defined parameters for inclusion/exclusion and sequencing are keyed prior to the label run. The labels can be printed one-up or four-up with names and addresses horizontally and vertically aligned. Changes in zip code (if the labels are sequenced by zip code) can be highlighted to facilitate mailing bundling. Mailing type is noted, that is, sample publications.

Circulation Reports: This report recaps totals by state, zip code, or type of mailing for each mailing. It can be used for advertising rate setting by showing circulation demographics.

Membership/Association Service Functions

Membership Cards: Membership identification cards can be prepared showing member's name and current membership period.

3 x 5 Information Cards: These cards can be prepared with user-defined inclusion/exclusion and sequencing criteria. They are useful for such functions as convention registration, direct sales follow-up, etc.

Rosters: Periodic alphabetic listings of the membership, mailing lists, or event participation can be prepared for reference.

Membership Profile: A profile of all information regarding a member can be printed that can be sent for review and correction. Therefore, it can serve as a turnaround document to maintain the accuracy of the data base.

Additional Features: The Membership and Mailing List System is designed to meet the needs of associations by producing standard printouts of selected input. Input inclusion/exclusion and sequencing criteria are entered through a simple ANALYZE command. This feature provides great flexibility to your customer. For example, the system does not arbitrarily send follow-up notices for dues or publication invoices after a fixed period. Your customer can implement a 30- or 60-day follow-up policy by simply entering the appropriate 30- or 60-day parameter into the ANALYZE command prior to running the follow-up procedure. Analysis report formats have been established for each major file. The user of the ANALYZE command in conjunction with these report programs gives the user a dynamic listing capability to answer needs as they occur. The ANALYZE command can also be used without a subsequent report to develop statistical profiles (demographic analysis) of the membership.

The optional files are implemented and descriptions are supplied to the programs by answering a questionnaire. The responses are then entered into a Systems Control File. Other options addressed on the questionnaire include such policy matters as invoicing frequency and dues proration for new members.

An inquiry capability is provided through the Data File Utilities (DFU) to indicate individual records on the System/32 display screen or to print the records.

System/32 Membership & Mailing List System (cont'd)**CUSTOMER RESPONSIBILITIES**

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

This System/32 Industry Application Program will execute on all models of the IBM System/32.

Information regarding disk allocation and usage (master and transaction files) and recommended backup levels and diskette requirements are available in the *Installation Guide*.

The OCL and file sizes, as distributed, will be fixed at the maximum capacity and normal distribution for the 5-megabyte file.

Any changes to file sizes should be carefully reviewed by the customer and IBM Systems Engineering to determine the necessity for more storage, estimate the time required to convert OCL procedures, and estimate throughput performance.

SOFTWARE REQUIREMENTS

The Membership and Mailing List System programs for IBM System/32 are written in IBM System/32 RPG II and operate under control of IBM System/32 System Control Program (5725-SC1). In addition, the IBM System/32 Utilities program product (5725-UT1) must be available for sorting of data (SORT), entering transactions with the Data File Utilities (DFU) and for making source program corrections with Source Entry Utility (SEU). If compilation of the RPG II source programs is required, the IBM System/32 RPG II Compiler (5725-RG1) and Source Entry Utility (SEU), for making RPG II program corrections, must be available.

CONVERSION

The Membership and Mailing List System requires loading of a large volume of data. This may make use of the System/32 keyboard inadvisable for conversion input. Programs are supplied to load the files from diskettes produced by the 3740 Data Entry System. Discussing conversion approaches and schedules with your customer or prospect will be a key element in your installation planning process.

DOCUMENTATION

(available from Mechanicsburg)

Installation Guide (SB30-0078) ... *Runbook* (SB30-0079) ... *Reference Manual* (LB30-0076).

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

**5230 DATA COLLECTION SYSTEM
SUPPORT for SYSTEM/32
5725-M3A**

PURPOSE

The 5230 Data Collection System Support for System/32 program provides the manufacturer with a convenient, practical means of preparing shop floor data for processing by the System/32 Manufacturing Management Accounting System (MMAS) application programs. Data collected by the 5230 Data Collection System is edited, consolidated, and formatted for processing by the MMAS Payroll, Inventory Management, and Production Status and Costing IAPs or for user-written manufacturing management systems (with appropriate changes to the output modules).

This IAP offers current System/32 MMAS account upgrading in the manufacturing industry. It is primarily intended for the manufacturer with 50 to 250 employees.

HIGHLIGHTS

- Interrelated to MMAS applications:
 - Elapsed time calculation for Payroll
 - Material receipt and issue data for Inventory Management
 - Job time for Production Status and Costing
- Management reports generated as a byproduct of data entry
 - Option to print or not print all reports except error reports and audit summaries
 - Labor report by supervisor for checking
 - Attendance and absentee reports
- Provides internal cross-checking and editing
 - Jobs started checked against jobs stopped
 - Employee time on jobs checked against time and attendance record
 - Transaction records checked for complete and accurate entry
- Provides automatic generation of machine-readable data
 - Reduces transcription errors
 - Eliminates time keeper calculation of elapsed time
 - Supports up to 40 different shifts to provide added flexibility for special starting times, lunch and other break times, and unique weekend schedules.
- Can be installed without customer
 - System tailoring procedure facilitates account growth by allowing on-site changes to file sizes and determination of functions used
 - File maintenance and audit procedures
 - Easy-to-use runbook
 - Step-by-step installation activity plan provided by the *Application Reference Manual*
 - User's information supplied to the supervisor by the *Application Reference Manual*

DESCRIPTION

The 5230 Data Collections System Support for System/32 provides two phases of operations: 5230 personalization phase and a data conversion phase.

The 5230 personalization provides a menu of actions from which the users select those that best fit their operation. Using the menu selections and loop definitions for up to three 5231 Controllers with up to four loops each, this phase creates the personalization records required to personalize the 5230 Data Collection System.

The data conversion phase prepares the data received from the 5230 Data Collections System for processing by the MMAS applications. The data can be accepted through the data communications facilities, the cards, or the diskette offered as output options by the 5230 Data Collection System.

Both material transactions and labor transactions are prepared. The material transactions are edited, listed, formatted, and stored for later use by the Inventory Management and Production Status and Costing applications. Labor transactions are expanded, edited, checked for accuracy, and adjusted for break and lunch times. They are also adjusted for lunch and shift start-stop time variances. The elapsed time for time and attendance and job time is calculated, and job time applied to overlapping jobs is apportioned to the jobs. Time and attendance totals are checked against job time totals with warning messages printed for differences that exceed user-prescribed limits. A correction procedure is included to allow for changing incorrect labor transactions. The results of the labor transaction processing are stored for later use by the Payroll and Production Status and Costing applications.

Reports are printed, at the user's option, for material transactions and for labor transactions. The material transactions report is a single listing. Labor transaction reports provide labor-related information suitable for management review and checking by supervisors for correctness. Attendance and absentee reports are also printed.

This program augments the MMAS cross-application Constants File with its own questionnaire responses. These records allow the

application to select certain options for the procedures to be used. The questionnaire responses are keyed during initial installation and may be changed as needed.

An *Application Reference Manual* provides a step-by-step installation activity plan including sample input and maintenance data forms, file loading sequences, and control forms with suggested procedures. This manual also provides information on the day-to-day use of the application.

The *Runbook* provides the operator with a detailed and easy-to-use set of instructions showing all the activities.

An *Application Logic Manual* is provided, as optional licensed material, for use by the self-sufficient customer and for systems engineering continuing support. It describes the architecture of programs, procedures, data base cross-references, data dictionary, and detailed descriptions of the program.

The 5230 Data Collection System Support for System/32 is a ready-to-execute program. It includes source code, object code, execution procedures, and the *Application Logic Manual*, if ordered as optional basic material.

CUSTOMER RESPONSIBILITIES

IBM will provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

The IBM 5230 Data Collection System Support for IBM System/32 will execute on all models of the IBM System/32. The programs are compiled assuming a 16K system. If data communications features are to be used, the Binary Synchronous Communications Adapter (#2074) must be installed in the IBM 5230 System Unit. If card output from the IBM 5230 System is to be used, the Data Recorder Attachment (#3200) may be installed on the System/32 only.

SOFTWARE REQUIREMENTS

The IBM 5230 Data Collection System Support program for the IBM System/32 is written in IBM System/32 RPG II Programming language and executes under control of the IBM System/32 System Control Program (5725-SC1 Version 3). IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the program. The IBM System/32 RPG II Compiler (5725-RG1) is required if modifications to the source code are necessary. In addition, one of the following MMAS applications should be installed.

- Payroll (5725-M32)
- Inventory Management (5725-M35)
- Production Status and Costing (5725-M31)

Additional Materials:

Data Collection Application Workbook (GH20-0203) ... *IBM 5230 Data Collection User's Guide* (GA34-0040)

DOCUMENTATION

(available from Mechanicsburg)

Runbook (SB30-0092) ... *Application Reference Manual* (SB30-0093) ... *Logic Manual* (LB30-0094).

TERMS and CONDITIONS: See PP Index

SYSTEM/32 MANUFACTURING MANAGEMENT ACCOUNTING SYSTEM (MMAS)

PRODUCTION STATUS AND COSTING ... 5725-M31
PAYROLL ... 5725-M32
ACCOUNTS PAYABLE ... 5725-M33
ACCOUNTS RECEIVABLE ... 5725-M34
INVENTORY MANAGEMENT ... 5725-M35
PRODUCT DEFINITION AND COSTING ... 5725-M36
GENERAL LEDGER ... 5725-M37
SALES ANALYSIS ... 5725-M38
ORDER ENTRY AND INVOICING ... 5725-M39

PURPOSE

The System/32 Manufacturing Management Accounting System (MMAS) provides manufacturers with a powerful aid in managing the business.

MMAS offers flexible applications specifically designed for the manufacturing industry. MMAS provides key reports to help management direct and control their business effectively.

MMAS offers opportunities for new name and first systems account sales in the manufacturing industry. It is primarily intended for the manufacturer with 20 to 250 employees.

HIGHLIGHTS

- Independent or interrelated applications approach:
 - Modular design facilitates sequential application installation
 - Single data entry results in multiple application updates
 - Modular design allows users to choose the applications that address problem areas
- Wide variety of reports and report options included:
 - Management reporting is a byproduct of normal data entry
 - Certain reports (statements, 941-As, and W-2s) can be saved on diskette for later printing
 - Detail or summary listings within a range of keys is supported in many reports
- Uses recognized accounting techniques and terminology to provide a solid accounting system:
 - Clear audit trails and control techniques are provided
 - Sample user-oriented forms for data preparation, file creation, audit and control are provided
 - Security code deters unauthorized inquiry or execution of key programs in each application
 - A Journal Reference Numbering System supplies audit trail for any application that automatically generates transactions into the General Ledger
- Provides manufacturers with an easy-to-use method for organizing and using manufacturing information such as bills-of-material, product cost, and shop order or job cost.
- MMAS can be installed without customer programming capability:
 - System tailoring procedure facilitates account growth by allowing on-site changes to file sizes and determination of functions used
 - File maintenance and audit procedures
 - Easy-to-use runbook
 - Supervisor and operator self-study courses are available
 - Step-by-step installation activity plan provided by the *Application Reference Manual*
 - User's information supplied to the supervisor by the *Application Reference Manual*

DESCRIPTION

The Manufacturing Management Accounting System is a set of nine independent yet interrelated, ready-to-execute applications for the small manufacturer:

- Order Entry and Invoicing
- Sales Analysis
- Accounts Receivable
- Inventory Management
- Product Definition and Costing
- Payroll
- Accounts Payable
- General Ledger
- Production Status and Costing: The system combines two data entry approaches - operator-oriented and batch-oriented. Support is provided for transaction entry through the System/32 keyboard or through a diskette created on a 3740 Data Entry System. The nine easy-to-operate applications can be installed in separate stages at different times and still be an interrelated system.

The only requirement is that Order Entry and Invoicing (5725-M39), and/or Inventory Management (5725-M35), and/or Accounts

Receivable (5725-M34) must be installed before Sales Analysis (5725-M38).

Each application has certain requirements records within a cross-application Constants File which contain questionnaire responses. These records allow the application to select certain fields for editing, report formats, file sizes, and functions to suit each customer's needs. The questionnaire responses are keyed during initial installation and may be changed as needed. The System Tailoring Procedure allows these responses to be entered.

The System Tailoring Procedure utilizes the answers to a series of questions regarding a manufacturer's requirements. It provides the following:

- Tailoring the application and Operator Control Language (OCL) on-site at installation time.
- Allows the user to activate and deactivate provided functions as the user's business changes.
- All provided functions are included in the programs but only required functions are executed.
- File sizes may be expanded or contracted as needed by rerunning the System Tailoring Procedure.

An *Application Reference Manual* provides a step-by-step installation activity plan including sample numbering systems, sample input and maintenance data forms, file loading sequences, control forms with suggested procedures. Volume II of the *Application Reference Manual* provides information on the day-to-day use of the application.

The *Runbook* provides the operator with a detailed and easy-to-use set of instructions showing all the activities necessary to run the MMAS programs on a System/32. The Operator Reference Card is provided for the operator as a reminder of the major operational functions of each procedure. It is intended to be used once the operator is thoroughly trained in the particular application.

Instructional material in the form of self-study courses is provided for the System/32 supervisor and operator to train them in the use of the *Application Reference Manual* and *Runbook*. The two courses are not application dependent. Therefore, only one copy of each course is needed per customer no matter how many applications are installed.

An *Application Logic Manual* is provided, as optional licensed material, for use by the self-sufficient customer and for systems engineering continuing support. It describes the architecture of programs, procedures, data base cross-references, data dictionary, and detailed descriptions of each program.

Features: The Manufacturing Management Accounting System consists of nine full-function, ready-to-execute applications. MMAS includes source code, object code, execution procedures, and the *Application Logic Manual*, if ordered as optional basic material.

These are some general features which all applications have:

- Designed to fit industry requirements
- Security codes to deter unauthorized use of master files
- In-house inclusion/exclusion of functions to be executed
- OCL procedures, Sort specifications, and processing programs are packaged into logical work units which simplify system operation
- Monitoring of execution sequence prevents execution of a program until preceding programs have been completely and successfully executed
- Compatible online/offline data entry through the system console or by means of diskettes created on a 3740 Data Entry System
- Dynamic Backup and Recovery System forces periodic backup of master files and edited transactions, and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files
- Reprint options are possible because file updating is separated from report writing functions
- Some report printing can be deferred to a more convenient time
- Selective printing options are available for many report functions

PRODUCTION STATUS AND COSTING (5725-M31)

This program provides management information on jobs or shop orders from the point of release to the shop floor through the closing process. Also, it provides a means to build and maintain a job select file for retaining and releasing repetitive or standard jobs. This file contains information at an operation and material level.

Jobs or shop orders may be released from the job select file and/or manually, based on individual requirements. During the release function the shop data base is created to provide for editing of feedback from the shop floor and for management reports. In addition to the creation

System/32 MMAS (cont'd)

of a shop data base, the release function creates a job worksheet to move with the work and a group of labor tickets for labor reporting.

The report function provides a variety of production and accounting reports such as Job Status, Work List, and exception reporting for quantity variance or cost variance. These reports reflect variance from projection on both production and accounting information and may be obtained in summary or detailed format.

The updating function records information from the shop floor to the shop data base at the operation and material detail level. Updates to the shop data base occur via labor, move, material issue, miscellaneous, outside operations and material receipts transactions. These transactions reflect the activity (hours and cost) and movement (quantity) of jobs or shop orders as they progress through the manufacturing facility. Transactions may be entered either manually or from other applications (Payroll, Inventory Management, and Accounts Payable) via the application interface.

Upon completion of a job, the closeout function produces closeout reports in both production and accounting formats to allow the analysis of labor and cost projections against actual. After producing these reports the closed jobs or shop orders are removed from the shop data base.

PAYROLL (5725-M32)

This hourly/salary/executive payroll provides for regular, overtime, premium, vacation, and sick pay. It may be run weekly, biweekly, semimonthly, monthly. Hours may be entered daily or by pay period; if selected, balancing time worked to attendance may be accomplished daily or weekly. Exception hours provide time and one-half, double time, double time and one-half, and triple time capabilities. Rates may be selected from the Employee Master Record or keyed in as an override. Shift differential capabilities are provided for second and third shift. The differential may be defined as a percentage of the rate or cents to be added to the rate.

Vacation/Holiday pay may be part of a regular pay check or on a separate check. A bonus payment is paid on a separate check with a flat percentage of income tax deducted. Sick pay may be fully non-taxable or only liable for income tax. Wages subject to Federal Unemployment Insurance (FUI) and State Unemployment Insurance (SUI) are determined.

The ability to handle taxable or non-taxable adjustments, pay advances and employer-paid union benefits (taxable and non-taxable) is also provided. Once the gross earnings is calculated, deductions will be taken to reach net pay. In addition to calculating present Federal and FICA taxes, a standard tax algorithm is provided to calculate most present state taxes based upon customer-provided data. Local taxes may also fit the standard tax algorithm provided. The state disability insurance deductions also use a standard algorithm based upon customer-provided data. Miscellaneous deductions may be taken by percent, fixed amount, hourly rate, upper limit, or cyclic within a user-specified frequency. Union deductions may be taken by percent, hourly rate, or fixed amount within a user-specified frequency.

Handwritten paychecks and paychecks never cashed (reversals) are also supported by the application. Once the payroll register and checks are printed, many analysis reports are produced: Labor Distribution, Job Distribution, Miscellaneous Deductions, Union Deductions, YTD/QTD Earnings, Workmen's Compensation Worksheet, and Payroll Journal. The presently formatted W-2 and 941-A reports are also provided.

The capability is provided to pass transactions to the General Ledger application, if installed. These transactions will be applied toward company use only. Payroll may be on either a cash or accrual basis. If the cash basis is selected, no transactions are passed to the General Ledger.

ACCOUNTS PAYABLE (5725-M33)

Accounts Payable provides an Open Payables and Cash Disbursements function on either an accrual or cash basis. Invoices and credit memos entered may be multilined and distributed by job, item number, cost type and General Ledger account number. Entries may be for standard or one-time vendors and may be open or prepaid. Credit memos may be entered manually or initiated automatically based upon a prior entered invoice.

A Purchase Journal provides the audit trail for cost transactions entering into the General Ledger system and into the open payables file. An Open Payables Report is provided in due date or vendor sequence. This turnaround document provides a mechanism to indicate payment by data, vendor or invoice, including partial payments, for Cash Disbursements. Invoices may be entered or placed in hold status to prevent inadvertent payment of invoices in question.

A Cash Requirements Report is used to assist the controller in insuring sufficient funds are available and proper invoice selection was made before the checkwriting procedure begins. The Cash Disbursements Journal provides an audit trail for its transactions entering the General Ledger application and acts as the Check Register. Checkwriting and reconciliation are also provided.

A Vendor Analysis Report indicates key business volumes and discounts lost and taken for previous year and current year.

ACCOUNTS RECEIVABLE (5725-M34)

Accounts Receivable supports a combination of both open-item and balance-forward customers. Billing transactions are directly keyed or accepted from Order Entry and Invoicing if that application is installed.

All transactions (that is, invoices, cash receipts, adjustments, and credit memos) are retained in an Open-Item File. This file may be purged daily or monthly at the user's request. An Aged Trial Balance with current plus four past periods is provided. It has multiple printing options (summary, detail, selected line, within limits). Delinquency Notices may also be printed. Late charges can be calculated for balance forward customers.

Two optional formats are provided for the customer statements which are printed at month-end. The capability is provided to delay the printing of the statements until a more convenient time without affecting the closing of the books. An account status inquiry feature is also provided.

INVENTORY MANAGEMENT (5725-M35)

Inventory Management maintains a perpetual inventory and on-order status for each item. It calculates and prints on demand numerous management figures including: Economic order quantity, dollar profit and percent of profit, average monthly usage, turnover rate, and reorder point. Management reports are also provided: ABC Analysis Report, two types of Stock Status, Inventory Analysis Report, Physical Inventory Checklist, On-Order Status Reports, Inventory Valuation and Variance Report, and Inventory Reorder Report. It can also interface with Order Entry and Invoicing, Sales Analysis, Product Definition and Costing, and Production Status and Costing.

PRODUCT DEFINITION AND COSTING (5725-M36)

Product Definition and Costing provides manufacturers with an easy-to-use method of organizing bills-of-material and item information and calculating product costs using bills-of-material. Costs are built from raw material up to the finished end-item. Assembly costs may be recalculated when there is a change in the bill-of-material or in the assembly labor or material costs or burden. The user can simulate the effect of proposed cost changes in end-item costs due to changes in labor, material or burden cost.

For all product costs the total cost of purchased parts is maintained separately as material cost. These costs are calculated and maintained level by level and make it possible for the user to identify the added value (labor, burden) for products and assemblies for tax purposes.

Management reports can be produced when required since the cost information is stored in the Product Definition and Costing data base. These reports include costed bills of material, cost reports reflecting either real or potential cost changes and variances (simulations), and special vendor where-used and final assembly where-used lists. The basic formats used for parts lists and where-used lists are single level, indented and summarized.

GENERAL LEDGER (5725-M37)

General Ledger combines all the transactions affecting the financial status of the company during the month. They may be entered directly as a General Journal Entry or may have been previously entered through interface with Accounts Payable or Payroll. At month-end closing time, Audit Registers and the Financial Statement Worksheet are provided to help verify that the user is still in balance before proceeding into the actual closing. The reports will also aid in generation of any necessary closing entries.

An Income Statement and Balance Sheet are standard report outputs. The user can define these reports with an easy-to-use format description procedure. The financial reports can illustrate current financial data as compared to budget or historical information.

Users may define their own chart of accounts or use a suggested account structure provided with the application. The fiscal year start month is user-defined. Multiple company support for up to ten companies is included. Any transactions passed from Payroll or Accounts Payable are applied to the first company only.

SALES ANALYSIS (5725-M38)

Sales Analysis reports summarize the activity and highlight the performance of items, customers, and/or salespersons. Selected reports may be printed in detail or summary, depending on the option selected at printing time. Since all data used in Sales Analysis can be entered through Order Entry and Invoicing, it should be installed to obtain full benefit of the Sales Analysis application. If Sales Analysis is installed with Accounts Receivable alone, only Salesperson and Customer Sales Analysis can be obtained; or with Inventory Management alone, only Item Sales Analysis can be obtained.

ORDER ENTRY AND INVOICING (5725-M39)

This postbilling program includes order entry and edit, invoicing, and preparation of an invoice register and price lists. The Order Acknowl-

System/32 MMAS (cont'd)

edgement will show warehouse location, while the picking list is printed in warehouse sequence. Pricing options include selection of the actual selling price, a discount percent from a list price, operator-entered price, or a contract price by customer. Up to six user-assigned discount percentages by item and up to three tax percentages are provided. Quantity break prices can be established optionally by item.

Order status and backorder status is provided by item, customer, or due date. Support is also provided for partial shipments and backordering or cancellation of the balance of the order. This application provides data for input into Inventory Management, Accounts Receivable, and Sales Analysis.

Two invoice formats are available. Picking list is optional and can be run either at order entry time or just prior to billing. Order acknowledgements are optional and may optionally be printed with prices.

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day to day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

Each of these IBM System/32 Industry Application Programs will execute on 16K or 24K models of the IBM System/32. The programs are compiled assuming either a 16K or 24K system. It is not intended that any one customer install all nine applications on one IBM System/32. Because of volume and time constraints, there may be a requirement for providing offline keying on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-character record features (#5455 and #4004).

The Manufacturing Management Accounting System is intended to be an independent yet interrelated set of applications. Many functions have been included to protect the integrity of the master files, programs, procedures, and libraries. Because of this, no other user-written program may co-reside with any MMAS application unless stringent coding requirements for these programs are met to insure compatibility with the MMAS applications.

SOFTWARE REQUIREMENTS

The application programs are written in IBM System/32 RPG II Programming language and execute under control of the IBM System/32 System Control Program (5725-SC1 Version 2), IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the programs. The IBM System/32 RPG II Compiler (5725-RG1) is required if modifications to the source code are necessary.

DOCUMENTATION

(available from Mechanicsburg)

MMAS Application Guides:

Production Status and Costing (G580-0029) ... *Payroll* (G580-0031) ... *Accounts Payable* (G580-0035) ... *Accounts Receivable* (G580-0033) ... *Inventory Management* (G580-0030) ... *Product Definition and Costing* (G580-0028) ... *General Ledger* (G580-0036) ... *Sales Analysis* (G580-0034) ... *Order Entry and Invoicing* (G580-0032).

MMAS IAP Specifications:

Production Status and Costing (GH30-0037) ... *Payroll* (GH30-0035) ... *Accounts Payable* (GH30-0036) ... *Accounts Receivable* (GH30-0031) ... *Inventory Management* (GH30-0032) ... *Product Definition and Costing* (GH30-0033) ... *General Ledger* (GH30-0034) ... *Sales Analysis* (GH30-0039) ... *Order Entry and Invoicing* (GH30-0038).

Customer Self-Study Education:**MMAS Users Guide, Modules 1 - 4**

Set of 4 Audio Tapes (SV30-0072) ... *Workbook 1, Introduction to MMAS* (SR30-0104) ... *Workbook 2, Product Definition and Costing* (SR30-0105) ... *Workbook 3, Inventory Management* (SR30-0106) ... *Workbook 4, Production Status and Costing* (SR30-0107).

MMAS Users Guide, Modules 5 - 8

Set of 4 Audio Tapes (SV30-0091) ... *Workbook 5, Accounts Payable and General Ledger* (SR30-0180) ... *Workbook 6, Payroll* (SR30-0181) ... *Workbook 7, Accounts Receivable, Order Entry and Invoicing, Sales Analysis* (SR30-0182) ... *Workbook 8, 5230 Data Collection System Support* (SR30-0183).

Unlicensed Publications

... *Production Status and Costing Runbook* (SB30-0038) ... *Reference Manual Volume 1* (SB30-0039) ... *Reference Manual Volume 2* (SB30-0059) ... *Payroll Runbook* (SB30-0032) ... *Reference Manual Volume 1* (SB30-0033) ... *Reference Manual Volume 2* (SB30-0056) ... *Accounts Payable Runbook* (SB30-0035) ... *Reference Manual Volume 1* (SB30-0036) ... *Reference Manual Volume 2* (SB30-0057) ... *Accounts Receivable ... Runbook* (SB30-0020) ... *Reference Manual*

Volume 1 (SB30-0021) ... *Reference Manual Volume 2* (SB30-0051) ... *Inventory Management Runbook* (SB30-0023) ... *Reference Manual Volume 1* (SB30-0024) ... *Reference Manual Volume 2* (SB30-0053) ... *Product Definition and Costing Runbook* (SB30-0026) ... *Reference Manual Volume 1* (SB30-0027) ... *Reference Manual Volume 2* (SB30-0054) ... *General Ledger Runbook* (SB30-0029) ... *Reference Manual Volume 1* (SB30-0030) ... *Reference Manual Volume 2* (SB30-0055) ... *Sales Analysis Runbook* (SB30-0044) ... *Reference Manual Volume 1* (SB30-0045) ... *Reference Manual Volume 2* (SB30-0061) ... *Order Entry and Invoicing Runbook* (SB30-0041) ... *Reference Manual Volume 1* (SB30-0042) ... *Reference Manual Volume 2* (SB30-0060).

Licensed Publications

Production Status and Costing Logic Manual (LB30-0040) ... *Payroll Logic Manual* (LB30-0034) ... *Accounts Payable Logic Manual* (LB30-0037) ... *Accounts Receivable Logic Manual* (LB30-0022) ... *Inventory Management Logic Manual* (LB30-0025) ... *Product Definition and Costing Logic Manual* (LB30-0028) ... *General Ledger Logic Manual* (LB30-0031) ... *Sales Analysis Logic Manual* (LB30-0046) ... *Order Entry and Invoicing Logic Manual* (LB30-0043).

TERMS and CONDITIONS: See PP Index

**SYSTEM/32 SHIPPING CONTROL for
SUPPLIERS TO THE AUTOMOTIVE INDUSTRY
5725-M44**

PURPOSE

System/32 Shipping Control for Suppliers to the Automotive Industry provides solutions for many problems associated with planning, controlling and reporting shipping dock transactions for the automotive supplier. Shipping Control for Suppliers to the Automotive Industry addresses the requirements for both release orders and discrete quantity orders by generating a wide variety of planning reports, shipping documentation and reporting of completed shipping transactions, which assists suppliers in effectively managing and controlling their shipping operations.

Shipping Control for Suppliers to the Automotive Industry offers opportunities for new name and first system account sales as well as established data processing accounts in the automotive industry. It is intended for automotive suppliers starting with enterprise locations with at least 50 employees or 2 million dollars in sales, and ranging up to the size of manufacturing plants of the automotive companies.

DESCRIPTION

Shipping Control is an operator-oriented system for suppliers to the automotive industry. The system is designed to operate in conjunction with Release Control for Suppliers to the Automotive Industry (5725-M45), or as a stand-alone application interfaced to the customer's release order processing and/or discrete order processing systems through customer-supplied programs. The application is designed for the needs of the automotive supplier by incorporating both batch and interactive modes of operation. All reports and shipping documents generated in the application are designed to meet the needs for both the automotive original equipment manufacturers and the replacement market.

An installation guide provides a step-by-step installation activity plan including sample reports and maintenance user data forms, control forms with suggested procedures, and other information necessary for a successful installation.

The runbook provides the operator with the detailed instructions necessary to effectively operate Shipping Control and provide accurate and timely management reports for planning, controlling, reporting and documenting shipping activity.

HIGHLIGHTS

Provides key planning reports:

- Schedule and Status Report showing the daily shipping schedule for current week, behind schedule position, current release position and last shipment date and quantity.
- Load and Routing Report showing projected daily shipments in terms of net, tare and gross weight with the associated carrier and routing instructions.
- Container requirements reports showing detailed container requirement by customer and/or container part number.
Allows selection and printing of shipping documents in a batch mode or through interaction between the system and the operator.
- Picking slips may be printed in customer, part number, or location sequence.
- Load sheets selected in interactive mode allow the operator to view the customer's requirements and the total weight buildup as parts are assigned to the load.
- Shipper documents designed to meet the requirements of the original equipment manufacturer and the replacement market.
- Bills of Lading may be printed in the formats required for direct shipments or shipments through consolidation points.

Provides a wide variety of reports of completed shipping transactions. Data files of shipping transactions are available for interfacing to other applications areas through user-supplied programs.

Creates advanced shipping notification data files for most of the major automotive manufacturers. Audit reports of all generated files are provided.

Interfaces with Release Control for Suppliers to the Automotive Industry (5725-M45) without programming modification.

CUSTOMER RESPONSIBILITIES

The customer is responsible for the following:

- Making all decisions regarding the application processing options (refer to *Installation Guide* for a discussion of system options).
- Acquiring all forms and supplies.
- Gathering all master file data and generating all master files.
- Preparing schedules.
- Providing for installation assistance if required.

- Providing any programs which might be required to interface with existing user systems. Specifically, if discrete quantity orders are to be processed in the shipping application, the order file must be prepared in the proper format.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Shipping Control has been designed for a minimum configuration of IBM System/32 mdl A12. The IBM System/32 mdl B12 can be used if the printing of cut form bills-of-lading is not required. It is recommended that users of Shipping Control review with their marketing representatives their direct access storage requirements which are a function of the size of the master data files and transaction volumes. The size of the user's files will dictate the size of the disk storage capacity required. Listed below is a guideline which will be helpful in determining the user disk requirements.

Shipping Control for Suppliers to the Automotive Industry was designed to fit on the IBM System/32 with 5-megabyte disk capacity and the 80 cps Printer (mdl A22) assuming the following volumes:

1,700	Customer Master Records
800	Destination Master Records
1,000	ItemMaster Records
200	Routing Master Records
4,000	Order Records
800	Open Shipping Activity Records
450	Advanced Shipping Notification Records

These volumes are not restrictive but can be used as a guide to determine if the customer's shipping control system and files can be contained within the minimum system. The minimum IBM System/32 (mdl A12) is supported if the customer daily transactions can be handled by a 40-cps printer.

The file sizes set in the distributed OCL reflect these volumes for a 5-megabyte file.

Any changes to the file sizes should be carefully reviewed by the customer and IBM Systems Engineer to determine the necessity for more direct access storage, estimate of time required to convert OCL Procedures, and estimate of throughput performance.

SOFTWARE REQUIREMENTS

The programs in Shipping Control for Suppliers to the Automotive Industry are written in IBM System/32 RPG II and operate under the control of IBM System/32 System Control Program (5725-SC1). In addition, the IBM System/32 Utilities licensed program (5725-UT1) must be available for sorting of data (SORT) and Source Entry Utility (SEU) for making procedure or RPG II source program modifications.

If compilation of the RPG II source programs is required, the IBM System/32 RPG II Compiler (5725-RG1) must be available.

DOCUMENTATION

(available from Mechanicsburg)

Profit Building Resources from IBM for the Automotive Supplier (G580-0066) ... Shipping Control Licensed Program Design Objectives (GH30-0013) ... Release Control Licensed Program Design Objectives (GH30-0014) ... Runbook (SB30-0098) ... Installation Guide (SB30-0099).

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**SYSTEM/32 RELEASE CONTROL for
SUPPLIERS to the AUTOMOTIVE INDUSTRY
5725-M45****PURPOSE**

System/32 Release Control for Suppliers to the Automotive Industry provides the automotive parts suppliers with solutions to many problems associated with processing and maintaining release orders from the major automotive manufacturers.

Release Control offers a means of easily maintaining accurate release information which may be used to better manage the planning of shipments, fabrication activities and material acquisitions.

Release Control offers opportunities for new name and first system account sales as well as established data processing accounts in the automotive industry. It is intended for automotive suppliers starting with enterprise locations with at least 50 employees or 2 million dollars in sales, and ranging up to the size of manufacturing plants of the automotive companies.

DESCRIPTION

Release Control is an operator-oriented system for suppliers to the automotive industry. The system is designed to operate in conjunction with Shipping Control for Suppliers to The Automotive Industry (5725-M44), or as a stand-alone application.

An installation guide provides a step-by-step installation activity plan including sample input and user data forms for file maintenance, control forms with suggested procedures, and other information necessary for a successful installation.

The runbook provides the operator with information necessary to effectively operate Release Control to provide accurate and timely management reports.

HIGHLIGHTS

- Provides for key entry of release data with the ability to tailor the operator prompting to the specific release document.
- Provides for the processing of machine-readable release data as if it were key entered.
- Audit reports are printed showing release status before and after update.
- Processes shipping activity and adjustments to update release status and to maintain shipping history.
- Provides management reports in detail and summarized formats.
- Allows inquiry into the release and shipping history files for quick resolution of customer or supplier questions.
- Comes complete with source code, ready-to-execute procedures and object code.
- Is documented with an installation guide, application logic manual and an operator runbook.
- Provides for file maintenance to generate, list, update or delete master file records.
- Designed to interface with the Shipping Control for Suppliers to the Automotive Industry licensed program (5725-M44) without program modification.

CUSTOMER RESPONSIBILITIES

The customer is responsible for the following:

- Acquiring all forms and supplies
- Gathering all master file data and creating all master files
- Preparing run schedule
- Providing for installation assistance if required

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

Release Control has been designed for a minimum configuration of IBM System/32 mdl A12 (Matrix Printer) or B12 (Line Printer).

It is recommended that users of the IBM Release Control for Suppliers to the Automotive Industry review with their marketing representatives their direct access storage requirements which are a function of the size of the master data files and transaction volumes. The size of the user's file will dictate the storage capacity required.

The minimum system was designed to handle the following approximate volumes:

- 800 releases (customer/part number) with an average of three destinations each.
- 6,000 shipping history records, before a purge is necessary.

The file sizes set in the distributed OCL reflect these volumes for a 5-megabyte file.

Any changes to the file sizes should be carefully reviewed by the customer and IBM Systems Engineer to determine the necessity for more storage, estimate of time required to convert OCL procedures, and estimate of throughput performance.

SOFTWARE REQUIREMENTS

The programs in Release Control for Suppliers to the Automotive Industry are written in IBM System/32 RPG II and operate under the control of IBM System/32 System Control Program (5725-SC1). In addition, the IBM System/32 Utilities licensed program (5725-UT1) must be available for sorting of data (SORT) and Source Entry Utility (SEU) for making procedure or RPG II source program modifications. If compilation of the RPG II source programs is required, the IBM System/32 Compiler (5725-RG1) must be available.

DOCUMENTATION

(available from Mechanicsburg)

Profit Building Resources from IBM for the Automotive Supplier (G580-0066) ... Shipping Control Licensed Program Design Objectives (GH30-0013) ... Release Control Licensed Program Design Objectives (GH30-0014) ... Runbook (SB30-0095) ... Installation Guide (SB30-0096).

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

SYSTEM/32 CONSTRUCTION MANAGEMENT ACCOUNTING SYSTEM (CMAS)

JOB COSTING ... 5725-M61
ACCOUNTS PAYABLE ... 5725-M62
PAYROLL ... 5725-M63
GENERAL LEDGER ... 5725-M64

PURPOSE

The System/32 Construction Management Accounting System (CMAS) provides the construction industry with a complete, yet flexible method for managing their Payroll, Accounts Payable, Job Costing, and General Ledger.

CMAS offers opportunities for new name and first systems account sales in the construction industry. It is primarily intended for the general contractor with 1 to 7 million dollars in contracts per year, 25 to 250 employees; or the subcontractor with \$65,000,000 in contracts per year, 35 to 250 employees.

CMAS offers flexible applications specifically designed for the construction industry. CMAS key reports help construction management effectively direct and control their business.

The Construction Management Accounting System consists of four full function ready-to-execute applications. CMAS includes source code, object code and execution procedures.

HIGHLIGHTS

- Independent or interrelated applications approach
 - Modular design facilitates sequential application installation.
 - A journal reference numbering system ties the four applications together when multiple CMAS Applications are installed.
 - Single data entry results in multiple application update
- Wide variety of reports and report options included
 - Management Reporting is a byproduct of normal data entry
 - All applications provide for multicompany entries and reports
 - Field reporting allows for projecting profit and loss by job
- Uses recognized accounting techniques and terminology to provide a solid accounting system.
 - Clear audit trails and control techniques are provided
 - Sample user-oriented forms for data preparation, file creation and audit and control are provided
 - Security code deters unauthorized inquiry or execution of key programs in each application
- CMAS can be installed without customer programming capability
 - System tailoring procedure on-site to facilitate account growth changes
 - Display Screen input prompting and output report formats are tailored to meet specific customer requirements
 - Complete, system-controlled, operator oriented input prompting
 - Complete file maintenance and audit programs and procedures
 - Installation and operator self-study training exercises are provided to each customer

DESCRIPTION

The Construction Management Accounting System is a set of four independent, interrelated, ready-to-execute applications for the small to medium size contractor/subcontractor. The system combines two approaches - operator-oriented and batch reporting. This approach and programming system provides a sound accounting base by doing Payroll with Labor Distribution, Accounts Payable with Subcontract Accounting, Job Costing with Management Reporting and General Ledger with Financial Statements.

The four easy-to-operate programs may be installed in separate stages at different times and still be a totally interrelated system, that is, payroll data may be passed by the system directly to general ledger and job costing, etc.

Each application contains a requirements file with user questionnaire responses which allows the application to select input formats, report formats, and functions to suit each customer's needs. These responses are keyed in during initial installation and may be changed as customer needs change.

The systems tailoring procedure controls the prompting of input records and fields to be entered, the types of reports and fields on reports, and data files used for output.

Systems tailoring procedure is a procedure requesting the answers to a series of questions regarding a contractor's company requirements. Systems tailoring provides the following:

- Tailoring the system on-site at installation time

- Application reprogramming is not required as business changes because system tailoring parameters can be changed by the customer
- The programs contain all the announced functions, but only required functions are performed by the system
- Applications may be installed in any sequence
- System tailoring options include the following:
 - Multiple companies or single
 - Multiple states or single
 - Multiple unions or no unions
 - Custom formatting of Balance Sheets and Income Statements

An installation guide provides a step-by-step installation activity plan including suggested numbering systems, sample input and maintenance user data forms, control forms with suggested procedures, and other activities necessary for a successful installation.

The runbook provides the operator with activities necessary to effectively operate CMAS as an accounting system to provide accurate and timely management reports.

Two self-study guides lead the user through the installation guide, runbook, and associated materials to assist the self-sufficient customer.

JOB COSTING (5725-M61)

General Journal entries with cost distribution may be entered with distribution by company, job, pay item, cost code, and cost type.

Job Costing automatically updates the General Ledger component, if available. General Ledger is then updated on a monthly basis.

Job Costing is automatically updated by the Accounts Payable application, if installed. Payroll reports, when used with the Job Cost reports provide a total perspective of job status.

Job Cost management reports are provided with unit costs, budget comparison, and projected profit or loss based on field reporting of percent complete or quantity 'put-in-place'. Income reporting with distribution provides the basis for cash flow reports by company and by job.

ACCOUNTS PAYABLE (5725-M62)

Invoices and credit memos entered may be multiline and distributed by company, job, pay item, cost code, and cost type. The entries may consist of vendor, miscellaneous, estimated or subcontract invoices. Prepaid invoices are permitted on all of the invoice types. Credit memos may be entered manually or initiated automatically based on a prior enter invoice.

Subcontract accounting provides for automatic movement and accountability of retainage and change orders. Subcontracts are maintained on either a balance forward or open items basis. Subcontract status reports by job and by vendor denote the contract amount, change orders, billed amount and date, payment amount and date, retention, and taxes.

An accrued accounting system provides for timely job cost information, while a cash flow handling capability indicates job cash position through the general ledger.

The Accounts Payable application provides an Open Payable and Cash Disbursements function. An Open Payable report is provided in due date or vendor sequence. This turnaround document provides a mechanism to indicate payment by date, job, vendor, or invoice, including partial payments for Cash Disbursements.

Invoices may be entered or placed on hold status to prevent inadvertent payment of invoices in question.

A Cash Requirements report is used to assist the controller in insuring funds are available and proper invoice selection was made before the check writing procedure begins.

Check writing and reconciliation are provided. The check format provided includes a user-indicated check stub length to adapt the size of the remittance advice. Stub overflow initiates a separate supplementary stub.

An Accounts Payable trial balance is available in job or vendor sequence.

A Vendor Analysis Report indicates key business volumes by quarter and year.

PAYROLL (5725-M63)

This hourly/salary distributed payroll provides for regular, overtime, premium, vacation, sick and travel pay. It may be run weekly, biweekly, semimonthly, or monthly. Exception hours provide time and one-half, double time, double time and one-half, and triple time capabilities. Rate selection may be standard, selected by craft, or keyed in as an exception overtime or premium rate.

PROGRAM PRODUCTS

System/32 CMAS (cont'd)

- Clear audit and accounting procedures aid in maintaining an in-balance Payroll system.
- Handwritten checks (payoffs, special, etc.) are easily handled.
- Standard union deductions are used to prepare two standard union deduction reports. Multiple union reporting is supported.
- Workmen's compensation calculations and a workmen's compensation worksheet report provide a mechanism for weekly tracking of insurance premiums.
- A standard tax algorithm calculates federal, FICA, and all state income taxes based on customer-provided data. Local taxes may fit the standard tax algorithm provided.
- Deductions by percent, fixed amount, upper limit, and miscellaneous deductions.
- Taxable or non-taxable adjustments
- State Disability Insurance is calculated and reported.
- Federal Unemployment Insurance and State Unemployment Insurance are calculated and reported.
- Check writing and reconciliation are provided.
- A payroll journal provides a clear audit trail of entries to the CMAS General Ledger application.
- Labor cost management reports are provided with unit cost, budget comparison, and projected profit or loss based on field reporting of percent complete or quantity put-in-place. The reports are available with distribution by company, job, pay item, cost code, cost type, and job class.
- 941-A, W-2, and Certified Payroll reports are provided.

GENERAL LEDGER (5725-M64)

General Journal entries may be entered for end of month closings or for out-of-balance conditions.

Journal entries identified by journal names and numbers are indicated on the Financial Statement Worksheet and Trial Balance Listing. These entries are automatically accepted from the Payroll, Accounts Payable, and Job Costing applications.

On an out-of-balance condition, a procedure is provided to rearrange the entries into journal reference number sequence and print out a selective audit listing. This listing can be compared with the monthly journals to quickly identify the out-of-balance entry.

An Income Statement and Balance Sheet are standard report outputs which provide the user with the flexibility of defining these reports with an easy-to-use format description procedure. This definition may be changed as needs vary.

Financial reports can illustrate current financial data as compared to budget or historical information.

Users may define their own chart of accounts or use a suggested account structure provided with the application. The fiscal year start date is user defined.

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

This IBM System/32 program will execute on all models of the IBM System/32.

It is recommended that users of IBM Construction Management Accounting System (CMAS) review with their Marketing Representatives their direct access storage requirements which are a function of the size of master data files and transaction volumes. The size of the user's files will dictate the size of the storage capability required. Listed below are some guidelines which should be helpful in determining user disk requirements.

Distributed System for System/32 5 Megabyte file (1,968 Blocks)

Files	Number of Blocks*
System Control Programming	239
SORT Executable Code	34
CMAS Executable Work Units	98

*These block figures are for the System/32 feature only.

Application Files (Online all the time)

- Payroll System - 250 Active Employees Design 476
 - Payroll System File - 3 Records
 - Employee Master - 250 inactive, 250 active employees
 - Current Hours - 1,400 Distributions/Pay Period
 - Employee Deductions - 2,000 Deductions for active or inactive
 - Check Reconciliations - 1,250 Outstanding Checks (250 checks x 5 weeks)
 - Job Classifications - 65 Job Classes
 - Distribution - 160 Payroll Distribution Codes
 - Active Labor Cost Distributions - 700 Weekly Distributions
 - Union Master Deductions - 80 Union Deductions 10 Unions + (10 Unions x 7 deductions/union)
 - Monthly Union Deductions - 3,000 deductions
 - Tax Tables Federal/State/Local - 30 tax brackets (Federal, single, weekly, 10 \$ Brackets)
 - Employee State and Local Taxes - 2,000 Deductions with additional withholding (2 states x 2 locals x 500 active/inactive employees)
 - Insurance File - 155 Insurance company masters
 - Insurance Summary - 1,200 Employee Workmen's Compensation
- Accounts Payable - 1,200 checks design 401
 - Payables Systems File - 3 records
 - Active Vendor Master - 900 name and address
 - Checks Written - 1,200 check/month
 - Open Payables Distribution - 1,000 Outstanding Invoices with three distributions per invoice (3,000 records)
 - Active Subcontracts - 1,000 Subcontracts
 - Payables Work File - 1,400 Invoices and distributions
- Job Costing - 100 Job Vouchers/Month Design 117
 - Job Costing Systems File - 3 records
 - Job Work File - 400 Job Vouchers/Batch
 - Job Name Master - 240 Active Jobs
 - Job Cost Detail - 2,100 Costing Entries (Active Job Costing Distributions + Income Distributions)
- General Ledger - 200 Journal Entries/Month 389
 - General Ledger Systems File - 3 records
 - General Ledger Work File - 200 General Journal Entries
 - General Ledger Chart of Accounts - 800 accounts
 - Temporary General Ledger Account Transactions - 9,200 entries
 - General Ledger Format - 400 formatting records

Application Work Files Area

• (Loaded by Application)	208
• Paid for CMAS User	6
Total Blocks	1,968

The OCL and file sizes, as distributed, have been fixed at the maximum capacity with normal distribution for the 5 MB file.

Any changes to file sizes other than those shown above should be carefully reviewed by the customers and IBM System Engineering to determine the necessity for more storage, estimate of time required to convert OCL procedures, and estimate throughput performance.

The IBM System/32 disk is backed up by dumping the disk to multiple diskettes. IBM-supplied system programs are provided to the user on diskettes initially and should be retained by the user for backup. The user-created application data files must also be backed up on diskette. Users are required to provide their own backup diskettes for CMAS procedures, programs, and data files.

Number of User-Supplied Diskettes Required for Backing Up the System/32 Distributed System and Data Files

	System/32 Back Up*	
	Single Level	Double Level
Payroll	18	36
Accounts Payable	12	24
Job Costing	8	16
General Ledger	13	26
All 4 Applications	38	76

* Includes Backing Up: Daily Transactions; CMAS Machine-Readable Object Programs; Disk-Resident Application Files

It does not include SCP 5725-SC1, Utilities 5725-UT1, RPG II 5725-RG1 machine-readable materials (PID shipment) or any other programs, procedures, data files, and spare diskettes to replace damaged or worn diskettes.

The System/32 user will require either the sum of the backup diskettes for each application installed or 38 diskettes, whichever is less.

SOFTWARE REQUIREMENTS

The CMAS licensed programs are written in IBM System/32 RPG II and operate under control of IBM System/32 System Control Program (5725-SC1). In addition, the IBM System/32 Utilities licensed program (5725-UT1) must be available for sorting of data (SORT) and Source



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PROGRAM PRODUCTS

System/32 CMAS (cont'd)

Entry Utility (SEU) for making RPG II source program corrections. If compilation of the RPG CMAS source programs is required, the IBM System/32 RPG II Compiler (5725-RG1) must be available.

DOCUMENTATION

(available from Mechanicsburg)

CMAS Specification Sheets: ... Payroll (GC21-5120) ... Accounts Payable (GC21-5117) ... Job Costing (GC21-5119) ... General Ledger (GC21-5118) ... Job Costing: ... Installation Guide (SC21-7624) ... Runbook (SC21-7630) ... Accounts Payable: ... Installation Guide (SC21-7626) ... Runbook (SC21-7629) ... Payroll: ... Installation Guide (SC21-7625) ... Runbook (SC21-7268) ... General Ledger: ... Installation Guide (SC21-7623) ... Runbook (SC21-7631) ... Job Costing Reference Manual (LY21-0549) ... Accounts Payable Reference Manual (LY21-0548) ... Payroll Reference Manual (LY21-5110) ... General Ledger Reference Manual (LY21-0550) ... Construction Industry Brochure for System/3 (GC20-1999).

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS**SYSTEM/32 RPG II
5725-RG1****PURPOSE**

System/32 RPG II provides the following capabilities:

- RPG II Language Level
- System/32 Device Support
- Auto-Report
- Binary Synchronous Communications (BSC)

DESCRIPTION

RPG II Language Level: The RPG II language is supported as on the System/3 mdl 6. Overlays are automatically generated when necessary. Differences do occur due to different devices and SCP function.

System/32 Device Support: All the devices available on the System/32 are supported by System/32 RPG II, except the diskette drive. Through the use of System/32 OCL, the diskette drive is supported as an offline multivolume sequential input, output or update file. The shared input/output access method is also supported. The following expanded device support is provided:

- **SET/KEY Display Support:** The field light capability (System/3 mdl 6) has been replaced by a prompting capability which will use messages stored either in the program or the library to prompt the operator.
- **CONSOLE File Support:** Through the use of normally coded File Description and Input Specifications, the CONSOLE File (keyboard/display) is supported in a buffered interactive mode. The operator is prompted by field name, one field at a time.

All input is buffered and overlapped with processing. The program is coded to process records as from any other sequential input device.

Auto-Report: Auto-Report is included with the System/32 RPG II compiler and includes the following features:

- **Copy:** Specifications may be cataloged in the library and included in any RPG II program via the COPY statement. It is especially useful for cataloging the File Description and Input Specifications for which overrides may be coded to specify such things as control levels. By using the COPY statement, only one description of the file need be cataloged and changed for all programs using the file.
- **Page Headings:** Page headings can easily be specified on Output Specifications without the need for Output Indicators or end positions. The heading is centered over the report complete with page numbers and date.
- **Simplified Report Specifications:** A report may be produced by listing on Output Specifications the fields desired in the order desired. On one Output Specification, the field, column heading, and an indication for column totals may be entered. The column headings, fields, and column totals are automatically generated.

Binary Synchronous Communications (BSC): The Telecommunications Specification is supported in System/32 RPG II. Support of Binary Synchronous Communications will be provided by System/32 to communicate with:

- Another System/32 with RPG II
- System/34 with RPG II and Assembler
- System/3 with ML/MP, CCP or RPG II
- System/7 with MSP/7
- S/360 with any of the following:
 - BTAM
 - TCAM/NCP*
 - CICS/DOS, CICS/OS
- S/370 with any of the following:
 - BTAM
 - TCAM/NCP*
 - VTAM/NCP
 - CICS/DOS, CICS/OS, CICS/VS
 - IMS/VS
- S/360 mdl 20 with BSCA IOCS
- 3741 mdl 2 or 4
- A 3747
- A 5110 Computer System supported as a 3741 mdl 2 or 4
- 5231 mdl 2, Receive mode only. Supported as a 3741 mdl 2 or 4.
- 5280 Distributed Data System

- * **Note:** The 3704/3705 Emulation Program (EP) or the Partitioned Emulation Program (PEP) extension to 3704/3705 NCP can be used to emulate the 2701.

The BSC support for System/32 is supported on the host system as System/3 BSC.

The RPG II device names are DISK, PRINTER, CRT, CONSOLE, KEYBOARD and BSCA. The user indicators (U1-U8) may be turned on and off in the RPG II program. The status of these indicators may then be tested by OCL. The DSPY operation code is not supported. See

"System/32 Device Support" for the expanded definition of SET/KEY which replaces the function.

- Header specification entries have been added to specify UDATE formats of mm/dd/yy, dd/mm/yy, yy/mm/dd and to designate the edit character to be used with the Y edit code. The Shared I/O Access Method is supported. The MOVEA and SETLL operation codes are supported.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

System/32 RPG II supports all models of the IBM 5320 and the following special features:

- #1005 Additional Storage #2074 BSCA
- #1100 1255 Attachment #3200 Data Recorder Attachment

SOFTWARE REQUIREMENTS

A current version of IBM System/32 System Control Programming (5725-SC1) is required.

DOCUMENTATION

(available from Mechanicsburg)

Introduction to RPG II (GC21-7514) ... RPG II Additional Topics Programmer's Guide (GC21-7567) ... Disk Concepts and Planning Guide (GC21-7571) ... RPG II Disk File Processing Programmer's Guide (GC21-7566).

TERMS and CONDITIONS: See PP Index

**SYSTEM/32 MOTOR FREIGHT
ACCOUNTING SYSTEM (MFAS)
5725-T21**

PURPOSE

This application provides small to medium size general commodity or specialty motor freight carriers with a powerful aid in managing their business.

The MFAS Revenue Accounting IAP offers conventional revenue accounting functions to the small and medium size general commodity and specialty carrier in the motor freight industry. These functions are divided into the five categories of (1) Freight Bill Entry and Daily Reports, (2) Accounts Receivable, (3) Interline Payables, (4) Shipment Analysis, and (5) Owner/Operator Accounting.

The application is designed to help the general freight and specialty carrier manage revenue accounting requirements and report prime motor freight sales and operational data.

The entry of data from a coded copy of the freight bill establishes records for daily statistical reporting, accounts receivable, interline payables, shipper/consignee and interline statistics and shipment analysis.

The entry of the owner/operator accounting data produces records of owner/operator freight bill revenue, expenses, charges, advances, and settlement amounts. Owner/operator accounting will also produce settlement sheets detailing those items used in settling with the owner/operator. Owner/operator accounting is by owner and/or driver or unit.

HIGHLIGHTS

- Wide variety of reports and report options included:
 - Management and operational data reporting is a byproduct of normal data entry
 - Detail or summary listings within a range of keys is supported in many reports
 - Statements for freight bill accounts receivable optionally printed on stock paper or preprinted forms with or without tear off portion for turnaround document.
- The Motor Freight Accounting System can co-reside in the System/32 with the Distribution Financial Accounting System and all application areas with the exception of owner/operator accounting can supply data to general ledger.
- Uses recognized accounting techniques and terminology to provide a solid accounting system:
 - Clear audit trails and control techniques are provided
 - Sample user-oriented forms for data preparation, file creation, audit and control are provided
 - Security code deters unauthorized execution of programs
 - A journal reference numbering system supplies an audit trail for any area that generates transactions for the DFAS General Ledger
- Can be installed without customer programming capability:
 - System tailoring procedure facilitates account growth by allowing on-site changes to file sizes and determination of functions used
 - File maintenance and audit procedures provided
 - Detailed runbook
 - Operator self-study course is available
 - Step-by-step installation activity plan provided by the *Application Reference Manuals*
 - User's information supplied to the supervisor by the *Application Reference Manuals*

DESCRIPTION

The Motor Freight Accounting System is a ready-to-execute application for the small to medium size motor carrier.

The system uses the Data File Utility as its data entry approach. Support is provided for transaction entry through the System/32 keyboard or through a diskette keyed offline on a 3740 Data Entry System. The Motor Freight Accounting System Revenue Accounting IAP can be installed with the Distribution Financial Accounting System General Ledger, Accounts Payable, and Payroll IAPs in separate steps, at different times and be an interrelated system.

The System Tailoring Procedure utilizes the answers to a series of questions regarding a carrier's requirements. It provides the following:

- Tailoring the application on-site at installation time.
- Allows the users to change selections of provided functions as the business changes.
- All provided functions are included in the programs but only required functions are executed.
- File sizes may be expanded or contracted as needed by rerunning the System Tailoring Procedure.

Volume 1 of the *Application Reference Manual* provides a step-by-step installation activity plan including sample input and maintenance data forms, file loading sequences, and control forms with suggested procedures. Volume 2 of the *Application Reference Manual* provides information on the day-to-day use of the application.

The *Runbook* provides the operator with a detailed set of instructions showing all the activities necessary to run the procedures on a System/32. The Operator Reference Summary Card is provided for the operator as a reminder of the major operational functions of each procedure. It is intended to be used once the operator is thoroughly familiar with the particular procedure.

Instructional material with exercises is provided to train the operator in the use of the *Runbook*.

An *Application Logic Manual* is provided, for use by the self-sufficient customer and for systems engineering continuing support. It describes the architecture of programs, procedures, data base cross references, data dictionary, and detailed descriptions of each program.

Application Description: The Motor Freight Accounting System is a full function, ready-to-execute application. Included are Source Code, Object Code, execution procedures, and the *Application Logic Manual*.

These are some general features which the Motor Freight Accounting System has:

- Designed to fit industry requirements
- Security codes to deter unauthorized use of master files
- In-house inclusion/exclusion of functions to be executed
- OCL procedures, Sort specifications, and processing programs are packaged into logical work units which simplify system operation
- Monitoring of execution sequence prevents execution of a program until preceding required programs have been completely and successfully executed
- Compatible online/offline data entry through the System/32 console or by means of diskettes keyed offline on a 3740 Data Entry System.
- Dynamic Backup and Recovery System forces periodic backup of master files and edited transactions and keeps track of what procedures need to be rerun from the last backup point to recreate up-to-date master files
- Reprint options are possible because file updating is separated from report writing functions
- Selective printing options are available for many report functions

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

The IBM System/32 Industry Application Program feature will execute on all models of the IBM System/32 which have 24K bytes of main storage. The programs are compiled assuming a 24K system. Because of volume and time constraints, there may be a requirement for providing offline keying on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-character record features (128-character feature #5455 and feature group A #4004).

SOFTWARE REQUIREMENTS

The application programs are written in IBM System/32 RPG II Programming language and execute under control of the IBM System/32 System Control Programming (5725-SC1 Version 5). IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the programs. The IBMSystem/32 RPG II Compiler (5725-RG1) is required if modifications to the source code are necessary.

DOCUMENTATION

(available from Mechanicsburg)

Runbook (SB30-0111) ... *Reference Manual Vol. 1* (SB30-0112) ... *Reference Manual Vol. 2* (SB30-0113) ... *Logic Manual* (LB30-0114).



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PROGRAM PRODUCTS

System/32 MFAS (cont'd)

Education:

Industry Marketing Education Self-Study Binder (ZR30-0202) ...
Industry Marketing Education Self-Study Workbook Vol 1 (SR30-0203) ...
Industry Marketing Education Self-Study Workbook Vol 2 (ZR30-0207) ...
Industry Marketing Education Audio Cassettes (ZV30-0098).

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index



PROGRAM PRODUCTS

**SYSTEM/32 UTILITIES
5725-UT1****PURPOSE**

The following utilities are provided with the Utilities licensed program:

- Data File Utility (DFU)
- Sort
- Source Entry Utility (SEU)

The following data base management functions are provided as part of DFU:

- Data File Creation and Maintenance
- Data File Inquiry
- Data File List

DESCRIPTION

All functions of the above utility take advantage of cataloged RPG II File Description and Input Specifications. To use any of the functions, the user need only know the name of the file and the name of the cataloged RPG II specifications. The functions will prompt for all the other information necessary to tailor the job to the user's task. Field names are included with the prompts to aid the user in selecting the data fields to be used.

Data File Creation and Maintenance: This function provides the necessary capabilities to create and maintain data files in a data base. Maximum use is made of the display to prompt the operator by field name for the data to be entered. For update, the data currently in the field is displayed. This function operates only with indexed sequential files. Highlights include:

- Formatted Report for an Audit Trail
- Auto-Duplication of Fields
- Control Totals
- Generated Keys
- Modulus 10 and 11 Self-Check Digit

Data File Inquiry: This function provides the necessary capability to allow inquiry into a file. Any indexed file may be inquired into. The records are displayed showing the current status of the information in the file. Highlights include:

- Retrieval by record key
- The capability to roll forward or backward in key sequence through the file.
- The ability to optionally print a record with the 'PRINT REC' command key.
- All displayed fields include column headings for easy identification.

Data File List: This function provides the capability to list and summarize selected information from any indexed or sequential file in the data base. The function is very useful for obtaining one-time reports and for creating recurring management reports. Highlights include:

- Page headings including date and page number
- Column headings
- Edited data fields
- Column totals – both final and subtotals
- Selection based on record codes and/or field values
- Sort-Ascending or Descending
- Summary list with totals only
- Retrieve and print data from a related file
- Calculate and print additional fields

Sort: The System/32 Sort utility provides the function and capability of the proven System/3 Sort. Highlights include:

- Selection based on field contents: for example, record codes
 - Support of any data field
 - ADDROUT (Tag) Sort
 - Summary Sort
 - Automatically allocated work file
 - Ascending or descending sequence

Source Entry Utility (SEU): SEU can be used to create and maintain OCL procedures, RPG II and FORTRAN IV source statements and SORT source statements. Highlights include:

- Sort formats to aid in entering Sort statements.
- RPG II and Auto-Report formats to aid in entering RPG II and Auto-Report statements.
- Optional RPG II and Auto-Report syntax checking
- Optional resequencing of statements in library.

- The ability to move statements around in a program.
- The ability to include statements from another library member.
- The ability to delete statements.
- Statement insertion.
- Rolling forward or backward through cataloged statements.
- Optional listing of statements.
- Use of display to show statement being entered or updated.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

IBM System/32 Utilities licensed program supports all models of the IBM 5320 and #1005 Additional Storage.

SOFTWARE REQUIREMENTS

A current version of IBM System/32 System Control Programming (5725-SC1) is required to support IBM System/32 Utilities licensed program (5725-UT1).

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**SYSTEM/32 FILE CONVERSION UTILITY (FCU)
5725-UT2****PURPOSE**

The File Conversion Utility (FCU) is a stand-alone System/32 utility accepting input from and providing output to 5321 Magnetic Card Unit or fixed disk (Link Direct Access Method [LDAM], sequential, direct or indexed sequential file organization).

DESCRIPTION**Functions**

- Convert numeric fields to packed, unpacked or signed binary.
- Convert monospace EBCDIC characters to lowercase or to proper noun (characters following blank or hyphen and first character of field converted to uppercase; all others converted to lowercase).
- Convert lowercase EBCDIC to uppercase.
- Format numeric data for word processing (insert minus sign, insert decimals, right or left justify, suppress leading zeroes and trailing blanks).
- Resequence fields in an output record
- Insert constant data.
- Process selected records (include or exclude based on field comparison).
- Display audit totals (sum, maximum and minimum) for packed or unpacked numeric fields over an entire file.
- Combine a primary Magnetic Card, LDAM or System/32 file with a secondary input file to produce a merged output file. (The secondary file must be indexed by a field in the primary file.)
- Can process up to 512-byte records.
- Support all System/32 Keyboard/Display character sets for update. Supports Magnetic Card data.
- Access variable-length fields separated by field separator characters.
 - Proper noun conversion exceptions. Names requiring nonstandard capitalization (such as von Fleet, McKinley, O'Connor) can be properly converted to upper/lowercase by defining special conversion specifications.
 - Abbreviation expansion.
- LDAM records up to 512K bytes can be processed when 24K bytes of main storage are available.

User instruction and/or input is provided the utility through data specification forms similar to forms used by RPG.

This utility provides support for the sharing of stored information between application programs. The utility provides the user with the capability of converting a file formatted for IAP or data processing applications to a format acceptable to the word/text processing applications. Similarly, data entered into Document Libraries can be used by other data processing programs after conversion by the utility (each user installation requires analysis for limitations).

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

IBM System/32 File Conversion utility supports all models and features of the IBM 5320. For IBM 5321 Magnetic Card Unit support to LDAM support, the Word Processor feature. (#6002) on 5725-SC1 is required. 24K bytes of main storage is required for processing records greater than 256 bytes.

SOFTWARE REQUIREMENTS

A current version of IBM System/32 System Control Programming (5725-SC1) is required to support IBM System/32 File Conversion Utility (5725-UT2).

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**SYSTEM/32 STATISTICAL SYSTEM
5725-XA1****PURPOSE**

The System/32 Statistical System is a set of routines offered for use by Problem Solvers to satisfy their needs in statistical data analysis. This licensed program is a set of four major tools: Stepwise Linear Regression Analysis, Factor Analysis, Analysis of Variance, and Orthogonal Polynomial Curve Fitting.

This flexible statistical system accepts user-supplied commands and data which instruct the system to perform one or more of the above analyses. Many options are available to the user, as described below.

- Orthogonal Polynomials Curve Fitting - derivatives can be obtained ... polynomials can be reentered for evaluation at a specified set of points.
- Analysis of Variance - four factors are allowed ... balanced designs can be analyzed, using factorial techniques ... a program for arranging the Analysis of Variance table to conform to specific design needs is included.
- Factor Analysis - twenty-five variables are allowed ... eigenvalues produced using the QR algorithm matrix output from programs can be used as input for later analyses ... orthogonal and oblique reference frames are possible.
- Stepwise Linear Regression Analysis - matrix output can be used and pooled with other matrices for use as input in later analysis ... twenty-five variables are allowed ... deletion and entry of variables are automatic.

In addition, many output report options may be selected by the user.

HIGHLIGHTS

- Data input to the Statistical System can be entered from the keyboard at the time of execution or read from the disk (stored from a previous run) or read from disk where the data had been created offline and transferred from diskette.
- Output to be retained will be saved on disk.
- Although FORTRAN coding knowledge is desirable, it is not required to use the Statistical System.
- Prompting messages on the display device will aid the user in selecting options available.
- Interactive response is provided for the user via the keyboard.
- Error checking and associated messages will be furnished.

CUSTOMER RESPONSIBILITIES

This program is distributed in machine-readable form (diskette). It is the customer's responsibility to provide for safekeeping of the diskette to ensure continued operation (back-up). A *User's Guide* is also provided. Procedures for installation are furnished.

SPECIFIED OPERATING ENVIRONMENT:**HARDWARE REQUIREMENTS**

The IBM System/32 Statistical System is designed to operate on all models of the IBM System/32.

The IBM System/32 Control Storage Increment (#1500) is required.

FORTRAN graphics on IBM 5320 B and C models are provided by the 64-character EBCDIC print belt or by a new 48-character FORTRAN print belt. This new belt is recommended and may be ordered as #9492 as the belt provided with the system, or as feature #5552 as an additional print belt.

IBM 5320 A models automatically provide FORTRAN graphics.

SOFTWARE REQUIREMENTS

The IBM System/32 System Control Programming (5725-SC1), Version 6 or later is required.

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

**SYSTEM/32 RETAIL DATA PREPARATION
5725-XA2****PURPOSE**

The System/32 Retail Data Preparation licensed program is designed to satisfy the basic functional requirements of retailers. It is available for a System/32 with 32K. It provides flexible, ready-to-execute programs specifically designed for processing transaction log data produced on 5265 Point-of-Sale Terminals.

HIGHLIGHTS

- Transaction data may come from diskettes created on 5265 Point-of-Sale Terminals (TP or hand carry).
- Processing frequencies are user-specified, governed only by file capacities and execution of prerequisite programs.
- File sizes can be periodically reallocated.
- Process-convert-separate transaction log data.
- Establish control counts.

Publications: The *RMAS General Information Manual* contains a description of RMAS and its application features and functions as they may be used by a typical customer. It contains three sections. The first introduces IBM's retail offering, as it pertains to the 5265 terminals, with special attention to the licensed programs, of which Data Preparation is the only one for System/32. The second provides more detailed information on the major functions and operations associated with the application programs. The last section reviews installation and planning tasks, and customer responsibilities.

The *Data Preparation User's Guide* provides the technical planning, reference, and operational information needed to understand, install, manage, and use Data Preparation.

A *Logic Manual* is provided, as licensed material, for use by the self-sufficient customer and for the systems engineer in maintaining and modifying Data Preparation. The *Logic Manual* contains information on naming conventions, controls, program functions and specifications, problem determination and resolution steps and other application-independent information. In addition, the *Logic Manual* will contain information that is relevant to the application, such as program descriptions, cross-reference lists and data dictionary.

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance, in the installation of IBM licensed programs. However, the responsibility for personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/32 licensed programs is a customer responsibility.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

The minimum system configuration is an IBM System/32 consisting of:

- IBM 5320 System Unit mdl A01 (with 3.2 megabytes of disk storage)
- Two #1005 Additional Storage special features (to 32K)

Although there is nothing inherent in the design of the IBM System/32 Retail Data Preparation program to prevent the use of the minimum system configuration stated above, the system configuration for a particular customer must be able to accommodate the expected business volumes, data base size, and operating requirements.

The amount of disk storage required is influenced by:

- The volume of daily transactions
- The frequency of processing

SOFTWARE REQUIREMENTS

The IBM System/32 Retail Data Preparation programs are written in IBM System/32 RPG II programming language and execute under control of the IBM System/32 Control Program (5725-SC1) (Version 8 or later). The IBM System/32 Utilities licensed program (5725-UT1), which includes Sort, Data File Utility, and Source Entry Utility, is required for execution of the programs. The IBM System/32 RPG II compiler (5725-RG1) is required if modification of the source code is desired.

DOCUMENTATION
(available from Mechanicsburg)

5260 Introduction (GA21-9284) ... RMAS General Information Manual (GH30-0136) ... Executive Brochure (G580-0201) ... Product Brochure (G580-0202) ... Industry Segment Brochures: ... Department/Discount Stores (G580-0203) ... Specialty Stores (G580-0204) ... Drug Stores (G580-0205) ... Apparel/Shoe Stores (G580-0206) ... Hardgoods Stores (G580-0207) ... Home Furnishing Stores (G580-0208)

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

**SYSTEM/32 SUBROUTINE LIBRARY - MATHEMATICS
SL-MATH (5725-XM1)****PURPOSE**

The Subroutine Library - Mathematics (SL-MATH) is a set of basic computational subroutines for the solution of mathematical problems. It includes a wide variety of subroutines, but is not exhaustive in terms of either functions performed or methods used. It provides powerful tools for the solution of many problems in industry, science, and engineering. The subroutines, which are designed as computational building blocks, operate on data that resides in main storage.

Included are three subroutines dealing with optimization. The solution of a standard linear programming problem by (1) the revised simplex method with bounds and ranges and (2) the revised dual simplex method is provided. The third optimization subroutine provides for the solution of a capacitated network flow problem (generalized transportation problem). Sample programs will be provided for two of the optimization subroutines.

HIGHLIGHTS

Some of the characteristics of SL-MATH are:

- The subroutines are purely computational in nature. They do not contain references to external devices, but operate exclusively on data already contained in main storage. The user must prepare a main program calling the SL-MATH subroutines and must furnish, as part of this program, the input/output and, possibly, other operational routines for the total solution of the problem.
- All subroutines comply with the FORTRAN IV conventions. They are called by means of the FORTRAN CALL statement, and are executed according to the normal rules of FORTRAN IV.
- The numerical mathematics part often provides multiple algorithms for one problem class, allowing the user to choose the method appropriate to the specific problem.
- Certain classes of errors are detected and flagged. The program takes appropriate action and warns the user.

CUSTOMER RESPONSIBILITIES

The Subroutine Library - Mathematics is distributed in machine-readable form (diskettes). It is the customer's responsibility to provide for safekeeping of the diskettes to ensure continued operation (back-up). A *User's Guide* is also provided. The user must be familiar with FORTRAN and must prepare a main program.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

The storage requirements for a specific problem will depend on the routines used, the size of the main program, and the data storage requirements. The IBM System/32 Control Storage Increment (#1500) is required.

FORTRAN graphics on IBM 5320 mdl B and C models are provided by the 64-character EBCDIC print belt or by a new 48-character FORTRAN print belt. This new belt is recommended and may be ordered as Specify #9492 as the belt provided with the system, or as feature #5552 as an additional print belt.

IBM 5320 A models automatically provide FORTRAN graphics.

SOFTWARE REQUIREMENTS

The SL-MATH subroutines require the following:

- IBM System/32 System Control Program (5725-SC1) Version 6 or later is required.
- IBM System/32 FORTRAN IV (5725-FO1)

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**SYSTEM/32 WORD PROCESSOR/32
5725-XX1**

PURPOSE

The Word Processor/32 (WP/32) licensed program provides a set of office-related word processing functions to process text information from a keyboard, store it in document form, and operate on and print this information in a batch mode.

DESCRIPTION

Word Processor/32 (5725-XX1), combined with the System/32, offers a comprehensive office data and word processing system.

The Word Processor/32 licensed program provides programming that supports System/32 word processing features:

- 5321 Magnetic Card Unit
- Dual Case Keyboard/Display with keys and functions corresponding to standard typewriter keyboards
- Print features, including superscripting and subscripting

This combination of licensed program and System/32 hardware features provides a comprehensive systems solution for:

- Document and letter generation from stored and original text
- Document editing at the magnetic card typewriter or via batch edit
- Creation, maintenance, sequencing, and selection of lists used for mass mailing or miscellaneous administrative support
- Sharing data for word processing and data processing use
- Production statistics reports

It provides functions ranging from automatic printing of data from magnetic cards prepared at a magnetic card typewriter, to comprehensive formatting and editing of long documents stored in a document library on the System/32 nonremovable disk storage facility.

Word Processor/32 will execute with System/32 System Control Program (SCP), 5725-SC1. SCP feature #6002 is required.

HIGHLIGHTS

- Existing functions of the Magnetic Card Selectric® typewriters are enhanced by providing automatic printing and extended word processing functions on the System/32.
- Multiple input media
 - Magnetic cards recorded on (standard features supported):
 - Magnetic Card Selectric®
 - Magnetic Card II
 - Magnetic Card/A
 - Magnetic Card Executive®
 - Communicating Magnetic Card Selectric® (in nonteleprocessing mode)
 - Format Feature on Magnetic Card II and Magnetic Card/A for input or output
 - Standard System/32 keyboard redefined to support one of twelve-character arrangements (requires Dual Case Keyboard and Display feature #3400.)
 - Diskette created on 3741 or 3742 in monospace or upper/lowercase convention. (3742 requires the 28-character blocking feature #5455).
- Comprehensive document formatting including:
 - Stored formats for standard settings such as margins, tabs, line spacing, page length, etc.
 - Headings and footings
 - Page numbering
 - Footnote control and numbering
 - Line numbering
 - Automatic pagination control including ability to keep blocks of text together or reserve white space on a page (for insertion of figures and tables) and controlled start/end of pages (sections, chapters, etc).
 - Right margin justification
 - Line ending adjustment to accommodate change (no adjust is an option).
 - Centering
 - Superscript/Subscript, Word Underscore
- Document Generation from a combination of original text and prestored text. Documents can range from simple letters built from paragraphs to multi-page specifications.
- Media Handling Efficiency through storage and retrieval of documents from System/32 nonremovable disk.
- Insertion of variables at designated places within text, such as tailoring a form letter with name and address and personal comments.
- Decimal Arithmetic performed on numeric symbol values.

- Keyboard efficiencies including:
 - Automatic paragraph and section numbering
 - Encoding/Expansion using three character 'symbols' to generate long names or phrases commonly used
 - Global change
 - Support of tables with:
 - Easy definition and entry
 - Headings centered on columns
 - Headings repeated on multipage tables
 - Blank space optionally padded with fill characters
 - Right, left, and decimal alignment
 - Automatic layout of table between margins
- Forms fill-in with prestored definition of form and position of variables
- Mass mailing including:
 - Conditional generation of paragraphs or whole letters based on a test or comparison
 - Easy definition and edit of name and address files
 - Sequencing of letters; for example, into zip code order
 - Direct access to contents of a System/32 data processing file with data conversion to a format suited to text printing (unpacked, commas inserted, decimals inserted, names converted to upper/lowercase, etc.)
- Preparation of code-compatible magnetic cards for revision or payout at a magnetic card typewriter, except proportional spacing at Magnetic Card Executive.
- Revision of disk-resident text with editing instructions entered from magnetic card, System/32 keyboard, or diskette created on 3741 or 3742. Change list printed during edit provides ease of proofing. Author/operator 'comments' or instructions can appear in proof copy with automatic deletion in final print.
- Production statistics control information trailer sheet printed at the end of each task giving as appropriate: Date, operator, author, department, task name, number of output pages, number of output cards, number of input lines.
- Production statistics reports printed daily, weekly, or monthly detailing production volumes and system utilization by author, department, and job, including year-to-date summary.
- Administrative lists (personnel listings, telephone directories, sales and inventory summaries, document logs of location of incoming and outgoing correspondence, etc.) supported by:
 - Formatting and printing of lists with headings, page numbers, etc.
 - Word processing-oriented definition and update of lists
 - Sort and selection of lists via typist-oriented commands
- Document security prohibiting read/write access by unauthorized WP/32 users
- Alternate use of the System/32 for word processing and data processing applications

CUSTOMER RESPONSIBILITIES

- Document security including Security Key assignment and Document Class assignment
- Manual operations and backup procedures
- Data conversion
- Implementor, system operator, and typist training
- Installation of hardware and prerequisite programs
- System/32 operation
- Installation of the licensed program

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

IBM System/32 with at least 3.2 million bytes of disk storage, 50 lpm line printing speed, and 16K bytes of main storage capacity (an IBM 5320 System Unit mdl B or C).

SOFTWARE REQUIREMENTS

This Word Processor/32 licensed program is distributed as IBM System/32 load modules. It is released to execute with Version 6 of the IBM System/32 System Control Program (SCP), 5725-SC1, and all subsequent versions and modifications unless so stated in a future revision of this document. Some production statistics report generation programs are written in RPG.

SCP feature #6002 is required.

Notes:



PROGRAM PRODUCTS

Word Processor/32 (cont'd)

1. There is no increase in printing throughput on C model systems over B model systems for Word Processor/32 applications.
2. Some applications executing complex PRINT task in a 16K main storage environment may exhaust available main storage. If this occurs, it will be called to the attention of the IBM System/32 operator by a message, and will require the operator to rerun the PRINT task preceded by a PROOF task. The print speed, when executing most print tasks, will be less than rated printer speed. The speed of printing is dependent upon factors such as memory size and the complexity of the task formatting requirements of the application.
3. Thorough evaluation of each prospect's throughput and file sizing requirements must be made prior to proposal of either 16K main storage or 3.2 million bytes of fixed disk storage, or both.

Support is provided for the following:

IBM 5321 Magnetic Card Unit
IBM 5321 Magnetic Card Unit Attachment
Dual Case Keyboard and Display
Half Line Space
48-character EBCDIC Print Belt
64-character EBCDIC Print Belt
96-character Artisan Print Belt
96-character Modified Courier Print Belt

Magnetic Card Typewriters supported by Word Processor/32 must have the Paragraph Indent Feature.

DOCUMENTATION
(available from Mechanicsburg)

Product Flyer (G580-0095) ... Executive Brochure (G580-0094).

TERMS and CONDITIONS: See PP Index

SYSTEM/32 LETTER WRITING APPLICATION 5725-XX2

PURPOSE

System/32 Letter Writing Application licensed program provides the System/32 user with the additional data processing capability of printing personalized letters for large volume distribution. The Letter Writing Application licensed program is directed toward the user with a System/32 installed or on-order, whose primary volume letter generation or response is nonexistent or presently done by means of preprinted forms or flyers.

DESCRIPTION

The Letter Writing programs produce a letter in upper and lower case with the ability to insert name and addresses into the address line, and other variable information into the body of the letter. When inserting variable information, the text line is spread, the phrase inserted, and unnecessary blanks deleted. The resulting line length must not exceed 80 positions or data will be lost. A maximum of 73 phrase characters, including phrase separator (>), blanks, and shift designator (-), can be entered for any one name and address record for insertion into the body of the letter. Multiple phrases are separated in the phrase field of the name and address record by the phrase separator (>), and are used sequentially as phrase insert characters. Logical OR symbols (| - upper shift 1) are encountered in the letter text. Labels can be produced from the Name and Address File as one-, two- or three-up across the page for mailing purposes. A statistical detail or summary report may be printed showing the number of name and address records on file by zip code or one of two user-specified codes (5 alphanumeric positions each).

The system has three primary files, a Name and Address file, a Letter Text file and a Title Table file.

The Name and Address file contains first and last name, address information, a letter code, a title code and 2 user codes. It also has space for limited phrases which may be inserted automatically into the body of the letter. The letter code specifies which letter, from the Letter Text file, the individual is to receive. This code may be changed if desired, so that all addresses in the name and address file get the same letter.

The Letter Text file contains fixed format text lines along with control information for the selection of salutation format (casual or formal), letter style, tab stops, date location and spacing, and name and title default values, if they are not present in the name and address record. The casual format allows use of first names or nicknames in the salutation line while containing the surname in the address name line. Suffixes to the last name (Jr., Sr., etc.), may be specified to print on the name line but omitted from a formal salutation.

The Title Table file contains thirty-six titles which may be specified in the name and address record by a title code. This information is automatically inserted into the name line of the address and salutation line, if desired.

File creation is in the form of diskettes from the 3740 Data Entry System or through the System/32 keyboard. Maintenance is via the System/32 keyboard only.

Text changes to the Letter Text file are limited to one line at a time. All text changes to the Letter Text file are done as a replace function. This means that the entire line displayed on the CRT, a maximum of 40 characters including blanks, must be retyped. (40 characters represents 1/2 line.) Changes to the Name and Address file are handled in the same manner on a field by field basis.

HIGHLIGHTS

- Full operator guidance through interactive CRT prompting for ease-of-use.
- Input from either the System/32 keyboard or diskettes from the 3740 Data Entry System. Maintenance is from System/32 Keyboard only.
- Routines for creation and maintenance of name and address records and their translation into upper/lowercase characters.
- Routines for creation and maintenance of text files made up of multiple letters and their translation into upper/lowercase characters.
- Routines for creation and change of title table file, which contains up to 36 title descriptions for insertion into the name line.
- Letters printed in block, modified block, or personal format.
- Casual or formal salutation.
- Variable phrase insertions into the body of the letter from the phrase field of the name and address record.

- User codes in the name and address record.
 - A three-position letter identification code in the name and address record to specify the letter to be printed from the letter text file.
 - Two user codes of 5 alphanumeric positions each in the name and address record to allow selective processing and sorting by user-defined data when printing labels or letters.
- Selective printing of letters from the text file by a letter identification code in the name and address record.
- Label printing 1-, 2-, or 3-up with optional print alignment pattern.
- Selective printing of labels or letters for any valid range of zip codes, or range within one of the two user-specified codes.
- Additional selective printing capability for restart of letters or labels (skip X number of records, print Y number of records).
- Sort and print labels or letters in sequence by zip code, or one of two user codes, or original entry sequence.
- Print total at the end of each label or letter run to show the number of labels or letters printed.
- Print a brief statistical report showing detail or summarized total for name and address records on file, by zip code, or one of two user-specified codes.
- Print report listing for all, or selected, labels or letters.

CUSTOMER RESPONSIBILITIES

The customer is responsible for the following:

- Personnel selection and training: The customer is responsible for selecting at least one person who will oversee the installation and at least one person to assume the duties of an operator. The customer is also responsible for the coordination and education of the various departments affected by the installation.
- Providing for installation assistance if required and completing the file sizing necessary to insure adequate disk space for proper installation.
- Acquiring all forms and supplies.
- Making all decisions regarding the application processing options or user codes in the name and address records.
- Gathering data for name and address file and generating all master files.
- Providing any programs that may be required to interface with existing user programs, PPs or IAPs.

SPECIFIED OPERATING ENVIRONMENT

Due to the unique upper and lower case printing requirements of IBM System/32 Letter Writing Application, throughput performance will not be enhanced by upgrading from an IBM 5320 mdl B2X to a mdl B3X. However, the joint letter writing/data processing user may require a mdl B3X for increased throughput when using a monospace print belt for data processing applications.

It is recommended that IBM representatives review their direct access storage requirements with their customers that have the System/32 Letter Writing Application. Storage requirements are a function of the size of the master data files and transaction volumes. The size of the master files will also dictate the size of the diskette storage capacity required.

The Letter Writing Application was designed to execute on all B and C models of the IBM System/32. The following file capacities are programmed into the Letter Writing OCL statements:

- 1,898 name and address records (256 characters each) in the Name and Address file
- 1,898 lines of text (96 characters each) in the Letter Text file
- 36 records in the Title file

With the above file size allocations, the Letter Writing Application requires a minimum of 478 blocks of available data file area on the system's fixed disk for proper execution. This space is required only while using the Letter Writing Application, and may be returned for the use of other applications after Letter Writing tasks have been completed.

The above file volumes are not restrictive but can be used as a guide to determine if the Letter Writing files can be contained within the system where other Application files are also online. Further information regarding disk allocation, diskette requirements, and file size modifications are contained in the *Application Reference Manual/Runbook* (SH30-0207).

Any changes to file sizes should be carefully reviewed by the customer and IBM Systems Engineering to determine the necessity for more storage, estimate the time required to convert OCL procedures, and estimate throughput performance.

System/32 Letter Writing Application (cont'd)**HARDWARE REQUIREMENTS**

This IBM System/32 licensed program was designed to execute on all line printing B and C models of the IBM System/32. Matrix printing is not supported. In addition to the system, a 96-character print belt (RPO #GG0339) is required for the upper/lowercase type. Program maintenance may be performed on all models of the IBM System/32. Dual Case Keyboard and Display (#3400) for the IBM System/32 is not supported by the IBM System/32 Letter Writing Application.

SOFTWARE REQUIREMENTS

The Letter Writing programs are written in IBM System/32 RPG II and operate under control of the IBM System/32 System Control Program (5725-SC1). In addition, the IBM System/32 Utilities licensed program (5725-UT1) must be available for sorting of data. If procedure and source program modifications are to be made, Source Entry Utility (SEU) must be installed.

If compilation of the RPG II Source Programs is required, the IBM System/32 RPG II Compiler (5725-RG1) must be available.

System and File Backup: The System/32's disk is backed up by dumping the disk to multiple diskettes. IBM-supplied system programs are initially shipped to the user on IBM-provided diskettes which should be retained by the user for backup. The user created application data files (Name and Address file, Letter Text file and Title file) may be backed up on one or more diskettes (depending on the size of the file), using the file backup procedure provided in the Letter Writing Application. The user is required to provide backup diskettes for procedures, programs, and data files.

RPOs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**SYSTEM/32 JOB ANALYSIS SYSTEM (JAS/32)
5725-XX3****PURPOSE**

The System/32 Job Analysis System (JAS/32) is a powerful tool to aid management in the planning, supervising, and controlling of project-oriented work by the critical path method. It is designed to be easily used by nontechnical personnel.

The JAS/32 operates under the System/32 System Control Program, (5725-SC1). Depending on main storage availability, the JAS/32 has the ability to handle 275 to 736 activities or work items and relationships per subnet.

HIGHLIGHTS

- Front-to-back interfacing of up to 10 subnets to form a network with up to 7,360 activities.
- Up to 10 subnets per master file.
- Up to 32 calendars.
- Four types of time relationships between work items.
- Multiple starts and ends.
- Reports easily modifiable.
- Progress reporting specifying actual start date and/or remaining duration.
- Three types of schedule dates: Actual, data, scheduled.
- Nine levels of milestones.
- Free-form or fixed-data input.

CUSTOMER RESPONSIBILITIES

All users should know the various features of this system before attempting to use it for actual project control. Users will need to know the fundamentals of the critical path technique before they can prepare input.

The customer must describe the activities which form the project network. This data may be recorded on diskettes for entry into the System/32 using an IBM 3740, or it can be entered directly from the keyboard. Processing and report requests may also be entered in either fashion.

The customer should provide for safekeeping of the diskette to ensure continued operation (backup). A *User's Guide* will also be provided. Procedure for installation will be furnished.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

The JAS/32 is designed to operate on all models of the IBM System/32.

SOFTWARE REQUIREMENTS

- IBM System/32 System Control Programming (5725-SC1), Version 6 or later Source Entry Utility licensed program (5725-UT1).

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**SYSTEM/34 MANAGEMENT SYSTEM FOR LAW FIRMS
5726-F52**

[NO LONGER AVAILABLE, effective May, 1983.]

PURPOSE

The IBM System/34 Management System for Law Firms licensed application program offers the partners in a law firm a practical, convenient means of capturing time and disbursement data, and organizing that data into meaningful working documents and management reports.

The application program is designed for the small to medium sized law firm. It is a complete set of programs designed to assist the law firm in time and disbursement accounting, billing and accounts receivable. These programs capture and store data which is then organized into reports to aid law partners in effectively controlling and managing the firm's business functions. In addition, it can be utilized with the MMAS General Ledger System licensed application program (5726-M37) to provide traditional general ledger functions such as balance sheet, income statement and other reports describing the financial status of the firm.

The System/34 Management System for Law Firms includes the components necessary for a controlled flow of daily time entries, disbursement entries (made on behalf of a client) and billing information, from data capture to final reports. Other entries, such as time or disbursements transfers, cash receipts, accounts receivable journal entries, file maintenance, and accounts receivable writeoffs, are supported. A series of comprehensive reports, with frequency of many of the reports being user-determined, is provided to the law firm.

HIGHLIGHTS

- Provides Missing Time Report which flags individuals who have reported less time than the firm standard
- Provides a turnaround document for billing information on demand or periodically with all of the necessary information to make billing decisions and update computer stored records.
- Provides disbursement-only billing information memos on demand or periodically
- Prints client bills in a variety of formats
- Calculates the variance between the firm investment of time for a bill and the actual amount received on the bill
- Provides aged accounts receivable reports
- Prepares aged reports of unbilled time and disbursements
- Analyzes billed and unbilled time
- Provides a file sizing program to create file sizes based on individual user needs
- Provides system tailoring procedures for user to select functions
- Designed to be used with the General Ledger licensed program.
- Provides initial file loading, record addition, and data entry capabilities through keyboard entry or 3740 Data Entry System.
- Provides data entry for daily transactions through keyboard or 3740 Data Entry System
- Provides file maintenance on existing master file records which use DFU (keyboard only)

DESCRIPTION

TIME and DISBURSEMENT ACCOUNTING

The Time and Disbursement Accounting application controls recorded unbilled time and disbursement entries made by the firm on behalf of a client, and provides a broad range of management reports. The major Time and Disbursement Accounting features are:

- Additional time recording steps are not required of the professional staff.
- Aged unbilled time and disbursement reporting triggers billing activity and should help improve cash flow.
- Time and disbursement information is maintained in detail with totals accumulated at the matter and client levels.
- One of two billing rates can be selected per individual.
- Time and client disbursement description codes are user-defined.
- Narrative can be included or omitted as required.
- References to an individual can be suppressed on selected reports.
- A single disbursement journal handles both firm and client disbursements.
- All or selected time or client disbursement records can be transferred from client-to-client, matter-to-matter, attorney-to-attorney, or date-to-date.

- All information is automatically adjusted and all transfers are listed for control and auditing purposes.
- Nonbillable time can be tracked for management analysis.
- Billing Proofs can be used to verify billing attorney instructions.
- A broad range of time and disbursements reports is provided:
 - Weekly Time Report
 - Missing Time Report
 - Individual Time Summary
 - Individual Unbilled Time Summary
 - Disbursements Journal
 - Billing Journal
 - Unbilled Time and Disbursements

The billing information function of the application processes time and client disbursement records to provide billing information to assist in the billing process. Features of the billing information function are:

- Produces Billing Information Memos on demand showing all reported activity performed by the firm for a client. This report is used by the billing attorney as a turnaround document to record decisions on actual amounts billed and/or written off.
- Enables the billing attorney to bill without relieving time entries (payment on account), by relieving time and client disbursement entries, or by relieving client disbursements only.
- Prints client bills in a variety of formats
- Produces Matter Billing Summary reports showing billing analysis for the billing attorney, the matter, or the client.
- Shows billing variance (the dollar difference between time value and fees billed) and billing realization (the ratio, expressed as a percentage, between fees billed and the value of the individual's reported and billed time).
- Prepares retainer lists showing billable retainer amounts.

ACCOUNTS RECEIVABLE

The Accounts Receivable application offers a systematic procedure of recording and reporting client fee and disbursement bills, receipts and write-offs as well as the firm's cash receipts. Features of the Accounts Receivable application are:

- Aging of client accounts
- Allocation of fees and write-off amounts
- Summary or detail printing of the Aged Receivables Report
- Advance payments for fees and disbursements
- Allows entry of billing information into Accounts Receivable without any supporting time or client disbursement entries
- Cash Receipts/Write-off Journal
- Paid Open Bill and Write-off Report
- Inactive Client/Matter List

Features: Included as part of this application program are several features designed to enhance day-to-day operation.

File maintenance is a part of every application within the program. Maintenance may be performed on descriptive data in all major files but not on auditable totals and dollar amounts.

Checking procedures guide the correct sequence of operations to maintain data integrity. When an operation is not successfully completed due to missing or incorrect information, or due to an attempt to perform an operation out of sequence, the operator is notified that corrective action must be taken. The operator can then correct problems before running subsequent tasks, which are dependent upon the accuracy of prior input for proper reporting.

Backup and recovery routines maintain a dynamic tracking history which records previously executed tasks. If recovery is necessary, the recovery routines guide the user in recovering required data developed since the last data back-up point.

Reprint options are available for most reports. Reports can be reprinted to provide extra copies. If recovery is needed to recreate data files, report printing is bypassed, thus saving time.

Selective printing allows the operator to specify various options to control the content and level of detail contained in reports.

Printing options include:

- Range printing. For example, the operator may specify client identifiers as limits so that information is printed only for the group of clients whose identifiers fall between those specified.
- Selection of specific data. For example, the operator may select to print only matters whose unbilled disbursement totals exceed a specified amount.

PROGRAM PRODUCTS

S/34 Management System for Law Firms (cont'd)

- Selection of detail level. For example, the operator may optionally request a detailed report or a summary report.
Users may modify information that is subject to change, such as report selection criteria and aging periods.
- Individual security codes for time and disbursement accounting, accounts receivable and maintenance are user-assigned at installation time. These codes may be periodically changed as authorization changes dictate.
- File sizes, which are determined at installation time, may be resized in the future to accommodate the firm's growth.

CUSTOMER RESPONSIBILITIES

IBM may provide marketing assistance, in accordance with the Marketing and Service Guidelines in the GI section, in the installation of IBM licensed programs. However, the responsibility for providing accurate ordering information, personnel selection and training, installation, and continued day-to-day operation lies solely with the customer.

Installation of System/34 application programs is a customer responsibility.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

The minimum system configuration requirement is an IBM System/34 with:

- 32K bytes of main storage
- 8.6 megabytes of disk storage
- 40 characters per second matrix printer
- IBM 5251 mdl 11 Information Display Station

Because of volume and time constraints, there may be a requirement for providing offline keying on an IBM 3740 Data Entry System. If an IBM 3742 is to be used, it must have the 128-character record features 128-character (#5455) and feature group A (#4004).

SOFTWARE REQUIREMENTS

IBM System/34 System Support licensed program (5725-SS1 Version 1), and System/34 Utilities licensed program (5726-UT1).

TERMS and CONDITIONS: See PP Index

OS FORTRAN IV (H EXTENDED) COMPILER 5734-FO3

PURPOSE

The FORTRAN IV (H Extended) Compiler program product, with the FORTRAN IV Library (Mod II) program product, provides OS and CMS FORTRAN users with increased performance and additional functional capabilities.

DESCRIPTION

The compiler provides a compile time option which allows the introduction of source programs in either BCD or EBCDIC character codes. If a cross-reference listing and/or a structural source listing is requested, a data set for each option must be defined.

This product includes language extensions to the Full FORTRAN language. OS Full FORTRAN language is compatible with and encompasses the American National Standard (ANS) FORTRAN. The language includes the following extensions to ANS FORTRAN:

- IMPLICIT statement allowing extended implicit classification by first character of a name.
- An extended type statement, including length specification.
- G-conversion, extended to cover all numeric and logical data types.
- Multiple entry points to subprograms, and non-standard returns from subroutines.
- Arrays of up to seven dimensions.
- PAUSE statement extended to permit output of messages.
- NAMELIST statement permitting input/output and conversion without an explicit I/O list and FORMAT statement.
- Extended subscripts.
- Hexadecimal constants and FORMAT code.
- Support of the direct (BDAM fixed length only) data access method.
- Compatible extensions to the READ and WRITE statements to provide direct data organization in support of direct access storage devices.
- Mixed mode arithmetic.
- The T-specification, permitting printed output to begin at any print position.
- STOP statement allows the processing of codes for testing by OS Job Control statements.

Enhancements to the OS Full FORTRAN language are:

EXTERNAL Statement Extension ... the EXTERNAL statement is extended to provide the capability to 'detach' the names of FORTRAN-supplied library functions and subroutines. This feature provides the user with the advantage of being able to supply his own functions or subroutines in the place of FORTRAN-supplied library functions and subroutines. The extension is achieved by the use of an ampersand prefixed to the function or subroutine name in its appearance in the EXTERNAL statement.

List-Directed I/O ... List-Directed I/O facility enables the user to read and write formatted data without having to specify a FORMAT statement. In List-Directed READ or WRITE statements, an asterisk is substituted for the FORMAT statement number.

Automatic Function Selection ... This facility simplifies the user's task of referencing built-in and library functions by obviating the need for coding specific or data dependent function names. Automatic Function Selection is requested by means of a new specification statement, GENERIC.

The processor can be invoked under CMS using the CMS command FORTHX.

The three most significant features of the FORTRAN IV (H Extended) Compiler program product are the ability to handle extended precision arithmetic and to support asynchronous I/O.

Extended Precision ... FORTRAN is used extensively to solve complex scientific problems. As the number of operations performed on a piece of data increases, so do the accumulated errors due to truncation. Higher precision, therefore, has to be used in certain stages of the computation to maintain the desired result significance.

The FORTRAN IV (H Extended) Compiler provides extended precision support to assure optimum accuracy of computational results.

Asynchronous I/O ... In the large systems area, where the requirement for reading and writing large logical records is frequent, this feature will offer significant performance improvement. (This feature is not available under CMS.)

Automatic Precision Increase Option ... this feature enables the compiler to convert single precision floating point calculations to double precision and/or double precision floating point calculations to extended precision. The Automatic Precision Increase option is a useful tool in precision conversion.

Automatic Precision Increase assists in overcoming precision problems encountered in converting second generation FORTRAN programs to OS floating point format.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

The FORTRAN IV (H Extended) Compiler supports all IBM OS machine configurations currently supported by the OS FORTRAN IV (H) Compiler.

In MFT and MVT, a minimum of 160K bytes of main storage is required for operation of the compiler, inclusive of data management.

In VS1 and VS2, 192K bytes of virtual storage, and in CMS, a virtual machine of at least 600K bytes of virtual storage is required for the compiler. The standard instruction set and floating point option are required.

SOFTWARE REQUIREMENTS

The FORTRAN IV (H Extended) Compiler requires no additional data sets beyond the SYSIN, SYSPRINT, SYSLIN, SYSPUNCH, SYSUT1 and SYSUT2 data sets currently required by the FORTRAN H Compiler depending upon the execution options selected.

Extended precision divide instruction is simulated for processors with extended precision instruction set. Extended precision add, subtract, multiply and divide instructions are simulated by the OS Supervisor for processors not having the extended precision hardware.

The extended precision simulator is also available with CMS.

Operating Environment: The FORTRAN IV (H Extended) Compiler operates as a separate component under OS MFT, MVT, VS1 and VS2, as well as under CMS.

The FORTRAN IV Library (Mod II) (5734-LM3), or its equivalent, is required when compiling and executing under the FORTRAN IV (H Extended) Compiler.

For extended precision floating point simulation, the Extended Precision Simulation is required.

COMPATIBILITY/CONVERSION CONSIDERATIONS

The FORTRAN IV (H Extended) Compiler program product will compile programs written for the OS FORTRAN H Compiler. Object code compatibility will also be assured. Thus, users will not have to recode nor recompile their FORTRAN programs when obtaining this program.

The disk format of CMS data sets are not compatible with OS, however, the data sets are transferrable through utilities or card or tape. It should be noted that ASCII data sets are not allowed under CMS.

DOCUMENTATION (available from Mechanicsburg)

Installation Procedure Letter ... FORTRAN IV Language (GC28-6515, TNL GN28-0595) ... *FORTRAN IV (H Extended) Compiler and Library (Mod II) General Information* (GC28-6884).

TERMS and CONDITIONS: See PP Index

**SYSTEM/7 FORTRAN IV
HOST COMPILER and LIBRARY
5734-FO4 - OS; 5736-FO1 - DOS**

PURPOSE

Provides high-level FORTRAN IV Language support for the System/7 user, enhances the System/7 Host Program Preparation Facility II, and offers to the System/7 user the ease and speed of coding in the FORTRAN language.

System/7 FORTRAN IV (S/360/370 OS, DOS Host Compiler and Library) processes source programs written in System/7 FORTRAN IV, which is an extension of American National Standard Basic FORTRAN, X3.10-1966. The FORTRAN processor is installed on a host S/360 or S/370 under the facilities of OS/VS1, OS/VS2, DOS/VS, Operating System, or the Disk Operating System; and produces relocatable object code that is suitable, after link-editing and formatting, for execution on a System/7.

System/7 FORTRAN IV requires the use of Host Program Preparation Facility II for processing object and load modules. The required facilities are:

- MSP/7 Macro Library/Relocatable, which contains IBM supplied sensor-based, input/output, and supervisory macros that are used by the System/7 FORTRAN IV programs,
- ASM/7 which assembles the MSP/7 macros,
- LINK/7, which link edits the compiled object code and combines it with appropriate library and sensor-based subprograms to form a load module, and
- FORMAT/7, which accepts the output of LINK/7 and produces a System/7 storage load.

DESCRIPTION**Compiler**

- Supports all devices available to S/360/370 FORTRAN IV compilers during compilation.
- Device statement support for the 5022 Disk Storage Module, the 129 Data Recorder, the 7431 Line Printer, the 5028 Operator Station, and BSCA during execution.
- Access, through CALL statements, to MSP/7 functions (including sensor-based input/output).
- Extensive syntax checking and diagnostics.
- Time and Space optimization for enhanced object-time performance.

Library

- Sensor-based subroutines per ISA S61.1
- Mathematical subprograms for exponential, natural logarithm, square root, sine, cosine, arctangent and hyperbolic tangent.
- Subprograms for extensive error handling and diagnostics, format conversion of numeric data, and input/output operations for the 5022 disk device (formatted and unformatted direct access and unformatted sequential records) and the 5028 Operator Station (ASCII data).
- Environment specification macro instructions to identify the user's FORTRAN input/output environment when configuring a storage load module for System/7.
- Modular and reentrant.

CUSTOMER RESPONSIBILITIES

- Understand the application they wish to perform and provide the appropriate hardware and software design.
- Generate a supporting system nucleus using the facilities of MSP/7 Host Program Preparation Facilities II on a S/360 or S/370.
- Provide the required user-written programs and link edit these programs with the MSP/7 nucleus on a S/360 or S/370.
- Load and test the resulting object programs on a System/7.

Note: Generation of the supporting nucleus requires a thorough understanding of MSP/7. The user should consider attending the required MSP/7 education courses, or requesting IBM to provide this nucleus through Systems Engineering Services.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS****Host System (for compilation)**

The system configuration required on the host is an IBM S/360 or S/370 CPU with at least 40K bytes of main storage available to the compiler, exclusive of the storage required by data management and the overlay supervisor (overlay supervisor exists for OS/VS1, OS/VS2, and OS only). Source programs of 250 cards can be processed in the minimum storage available to the compiler.

The Floating Point feature must also be installed in the host System.

A minimum system configuration requires the following devices:

- 1 - Input device
- 1 - Output device
- 1 - Console Typewriter
- 1 - Disk Storage Device

For its residence on the host, the compiler and library require the following number of tracks on an IBM 2314:

OS	15 Compiler
	12 Library
DOS	11 Compiler (in the core-image library)
	19 Library

An additional 21 tracks are required for DOS if the compiler object modules are also kept in the relocatable library.

System/7 (for execution)

The minimum system configuration for executing on System/7 is the following:

- 1 - IBM 5010 Processor Module - 6K or larger
- 1 - IBM 5028 Operator Station

To use FORTRAN direct-access or sequential I/O statements unformatted, an IBM 5022 Disk Storage Module is also required plus additional memory required by Symbolic File Support access methods. Use of the 5022 disk device also requires the Disk Support System (DSS/7) service programs.

SOFTWARE REQUIREMENTS

IBM System/7 FORTRAN IV runs under the facilities of OS/VS1, OS/VS2, DOS/VS, Operating System or Disk Operating System. The object modules produced by System/7 FORTRAN IV must be link-edited using LINK/7 and the resultant load module must be formatted using FORMAT/7 prior to execution on a System/7 machine. Both LINK/7 and FORMAT/7 are system control-type programs that execute on the host machine. The System/7 Host Macro Assembler and the MSP/7 Macro Library/Relocatable are required for preparing the nucleus and for those user applications that utilize sensor-based subprograms.

COMPATIBILITY

The host compiler accepts source programs written in System/7 FORTRAN IV, which is an extension of American National Standard Basic FORTRAN, X3.10-1966 and produces object modules that are acceptable to LINK/7 for link-editing. The System/7 FORTRAN IV compiler will also accept source programs written in ANS Basic FORTRAN. Its language level is similar to stand-alone System/7 FORTRAN, with minor differences due to hardware restrictions.

System/7 FORTRAN IV can process on the 5022 Disk Storage Module, formatted and unformatted direct-access data sets that are compatible with System/3 data sets.

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS
**APPLICATION PROGRAM GENERATOR
OS - 5734-XC3; DOS - 5736-XC3**
PURPOSE

The System/7 Application Program Generator (APG/7) offers high-level program support for many different sensor-based applications found in the plant automation, process control, and data-acquisition applications. APG/7 reduces the programming effort required to install and maintain such applications. It allows the customer or IBM systems engineer to focus attention on application design, rather than machine-oriented programming details.

DESCRIPTION

APG/7 is made up of three major components: 'fill-in-the-blanks' facilities, a high-level language compiler, and a series of System/7 subroutines. The first two execute on a S/360 or S/370; the third consists of subroutines that execute on System/7, and are used to implement functions invoked by 'fill-in-the-blanks' specifications, or by language statements.

The 'fill-in-the-blanks' facilities provide question forms that guide the user in the selection and specification of programs from the library of Modular Systems Programs (MSP/7) or from the Application Module Library (5707-LM1).

The APG/7 compiler provides the user a means for specification of operations that are more conveniently handled by language statements, rather than by specification of tables for library subroutines. The language contains a compatible subset of PL/1. The APG/7 language may be used to READ/WRITE files from/to a remote computing system, using the System/7 Binary Synchronous Communications Adapter (BSCA). Transmission of data to/from the remote computer will be in EBCDIC transparency mode in fixed record length.

The remote computing system may be an S/370, mdl 115 through mdl 195, an System/3, mdl 10 or mdl 15 Disk or another System/7 with the BSCA feature.

The APG/7 language contains special features oriented to System/7 applications. These features are peculiar to APG/7; they are not part of PL/1.

HIGHLIGHTS

- 'Fill-in-the-blanks' forms - guide users as they select and tailors library programs to be used, describes their data tables, and specifies the hardware configuration.
- Host file maintenance - S/360-S/370 host data files can be updated to reflect alterations to the System/7 program and data.
- Report generation - data from S/360-S/370 host files can be printed according to user-defined formats.
- Language compiler - provides users with high level method of describing their operating procedures using terminology familiar to them. The language contains a compatible subset of PL/1.

Applications: APG/7 is designed for cross-industry use in realtime sensor-based applications found in the plant automation, process control, and data acquisition applications.

The APG/7 language addresses a broad spectrum of sensor-based applications including manufacture, movement, test, and batch sequence control.

Use: To create a program for execution in System/7, the user answers questions about the application on 'fill-in-the-blanks' forms. These answers select and tailor the operating system facilities required from the MSP/7 library. If AML/7 is used, answers are also provided for the application data tables and facilities. Application operations are then described using the APG/7 procedural language. (Alternatively, subroutines may be written using the macro assembler language.) APG/7, working with the MSP/7 Host Program Preparation Facilities II, converts this information into a System/7 storage load module. The MSP/7 facilities are also used to format the storage load for transfer to the System/7 for execution.

Maintenance of such application programs is eased, since APG/7 provides facilities to generate reports that completely document the selections and the data provided on the forms. Additions to the APG/7 files can easily extend the use of the tailoring and documenting facilities to application subroutines that the user may personally write.

CUSTOMER RESPONSIBILITIES

- Create specification information for the application and complete the 'fill-in-the-blanks' forms for input to APG/7.
- Supply all program libraries necessary to the implementation of the application. This includes program products such as AML/7 if required.
- Provide, if necessary, appropriate application routines using the APG/7 procedural language.

SPECIFIED OPERATING ENVIRONMENT
HARDWARE REQUIREMENTS

System Configuration for OS, OS/VS1, or OS/VS2: APG/7 requires a partition or region size of approximately 80K bytes. APG/7 requires storage space on a disk file for programs and files. The OS version uses approximately 418 tracks of an IBM 2316 Disk Pack or equivalent 3336 or 3348 Disk Pack Space. The sizes of some files are specified by the customer and may be smaller than the standard values. The use of tapes or cards for backup files can further reduce requirements.

System Configuration for DOS or DOS/VS: APG/7 requires a partition size of approximately 52K bytes. APG/7 requires storage space on a disk file for programs and files. The DOS version uses approximately 685 tracks of an IBM 2316 Disk Pack or equivalent 3336 or 3348 Disk Pack Space. The sizes of some files are specified by the customer and may be smaller than the standard values. The use of tapes or cards for backup files can further reduce requirements.

An APG/7 application program including only MSP/7 routines and not using the APG/7 language, the IBM 5022 Disk Storage Module, the IBM 3340 Disk Storage Module, an IBM 2790 Data Communication System, the BSCA support, or the Sequential Access Method requires a minimum System/7 configuration of 4K words of storage (an IBM 5010 Processor Module mdl A4 or B4) and an IBM 5028 Operator Station. Normally, at least a mdl A6 or B6 (6K words) is required if the APG/7 language is used. If other programs are included, such as AML/7 or PCP/7, the appropriate amount of storage must be added to the requirement.

The System/7 Processor mdls E16-E64 (16K words to 64K words) are supported.

SOFTWARE REQUIREMENTS

The portions of APG/7 that execute on the IBM S/360 or S/370 are written in macro assembler language. APG/7 operates under Release 26 and Release 27 of the Disk Operating System (DOS), and under Release 29 (DOS/VS), using the SAM and DAM access methods. When operating under the Operating System (OS), access methods used are QSAM, BSAM, and BDAM. APG/7 also operates under OS/VS1, and OS/VS2, in Real or Virtual Mode.

When using the IBM System/7 BSCA feature to communicate to a remote computing system, the remote system must use Teleprocessing access methods as follows:

For IBM S/370:

- DOS, DOS/VS - BTAM
- OS, OS/VS1, OS/VS2 - BTAM or TCAM
- DOS/VS, OS/VS1, OS/VS2 - VTAM

Refer to System/7 Facilities II Macro Library/Relocatable for System/7 specifications.

For IBM System/3:

- System/3 MLMP

For IBM System/7:

- MSP/7 Communications Access Method

The IBM System/7 subroutines are written in the System/7 macro assembler language. The Modular Systems Program (MSP/7), ASM/7 and LINK/7 are used in support of APG/7.

**DOCUMENTATION
(available from Mechanicsburg)**

General Information Manual (GH20-1162).

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

ACF/VTAM R3 (cont'd)

Decrypt Features	September 30, 1981
OS/VS1 Release 7	
SCP	September 30, 1981
BASE, MSNF and Encrypt/Decrypt Features	September 30, 1981
OS/VS2 (MVS) Release 3.7	
SCP	December 31, 1980
BASE, MSNF and Encrypt/Decrypt Features	September 30, 1981
OS/VS2 (MVS) Release 3.8	
SCP	September 30, 1981
BASE, MSNF and Encrypt/Decrypt Features	September 30, 1981

(1) End of currency for ACF/VTAM Release 1 on DOS/VS Release 34 is being extended from December 31, 1980 to March 31, 1981.

ACF/VTAM Release 2

The VSE System	
SCP	December 31, 1982
BASE and MSNF Feature	December 31, 1982
OS/VS1 Release 6.7	
SCP	December 31, 1980
BASE, MSNF and Encrypt/Decrypt Features	December 31, 1982
OS/VS1 Release 7	
SCP	December 31, 1982
BASE, MSNF and Encrypt/Decrypt Features	December 31, 1982
OS/VS2 (MVS) Release 3.8	
SCP	December 31, 1982
BASE, MSNF and Encrypt/Decrypt Features	December 31, 1982

DOCUMENTATION
(available from Mechanicsburg)

Introduction to Advanced Communications Function (GC30-3033) ... Advanced Communications Function for VTAM (ACF/VTAM) General Information: Introduction (GC27-0462) ... ACF/VTAM Program Summary (GC27-0457).

ACF/VTAM Licensed Program Specification will be available at program product availability.

ACF/VTAM R3 TERMINAL SUPPORT CHART†

Start/Stop Terminals [Note 1]

- 2740-1
- * 2741
- 3101, as CPT-TWX (M33/35)
- 3232-51 as CPT-TWX (Mdl 33/35)
- 6733 as CPT-TWX (M33/35)
- * CPT-TWX (M33/35)
- * WT Telegraph

BSC Terminals

- * 3271-1, -2 [Note 2]
- * 3274-1C, -21C, -31C, -51C, (3271-1, -2) [Notes 2 and 4]
- * 3275-1, -2 [Note 2]
- * 3276-1, -2, -3, -4 (3271-1, -2) [Notes 2 and 4]
- * 3780 [Notes 2 and 8]
- * 5275 (3275-1, -2) [Note 2]
- * 5937 (3271-1, -2) [Note 2]
- * 8100/DPPX (3276-1, -2, -3, -4) [Note 2]

SDLC Terminals

- * 3232-1
- * 3271-11, -12 [Note 2]
- * 3274-1C, -21C, -31C, -51C (3791) [Notes 2 and 4]
- * 3275-11, -12 [Note 2]
- * 3276-1, -2, -3, -4 (3791) [Note 5]
- * 3276-11, -12, -13, -14 (3791) [Note 4]
- 3601, 3602
- 3614, 3624 [Note 2]
- 3631, 3632 (3601, 3602)
- 3661 [Note 3]
- 3684
- 3694
- * 3767-1, -2, -3
- * 3771-1, -2, -3
- * 3773-1, -2, -3
- 3773-P1, -P2 -P3
- * 3774-1, -2
- 3774-P1, -P2
- * 3775-1
- 3775-P1
- 3776-1, -2, -3, -4
- 3777-1, -3, -4
- 3791 [Note 6]
- * 3791/3730 [Note 6]
- 3791/3760
- 4701-1, -2
- 5285/5288 (3770)
- 5520 (3791/3730)
- 5937 (3271) [Note 2]
- 6670
- * 8100/DPPX (3791) [Note 6]
- * 8100/DPCX (3791) [Note 6]
- 8775-11, -12 (3274) (Note 7)
- S/32 (3770)
- S/34 (3770) (3791)
- S/38 (3770)
- Series/1

Local Terminals

- * 3272-1, -2
- * 3274-1A, -21A, -31A (3791), -1B, -21B (3272-1, -2), -1D, -21D, -31D (3272-1, -2)
- * 3791 [Note 6]
- * 3791/3730 [Note 6]
- 3791/3760
- 4331 Display/Printer Adapter (3272-2)
- 4331 Loop Adapter (3274-1A)

† All of the above terminals have both single and multisystem support. The terminal type in parentheses designates the programming support provided by ACF/VTAM R3, e.g., S/32 (3770) means the S/32 is supported as a 3770.

* Also supported by TSO/VTAM

Note 1: The Start/Stop Terminals shown are supported only via the Network Terminal Option (NTO) program product.

Note 2: Nonswitched connection only.

Note 3: Switched connection only.

Note 4: Buffer sizes of 960, 1920, 2560 and 3440 are supported.

Note 5: With the SDLC/BSC switch feature set to SDLC.

Note 6: TSO support applies only with 3270 Data Stream compatibility.

Note 7: For OS/VS1, ACF/VTAM Release 3 supports the IBM 8775 with Downstream Loadable Functions. ACF/VTAM Release 3 on VSE and OS/VS2 (MVS) for the IBM 8775 is for base function only.

Note 8: Supported only via the Network Terminal Option Release 2 (NTO) program product.

MVS INTEGRITY

IBM will accept APARs describing any situation where the installation of ACF/VTAM R3 causes an exposure to the system integrity of OS/VS2 (MVS).

RPQs ACCEPTED: No

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**ADVANCED COMMUNICATIONS FUNCTION FOR TCAM
(ACF/TCAM) VERSION 2 RELEASE 1
OS/VS1 and OS/VS2 MVS (5735 - RC3)**

PURPOSE

Advanced Communications Function for TCAM Version 2 Release 1 is a program product for users of OS/VS1 and OS/VS2 (MVS) that can provide additional capabilities for improved installability and usability, problem determination, network operation and data communications in a network with a single S/370 or with multiple S/370s.

To support multiple S/370 networks, a user must install the ACF/TCAM V2 Multisystem Networking Facility feature.

HIGHLIGHTS OF ACF/TCAM V2 R1

Problem determination and network operation ... Includes additional functions that can assist in optimizing management and control of a user's data communication installation.

- Enhanced SDLC data link test.
- SNA terminal connectivity test.
- Intensive mode recording of SDLC data link errors.
- Dynamic display of ACF/NCP/VS storage.
- Dynamic reconfiguration of nonswitched SNA-SDLC devices under ACF/NCP/VS Release 2.
- Support for the Network Communications Control Facility (NCCF) program product and its related Network Problem Determination Application program product.

Enhanced data communications capabilities ... Includes improved flexibility for session operation, data security and enhanced device support.

- Negotiable session initialization parameters.
- Support of the Programmed Cryptographic Facility program product (5740-XY5).
- Support of channel-attached 3790 and 3270 systems.
- Support of the channel-attached 3270 systems (SNA only) and 3790 systems (configuration support #9165 and #9169 only) in a multiple processor network, using the Multisystems Networking Facility feature.
- Support of the 3790 Communication System inbound message traffic pacing function. (Also supports 8100 and 3730 systems).

ACF/TCAM V2 R1 provides service programs and customer tailorable facilities that enhance the installability and usability of ACF/TCAM in the following areas:

- System startup and restart.
- Session establishment and routing control.
- Statistics gathering.
- Exception and error control.
- Operator control.
- Message retrieval.
- Message routing.

In addition, the Multisystem Networking Facility feature has been enhanced by providing customer aids for implementing the following:

- Installation and management of ACF/TCAM host to host data flows in large networks with multiple application types, such as:
 - Interactive applications.
 - Message routing.
 - Data collection.
 - Data distribution.
- Extended device support for ACF/TCAM host to host networking.
- Automatic recovery of ACF/TCAM host to host message traffic.
- Other usability enhancements.

SUMMARY AND ADVANTAGES OF ACF/TCAM V2 R1

Problem Determination and Network Operation Functions

- Enhanced data link test offers the capability to dedicate one station on an SDLC to testing while allowing the remaining stations on that link to remain active. When a station comprises a cluster control unit and its attached devices, the control unit is dedicated to the test; its attached devices are deactivated.
- SNA terminal connectivity test provides the capability of initiating an echo test from the terminal end of a session to determine that an SNA terminal and its connection to ACF/TCAM V2 are functioning correctly. The test does not interfere with other stations on the link, or with other devices on the same control unit.
- Intensive mode error recording of SDLC data link errors allows a network operator to dynamically invoke and terminate recording of information about temporary errors that may be occurring on an SDLC data link. This capability supplements existing support that

records permanent error information and permits a user to collect additional information on SDLC data link errors. This detailed information could preclude the need for specific testing in order to recreate an error situation.

- Dynamic display of ACF/NCP/VS storage allows the network operator to display any contiguous 256 bytes without disrupting normal ACF/NCP/VS operation. This display capability, provided in hexadecimal representation, can be useful in dynamically evaluating network problem situations.
- Dynamic reconfiguration of nonswitched SNA-SDLC devices under ACF/NCP/VS R2 allows the user to selectively add or delete supported nonswitched SNA-SDLC devices, without disrupting other network functions. This capability supplements the ACF/NCP/VS R2 generation process, and supports temporary configuration in a non-disruptive fashion, until a permanent network control generation can be done.
- In support of the Network Communications Control Facility program, ACF/TCAM V2 R1 provides an interface to support the problem determination and operation facilities offered by this program product.

Additional Data Communications Capabilities

- Negotiable session initialization parameters allow a more flexible session initialization process. During session initialization, two user-written application programs or message handlers can dynamically exchange certain session parameters to establish and/or modify transmission control and integrity of session data. With this capability, it may be possible for a user to simplify the predefined installation of intercommunicating application programs.
- ACF/TCAM support of the Programmed Cryptographic Facility offers the user transmission security of data.
- Support of enhanced 3705-II (mdls J, K, & L) permits channel attachment and/or SDLC data link attachment of the enhanced 3705-II in an ACF/TCAM V2 R1 network with ACF/NCP/VS Release 2.
- Support of channel-attached 3270 and 3790 systems permits these systems to be included in the single system SNA environment supported by ACF/TCAM V2 R1.
- Channel-attached SNA 3270 system and 3790 system networking permits the channel-attached 3270 systems (SNA only) and 3790 systems (configuration support #9165 and #9169 only) supported by ACF/TCAM V2 R1 to participate in multiple system networking.
- 3790 inbound pacing is supported as a user-selectable session establishment function under ACF/TCAM V1 and V2 R1 with 3790 support. ACF/TCAM V2 R1 also supports 8100 and 3730 systems.

Enhanced Installability and Usability Capabilities: The following enhancements to ACF/TCAM V2 R1 consist of macros, system service programs, and message handler facilities that a customer can tailor to meet unique system configurations. Model message control programs are provided to aid the customer in implementing these new capabilities and minimize his coding requirements.

Enhancements to the Base ACF/TCAM V2 R1 Program Product

- An initiator program ... Functions as a master task for a customer's message control program. The initiator provides for automatic activation, monitoring and selective restart of the message control program and associated IBM or user supplied service programs. The initiator allows non-failed tasks in the MCP region to continue running when another task in the region fails. The initiator will optionally restart the failed task.
- A message generation facility for building variable content start-up and restart messages.
- Enhanced message handler facilities to provide ease of use and flexibility in:
 - ACF/TCAM session establishment.
 - Routing control.
 - Security checking.
 - Logon/logoff message handling.
 - Error handling.
- A system accounting facility that enables an installation to gather system utilization data for financial accounting and system control. Data such as line utilization, application program logons, number of messages processed by each terminal, etc., can be captured for either on-line or deferred processing.
- Enhanced exception and error control facilities are provided in the form of macro instructions that the installation can use to achieve a high degree of automation in exception handling procedures. To end users and operations people, these facilities can provide awareness of exception conditions, advise the operator of

ACF/TCAM V2 R1 (cont'd)

automatic actions taken and/or generate messages indicating required action and deliver the messages to the point where the action needs to be taken.

- Enhancements to operator control
 - A command for transferring, copying and purging unsent queued messages.
 - A facility for adding user written commands.
 - An on-line operator's guide that displays available commands and command format details.
 - Additional commands to facilitate large system management.
- A message retrieval system service program allows disk queued messages to be retrieved by command from specially designated stations. Retrieved messages may be sent to any station(s) and/or tape. This facility may be used in support of a message routing application, or to aid in investigation and analysis of user difficulties. The program can locate sent and unsent messages by specification of sending or receiving station, time of entry, sequence numbers or range of sequence numbers.
- A message queue system service program that at the time of system closedown can search all, or selected, queues for unprocessed or unsent messages and place those messages on tape for introduction into a changed or altered system after a cold start. This facility allows the installation to redefine the network configuration and perform a cold restart without message loss and without having to wait for the system to drain. The latter could be difficult if traffic has been queued after hours to terminals that have been turned off for the night.

Enhancements to the ACF/TCAM V2 R1 Multisystem Networking Facility Feature: The enhancements to the networking feature of ACF/TCAM V2 R1 are oriented toward support of large networks with multiple application types. Two important elements of the enhanced support are:

Host to host data flows ... In which message traffic flowing on the network is always handled by both the originating host and the destination host. Depending upon the particular application, and user specified routing instructions, message traffic may also be handled by intermediate host nodes, in addition to the originating and destination hosts.

Host to host data flows can contribute to increased network usability by providing capabilities such as:

- An efficient mechanism for session establishment and message routing for interactive applications.
- A technique for re-routing of interactive data around failed network elements that is transparent to the terminal operator.
- A facility for staging the movement of non-interactive data across a network during periods of low interactive message traffic.
- Added capabilities for system accounting and control in large networks.

Transmission categories ... A customer may establish up to 16 transmission categories in his network. All messages in the same category are treated similarly with respect to queuing medium, message priority, sequence checking, error handling, data staging, routing alternatives, etc.

Use of host-to-host data flows and transmission categories is facilitated by enhanced message handler facilities and user specified networking tables. Within the structure provided by these enhancements, the ACF/TCAM V2 R1 user has the following capabilities:

Interactive Applications: Enhanced session establishment and message routing capabilities for interactive applications:

- Transaction routing on a message by message basis.
- Extended interchanges between a terminal and a single application.

Transaction input to different application programs residing in different hosts may be routed without requiring the terminal operator to establish separate SNA sessions for each transaction.

A terminal may access an application in another host, even if the terminal is not defined in the application's host.

Input for a conversational application that is not currently active can be rejected, with an appropriate message sent to the terminal sending the input.

Non-Interactive Applications

Message Routing

- Terminals need be defined to only their owning host nodes in order to gain access to the network via host-to-host message routing flows. New destinations may be added to the network, affecting only the owning host's ACF/TCAM terminal table.

- A single set of input and output sequence numbers can be defined and assigned to messages received from and sent to each terminal. Messages may be retrieved by input and output sequence numbers, thereby facilitating error recovery and problem determination.

Data Collection

- Input from a terminal to an application in a cross-domain host can be edited and accepted for processing by the terminal's host, even if the application host has not been brought up.
- Using host to host data flows, messages enter the terminal's host immediately, and are delivered to the application host at the system's convenience -- as determined by the priority and routing parameters specified by the customer.

Data Distribution

- Output for a terminal can be accepted for delivery by the terminal's host node even if the terminal is not up.
- Data may be moved in stages to other host(s) closer to the destination terminal, or directly from the source host to the destination host. The staging of data can be controlled by the system operator, contributing to a more manageable and efficient flow of data through the network.

In addition, the macros, system service programs and message handler facilities of the Multisystem Networking Facility feature provide the customer with the following capabilities:

- Host-to-Host networking support for:
 - Non-SNA Channel attached devices.
 - EP attached devices.
 - NCP attached start/stop, BSC and SNA-SDLC devices (in addition to the networking support already provided to these devices).
- In the event that the primary route to a destination host node is unavailable, messages in a particular transmission category can be re-routed through an intermediate host node(s) enroute to the destination host.
- The balancing of message traffic between two host nodes by the use of transmission categories.
- Automatic recovery of host-to-host message traffic.
- Automatic monitoring of the availability of cross-domain host nodes, terminals, and applications.
- Through the use of an expanded ACF/TCAM addressing structure, networking support can be extended to:
 - Non-SNA hosts.
 - SNA clusters as "hosts".
 - Non-SNA links.
 - Multiple SNA networks.

Model Message Control Programs: The base and networking capabilities previously described are utilized in *Model Message Control Programs*, which are shipped to the customer in machine readable form. The programs are Class A supported, and may be used exactly as is, or tailored to the user's installation requirements. The models include message handlers for 2740 EP start/stop, 3270 EP BSC, 3270 local, and 3767 SDLC devices, including TSO support.

The models will be documented in the publication, *ACF/TCAM Installation Sample Programs*.

MIGRATION and PLANNING CONSIDERATIONS

ACF/TCAM V2 R1 with ACF/NCP/VS: When used only for local user applications (that is, data communications between two application programs or message handlers in the same S/370 or between a channel-attached terminal and an application program or message handler on the same S/370) ACF/TCAM V2 R1 supports the following items without the need for ACF/NCP/VS:

- Support of channel-attached 3790 and 3270 systems.
- Support of IBM 3790 inbound pacing.
- Negotiable session initialization parameters.
- Support for the Network Communications Control Facility program product.

When used for remote network user applications, ACF/TCAM V2 R1 supports the following items in conjunction with NCP/VS 5.0, ACF/NCP/VS R1, or with ACF/NCP/VS R2:

- Dynamic display of ACF/NCP/VS storage.
- SNA terminal connectivity test.
- Multisystem networking feature support of channel-attached 3790 and 3270 systems.

PROGRAM PRODUCTS

ACF/TCAM V2 R1 (cont'd)

- Support for the Programmed Cryptographic Facility program product.
- Support for the NCCF program product.
- Support for 3790 inbound pacing.
- Negotiable session initialization parameters (application-to-application). *
- Enhanced installability and usability capabilities.

When used for remote network user applications, ACF/TCAM V2 R1 supports the following items only in conjunction with ACF/NCP/VS Release 2:

- Enhanced SDLC data link test.
- Intensive mode recording of SDLC data link errors.
- * Applicable only to ACP/NCP/VS R1 and R2

- Notes: (1) Single system support is provided through ACF/NCP/VS or NCP/VS. Multiple Systems Support is provided through ACF/NCP/VS.
- (2) Nonswitched support only.
- (3) S/360 mdls 25, 30, 40, 50, 65, 65MP, 67 (65 Mode) 75, 85, 91, 195 with either BOS, BPS, DOS, OS; S/370 mdls 115-168MP with either BOS, BPS, DOS, OS, DOS/VS, OS/VS1 or OS/VS2.
- (4) 3771-1,-2,-3; 3773-1,-2,-3; 3773-P1,-P2,-P3; 3774-1,-2; 3774-P1,-P2; 3775-P1; 3776-1,-2,-3,-4; 3771-1,-3,-4.
- (5) In 3767 compatibility mode.
- (6) TSO support applies only to 3790 with 3270 data stream compatibility.
- (7) Configuration support #9165 and #9169 only.

PROGRAM PRODUCTS

ACF/TCAM V2 R1 (cont'd)

ACF/TCAM V2 R1 TERMINAL SUPPORT CHART
FOR GET/PUT INTERFACE

	Single System Support ACF/TCAM via EP/VS	Single System Multi-system Support(1) ACF/TCAM via NCP/VS or ACF/NCP/VS	Single System Support TSO with ACF/TCAM via EP/VS	Single System Multisystem Support (1) TSO with ACF/TCAM via NCP/VS or ACF/NCP/VS
S/S Terminal				
1030	x	-	-	-
1050	x	x	x	x
1060	x	-	-	-
2260	x	-	x	-
2265	x	-	x	-
2740-1,2	x	x	-	-
2741	x	x	x	x
2760	x	-	-	-
3101	x	x	x	x
3232-51 (as CPT-TWX)	x	x	x	x
6733				
(as CPT-TWX 33/35)	x	x	x	x
AT&T 83B3 WU 115A line control type	x	x	-	-
CPT-TVWX (M33/35) line control type	x (8)	x (8)	x (8)	x (8)
WT Telegraph (CCITT 2 & 5)	x	x	-	-
BSC Terminals				
2715-2	x	x	-	-
2772	x	x	-	-
2780	x	x	-	-
2922	x	-	-	-
2972-8,-11	x (2)	x (2)	-	-
3271-1,-2	x (2)	x (2)	x (2)	x (2)
3275-1,-2	x (2)	x (2)	x (2)	x (2)
3670	x	-	-	-
3735	x	x	-	-
3741-2,-4	x	x	-	-
3747	x	x	-	-
5110	X	X	-	-
1131	x	x	-	-
1826	x	x	-	-
S/3	x	x	-	-
S/360-20	x	x	-	-
S/360 (3)	x	x	-	-
S/370 (3)	x	x	-	-
S/38 (3271)		x (2)		
5285/5288				
(as a 3271-2)	-	x (2)	-	-
SDLC Terminals				
3232-1	-	x	-	x
3271-11,-12	-	x (2)	-	x (2)
3275-11,-12	-	x (2)	-	x (2)
3274-1C,-21C,-31C,-51C	-	x (2)	-	x (2)
3276-11,-12,-13,-14	-	x	-	x
3601, 3602	-	x	-	-
3614	-	x (2)	-	-
3624	-	x (2)	-	-
3694	-	x	-	-
3767-1,-2,-3	-	x	-	x
3770 (4)	-	x	-	x (5)
3791/3730	-	x	-	x (6)
3791/3760	-	x	-	x (6)
4701	-	x	-	-
5285/5288(as a 3274-1C)	-	x	-	-
Series/1	-	x	-	-
Communications Controllers				
3705-1 Remote				
3705-II Remote				
* Local Terminals	TCAM	TSO		
2260	x	x		
2715-1	x	-		
3272-1,-2	x	x		
3274-1A,-1B,-1D,-21A, 21B,-21D,-31A,-31D	x	x		
3791	x (7)	x (6)		
3791/3730	x (7)	x (6)		
7770-3	x	-		

PROGRAM PRODUCTS

ACF/TCAM V2 R1 (cont'd)

ACF/TCAM TERMINAL SUPPORT CHART FOR GET/PUT INTERFACE (Cont'd.)

COMPATIBILITY MODE (1)

	Single System Support ACF/TCAM via EP/VS	Single System Multi-system Support(1) ACF/TCAM via NCP/VS or ACF/NCP/VS	Single System Support TSO with ACF/TCAM via EP/VS	Single System Multisystem Support (1) TSO with ACF/TCAM via NCP/VS or ACF/NCP/VS
S/S Terminals				
3767-1,-2 (2740-1)	x	x	-	-
3767-1,-2(2740-2)	x (3)	x (3)	-	-
3767-1,-2 (2741)	x	x	x	x
CMCST (2741)	x	x (4)	x	x
S/7 (2740-1)	x	x	-	-
5100 (2741)	x	x	x	x
5110 (2741)	x	x	x	x
BSC Terminals				
3274-1C,-21C,-31C,-51C (3271)	x (3)	x (3)	x (3)	x (3)
3276-1,-2,-3,-4 (3271)	x (3)	x (3)	x (3)	x (3)
3771-1,-2,-3 (2772)	x	x	-	-
3773-1,-2,-3,-P1 -P2,-P3 (2772)	x	x	-	-
3774-1,-2,-P1 -P2 (2772)	x	x	-	-
3775-1,-P1 (2772)	x	x	-	-
3776-1,-2 (2772/3780)	x	x	-	-
3777-1 (2772/3780)	x	x	-	-
3780 (2772)	x	x	-	-
5265 (3741-2,-4)	x	x	-	-
5274 (3275-1,-2)	x (3)	x (3)	x (3)	x (3)
5285/5288 (3770)	-	x	-	-
5937 (3271-1,-2)	x (3)	x (3)	-	-
8130 (3271)	x (3)	x (3)	x (3)	x (3)
8130 (3780)	x (3)	x (3)	-	-
8140 (3271)	x (3)	x (3)	x (3)	x (3)
8140 (3780)	x (3)	x (3)	-	-
S/7 (S/3)	x	x	-	-
S/32 (S/3)	x	x	-	-
S/34 (S/3)	x	x	-	-
S/38 (S/3)	x	x	-	-
Series/1 (S/3)	-	x	-	-
SDLC Terminals				
3232-1	-	-	-	-
3274-1C,-21C,-31C,-51C (3791)	-	x (6)	-	x (6)
3276-1,-2,-3,-4 (3791)	-	x (7)	x	x (7)
3276-11,-12,-13,-14 (3791)	-	x (6)	-	x (6)
3770 (3767)	-	x (5)	-	x (5)
5285/5288 (3770)	-	x	-	-
5520 (3791/3730)	-	x	-	-
8130 (3791)	-	x	-	x
8140 (3791)	-	x	-	x
S/32 (3770)	-	x	-	x
S/34 (3770)	-	x	-	x
S/34 (3791)	-	x	-	x
S/38 (3770)	-	x	-	x

*Local devices, except for SNA 3270 and 3790 systems, are not supported by ACF/TCAM for cross-system communications with the ACF/TCAM Multisystem Networking Facility ... Unless such devices communicate via host-to-host data flows.

- Notes: (1) The terminal type in parenthesis designates the programming support provided by ACF/TCAM, e.g., S/7 (2740-1) means the S/7 is supported as a 2740-1.
- (2) Single System Support is provided through ACF/NCP/VS or NCP/VS. Multiple System Support is provided through ACF/NCP/VS.
- (3) Nonswitched support only.
- (4) Switched support only.
- (5) Supported as an interactive 3767 - applies to 3777-1,-2,-3; 3773-1,-2,-3; 3774-1,-2; and 3775-1,-3 only.
- (6) Buffer size of 960, 2560, and 3440 also supported.

(7) Applies to 3276 mdls 1, 2, 3, 4 with BSC/SDLC switch set to SDLC mode.

ACF/TCAM V2 RECORD MODE TERMINAL SUPPORT CHART

BSC Terminals

3271-1,-2 (2,4)
3274-1C,-21C,-31C,-51C (2,4)
3275-1,-2 (2,4)
3276-1,-2,-3,-4 (2,4)
5274 (3275-1,-2) (2,4)
5937 (3271-1,-2) (2,4)
8130 (3276) (2,4)
8140 (3276) (2,4)

PROGRAM PRODUCTS

ACF/TCAM V2 R1 (cont'd)**SDLC Terminals**

3271-11,-12 (2)	3774-1,-2,-P1,-P2
3274-1C,-21C,-31C,-51C (2)	3775-1
3275-11,-12 (2)	3775-P1
3276-11,-12,-13,-14	3776-1,-2,-3,-4
3601, 3602	3777-1,-3,-4
3614 (2)	3791
3624 (2)	3791/3730
	5285/5288 (3770)
	5520 (3791/3730)
3631 (2)	5937 (3271) (3)
3632 (3601,3602) (2)	8130 (3791)
3651 (5)	8140 (3791)
3694	
3767-1,-2,-3	S/32 (3770)
3771-1,-2,-3	S/34 (3770)
3773-1,-2,-3	S/34 (3791)
3773-P1,-P2,-P3	

Local Terminals

3272-1,-2
3274-1A,-1B,-1D,-21A,-21B,-21D,-31A,-31D
3791 (1)
3791/3730 (1)

All the above terminals have both single and multisystem support.

- (1) Configuration Support #9165 and #9169 only.
- (2) Nonswitched connection only.
- (3) Switched connection only.
- (4) Connection only through NCP/VS or ACF/NCP/VS.
- (5) Applies to 3651 mdls A25, B25, A75, B75, C75 and D75, with the appropriate SDLC communications features.

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**ADVANCED COMMUNICATIONS FUNCTION FOR TCAM
ACF/TCAM VERSION 2 RELEASE 2
5735 - RC3**

Advanced Communications Function for TCAM Version 2 Release 2 adds support for record mode operations and associated device products.

HIGHLIGHTS OF ACF/TCAM V2 R2

Record API support ... Provides a single telecommunications access method interface to subsystems for ACF/TCAM V2 R2, and VTAM and ACF/VTAM, and support for device products associated with record mode operations.

- Permits use of CICS, DSX, IMS, JES 2/3, and/or VSPC under ACF/TCAM at execution time without change to the existing subsystem/service program.
- Supports single-session inter-host subsystem communication.

ACF/TCAM V2 R2 WITH ACF/NCP/VS: The following ACF/TCAM V2 R2 enhancements are supported in conjunction with ACF/NCP/VS Release 1 or with ACF/NCP/VS Release 2:

- Record API support. *
- Single-session inter-host communication. **
 - * Supported also by NCP/VS 5.0.
 - ** Requires the ACF/TCAM V2 R2 Multisystem Networking Facility feature.

Communications Controller Support: ACF/TCAM Version 2 operates with the following communications controllers, as supported by NCP/VS 5.0, ACF/NCP/VS R1, and ACF/NCP/VS R2:

- 3705-I Communications Controller.
- 3705-II Communications Controller.

CUSTOMER RESPONSIBILITIES

To install and use ACF/TCAM V2, the customer must:

- Design the single system network.
- Order and install all required communications equipment.
- Have prerequisite TCAM SCP for ACF/TCAM V2 installed.
- Install ACF/TCAM V2.
- Define the network to ACF/TCAM V2.
- Install NCP/VS 5.0, ACF/NCP/VS R1, and/or ACF/NCP/VS R2 (unless all terminals defined to ACF/TCAM V2 are channel-attached to the host processor or are EP/VS-defined).
- Define the network to ACF/NCP/VS R1 and/or ACF/NCP/VS R2.

To install and use the ACF/TCAM V2 Multisystem Networking Facility feature, the customer must:

- Design the multisystem network.
- Order and install any additional communications equipment (for example, intersystem links between interconnected 3705 Communications Controllers).
- Have prerequisite TCAM SCP for ACF/TCAM V2 installed.
- Install ACF/TCAM V2.
- Install ACF/NCP/VS R1 and/or ACF/NCP/VS R2.
- Install the ACF/TCAM V2 Multisystem Networking Facility feature.
- Define the multisystem network to ACF/TCAM V2 and to ACF/NCP/VS R1 and/or ACF/NCP/VS R2 in each host system.

SOFTWARE REQUIREMENTS

ACF/TCAM V2 R1 and V2 R2 require one of the following operating systems at the specified level or subsequent levels unless otherwise specified:

- OS/VS1 Release 6.7.
- OS/VS2 (MVS) Release 3.8.

Multisystem Considerations: In a multiple host system environment, the ACF/TCAM V2 enhancements are supported for each respective ACF/TCAM V2 host system just as they are within a single host system environment.

ACF/TCAM V2 supports the following items between ACF/TCAM V2 host systems, or between ACF/TCAM V2 and ACF/VTAM R2 host systems:

- Negotiable session initialization parameters.
- Channel-attached SNA 3270 and 3790 systems.
- Single-session inter-host subsystem communication. **
- Support for the NCCF program product. *
- Support for the Programmed Cryptographic Facility

- program product.
- Support for 3790 inbound pacing. *

* Also supported between ACF/TCAM V2 and ACF/TCAM V1 or between ACF/TCAM V2 and ACF/VTAM V1 R1 systems.

** Support provided in ACF/TCAM V2 R2 Record API.

The following ACF/TCAM V2 enhancement is also supported from an ACF/TCAM V2 host system when intercommunicating with an ACF/TCAM V1 or ACF/VTAM R1 host system:

- Channel-attached SNA 3270 system and 3790 system networking.

In the above configuration, the appropriate access method features for multisystem networking must be installed.

ACF/TCAM V2 can co-exist with non-ACF/TCAM hosts and provide the structure for network-wide services such as message routing, data collection and data distribution. In addition, ACF/TCAM V2 enhanced installability and usability functions can be used to interface two separate networks that wish to communicate with one another.

MIGRATION

Migrating from TCAM 10 or ACF/TCAM V1 to ACF/TCAM V2: The following migration paths are available for the given levels of TCAM and ACF/TCAM:

TCAM 10 will operate with the following levels of NCP/VS and ACF/VS:

- NCP/VS 5.0.
- ACF/NCP/VS R1.
- ACF/NCP/VS R2 (with appropriate TCAM 10 PTFs).

ACF/TCAM V1 will operate with the following levels of NCP/VS and ACF/NCP/VS:

- NCP/VS 5.0.
- ACF/NCP/VS R1.
- ACF/NCP/VS R2 (with appropriate ACF/TCAM V1 PTFs).

ACF/TCAM V2 R1 and R2 will operate with the following levels of ACF/NCP/VS:

- NCP/VS 5.0.
- ACF/NCP/VS R1.
- ACF/NCP/VS R2.

Functions supported by TCAM 10 or ACF/TCAM V1 are also supported by ACF/TCAM V2 with the appropriate level of NCP/VS or ACF/NCP/VS with the following exceptions:

- OS/VS2 SVS is not supported by ACF/TCAM V2, and consideration must be given to migrating a user's operating system support before or at the same time as migrating to ACF/TCAM V2.
- The enhancements to ACF/TCAM V2 R1 include an initiator task that allows non-failed tasks in the MCP region to continue running when another task in the region fails. The initiator will optionally restart the failed task.

Both the MCP and TCAM operator control run as subtasks of the initiator. These subtasks, along with other initiator subtasks, are defined in a subtask table which contains information on each subtask running under the control of the initiator. A default subtask table, which may be changed by the user, is shipped with ACF/TCAM V2 R1.

The TCAM 10 or ACF/TCAM V1 user will need to do the following in order to execute his MCP as an ACF/TCAM V2 system:

- 1) Modify JCL to start the initiator rather than the MCP.
- 2) Update the subtask table to include his MCP name, or
- 3) Rename his MCP to the default name supplied in the subtask table, or
- 4) Override the default name via JCL.

If the user chooses to code his own subtask table rather than use the one supplied, he must code entries for his MCP and for the TCAM operator control program.

- In an ACF/TCAM V1 R1 multisystem networking environment, when one host had two or more 3705s with ACF/NCP/VS, cross-domain session traffic could be routed either through an ACF/TCAM host transit node or directly through the 3705s without host involvement. In ACF/TCAM V2, the host transit node capability has been removed. Therefore, cross-domain session traffic which does not use host to host data flows must be routed directly through the 3705s. The new 3705-II high speed local attachment feature for communication between 3705-IIIs offers an attractive means of off-loading this function.

Migrating from TCS-ACF to ACF/TCAM V2 R1: All TCS-ACF macros are supported by ACF/TCAM V2 R1. In addition, the functions

PROGRAM PRODUCTS

ACF/TCAM V2 R2 (cont'd)

of the following TCS-ACF macros have been incorporated into ACF/TCAM macros:

TCS-ACF	ACF/TCAM Macro/Operand
TCSRROUTE	FORWARD TTCIN =
HOLDNEXT	HOLDSYNCHLD =
NEXTMSG	IEDRELS SYNCHLD =, BRANCH =,
TCSINTRO	INTRO NETMON =, MANUAL =,
	NEWLINE =, NODEID =,
	LOOPCNT =, LOOPQ =
TOPTION	OPTION USE =
TCSPRIOR	PRIORITY PRISAVE =
SKIPFLD	SETSCAN SKIPFLD =
MEROFF	TERRSET MASK =

To aid in migration, ACF/TCAM V2 R1 will also support the above TCS-ACF macros in their TCS-ACF form. However, it is recommended that customers use the new TCAM operands.

Users of TCS levels prior to TCS-ACF Version 1 Release 2 modification 2 should note that the format and size of two controls fields, the FHP and TCSOPTS option field, have been changed. Any absolute (rather than symbolic) references in user code to their content or size may be changed.

Compatibility: Source code compatibility is retained for existing user programs that utilize current levels of TCS-ACF. However, such programs may require changes to take advantage of the additional capabilities offered through ACF/TCAM V2 R1.

Other Considerations: ACF/TCAM V2 requires the following features in support of the Compare and Swap instructions: Conditional Swapping (#1051) on the 3135; Advanced Control Program Support (#1001) or Conditional Swapping (#1051) on the 3145.

ACF/TCAM V2 will operate in a VM/370 virtual machine which supports the required release of the operating system (OS/VS1, OS/VS2 MVS). ACF/TCAM V2 operation in a VM/370 environment is intended for use in program development and testing and other uses where performance is not critical. Operation of ACF/TCAM V2 under VM/370 Release 5, even with the virtual machine assist feature, may add significant additional processor overhead. If your customer has specific throughput or terminal response requirements, you should plan to benchmark under VM/370 to ensure that any proposed configuration will meet the customer's performance needs.

Each OS/VS1 or OS/VS2 (MVS) virtual machine in which ACF/TCAM V2 resides requires a dedicated sub-channel address to a 3705-I or 3705-II with ACF/NCP/VS.

In a mixed ACF/TCAM - ACF/VTAM multisystem environment, the ability of ACF/VTAM to access device characteristics of terminals controlled by ACF/TCAM V1 or ACF/TCAM V2 is limited to those indicators defined and maintained by these versions of ACF/TCAM. In particular, the ability to determine the following SNA 3270 (3271-11,-12; 3275-11,-12) device characteristics is not supported:

- The physical device address (used on the copy function).

Machine and storage requirements will be provided in the *Advanced Communications Function for TCAM (ACF/TCAM) Version 2 Installation: Storage Estimates, Conversion Information, Sample Programs*, at the availability of ACF/TCAM V2 on each supported operating system.

IBM will accept APARs describing any situation where the installation of ACF/TCAM V2 causes an exposure to the system integrity of OS/VS2 MVS.

Related IBM Programs: The following table summarizes ACF/TCAM Version 2 relationships in a networking environment:

OS/VS1	OS/VS2 MVS	ACF/TCAM V2 R2			
		ACF/TCAM V2 R1		GET/PUT Interface*	Record API
*	*	DB/DC	CICS/VS 1.4	*	*
*	*		IMS/VS 1.1.5		*
		Job Entry	JES2/RJE 4.1		*
	*		JES2/NJE 3.0		*
	*		JES3/SNA RJP		*
		Interactive	TSO	*	
*			VSPC		*
*	*		IIS	*	
		Device Suppt.	SSS 5.0	*	
*	*		DSX	*	*
*	*		3650 Host Sup't**		*
		Communication Network Mgt.	NCCF-NPDA	*	
		Programmed Cryptographic Facility		***	***

- * Includes programs utilizing TGET, TPUT, READ, WRITE, and native TCAM applications not written to Record API.
- ** Host support for 3650 Programmable Store System.
- *** Supported by ACF/VTAM V2 but independent of interface levels shown.

COMPATIBILITY

ACF/TCAM V2 R1 and R2 retain compatibility with ACF/TCAM V1, with the following exception:

- ACF/TCAM V2 does not support OS/VS2 SVS.

Consideration for this difference is described above under the section entitled "Migration and Planning Considerations".

ACF/TCAM V2 R1 and R2 offer compatibility with NCP/VS 5.0, ACF/NCP/VS R1, and ACF/NCP/VS R2.

Compatibility of related IBM programs (see previous chart) written to the Record Mode Application Program Interface (Record API) is retained in ACF/TCAM V2 R2, except for programs written to the Programmed Operator interface and user programs written directly to the Record API.

PROGRAM CURRENCY

ACF/TCAM V1 is currently supported under OS/VS1 release 6.0 and 6.7, OS/VS2 (SVS) release 1.7, OS/VS2 (MVS) release 3.7 and 3.8.

ACF/TCAM V2 R1 and V2 R2 is supported by OS/VS1 Release 6.7, and OS/VS2 (MVS) Release 3.8, and subsequent releases unless otherwise specified.

DOCUMENTATION:

(available from Mechanicsburg)

Publications currently available which describe ACF/NCP/VS V2 are the following:

Advanced Communications Function for TCAM (ACF/TCAM) Version 2 General Information: Introduction, ACF/TCAM Version 2 Program Library and Introduction to Advanced Communications Function.

TERMS and CONDITIONS: See PP Index

**ADVANCED COMMUNICATIONS FUNCTION FOR TCAM
(ACF/TCAM) VERSION 2 RELEASE 3
OS/VS1 and OS/VS2 MVS (5735-RC3)**

Advanced Communications function for TCAM Version 2 Release 3 is a program product for users of OS/VS1 and OS/VS2 (MVS) that offers expanded network configurability, network management capability and enhanced network recoverability.

To support multiple S/370 networks, a user must install the ACF/TCAM V2 R3 Multisystem Networking Facility feature. To take advantage of some of the functions provided by the Multisystem Networking Facility, a user may install the feature in large, multi-node single system environments.

HIGHLIGHTS OF ACF/TCAM V2 R3

- **Parallel Links:** Multiple active SDLC links between adjacent 3705s.
 - **Transmission Groups:** Logical groupings of transmission links between adjacent network nodes. *
 - **Multiple Routes:** Multiple routes for SNA and non-SNA message transmission between nodes in a network. *
 - **Automatic Session Re-initiation Option:** Disrupted sessions can be automatically re-initiated to take advantage of multiple route availability. *
 - **Multiple Priority Levels:** Three levels of transmission priorities, selectable by session. *
 - **Extended NCP Interconnection:** New capabilities for interconnecting 3705s in single and multiple system networks.
 - **Extended NCP Ownership.**
 - **Flow Control:** Enhanced management of network traffic demands. *
 - **Reduced Cross-Domain Resource Definition Requirements.**
 - **Session Outage Notification:** Enhanced awareness of session outages.
 - **Enhanced Recovery Capabilities. ***
 - **Route Verification and Error Notification Facilities. ***
 - **Route Availability Monitoring Option:** Notification to a session requestor that a previously unavailable route is now available. *
 - **Transmission Group Option for Line Trace.**
 - **Dynamic NCP Dump Facility.**
 - **Support of the Network Terminal Option (NTO) program product.**
 - **Supports the CCITT X.21 switched interface when the 3705-II is attached to an X.21 Interface via the 3705-II.**
- * Requires the Multisystem Networking Facility feature.

Note: The ACF/TCAM V2 R3 Base System provides the capability to define one Transmission Group between adjacent network nodes. The capability to define more than one Transmission Group requires the networking feature.

SUMMARY AND ADVANTAGES OF ACF/TCAM V2 R3

Parallel Links: Multiple active SDLC links between adjacent 3705s ... Parallel Links allows data traffic to flow simultaneously over two or more SDLC links between adjacent 3705s. All such links can be operational and in use at the same time, and each can be activated or deactivated independently of the others. This capability can provide increased message flow and improve the availability and reliability of transmissions between 3705s.

Transmission Groups: Logical groupings of transmission links between adjacent network nodes A user may define up to eight Transmission Groups, each with one or more SDLC links between adjacent 3705s with ACF/NCP/VS R3. A Transmission Group permits multiple SDLC links to be defined as a single logical link. A single channel between a host and its channel attached 3705 is also defined as a Transmission Group. If a link or links in a Transmission Group fails, session traffic will automatically be placed on remaining active links without loss of data. This enhances the reliability and availability of service between 3705s. Multiple Transmission Groups and appropriate route selection permit a user to specify message traffic for different applications to flow through a network via pre-assigned Transmission Groups. For example, interactive processing may be assigned one group and batch processing may be assigned a different group, each with its own physical link support.

Multiple Routes: Multiple routes for SNA and non-SNA message transmission between nodes in a network ... A user may define up to eight routes for message transmission between two host systems or between a host system and a 3705. When a session is initiated between two application programs or between a terminal and an application program, one of the routes is automatically selected to transmit the session traffic. The user may limit the selection to a particular route or to one of an ordered sequence of routes. Thus, it is

possible to distribute the traffic for different sessions to different routes, dividing the load among several routes.

The ordered sequence of routes, determined by the installation, defines the set of alternate routes available for session traffic. In the event a route becomes inoperative during a session, the application program or terminal may request that the session be re-initiated. This causes automatic selection of one of the alternate routes. The user can then resynchronize the session data traffic and continue data communications and application processing via network routes that remain in operation.

Automatic Session Re-Initiation Option: A user-provided exit routine gains control whenever a session is terminated. The routine may specify that automatic session re-initiation is to be provided for a given session. When this option is requested, TCAM will immediately request a new session with the same characteristics as the terminating session. The exit routine could be designed so that, for example, sessions terminating because of route failure will be automatically re-initiated. When a route fails, sessions using the route are terminated, the exit routine gains control for each session and new sessions are requested. If other routes are operational, a new session can be started immediately on one of the other routes, and data transmission can resume as soon as the new sessions are established.

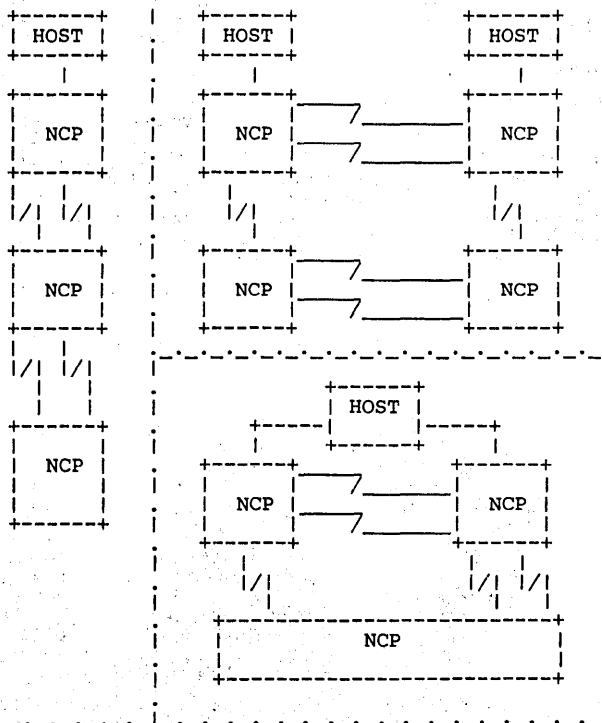
Multiple Priority Levels: Three levels of transmission priorities, selectable by session ... A user can specify one of three message traffic priorities for a session between two application programs or between a terminal and an application program. For example, this permits message traffic for a time dependent session to be transmitted through a network ahead of other message traffic. That is, interactive processing may be given top priority by a user while other network traffic, such as batch processing, is assigned to a lower priority by the user.

Extended NCP Interconnection: New capabilities for interconnecting 3705s in single and multiple system networks ... in ACF/TCAM V2 R2 a remote NCP could only be link-attached via a single link to a single channel-attached 3705. In ACF/TCAM V2 R3 a 3705 may now be link-attached via Transmission Groups to one or more channel-attached and/or link attached 3705s.

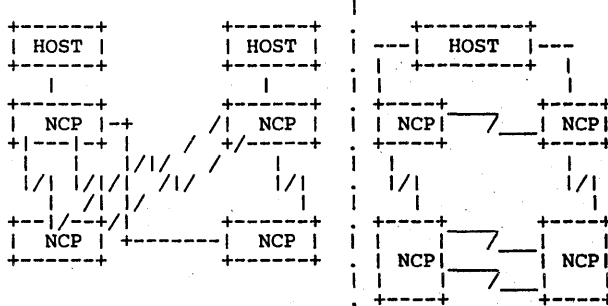
These capabilities can significantly expand the installation's configurability options. Also, they can improve the overall efficiency of the network and improve the ability of a host processor to take over a 3705 whose current owner (or a link to that owner) has failed or has been deactivated.

See Figure 1 for interconnection flexibility.

FIGURE 1



ACF/TCAM V2 R3 (cont'd)



Extended NCP Ownership: As many as eight host systems can share the ownership of a 3705 that is channel-attached * and/or link-attached to another 3705(s). Each of the owning host systems is notified in the event the 3705 becomes inoperative. This permits re-instatement of a failed or deactivated 3705 via any one of the host systems that shares in its ownership.

- * The channel attachments cannot exceed the number of channels supported by the 3705-I or the 3705-II communications controllers.

Flow Control: Enhanced management of the network traffic demands ... Via SNA protocols, the flow of message traffic is dynamically regulated between a host system and a 3705 and between two host systems. Continuous feedback is exchanged between network resources in order to regulate network traffic and reduce the possibility of network congestion.

Reduced Cross-domain Resource Definition Requirements: An enhancement that is available for both SNA terminal or application definitions ... A SNA terminal in one domain can request a session with an application program in a different domain without prior definition of the terminal within the application program's host. Also, an application in one domain can request a session with an application program or SNA terminal in a different domain without prior definition of the requesting application within the cross-domain application program's or cross-domain terminal's host.

This enhancement is designed to reduce the need for user-specified cross-domain resource definitions in a multisystem environment and also to reduce the storage required to support such definitions. It permits the addition of an application program or SNA terminal to one host system without the need to re-define other host systems with which the resource may want to enter into a SNA session.

Session Outage Notification: If the route supporting a session becomes inoperative, the session ends are made aware of the outage. Session reinitiation may be requested as described under "Multiple Routes".

Enhanced Recovery Capabilities:

- Enhanced restart or host-to-terminal control sessions: In recovering from a host failure situation, a host system can recover its control session for a 3271-11**, 3271-12**, 3274-10*, 3275-11**, 3275-12**, 3684, 3770 MLU, S/32, S/34 or S/38 without disruption of existing sessions between the device and application programs on other host systems. This permits user applications that are not affected by such a failure to continue processing during recovery of the control session. This capability is included in the base ACF/TCAM V2 R3 system.
 - * This product must be at an appropriate EC level for this function.
 - ** Support for these devices is provided by ACF/NCP/VS R3.

- Enhanced takeover of a 3705: In the event a host system fails or otherwise gives up control of a 3705, any host system that is sharing ownership of the same 3705 will have its network operator notified about the lost host. Any of the notified host systems can take over control of the devices mentioned above without disrupting their existing cross-domain sessions with application programs. It is no longer necessary to deactivate corresponding cross-domain resource definitions before acquiring resources attached to the 3705 that were controlled by the lost host system.

- Enhanced multiple host system re-synchronization: In recovering from a failure situation, two host systems can re-synchronize their control session without disruption of existing cross-domain sessions between two application programs or between a terminal and an application program. This permits user applications that are not affected by such a failure event to continue operations during re-instatement of the host system's cross-domain control session.

Route Verification and Error Notification Facilities: Via the DISPLAY command, a network operator can determine if a message route originating in his host is operative or inoperative. This permits a network operator to verify the availability of network routes and to take corrective action for routes that may have become inoperative. It also

permits a network operator to verify that a route has been returned to service following a failure or deactivation. During the verification, appropriate resource owners are notified when an inactive or failed resource is encountered on a route.

In addition, if during network operation a route fails, an awareness message is issued at the host end point(s) identifying the inoperative route to the network operator. New display commands have been added which permit a network operator to take appropriate action to minimize the affects of an unusable message route on network applications.

Route Availability Monitoring Option: A user-provided exit routine gains control whenever a session initiation is attempted. The routine may specify that route availability monitoring is to be provided for a given session.

When a session initiation is attempted but there is no route available, the session attempt is rejected and the requestor is notified of the failure. It is the responsibility of the requestor to retry the session request later, requesting the same or a different route. When route availability monitoring is in effect for a session, however, the failure of the initiation attempt is remembered by TCAM and the requestor is notified of the availability of the route when it becomes available.

Transmission Group Option for Line Trace: Extends the existing SDLC line trace capabilities to Transmission Groups. Via the network operator MODIFY command, the message traffic over a Transmission Group between two 3705s can be traced as if it were a single SDLC link.

Dynamic NCP Dump Facility: A network operator can invoke a dump of NCP storage from a channel-attached or SDLC-attached 3705. Since NCP continues to operate during the dump process, the dump will represent NCP status over a period of time. The dump contents are recorded and printed via the facilities of the appropriate System Support Programs (SSP) for NCP, and can be useful in dynamically evaluating network problem situations.

Note: ACF/TCAM V2 R3 provides Multiple Active Routes and Session Outage Notification support to non-SNA, non-EP devices. EP device networking support continues as in ACF/TCAM V2 R2.

In addition to the existing TCAM support for non-SNA devices, ACF/TCAM V2 R3 supports the following devices as virtual SNA devices through its support of the Network Terminal Option (NTO) program product.

- 2740 mdl 1 Communications Terminal, switched and nonswitched.
- 2741 Communications Terminal, switched and nonswitched.
- Western Union Teletypewriter Exchange Service (TWX) M33/35, switched and nonswitched.
- World Trade Teletypewriter Terminal (WTTY), nonswitched only.

The support is provided for users of the DCB application interface and the TCAM subsystem interface. These devices can participate in a multiple system as well as a single system environment.

In addition to the existing support for non-SNA devices, TSO/TCAM supports the 2741 and TWX M33/35 via the NTO program product.

ACF/TCAM Version 2 Release 3 also supports the following CCITT X.21 switched function when attached to an X.21 Interface via the 3705-II:

- Address calling.
- Auto Answer.
- Call progress signal.
- Direct call.
- Closed User Groups.
- Abbreviated Address Calling.

CUSTOMER RESPONSIBILITIES

To install and use ACF/TCAM V2 R3, the customer must:

- Design the single system network.
- Order and install all required communications equipment.
- Have prerequisite TCAM SCP for ACF/TCAM V2 R3 installed.
- Install ACF/TCAM V2 R3.
- Define the network to ACF/TCAM V2 R3.
- Install NCP/VS 6.0, ACF/NCP/VS R1, ACF/NCP/VS R2, or ACF/NCP/VS R3 (unless all terminals defined to ACF/TCAM V2 R3 are channel-attached to the host processor or are EP/VS - defined).
- Define the network to NCP/VS 5.0, ACF/NCP/VS R1, ACF/NCP/VS R2 or ACF/NCP/VS R3.

To install and use the ACF/TCAM V2 R3 Multisystem Networking Facility feature, the customer must:

PROGRAM PRODUCTS

ACF/TCAM V2 R3 (cont'd)

- Design the single or multisystem network.
- Order and install any additional communications equipment (for example, intersystem links between interconnected 3705 Communications Controllers).
- Have prerequisite TCAM SCP for ACF/TCAM V2 R3 installed.
- Install ACF/TCAM V2 R3.
- Install ACF/NCP/VS R1, ACF/NCP/VS R2, or ACF/NCP/VS R3.
- Install the ACF/TCAM V2 R3 Multisystem Networking Facility feature.
- Define the network to ACF/TCAM V2 R3 and to ACF/NCP/VS R1, ACF/NCP/VS R2, or ACF/NCP/VS R3 in each host system.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Hardware Configurations: ACF/TCAM V2 R3 operates with the following communication controllers:

- 3705-I Communications Controller.
- 3705-II Communications Controller.

Hardware Features: ACF/TCAM V2 requires the following features in support of the Compare and Swap instruction: Conditional Swapping (#1051) on the 3135; Advanced Control Program Support (#1001) or Conditional Swapping (#1051) on the 3145.

System Configuration: ACF/TCAM V2 R3 runs in a virtual storage environment in any operating system configuration that supports the OS/VS1 or OS/VS2 MVS operating system as specified in the "Programming Requirements" section below.

SOFTWARE REQUIREMENTS

ACF/TCAM V2 R3 needs one of the following operating systems: OS/VS1 Release 7.0, or OS/VS2 MVS Release 3.8, and all subsequent releases and modifications unless otherwise stated.

Software Configuration: ACF/TCAM V2 R3 requires one of the following operating systems at the specified level, or subsequent levels, unless otherwise specified:

- OS/VS1 Release 7.0.
- OS/VS2 (MVS) Release 3.8.

ACF/TCAM V2 will operate in a VM/370 virtual machine which supports the required release of the operating system (OS/VS1, OS/VS2 MVS). VM/370 provides a means of supporting any combination of TCAM and VTAM systems in the same processor each running in its own virtual machine. This facility can be helpful when changing TCAM releases, and when testing the ACF/TCAM Multisystem Networking Facility. Further, one VTAM and one TCAM system can coexist in one virtual machine. Operation of ACF/TCAM V2 under VM/370, even with the virtual machine assist feature, may add additional processor overhead, which should be considered in your review of customer performance needs.

Each OS/VS1 or OS/VS2 (MVS) virtual machine in which ACF/TCAM V2 resides requires a dedicated sub-channel address to a 3705.

Prerequisite SCP: Use of ACF/TCAM requires the concurrent installation of prerequisite TCAM system control programming (SCP) modules.

Other Considerations: In a mixed ACF/TCAM - ACF/VTAM multisystem environment, the ability of ACF/VTAM to access device characteristics or terminals controlled by ACF/TCAM V1 or ACF/TCAM V2 is limited to those indicators defined and maintained by these versions of ACF/TCAM. In particular, the ability to determine the physical device address, used with the copy function of a 3271-11, -12, is not supported.

3274 mdl 1A and 3274 mdl 1C/SNA Inbound Pacing ... Is supported under ACF/TCAM V2 R2 and ACF/TCAM V2 R3. These products must be at the appropriate EC level for this function.

COMPATIBILITY

See "Migration and Planning Considerations" section for important compatibility exceptions.

Object code compatibility is retained in ACF/TCAM V2 R3 for related IBM programs (see *Related IBM program charts*) written to the VTAM Record Application Programs Interface (Record API). User programs written directly to the VTAM Record API are not supported by the ACF/TCAM V2 subsystem interface.

ACF/TCAM V2 R3 enhancements made in support of parallel links, multiple routes, and extended NCP interconnection result in minor operational differences from previous releases of TCAM. Users should

refer to the *ACF/TCAM V2 Installation and Migration Guide* available at first customer shipment.

MIGRATION AND PLANNING CONSIDERATIONS

ACF/TCAM V2 R3 with NCP/VS and ACF/NCP/VS: With the exception of the dynamic NCP Dump facility and Reduced Cross Domain Network Definition Requirements, the enhanced functions of ACF/TCAM V2 R3 are supported only in conjunction with ACF/NCP/VS R3.

The NCP Dump facility will operate with NCP/VS 5.0 (with appropriate PTFs), ACF/NCP VS R1, R2 or R3.

Reduced Cross Domain Network Definition Requirements will operate with ACF/NCP/VS R1, R2 or R3.

ACF/TCAM V2 R3 with EP/VS: ACF/TCAM R3 will continue to support the latest current level of the Emulator Program (EP/VS) and Partitioned Emulator Program (PEP). See the Terminal Support chart for specific device support.

Migrating from ACF/TCAM R1, ACF/TCAM V2 R1, or ACF/TCAM V2 R2 to ACF/TCAM V2 R3

The following support alternatives are provided to aid in migration planning:

	NCP/VS 5.0	ACF/NCP/VS R1	R2	R2.1 (1)	R3
TCAM 10	X	X	X*	X	No
ACF/TCAM V1	X	X	X*	X	X
ACF/TCAM V2 R1	X	X	X	X	X
ACF/TCAM V2 R2	X	X	X	X	X
ACF/TCAM V2 R3	X	No	X	X	X

* Requires applicable access method PTFs.

(1) Requires EREP PTFs for LPDA level maintenance data records.

Note: The above matrix assumes that customers will be at current access method maintenance levels when migrating from one NCP release to another.

The following significant differences between ACF/TCAM V2 and ACF/TCAM V1 may require special planning. All other functions supported by ACF/TCAM V1 are also supported by ACF/TCAM V2 R1, R2 and R3.

OS/VS2 (SVS) is not supported by ACF/TCAM V2, and consideration must be given to migrating a user's operating system support before or at the same time as migrating to ACF/TCAM V2.

In an ACF/TCAM V1 multisystem networking environment, when one host had two or more 3705s with ACF/NCP/VS, cross-domain session traffic could be routed either through an ACF/TCAM host transit node or directly through the 3705s without host involvement. In ACF/TCAM V2, the host transit node capability has been removed. Therefore, cross-domain session traffic which does not use host-to-host data flows must be routed directly through the 3705s. The new 3705-II high-speed local attachment feature for communication between 3705-IIIs offers an attractive means of off-loading this function.

Multisystem Considerations: In a multiple host system environment:

- The ACF/TCAM V2 R3 enhancements are supported for each respective ACF/TCAM V2 R3 host system.
- The ACF/TCAM V2 R3 host system can coexist with ACF/TCAM V2 R2, ACF/TCAM V2 R1, ACF/TCAM V1, ACF/VTAME, ACF/VTAM R3, ACF/VTAM R2, and/or ACF/VTAM R1 host systems at the level of function supported by these host systems.

PERFORMANCE and STORAGE CONSIDERATIONS

Machine and storage requirements will be provided in the *Advanced Communications Function for TCAM (ACF/TCAM) Version 2 Installation: Sample Programs*, at the availability of ACF/TCAM V2 R3 on each supported operating system.

The new functions provided by the ACF/TCAM V2 R3 Multisystem Networking Facility feature may increase storage requirements and path lengths over those in ACF/TCAM V2 R1 and R2. The actual performance impact (if any) to a customer will vary depending upon his particular hardware and network configuration.

DATA SECURITY, AUDITABILITY, and CONTROL

Previously announced security functions such as support for the Programmed Cryptographic Facility continue to be supported in ACF/TCAM V2 R3.

User management is responsible for the selection, adequacy, and implementation of these features and the appropriate application and administration control.

PROGRAM PRODUCTS

ACF/TCAM V2 R3 (cont'd)

RELATED IBM PROGRAMS

The following summarizes relationships:

		ACF/TCAM V2 R3		
OS/VS1	OS/VS2 MVS		GET/PUT Interface*	Subsystem Interface
*	*	DB/DC	CICS/VS	*
*	*		IMS/VS 1.1.5	*
	*	JOB ENTRY	JES2/RJE 4.1	*
	*		JES2/NJE 3.0	*
	*		JES3/R3.0	*
	*	Interactive	TSO	*
*	*		VSPC	*
*	*		IIS	*
*	*	Device Suppt.	SSS 5.0	*
*	*		DSX	*
*	*		PSS Host Support**	*
*	*		Host Command Facility	*
*	*	Communication Network Mgt.	NCCF-NPDA	*
*	*	Programmed Cryptographic Facility	See Note	See Note

* Includes programs utilizing TGET, TPUT, READ, WRITE, and native TCAM applications.

** Host Support for 3650 Programmable Store System.

Note: Supported by ACF/TCAM V2 R3 but independent of application program interface.

PROGRAM CURRENCY

TCAM and ACF/TCAM levels are currently supported on each operating system release as follows:

TCAM Level 8 *	OS/VS2 (MVS) - 3.7
TCAM Level 9 *	OS/VS1 - 6.0 OS/VS2 (MVS) - 3.7
TCAM Level 10 *	OS/VS1 - 6.0, 6.7, 7.0 OS/VS2 (SVS) - 1.7 OS/VS2 (MVS) - 3.7, 3.8
ACF/TCAM V1	OS/VS1 - 6.0, 6.7 OS/VS2 (SVS) - 1.7 OS/VS2 (MVS) - 3.7, 3.8
ACF/TCAM V2 R1, R2	OS/VS1 - 6.7, 7.0 OS/VS2 (MVS) - 3.8

* These releases will no longer be supported when currency terminates for the associated operating system. Currency is as follows:

OS/VS1 6.0	-	12 months after availability of VS1 Release 6.7
OS/VS2 (SVS) 1.7	-	December 1979
OS/VS2 (MVS) 3.7	-	21 months after availability of OS/VS2 (MVS) Release 3.8

DOCUMENTATION
(available from Mechanicsburg)

Advanced Communications Function for TCAM (ACF/TCAM) Version 2 General Information Manual: Introduction (GC30-3057) ...
ACF/TCAM Version 2 Release 3 Program Summary (GC30-9526) ...
Introduction to Advanced Communications Function (GC30-3033).

Introduction to Advanced Communication Function for TCAM Program Product Specifications will be available at ACF/TCAM V2 R3 availability.

MVS INTEGRITY

IBM will accept APARs describing any situation where the installation of ACF/TCAM V2 R3 causes an exposure to the system integrity of OS/VS2 (MVS).

ACF/TCAM V2 R3 Terminal Support Summary

Local Terminals	DCB API	Subsystem Interface (3)	TSO
2260	X	-	X
2715-1	X		
3272-1,2	X	X	X
3274-1A,21A,31A (3791)	X	X	X
3274-1D,21D,31D (3272)	X	X	X
3791 (1)	X	X	
3791/3730 (1)	X	X	
3791 (3270) (1)	X	X	X
3791/3730 (3270) (1)	X	X	X
7770-3	X		

Start/Stop Terminals	DCB API		Subsys. Int'f'ce (3)	TSO	
	(2)	ACF/NCP NCP/VS		EP (2)	ACF/NCP NCP/VS
1030	X		N		
1050	X	X	O	X	X
1060	X		T		
2260	X			X	
2265	X		A	X	
2740-1,2	X	X	P	-	
2741	X	X	P	X	X
2760	X		L		
3101	X	X	I	X	X
3232	X	X		X	X
AT&T 83B3	X	X	C		
WU 115A	X	X	A		
CPT-TWX (M33/35)	X	X	B	X	X
WT Telegraph	X	X	L		
3767-1,2 (2740-1)	X	X	E		
3767-1,2 (2740-2)	X(5)	X(5)			
3767-1,-2 (2741)	X	X		X	X
CMCST (2741)	X	X(4)		X	X
S/7 (2740-1)	X	X			
5100 (2741)	X	X		X	X
5110 (2741)	X	X		X	X
6733 (M33/35)	X	X		X	X

PROGRAM PRODUCTS

ACF/TCAM V2 R3 (cont'd)

BSC Terminals	DCB API		Subsys. Int'f'ce	TSO	
	EP (2)	ACF/NCP NCP/VS		EP (2)	ACF/NCP NCP/VS
2715-2	X	X			
2772	X	X			
2780	X	X			
2922	X				
2972-8,11	X(5)	X(5)			
3271-1,2	X(5)	X(5)	X(5)	X(5)	X(5)
3275-1,2	X(5)	X(5)	X(5)	X(5)	X(5)
3670	X				
3735	X	X			
3741-2,4	X	X			
3747	X	X			
5110	X	X			
1131	X	X			
1826	X	X			
S/3	X	X			
3274-1C,21C,31C,51C (3271)	X(5)	X(5)	X(5)	X(5)	X(5)
3276-1,2,3,4 (3271)	X(5)	X(5)	X(5)	X(5)	X(5)
3771-1,2,3 (2772)	X	X			
3773-1,2,3,P1,P2,P3 (2772)	X	X			
3774-1,2,P1,P2 (2772)	X	X			
3775-1,P1 (2772)	X	X			
3776-1,2 (2772/3780)	X	X			
3777-1 (2772/3780)	X	X			
3780 (2772)	X	X			
5265 (3271-2,4)	X	X			
5275 (3275-1,2)	X(5)	X(5)	X(5)	X(5)	X(5)
5285/5288 (3741)	X	X	-	-	-
5285/5288 (3271-2)	X(5)	X(5)	X(5)	X(5)	X(5)
5937 (3271-1,2)	X(5)	X(5)	X(5)		
6670 (2772)	X	X			
8100/DPPX (3271)	X(5)	X(5)	X(5)	X(5)	X(5)
S/7 (S/3)	X	X			
S/32 (S/3)	X	X			
S/34 (S/3)	X	X			
S/38 (S/3)	X	X			
S/38 (3271-2)		X(5)			X(5)
Series/1 (S/3)	-	X			

SDLC Terminals	DCB API		Subsys. Int'f'ce	TSO	
	EP (2)	ACF/NCP NCP/VS		EP (2)	ACF/NCP NCP/VS
3232-1	-	X	X	-	X
3271-11,12	N	X(5)	X(5)	N	X(5)
3274-1C,21C,31C,51C	O	X(5)	X(5)	O	X(5)
3275-11,12	T	X(5)	X(5)	T	X(5)
3276-1,2,3,4		X(5,8)	X(5,8)		X(5,8)
3276-11,12,13,14		X	X		X
3601	A	X	X	A	
3602	P	X	X	P	
3614	P	X(5)	X(5)	P	
3624	L	X(5)	X(5)	L	
3651	I		X(6)	I	
3694		X	X		
3767-1,2,3	C	X	X	C	X
3771-1,2,3	A	X	X	A	
3773-1,2,3,P1,P2,P3	B	X	X	B	
3774-1,2,P1,P2	L	X	X	L	
3775-1,P1	E	X	X	E	
3776-1,2,3,4		X	X		
3777-1,3,4		X	X		
3791		X	X		X(7)
3791/3730		X	X		X(7)
5285/5288 (3274-1C)		X(5)	X(5)		X(5)
5285/5288 (3770)		X	X		
6670		X	X		
Series/1		X			
3631,3632 (3601,3602)		X	X		
3771-1,2,3 (3767)		X	X		X
3773-1,2,3 (3767)		X	X		X
3774-1,2 (3767)		X	X		X
3775-1,3 (3767)		X	X		X
6520 (3791/3730)		X			X
5937 (3271)			X(5)		
8100/DPPX (3791)		X	X		X(7)
8100/DPCX (3791)		X	X		X(7)
S/32 (3770)		X	X		X
S/34 (3767,3770, 3791)		X	X		X

Notes

- 1) Configuration support #9165 and #9169 only.
- 2) No multisystem support unless host to host data flows are utilized.
- 3) ACF/TCAM V2 R2 and subsequent releases only.
- 4) Switched support only.
- 5) Nonswitched support only.
- 6) Applies to 3651 mdls A25, B25, A75, B75, C75, and D75.
- 7) TSO support applies to 3276 mdls 1, 2, 3, and 4 with BSC/SDLC switch set to SDLC mode.
- 8) Applies to 3276 mdls 1, 2, 3 and 4 with BSC/SDLC switch set to SDLC mode.

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**ADVANCED COMMUNICATIONS FUNCTION FOR TCAM
ACF/TCAM VERSION 2 RELEASE 4
5735-RC3**

ACF/TCAM Version 2 Release 4 offers significant extensions and enhancements to TCAM customers in a single and multiple networking environment.

Advanced Communications Function for TCAM Version 2 Release 4 is a program product for users of OS/VS1 and OS/VS2 (MVS) that offers expanded network configurability, network management capability, enhanced queue recoverability, and improved migration.

To support multiple S/370 networks, a user must install the ACF/TCAM V2 R4 Multisystem Networking Facility feature. With multiple TCAMs a user may network in the same CPU as well as run two or more copies of ACF/TCAM V2 R4.

HIGHLIGHTS OF ACF/TCAM V2 R4

- Multiple TCAMs: Capability of running multiple copies of ACF/TCAM V2 R4 concurrently in the same CPU. This function is not supported on an MVS/XA system.
- Reusable Queues Enhancement: Sequence of messages on a reusable queue will be maintained after queue reorganization is completed. Also most 045-2 ABEND conditions have been eliminated.
- Support Local Non-SNA 3270 Networking.
- Model MCP Supports Remote SNA 3270 Controllers.
- Support for 3274 Notify: Ability to sense power on/off status of LUs attached to 3274.
- Support for MVS/XA: The ability of ACF/TCAM to run on hardware supported by MVS/XA.
- Support for TAF (Terminal Access Facility) and HCF V2 (Host Command Facility)
- 3270 SNA Local REQMS/RECFMS Support: New options to retrieve messages.
- Tote Removal.

SUMMARY AND ADVANTAGES OF ACF/TCAM V2 R4

Multiple TCAM's: Multiple copies of ACF/TCAM V2 R4 may run concurrently in the same CPU. This capability is only supported in OS/VS2 MVS SP1.3.1. All copies of ACF/TCAM V2 R4 must be at the same maintenance level. Only one TSO/TCAM can run in a CPU.

Reusable Queue Enhancements: The possibility of overlaying a message during reusable queue reorganization has been greatly reduced. Also during reuse, sequence of messages is retained.

Local Non-SNA 3270 Networking: Local non-SNA 3270 terminals owned by ACF/TCAM may now participate in cross-domain sessions with either another ACF/TCAM or an ACF/VTAM.

Model MCP Supports Remote SNA 3270 Controllers: The Model MCPs are enhanced to support the remote 3270 SNA devices. Two additional SNA message handlers are included in the models. A message handler which supports displays (LU 2) and a message handler which supports printers (LU 1 and LU 3).

Retrieval Enhancements: New options have been provided to allow retrieval of very old messages, messages that have a higher sequence number than the current message number (rollover of sequence number) and other capabilities.

New Subsystem Support: Support of the Terminal Access Facility (TAF) feature of NCCF and Host Command Facility (HCF) V2.

Support for 3274 Notify: Support of the powered on/powered off feature on the model 1A control unit or model 1C or 51C control unit when BSC/SDLC switch is in SDLC mode.

3270 SNA Local REQMS/REQFMS Support: Allows 3274 model 1A maintenance statistics to be collected and transmitted to the host for processing by NPDA.

TOTE Removal: The Teleprocessing Online Test Executive (TOTE) is no longer supported.

OS/VS2 (MVS/SP Version 2): Support for expanded (3 byte) UCB in OS/VS2 (MVS/SP V2).

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

ACF/TCAM V2 R4 operates with the following communication controllers as supported by NCP/VS 5.0, ACF/NCP V1 R1, R2, R3 or ACF/NCP V2:

- 3705-I Communications Controller
- 3705-II Communications Controller
- 3705-80 Communications Controller
- 3705 Communications Controllers

ACF/TCAM V2 requires the following features in support of the Compare and Swap Instruction: Conditional Swapping (#1051) on the 3135; Advanced Control Program Support (#1001) or Conditional Swapping (#1051) on the 3145.

SOFTWARE REQUIREMENTS

ACF/TCAM V2 R4 requires one of the following operating systems at the specified level, or subsequent levels, unless otherwise specified:

- OS/VS1 7.0
- MVS/370
- MVS/XA

ACF/TCAM V2 will operate in a VM/370 virtual machine which supports the required release of the operating system (OS/VS1, OS/VS2 (MVS)). VM/370 provides a means of supporting any combination of TCAM and VTAM systems in the same CPU each running in its own virtual machine. This facility can be helpful when changing TCAM releases, and when testing the ACF/TCAM Multisystem Networking Facility. Further, one VTAM and one TCAM system can coexist in one virtual machine.

Prerequisite SCP: Use of ACF/TCAM requires the concurrent installation of prerequisite TCAM System Control Programming (SCP) modules.

Other Considerations: In a mixed ACF/TCAM - ACF/VTAM multisystem environment, the ability of ACF/VTAM to access device characteristics of terminals controlled by ACF/TCAM V1 or ACF/TCAM V2 is limited to those indicators defined and maintained by these versions of ACF/TCAM. In particular, the ability to determine the physical device address used with the copy function of a 3271-11, 12 is not supported.

COMPATIBILITY

See section on "Migration and Planning Considerations" for important compatibility exceptions.

Object code compatibility is retained in ACF/TCAM V2 R4 for related IBM programs (see "Related IBM Programs" chart) written to the VTAM Record Application Program Interface (Record API). User programs written directly to the VTAM Record API are not supported by the ACF/TCAM V2 subsystem interface.

RELATED IBM PROGRAMS: The following summarizes ACF/TCAM Version 2 Release 4 relationships:

		ACF/TCAM V2 R4			
OS/VS1	OS/VS2 MVS			GET/PUT Interface*	Subsystem Interface
*	*	DB/DC	CICS/VS 1.4	*	*
*	*		IMS/VS 1.1.6		*
	*	Job Entry	JES2/RJE 4.1		*
	*		JES2/NJE 3.0		*
	*		JES3/R3.0		*
	*	Interactive	TSO	*	
*	*		IIS		*
*	*		IIPS		*
*	*	Device Suppt.	SSS 5.0	*	
*	*		DSX	*	*
*	*		HTF		*
	*		IDWS		*
*	*		Programmable Store System Host Support **		
*	*		Host Command Facility ***	*	*
*	*	Communication Network Mgt.	NCCF-NPDA	*	
*	*		TAF		
*	*		Programmed Cryptographic Facility	See Note	See Note

* Includes programs utilizing TGET, TPUT, READ, WRITE, and native TCAM applications.

** Host Support for 3650 Programmable Store System.

PROGRAM PRODUCTS

ACF/TCAM V2 R4 (cont'd)

*** Host Command Facility (HCF) runs only on Get/Put interface and V2 runs only on subsystem interface.

Note: Supported by ACF/TCAM V2 R3 but independent of application program interface.

PROGRAM CURRENCY

TCAM and ACF/TCAM Levels are currently supported on each operating system release as follows:

TCAM Level 10	OS/VS1 - 7.0*
	OS/VS2 (MVS) - 3.8*
ACF/TCAM V1	OS/VS2 (MVS) - 3.8*
ACF/TCAM V2 R2, R3	OS/VS1 - 7.0**
	OS/VS2 (MVS) - 3.8**

* Corrective service only

** ACF/TCAM V2 R2 will remain current until October, 1982.

MIGRATION AND PLANNING CONSIDERATIONS

ACF/TCAM V2 R4 with NCP/VS and ACF/NCP/VS: All functions that are supported by ACF/TCAM V2 R2 and R3 are also supported by this release.

ACF/TCAM V2 R4 with EP/VS: ACF/TCAM R4 will continue to support the latest current level of the Emulator Program (EP/VS) and Partitioned Emulator Program (PEP). See the Terminal Support Chart for specific device support.

Migrating from ACF/TCAM V1, ACF/TCAM V2 R1, R2, R3 to ACF/TCAM V2 R4: Migration plans can take advantage of the following support alternatives:

	NCP/VS 5.0	ACF/NCP V1 R1	ACF/NCP V1 R2, 2.1	ACF/NCP V1 R3	ACF/NCP V2
ACF/TCAM V1	X	X	X*	X*	
ACF/TCAM V2 R1	X	X	X	X	
ACF/TCAM V2 R2	X	X	X	X	
ACF/TCAM V2 R3	X	X	X	X	X
ACF/TCAM V2 R4	X	X	X	X	X

* Requires applicable TCAM PTF's.

The following significant differences between ACF/TCAM V2 and ACF/TCAM V1 may require special planning. All other functions supported by ACF/TCAM V1 are also supported by ACF/TCAM V2 R1, R2, R3 and R4.

OS/VS2 (SVS) is not supported by ACF/TCAM V2, and consideration must be given to migrating a user's operating system support before or at the same time as migrating to ACF/TCAM V2.

In an ACF/TCAM V1 multisystem networking environment, when one host had two or more 3705s with ACF/NCP/VS, cross-domain session traffic could be routed either through an ACF/TCAM host transit node or directly through the 3705s without host involvement. In ACF/TCAM V2, the host transit node capability has been removed. Therefore, cross-domain session traffic which does not use host to host data flows must be routed directly through the 3705s. The new 3705-II high-speed local attachment feature (see 278-95) for communication between 3705-II's offers an attractive means of off-loading this function.

Multisystem Considerations: In a multiple host system environment:

- The ACF/TCAM V2 R4 enhancements are supported for each respective ACF/TCAM V2 R4 host system.
- An ACF/TCAM V2 R4 host system can coexist with ACF/TCAM V2 R2, ACF/TCAM V2 R3, ACF/TCAM V1, ACF/VTAME, ACF/VTAM V2, ACF/VTAM R3, ACF/VTAM R2, and/or ACF/VTAM R1 host systems at the level of function supported by these host systems.

PERFORMANCE and STORAGE CONSIDERATIONS

Machine and storage requirements will be provided in the *Advanced Communications Function for TCAM (ACF/TCAM) Version 2 Installation: Sample Programs* at the availability of ACF/VTAM V2 R4 on each supported operating system.

The new functions provided by ACF/TCAM V2 R4 may increase storage requirements and path lengths over those in ACF/TCAM V2 R3. The actual performance impact (if any) to a customer will vary depending upon his particular hardware and network configuration.

Security, Auditability, and Control: Previously announced security functions such as support for the IBM Programmed Cryptographic Facility, continue to be supported in ACF/TCAM V2 R4.

User management is responsible for the selection, adequacy, and implementation of these features and for appropriate application and administration control.

DOCUMENTATION
(available from Mechanicsburg)

Advanced Communications Function for TCAM (ACF/TCAM) Version 2 General Information Manual: Introduction (GC30-3057) ... ACF/TCAM Version 2 Release 4 Program Summary (GC30-9526).

MVS INTEGRITY

IBM will accept APARs where the installation of ACF/TCAM V2 R4 introduces an exposure to the system integrity of OS/VS2 (MVS). This program is intended to run authorized.

ACF/TCAM V2 R4 enhancements made in support of multiple concurrent ACF/TCAMs, result in minor operational differences from previous releases of TCAM. Users should refer to the *ACF/TCAM V2 Installation and Sample Programs* manual available at first customer shipment.

RPOs ACCEPTED: No

ACF/TCAM V2 R4 Terminal Support Summary

Local Terminals	DCB API	Subsys. Int'fce. (3)	TSO
2260	X		X
2715-1 (10)	X		
3272-1,2	X	X	X
3274-1A (3791),1B,1D	X	X	X
3791 (1)	X	X	
3791/3730 (1)	X	X	
3791 (3270) (1)	X	X	X
3791/3730 (3270) (1)	X	X	X
7770-3	X		

Start/Stop Terminals	DCB API		Subsys. Int'fce (3)	TSO	
	EP (2)	ACF/NCP NCP/VS		EP (2)	ACF/NCP NCP/VS
1030	X				
1050	X	X		X	X
1060 (10)	X				
2260	X			X	
2265	X			X	
2740-1	X	X	X(9)		
2740-2	X	X			
2741	X	X	X(9)	X	X
2760	X				
AT&T 83B3	X	X			
WU 115A	X	X			
CPT-TWX (M33/35)	X(4)	X(4)	X(4,9)	X(4)	X(4)
WT Telegraph	X	X	X(5,9)		
3101	X	X	X(4,9)		
3767-1,2 (2740-1)	X	X			
3767-1,2 (2740-2)	X(5)	X(5)			
3767-1,-2 (2741)	X	X		X	X
CMCST (2741)	X	X(4)		X	X
S/7 (2740-1)	X	X			
5100 (2741)	X	X		X	X
5110 (2741)	X	X		X	X

PROGRAM PRODUCTS

ACF/TCAM V2 R4 (cont'd)

BSC Terminals	DCB API		Subsys. Int'f'ce	TSO	
	EP (2)	ACF/NCP NCP/VS		EP (2)	ACF/NCP NCP/VS
2715-2	X	X	-	-	-
2772	X	X	-	-	-
2780	X	X	-	-	-
2922	X	-	-	-	-
2972-8,11	X(5)	X(5)	-	-	-
3271-1,2	X(5)	X(5)	X(5)	X(5)	X(5)
3275-1,2	X(5)	X(5)	X(5)	X(5)	X(5)
3670 (10)	X	-	-	-	-
3735	X	X	-	-	-
3741-2,4	X	X	-	-	-
3747	X	X	-	-	-
5110	X	X	-	-	-
1131	X	X	-	-	-
1826	X	X	-	-	-
S/3	X	X	-	-	-
3274-1C (3271)	X(5)	X(5)	X(5)	X(5)	X(5)
3276-1,2,3,4 (3271)	X(5)	X(5)	X(5)	X(5)	X(5)
3771-1,2,3 (2772)	X	X	-	-	-
3773-1,2,3,P1,P2,P3 (2772)	X	X	-	-	-
3774-1,2,P1,P2 (2772)	X	X	-	-	-
3775-1,P1 (2772)	X	X	-	-	-
3776-1,2 (2772/3780)	X	X	-	-	-
3777-1 (2772/3780)	X	X	-	-	-
3780 (2772)	X	X	-	-	-
5275 (10) (3275-1,2)	X(5)	X(5)	X(5)	X(5)	X(5)
5937 (3271-1,2)	X(5)	X(5)	X(5)	-	-
6670 (2772)	X	X	-	-	-
8100/DPPX (3271)	X(5)	X(5)	X(5)	X(5)	X(5)
S/7 (S/3)	X	X	-	-	-
S/32 (S/3)	X	X	-	-	-
S/34 (S/3)	X	X	-	-	-
S/38 (S/3)	X	X	-	-	-
Series/1 (S/3)	-	X	-	-	-

SDLC Terminals	DCB API		Subsys. Int'f'ce.	TSO	
	EP (2)	ACF/NCP NCP/VS		EP (2)	ACF/NCP NCP/VS
3271-11,12	N	X(5)	X(5)	N	X(5)
3274-1C	O	X(5)	X(5)	O	X(5)
3275-11,12	T	X(5)	X(5)	T	X(5)
3276-1,2,3,4		X(5,8)	X(5,8)		X(5,8)
3276-11,12,13,14		X	X		X
3601	A	X	X	A	-
3602	P	X	X	P	-
3614	P	X(5)	X(5)	P	-
3624	L	X(5)	X(5)	L	-
3651	I	-	X(6)	I	-
3767-1,2,3	C	X	X	C	X
3771-1,2,3	A	X	X	A	-
3773-1,2,3,P1,P2,P3	B	X	X	B	-
3774-1,2,P1,P2	L	X	X	L	-
3775-1,P1	E	X	X	E	-
3776-1,2,3,4		X	X		-
3777-1,3		X	X		-
3791		X	X		X(7)
3791/3730		X	X		X(7)
6670		X	X		-
Series/1		X	-		-
3631,3632 (3601,3602)		X	X		-
3771-1,2,3 (3767)		X	X		X
3773-1,2,3 (3767)		X	X		X
3774-1,2 (3767)		X	X		X
3775-1,3 (3767)		X	X		X
5937 (3271)			X(5)		-
8100/DPPX (3791)		X	X		X(7)
8100/DPCX (3791)		X	X		X(7)
S/32 (3770)		X	X		X
S/34 (3767,3770, 3791)		X	X		X

Notes:

- 1) Configuration support #9165 and #9169 only.
- 2) No multisystem support unless host to host data flows are utilized.
- 3) ACF/TCAM V2 R2 and subsequent releases only.
- 4) Switched support only.
- 5) Nonswitched support only.
- 6) Applies to 3651 mdls A25, B25, A75, B75, C75, and D75 with the appropriate SDLC feature.
- 7) TSO support applies only with 3270 data stream compatibility.
- 8) Applies to 3276 mdls 1, 2, 3 and 4 with BSC/SDLC switch set to SDLC mode.
- 9) Supported via Network Terminal Option (NTO) program product.
- 10) These devices are not supported by MVS/XA.

The terminal types in parentheses designate the programming support provided by ACF/TCAM, e.g., S/7 (2740-1) means the S/7 is supported as a 2740-1.

**VIRTUAL MACHINE/VTAM
COMMUNICATIONS NETWORK APPLICATION
VM/VCNA (5735-RC5)**

PURPOSE

The Virtual Machine/VTAM Communications Network Application (VM/VCNA) program product provides the VM/System Product (VM/SP) user the capability of using an SNA, BSC, SS or local terminal as an operator console for a virtual machine. Support is included for Control Program/Conversational Monitor System (CP/CMS) command processing, CMS editor processing and VM full screen support. VM/VCNA is an application program that provides an interface between VM's console support and ACF/VTAM's or ACF/VTAME's application program interface in order to support SNA, BSC, SS or local devices as virtual machine consoles.

VM/VCNA, in conjunction with ACF/VTAM or ACF/VTAME, provides SNA, BSC, SS or local console support for virtual machines for VM/SP users and supports those S/370, 303X and 4300 processors announced as supported by VM/SP. All references to ACF/VTAM refer to ACF/VTAM Version 1 Release 2 or Release 3 or ACF/VTAM Version 2 (VSE or OS/VS1).

VM/VCNA, in conjunction with ACF/VTAM, ACF/VTAME, NTO and ACF/NCP/VS, provides VM users the advantages and capabilities of the multisystem networking facilities of the ACF products and allows the VM system to participate in an existing or planned multisystem ACF network based on Systems Network Architecture (SNA).

The SNA support for VM is located in what will be referred to as the VTAM (SNA) Service Machine (THE VSM, Figure 1) and provides SNA, BSC, SS or local terminal services to virtual machine consoles as well as providing ACF networking services. The VSM is a VM/SP Virtual Machine which consists of the following components:

- VSE and VSE/AF or OS/VS1 and OS/VS1 BPE
- ACF/VTAM or ACF/VTAME
- VM/VCNA

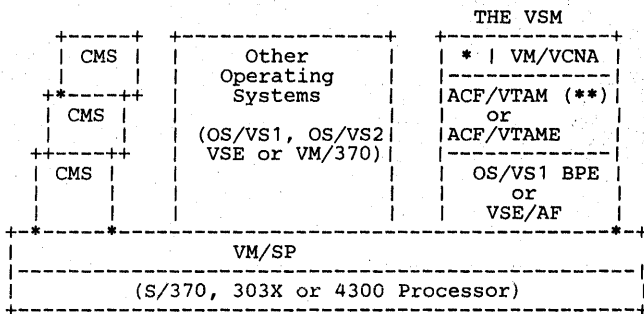


FIGURE 1

* Other application programs and subsystems; for example, CICS/VS or NCCF/NPDA.

** For ACF multisystem networking, ACF/VTAM Version 2 (VSE or OS/VS1) or the MSNF feature on ACF/VTAM Version 1 Release 2 or 3 is required.

The VSM owns and controls the network through ACF/VTAME or ACF/VTAM, including the SNA, BSC, SS or local terminals that will be used as VM Virtual Machine consoles. It is this ownership that permits terminals attached to the VM system, through ACF/VTAME (locally or through a Communications Adapter) or ACF/VTAM (locally or through ACF/NCP/VS), to gain access to the facilities of a multisystem (cross domain) ACF network.

Additional IBM and user application programs may also be present in the VSM (e.g., CICS/VS, NCCF/NPDA). VM/VCNA uses both the Console Communication Services and the Inter-User Communication Vehicle facilities available with the VM/System Product. The communication between the VSM and Console Communication Services of VM/SP is by the Inter-User Communication Vehicle available with VM/SP.

The terminals owned by the VSM may now be used by applications or subsystems in the VSM, such as CICS/VS, as well as virtual machine consoles for systems such as: CMS, OS/VS1, OS/VS2 or VSE.

DESCRIPTION

VM/VCNA, in conjunction with ACF/VTAME, ACF/VTAM, NTO and ACF/NCP/VS, offers the following advantages to the VM user:

- Terminal sharing (assuming NTO support for SS devices) of the VSM across multiple ACF/VTAM or ACF/VTAME applications or subsystems, such as the Customer Information Control System/Virtual Storage (CICS/VS), the Information Management System/Virtual Storage (excluding NTO devices), user-written application programs and the CP/CMS system. This increases the usage of the terminal since it can now be located anywhere in a multisystem ACF network and may be used as a virtual machine console on VM systems in addition to having access to other systems that are not VM-based, (such as CICS/VS under ACF/VTAM or ACF/VTAME or TSO under ACF/VTAM or ACF/VTAM on an operating system running in native mode on another processor).

NTO Device Support by VM/VCNA: NTO is an IBM program product that extends the capabilities of ACF/NCP/VS in a 3705 Communications Controller to allow a select group of non-SNA devices to be supported as SNA devices. VM/VCNA's support of NTO allows VM installations with non-SNA devices to migrate to SNA. NTO support also allows an installation with S/S or asynchronous non-SNA devices to have the use of SNA services that:

- Provide a consistent and comprehensive structure for data communications growth.
- Minimize the effects of system changes.
- Distribute data communication functions throughout the SNA network.
- Allow for network sharing of asynchronous non-SNA devices.
- Extend data communication functions conveniently and effectively to the end-user in a distributed data processing (DDP) network.
- Minimize the end user's involvement in the details of data communications operations.

The support of NTO by VM/VCNA is transparent to both the NTO devices and the VM/SP control program. The NTO devices are supported by VM/VCNA through the application programming interface (API) of ACF/VTAM.

These supported NTO devices appear to ACF/VTAM as Physical Unit Type 1 (PU type 1), Logical Unit Type 1 (LU type 1) devices and support the same bind parameters as the SDLC 3767 Communications terminal. Therefore, the NTO support by VM/VCNA is an enhancement to the LU type 1 support provided by VM/VCNA. Thus the support provided for the IBM 3101 display terminal is a line by line operation in character mode using the 64 graphic character set.

For a description of the facilities of related SNA products, see the following announcement letters:

- ACF VTAM Version 1 R2
- ACF/VTAM Version 1 R3
- ACF/VTAME
- ACF/NCP/VS R2.1
- ACF/NCP/VS R3
- NTO R2
- NCCF
- NPDA
- VM/VCNA

PROGRAM PRODUCTS
CICS/DOS/VS EXTM (5746-XXB)

[NO LONGER AVAILABLE, effective May, 1983.]

PURPOSE

The basic function of the Extended Telecommunications Modules (EXTM) feature of CICS/DOS/VS is to establish and support data flow between a CICS/DOS/VS application and a corresponding user application for IBM advanced communication subsystems and preSNA terminals. Services required to support the necessary data flow (System Services Control Point, Session Control, etc.) are an integral part of EXTM. EXTM uses the functional capability of the 3704/3705 Network Control Program/VS (NCP/VS) for controlling terminal operations. Support utilities for the IBM advanced communication subsystems and utility services such as load and dump for 3704/3705 are included. A preprocessor is provided to aid the user during system generation. Normal CICS/DOS/VS functions are supported when using this program. EXTM has been designed to share and take advantage of the functions of CICS/DOS/VS in order to optimize attachment of SNA terminals to a CICS/DOS/VS system and can co-exist in the same partition with BTAM.

DESCRIPTION

EXTM provides support for the IBM advanced communication subsystems with CICS/DOS/VS on smaller mdls of S/370 processors (160K) as well as larger systems interested in an SNA interface tailored to the CICS/DOS/VS environment. The functions performed by EXTM are provided by the following facilities:

Application Program Interface: This module is an interface between the EXTM I/O Module and DFHZCP (which provides CICS/DOS/VS support for SNA terminals) and allows DFHZCP to operate as it does with VTAM. This interface supports the subset of VTAM macros used by CICS/DOS/VS and performs equivalent functions for CICS/DOS/VS. CICS/DOS/VS will continue to use the same control blocks with EXTM as with VTAM.

I/O Module: The I/O Module controls the transfer of data between the host computer and the 3704/3705. This includes blocking/ deblocking of I/O, constructing of channel programs, maintaining physical control of the 3704/3705 NCP/VS and initiating 3704/3705 control functions (activation/deactivation of lines, etc.). The I/O Module also provides an interface to the 3704/3705 load and dump services.

Linkage Module: The Linkage Module acts as an interface between the I/O Module and the CICS/DOS/VS user applications, for preSNA terminals, performing such functions as message synchronization and handling of read/write requests.

Master Terminal Functions: The EXTM Master Terminal Programs provide dynamic user control of the system for EXTM supported terminals. The EXTM master terminal operator can change the status and values of parameters used by CICS/DOS/VS and EXTM and thereby alter the operation of the system.

System Services Control Point: The function of the System Services Control Point (SSCP) is to establish and maintain sessions between the host computer and all nodes in the network. The SSCP will perform network initialization and dynamic node activation/deactivation requested through the EXTM master terminal commands.

Support Service Utilities: Utilities are provided for loading and dumping the 3704/3705. The utilities run under CICS/DOS/VS. These services can be invoked automatically and through EXTM master terminal commands.

Access to Subsystem Support Services batch created files is provided by EXTM for online transmission of subsystem data to the SNA terminal system controllers. This access can be invoked by the EXTM Master Terminal Facility. EXTM master terminal commands may be used to transmit subsystem data to the 3600, 3650 and 3790. Dumping of the 3600 is initiated by the 3600 user application program. EXTM recognizes the request and invokes a DUMP program, routing the 3600 system dump to a user-specified data set.

RAS Functions: Message integrity is achieved through the sequence number facilities inherent in SNA transmission services.

System/Network integrity is provided by serviceability aids which include:

- Path Information Unit (PIU) Trace
- Channel End Appendage Trace
- Miscellaneous Data Record (3704/3705) Statistics Recording
- 3704/3705 Formatted Dump Facility
- CICS/DOS/VS System Trace (a CICS/DOS/VS facility)
- 3704/3705 Line Trace
- Application Program Interface (API) Trace
- Concurrent Online Telecommunication Test

Concurrent Online Telecommunication Test: The EXTM Concurrent Online Telecommunications Test Program is the interface between the online test (OLT) programs and the Extended Telecommunications Modules (EXTM). It controls the selection and execution of the OLTs used for testing the teleprocessing terminals supported by EXTM. COLTT programs can be used to perform preventive maintenance, perform

problem determination, diagnose I/O errors and verify device repairs and engineering changes.

COLTT can be initiated from any alphanumeric terminal with input and output capability that is supported by CICS/VS and has sufficient output message size capacity.

Preprocessor: The Extended Telecommunications Modules Preprocessor is an installation aid whose output provides input for the generation of an NCP/VS, EXTM, and CICS/DOS/VS system generation including required CICS/DOS/VS tables. Users may select various levels of output from the preprocessor and save time in generating the job stream to install their systems. The preprocessor will generate a sample system based on device types specified, and will have additional cross-checking of parameters between CICS/DOS/VS, EXTM, and NCP/VS generations.

CUSTOMER RESPONSIBILITIES

The specific installation requirements must be determined by customers based on their need and available resources. Customer responsibilities for installing CICS/DOS/VS are detailed in the *CICS/VS General Information Manual* GH20-1280. For CICS/DOS/VS with the Extended Telecommunications Modules Feature the customer should:

- Order and install communications equipment based on processing needs.
- Train system analysts, programmers and operators in the use of DOS/VS, CICS/DOS/VS with Extended Telecommunications Modules, 3704/3705, NCP/VS, and subsystem design and programming language.
- Install the NCP/VS in the 3704/3705.
- Develop, write and test the subsystem application programs and/or customized images as required.
- Have installed the prerequisite versions of DOS/VS and CICS/DOS/VS.

SPECIFIED OPERATING ENVIRONMENT
HARDWARE REQUIREMENTS

The minimum configuration supported is:

- 3115 mdl GE (160K). IBM S/370 processor mdls and the IBM 3031 Processor supported by DOS/VS are supported by EXTM.
- IBM I/O devices to support a Virtual Storage Operating System (DOS/VS and CICS/DOS/VS).
- IBM 3704/3705 II Communications Controller with required channel prerequisites or, if appropriate, an IBM 3790 with LCA and required channel prerequisites.
- A minimum of one EXTM supported terminal.

Note 1: Only the standard IBM S/370 instruction set is used by EXTM. The CICS/VS instruction set requirement for preSNA support with EXTM is the same as with BTAM. The CICS/VS instruction set requirement for SNA support with EXTM is the same as with VTAM.

Note 3: See *EXTM General Information Manual* (GH20-1702) for EXTM configuration guidelines. The EXTM storage configuration aid, called STOREXTM, is available on HONE.

Note 4: The sizes of the CICS/DOS/VS partition and the DOS/VS supervisor are dependent upon the functions and parameters chosen. Appropriate SRLs should be used to configure these products.

Communication Device Support

Communications Controller Support: EXTM supports the IBM 3704 and 3705 Communications Controllers in either NCP/VS mode or NCP/VS with PEP. The emulation of PEP may be utilized by CICS/DOS/VS - BTAM or another partition. EXTM does not support the dynamic switching of lines between the emulation partition and NCP/VS when operating with PEP. Multiple IBM 3704s and 3705s may be attached to an EXTM system. Remote IBM 3704/3705 facilities, available under NCP/VS control, are supported by EXTM. The IBM terminals supported by the remote controller are the same IBM terminals supported by EXTM on a local controller.

3704 Communications Controller, mdls A3 and A4
 3705-I Communications Controller, mdls A2 - D8
 3705-II Communications Controller, mdls E2 - H8

Communication Systems and Terminals Supported
Start/Stop Transmission Terminals

- 2740 Communication Terminal mdl 1 with, optionally, Record Checking (#6114) Station Control (#7479)
- 2740 Communication Terminal mdl 2 with, optionally, Record Checking (#6114)

PROGRAM PRODUCTS

EXTM (cont'd)

- Buffer Receive (#1499)
- 2741 Communication Terminal with, optionally, Receive Interrupt (#4708)
- 3767 Communication Terminal with Start/Stop Feature (#7111, #7112 or #7113) (supported as compatible version of appropriately featured 2740/2741)

Binary Synchronous Communications Terminals

- 2770 Data Communication System
- 2772 Multipurpose Control Unit, with optionally, EBCDIC Transparency (#3650) WACK Response (#9936) Buffer Expansion (#1490) Conversational Mode (#1910) Multipoint Data Link Control (#5010) 0545 Output Punch 1053 Printer or 2213 Printer 2265 Display Station 2502 Card Reader
- 3270 Information Display System
- 3271 Control Unit mdl 1 or 2, with EBCDIC Transmission Code (#9761) or ASCII Transmission Code (#9762), and 3277 Display Station mdl 1 or 2, and, optionally 3284 Printer mdl 1 or 2 3286 Printer mdl 1 or 2 3288 Printer mdl 2 Copy (#1550 for 3271 Control Unit)
- 3275 Display Station mdl 1 or 2 with EBCDIC Transmission Code (#9761) or ASCII Transmission Code (#9762), and optionally 3284 Printer mdl 3
- 3780 Data Communication Terminal with EBCDIC Transparency (#3601), WACK Response (#9936) Multipoint Data Link Control (#5010)
- 3781 Card Punch with Component Selection (#1601) on 3780
- 3770 Data Communication System with BCS feature (#1460 or #1461) (supported as compatible version of appropriately featured 2770)

Synchronous Data Link Control Terminals

- 3600 Finance Communication System
- 3601 Finance Communication System Controller mdls 1, 2A, 2B, 3A and 3B with SDLC Communication Feature (#4501, #4502, #6301 or #6302)
- 3602 Finance Communication System Controller mdls 1A and 1B with SDLC Communication Feature (#4501, #4502, #6301 or #6302)
- 3604 Keyboard Display mdls 1, 2, 3, 4, 5 and 6
- 3606 Financial Services Terminal mdls 1 and 2
- 3608 Printing Financial Services Terminal mdls 1 and 2
- 3610 Document Printer mdls 1, 2, 3 and 4
- 3611 Passbook Printer (supported as a 3612) mdls 1 and 2
- 3612 Passbook and Document Printer mdls 1, 2 and 3
- 3614 Consumer Transaction Facility mdls 1, 2, 11 and 12
- 3618 Administrative Line Printer mdl 1
- 3624 Consumer Transaction Facility mdls 1, 2, 11 and 12
- 3630 Plant Communication System
- 3631 Communication System Controller mdls 1A and 1B with SDLC Communication feature (#4502, #6301 and #6302)
- 3632 Plant Communication System Controller mdls 1A and 1B with SDLC Communication feature (#4502, #6301 and #6302) (3600 Compatible)
- 3650 Retail Store System
- 3651 Store Controller mdls A50 and B50
- 3653 Point of Sale Terminal mdl 1
- 3275 Display Station mdl 3
- 3284 Printer mdl 3
- 3790 Communication System
- 3791 Controller mdls 1A, 1B, 2A and 2B with

- SDLC Communication feature (#6301, #6302 or #6303) and Configuration Support #9165 and 3792 Auxiliary Control Unit 3793 Keyboard Printer mdl 1 3277 Display Station 3284 Printer mdls 1 and 2 3286 Printer mdls 1 and 2 3288 Printer mdl 2 3767 Communication Terminal mdls 1, 2 and 3 with Vertical Forms Control feature (#8731) (optional)
- 3770 Data Communication System with SDLC Communication feature (#1460 or #1470)
- 3771 Data Communication Terminal mdls 1, 2 and 3
- 3773 Data Communication Terminal mdls 1, 2 and 3 Programmable mdls P1, P2 and P3
- 3774 Data Communication Terminal mdls 1 and 2 Programmable mdls P1 and P2
- 3775 Data Communication Terminal mdl 1 Programmable mdl P1
- 3776 Data Communication Terminal mdls 1 and 2
- 3777 Data Communication Terminal
- 3270 Information Display System
- 3271 Control Unit mdls 11 or 12 with Copy (#1550)
- 3277 Display Station mdls 1 or 2, and, optionally 3284 Printer mdls 1 or 2 3286 Printer mdls 1 or 2 3288 Printer mdls 2
- 3775 Display Station mdl 11 or 12 with 3284 Printer mdl 3

Terminals Connected Via Local Attachment

- 3790 Communication System
- 3791 Controller mdls 1A, 1B, 2A and 2B with Local Channel Attachment (#1515) and Configuration Support #9165 and 3792 Auxiliary Control Unit 3277 Display Station 3793 Keyboard Printer 3284 Printer mdls 1 and 2 3286 Printer mdls 1 and 2 3288 Printer mdl 2

The following table illustrates EXTM support of IBM SDLC devices on nonswitched or dial communicating facilities:

SDLC Device	Non-switched	Dial-in	Dial-out
3270	X		
3600	X	X	X
3614	X		
3624	X		
3630	X	X	X
3650	X		X
3767	X	X	
3770	X	X	X
3790	X	X	X

Equivalent Terminals: Terminals that are functionally equivalent to those specifically supported by EXTM may also function satisfactorily with EXTM; the customer is responsible for establishing equivalency.

SOFTWARE REQUIREMENTS

The Extended Telecommunications Modules Feature is coded using S/370 Assembler Language.

EXTM operates in the following environment:

	EXTM V2 Rel. 0	EXTM V3 Rel. 0	EXTM V3 Rel. 1
DOS/VS Release	31 or 32	32 or 33	33 or *
NCP/VS Version	4.1 or 5.0	4.1 or 5.0	5.0 or **
CICS/DOS/VS Version	1.1.1 or 1.2	1.2 or 1.3	1.3 or *

* Currently available version at the time of EXTM V3.1 availability.

** ACF/NCP/VS support will be available at the availability of ACF/NCP/VS.

The support utilities for the subsystem controllers use CICS/DOS/VS VSAM which requires the Relocating Loader.

CICS/DOS/VS support of BTAM terminals remains unchanged. BTAM can coexist with EXTM in the CICS/DOS/VS partition. When supporting terminals via BTAM, they must interface to CICS/DOS/VS-BTAM via a separate control unit or via an IBM 3704/3705 in emulation mode or by using the Partitioned Emulator Program (PEP). VTAM can coexist with Extended Telecommunications Modules in the system but

PROGRAM PRODUCTS

EXTM (cont'd)

not in the same CICS/DOS/VS partition. Each system, VTAM and EXTM, must have its own 3704/3705.

EXTM/VTAM Selection Criteria: In selecting whether EXTM or VTAM should be used in a DOS/VS environment with CICS/DOS/VS, careful consideration should be given to the availability of the necessary minimum system configuration and to the functions required in the system.

PERFORMANCE CONSIDERATIONS

The performance of EXTM in a virtual storage environment is highly dependent on the system resources available, on any programs that operate concurrently and their relative priorities, on system and application data file placement, on system timing, etc. Performance also depends on the paging characteristics and storage reference patterns of CICS/DOS/VS and its application programs, on the allocation of data files to particular devices, and on the particular data being processed.

For specific online performance and response time requirements, careful attention should be given to ensure that adequate real resources (main storage, processor computing capability, channels, disk file arms, etc.) are available. To verify specific performance, benchmarking EXTM with CICS/DOS/VS and DOS/VS may be appropriate.

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**COMMUNICATION ORIENTED MESSAGE SYSTEM
CORMES Release 1 Modification Level 0 (5746-XXM)****PURPOSE**

The Communication Oriented Message System (CORMES) is designed to build the central "paperless" message exchange system in an organization connecting terminal users and application programs of different functions. It provides communication links:

- For the exchange of information between terminal users (action messages).
- For the interaction between online application programs and terminal users (action messages).
- For triggering the execution of application programs based on the occurrence of prespecified events (trigger messages).

DESCRIPTION

CORMES operates under the IBM Disk Operating System/Virtual Storage (DOS/VS) Release 33 or subsequent releases unless otherwise identified.

For data base management, the system uses the data base facilities of the IBM S/370 Data Language/I Disk Operating System/Virtual Storage (DL/I DOS/VS) Version 1, program number 5746-XX1, Release 1, or subsequent releases unless otherwise identified.

For data communication, CORMES uses the facilities of the IBM S/370 Customer Information Control System/Virtual Storage (CICS/DOS/VS) Version 1, program number 5746-XX3, Release 2, or subsequent releases unless otherwise identified.

HIGHLIGHTS**Terminal user services:**

- Easy to use terminal functions to create, display, modify, and distribute action messages.
- Routing of action messages from one user to another.
- Linkage to online application programs to process a user-selected action message.

Application program services:

- User macros to simplify the creation of action and trigger messages in user-written programs and their transfer to the central message files.
- Triggering of application program execution according to prespecified events: A point in time, a time interval or a queue length.
- CORMES as a frame for the implementation of interactive application programs.

System services:

- Monitoring of the individual message queue of each terminal user by due date and priority of the received messages.

CUSTOMER RESPONSIBILITIES

This section briefly discusses the activities the user has to perform to make CORMES operational. It gives a rough guide for assessing the total installation effort. The assumption is that a system running under DOS/VS with DL/I DOS/VS and CICS/DOS/VS has already been installed.

The installation procedure allows an easy installation of the CORMES system including the sample by use of object code facility. The distributed source code will be used for the final adaptation to the existing system environment.

The major implementation steps are:

- Installation of the CORMES system according to the distribution tape and installation description.
- Execution of the supplied sample to verify the installation. This sample can also be used as a tool for training terminal users.
- Optionally, assembly of all CORMES online programs to include customer requirements.
- Modification and reassembly of existing programs for CORMES communication (according to the rules defined by CORMES) by use of macros and examples provided.
- Exchange of the sample files and tables by files and tables that describe the customer system.

The required changes within existing customer programs have been reduced to a minimum. In addition, macros are provided to simplify the program interactions. Support is provided for Assembler, PL/I and COBOL programs.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

For compilation and/or execution of CORMES, an IBM S/370 with the minimum main storage capacity for CICS/DOS/VS operation is required.

For CORMES, additional storage is required. For the first terminal 16,500 bytes and for each additional terminal 3,000 bytes; for the first application program 11,800 bytes and for each additional program 1,200 bytes.

For the data bases, and files the same devices are used as for the basic software of DOS/VS, CICS/DOS/VS and DL/I DOS/VS.

At least an IBM 3277 Display Station mdl 2 with a 66-key keyboard must be available. The Selector Light-pen (#6530) and program function keys are supported optionally. The IBM 3274 and 3276 are supported in compatibility mode.

The online address space requirements for CORMES may vary widely, according to the number of active terminals. A minimum installation might require address space of about 384K bytes for the combined CICS/VS and DL/I DOS/VS user task partition.

SOFTWARE REQUIREMENTS

CORMES is written in Assembler language and uses the macro language facility.

CORMES is designed for an online DOS/VS environment and requires the following programs:

- DOS/VS Release 33 and subsequent releases). *
- CICS/DOS/VS Version 1, program number 5746-XX3, Release 2 and subsequent releases). *
- DL/I DOS/VS Version 1, Program Number 5746-XX1, Release 1 and subsequent releases). *
- Unless otherwise identified in a future revision of this document.

Note: CORMES executes, and is supported by IBM, on S/370 virtual storage configurations running under DOS/VS in virtual mode, and DOS/VS under VM/370 in virtual machine mode.

DOCUMENTATION: (available only from the European Publications Center)

Licensed Program Specifications (GH12-5238) ... General Information Manual (GH12-5127).

TERMS and CONDITIONS: See PP Index

PROGRAM PRODUCTS

**DISPLAY MANAGEMENT SYSTEM/3790
5748-XC2**

[NO LONGER AVAILABLE, effective May, 1983.]

PURPOSE

This program product is a productivity aid for users of the 3790 Communication System that eases the design, coding, testing and support of the 3790 application programs. The DMS/3790 program product consists of a forms-oriented program generator for modules interfacing with the operator terminals, a teleprocessing interface program, and a set of macros to invoke functions, retrieve data, and manage the program's working storage.

DESCRIPTION

The DMS/3790 program product produces a class of programs referred to as screen handlers. The user defines the screen handler on a set of forms that is provided with DMS/3790. These forms allow the user to describe layouts (screen, line printer or 3793), input and output fields and the editing characteristics of these fields. In addition, the meaning of program function keys, program attention keys and selector pen detectable fields can be described. The output of the 3790 Program Generator will be programs which are ready for assembly. A facility is also available which will allow these forms to be prepared interactively under CICS/VS, TSO or VM/370.

DMS/3790 will provide the Communications Interface Monitor (CIM) as an optional feature. This feature manages communications between 3790 user application programs and IMS/VS or CICS/VS. CIM supports opening and closing of sessions with IMS/VS and CICS/VS, recovering from sessions that failed due to errors, sending messages to and receiving replies from the host system and storing replies in 3790 user buffers, indexed or relative data sets or work area files. CIM supports CICS/VS Release 1.3 and IMS/VS Release 1.1.4 host applications using VTAM. CIM will provide communications between DMS/3790 programs and IMS/VS via SLU type P.

DMS/3790 provides a Linkage Service facility which establishes standard interfaces and communication protocols between modules via a set of macros. Programmers can invoke application functions by names specifying only what data is to be operated on and where the result is to be stored. Linkage services locates the invoked function and, if at the host, CIM will transmit the data and store the reply in the specified location.

The Get Collection facility of DMS/3790 allows programmers to request inquiry data by name, specifying only a key field. Get Collection will permit inquiries against local or host resident files or files split between the 3790 and host systems. If the data resides on the host system, control will be given to the Communications Interface Monitor which will send the transaction to the host to retrieve the data.

The Work Area Management (WAM) facility of DMS/3790 provides temporary working storage for application programs. The WAM macros provide for high-level manipulation of this working storage, and symbolic addressing of storage. The Work Area is designed for storing terminal input data and passing data between modules on the 3790 and between the 3790 and the host.

HIGHLIGHTS

- DMS/3790 forms allow an application designer to describe the 3790 interface with the display operator. The forms provided are:
 - The Layout Form which defines:
 - Program information such as name, number and record layouts.
 - The screen format to be displayed to the operator.
 - The location of variable display and input fields on the display.
 - The meaning of PA keys, PF keys and selector light-pen attentions.
 - Special error messages that may be displayed to the terminal operator.
 - The Field Processing Form which defines:
 - Variable fields to be displayed to the operator.
 - Input fields to be entered by the operator.
 - Input field edits, including count, required or optional, type, selfcheck, picture, range and value.
 - Selector light-pen data.
 - The action that is to be taken if an edit detects an error.
 - The Buffer Description Form which defines the layout of fields in a record or buffer.
- Flexible panel definition provides for:
 - Field-by-Field Support.
 - Full Screen Processing Support.
 - Full 3277 Field Attribute Capability.

Extensive Operator Communications.

Deferred and Immediate Selector Light-Pen Support.

- Interactive Forms Preparation facility is a productivity tool that aids the designer in describing the interface with the display operator. It operates with a 3277 mdl 2 attached to the S/370 via a 3271 or 3277 control unit. This facility operates under TSO/TCAM, TSO/VTAM, CICS/VS and VM/370. This feature supports all the capabilities of the form plus:
 - Full screen entry of display and print layouts.
 - Left-right and up-down scrolling capability.
 - Automatic prompting for field attributes.
 - Restart capability.
 - Help panels.

Full screen entry of display and print layouts.

Left-right and up-down scrolling capability.

Automatic prompting for field attributes.

Restart capability.

Help panels.

- The Work Area Manager is a high function facility for temporary working storage.

It contains a two-level hierarchical structure. It provides for root segment and multiple dependent segment types, and multiple occurrences of each dependent type.

It is application oriented. The programmer assigns symbolic names to the root and dependent segment types. Using these names and flexible work area macros the programmer can easily add desired segments, add new occurrences of segments, insert segments at the start or middle of a chain and delete segments anywhere in the work area.

It provides for security checking.

The Work Area Manager performs all work area disk I/O for the program. If a segment has been updated by an application, the Work Area Manager automatically writes that segment to disk, eliminating the chance of losing the new information. The Work Area Manager controls record pools for allocation of work areas to programs and gives segments to all programs as needed.

- Get Collection supports distribution of inquiry data in the 3790 environment.

Inquiry data is requested by name, specifying only a key field. System-wide symbolic names are given to groups of related fields called collections. The programmer requests a collection by its symbolic name, specifying only the key of the collection.

A collection can be resident on the 3790, the host S/370 system, or distributed between the two systems. If it is 3790 resident, Get Collection will retrieve it from the local disk and present it to the program. If it is host resident, Get Collection will search the local disk to determine if it has previously been retrieved before requesting it from the host system. This reuse of data can improve response time to the user, and can minimize communications traffic and host processing overhead. If a collection can reside both locally and at the host system, Get Collection will search the local data set to see if it is residing locally before going to the host system. This allows the system designer to permanently store those collections that are most frequently used on the controller without limiting access to collections that are on the host system.

Location of collections is transparent to 3790 programs. Get Collection allows the system designer to change where collections reside without having to be concerned about the programs that reference them. A reassembly of these programs is necessary to allow them access to the moved collection. It is the user's responsibility to provide the necessary host application programs to transfer the collections.

Get Collection is transparent to the 3790 program because it automatically invokes the Communications Interface Monitor if the collection is located at the host system. When the program regains control, it looks as if the collection was resident on the local 3790 disk.

- Linkage Services supports the distribution of function in the 3790 environment.

Functions are invoked by name, specifying only the input and where to place the reply. A symbolic name is given to each function in the distributed system. The program invokes a function by this symbolic name, identifying the data that is to be passed to the function and where the reply is to be stored.

Linkage Services provides a set of standard data interfaces that can be used between 3790 programs. These interfaces identify the data that is to be operated on by a called function and where the calling function expects the reply to be stored.

Functions can be local or host resident. If a called function resides at the host, Linkage Services will invoke the communications facility to transmit the data to host system. When the reply is

DMS/3790 (cont'd)

retrieved, it will be stored in the area specified by the calling function.

Location of invoked functions is transparent to the programmer. Linkage Services allows the system designer to change where functions are located without being concerned about the programs that invoke them. Only a reassembly of the invoking programs is necessary to provide access to the moved function. It is the user's responsibility to write the application programs which perform the specific function.

- Communications Interface Monitor (CIM) is a separate feature of the DMS/3790 product.

CIM controls the 3790 side of the communications link. The session control functions performed include opening and closing of sessions, recovery from temporary errors, restarting and resynchronizing interrupted sessions and maintaining a log of communications errors.

CIM transmits requests to the host from the calling program's buffer, the calling program's work area, indexed records or relative records.

CIM retrieves replies from the host and stores them in the calling program's buffer, the calling program's work area, indexed records or relative records.

CUSTOMER RESPONSIBILITIES

To install and use the DMS/3790 program product the user must:

1. Acquire a knowledge of the functions provided by the different facilities.
2. Learn the new macros provided for implementing these facilities.
3. Learn how to prepare the forms provided for the screen handler generation.
4. Generate the necessary tables required at the host system for Linkage Services and Get Collection.
5. Provide the necessary data set and program IDs to be used.
6. Provide the necessary host application programs if the CIM feature is used.
7. Provide additional programming for the screen handler user routines if required for the 3790 applications.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

DMS/3790 requires the following system configuration:

- An IBM S/370 mdl 115 or larger for DOS/VS, mdl 135 or larger for OS/VS1 or a mdl 145 or larger for OS/VS2. The machine configuration for DMS/3790 varies according to the user's application needs. The requirement for operation under CICS/VS or IMS/VS is any IBM S/370 with enough real storage to meet the combined operating requirements of CICS/VS or IMS/VS, the host operating system, the appropriate access methods and other user-required applications. DMS/3790 requires 85K of virtual storage. The program operates in a virtual equals virtual environment.
- Depending upon the operating system used, any direct access storage device supported by the Virtual Storage Access Method (VSAM) and OS/VS1, OS/VS2 or DOS/VS.
- Any card read/punch and printer supported by OS/VS1, OS/VS2 or DOS/VS.
- Any magnetic tape drive supported by OS/VS1, OS/VS2 or DOS/VS (required for installation only.)
- A minimum of 1-3271 or 1-3272 and 1-3277 mdl 2 Display Station if the Interactive Forms Preparation facility is used.
- A 3704 or 3705 Communications Controller for online operations (if the 3790 is not local channel attached).

or

A 3747 Data Converter for offline diskette creation.

- A 3791 Controller, mdl 1A or larger.
 - 3791 configuration support feature #9431, #9165 or #9169. (CIM does not support feature #9431).
 - DMS/3790 will support only the following attached devices included in the above configuration:
 - 3793 Keyboard/Printer
 - 3277 mdl 1 or 2
 - A minimum of either 1-3277 or 1-3793 is required. In addition to above attached devices, the line printer (feature #4710, #4711 or #4715) is also supported.

SOFTWARE REQUIREMENTS

DMS/3790 is written in S/370 Assembler language, PL/S* and 3790 programming statements as follows:

- Interactive Forms Preparation - PL/S* and Assembler
- Screen Handler Generator - PL/S* and Assembler
- Get Collection - Assembler
- Linkage Services - Assembler
- Work Area Management - Assembler and 3790 Programming Statements
- Communications Interface Monitor (feature) - 3790 Programming Statements

* Programming Language/Systems (PL/S) is an IBM proprietary language.

Assembler language and 3790 programming statements source code is provided with the DMS/3790 program product.

Depending upon the host operating system used, the following programs are required:

OS/VS

	VS1	VS2
OS/VS Assembler XF	5741-SC1-03	5752-SC1-03* 5742-SC1-03**
Linkage Editor	5741-SC1-04	5752-SC1-04* 5742-SC1-04**
Virtual Storage Access Method (VSAM)	5741-SC1-DE	5752-SC1-DE* 5742-SC1-DE**
IDCAMS (Access Method Services)	5741-SC1-DK	5752-SC1-DK* 5742-SC1-DK**
Sequential Access Method	5741-SC1-DO	5752-SC1-DO* 5742-SC1-DO**
Virtual Telecommunications Access Method (VTAM)	5741-SC1-23	5752-SC1-23* 5742-SC1-23**
3704/3705 Network Control Program (NCP/VS) (If 3790 is not local channel attached)	5744-BA2	5744-BA2
Subsystem Support Services (SSS)	5741-SC1-SS	5752-SC1-SS* 5742-SC1-SS**
3790 Host Support	5744-BZ3	5744-BZ3
Customer Information Control System (CICS/VS), Version 1 Release 3.0 ***	5740-XX1	5740-XX1
or Information Management System (IMS/VS) Version 1, Release 1.4***	5740-XX2	5740-XX2
Telecommunications Access Method (TCAM)	-----	5752-SC1-21* 5742-SC1-21**
TSO Subroutines for TCAM	-----	5752-SC1-T8* 5742-SC1-T8**
TSO		
Data Management	-----	5752-SC1-T3* 5742-SC1-T3**
Scheduler	-----	5752-SC1-T4* 5742-SC1-T4**
Supervisor	-----	5742-SC1-T7**

- * = MVS
- ** = SVS
- *** Also applies to subsequent releases unless otherwise identified.

Note 1:

VTAM or TCAM/NCP/VS Direct, NCP/VS and SSS are required for the transmission of programs from the host to the 3790. They are not required if the Batch Data Exchange facility is used to forward programs to the 3790.

Note 2:

PROGRAM PRODUCTS

DMS/3790 (cont'd)

VTAM, NCP/VS and CICS/VS or IMS/VS are required if the Communications Interface Monitor feature of DMS/3790 is to be used.

Note 3:

For the Interactive Forms Preparation facility CICS/VS or TSO with either VTAM or TCAM is required.

DOS/VS: Release 33

DOS/VS Assembler	5745-SC-ASM
Linkage Editor	5745-SC-LNK
Virtual Storage Access Method (VSAM)	5745-SC-VSM
Access Method Services	5745-SC-AMS
Sequential Disk IOCS	5745-SC-DSK
Virtual Telecommunications Access Method (VTAM)	5745-SC-VTM
Extended Telecommunications Modules (EXTM) with CICS/VS Version 1, Release 3.0	5746-XXB
3704/3705 Network Control Program/VS (NCP/VS) (if 3790 is not local channel attached)	5747-AJ2
Subsystem Support Services (SSS)	5745-SC-SSS
3790 Host Support	5747-BQ1
Customer Information Control System (CICS/VS) Version 1, Release 3.0 (and subsequent releases unless otherwise identified)	5746-XX3

Note 1:

NCP/VS, SSS and either VTAM or EXTM are required for the transmission of programs from the host to the 3790. They are not required if the Batch Data Exchange facility is used to transfer programs to the 3790.

Note 2:

NCP/VS and CICS/VS with either VTAM or EXTM are required if the Communications Interface Monitor feature of DMS/3790 is to be used.

Note 3:

For the Interactive Forms Preparation facility CICS/VS is required.

VM/370: VM/370 can be used for execution of the screen handler generator, for interactive forms preparation and for assembly of programs if a 3790 macro library is available. For validation and transmission of programs to the 3790 and for use of the CIM feature of DMS/3790, a DOS/VS or OS/VS system is required.

DOCUMENTATION
(available from Mechanicsburg)

Title	Order Number
General Information Manual	To Be
Sales Flyer	Announced

TERMS and CONDITIONS: See PP Index

**DISPLAY MANAGEMENT SYSTEM/3770
(DMS/3770), RELEASE 1
5748-XC3**

PURPOSE

This program product is a productivity aid for users of the 3770 Communication System that simplifies the design, coding, testing and maintenance of the 3770 application programs. The DMS/3770 program product consists of an interactive or forms driven panel definition program, a screen handler program generator, a local data set access manager, a host communication access manager and an application function manager.

The 3770 programmable system is an operator oriented communication system that consists of an IBM 3774 or 3775 Programmable Communication Terminal and its attached devices. The operator terminal consists of the console keyboard, the 480 character gas panel display, the console printer and the 3278 Display Station mdl 2 RPQ #EJ2657 (3774 only). Support for the RPQ will be available in a later release. Records may be stored on one fixed diskette drive, and/or two additional diskette drives that are optional. Other devices supported are the 3501 Card Reader, the 2502 Card Reader and the 3521 Card Read/Punch.

Programs prepared on the host system are transmitted to the 3770 where they may be executed. These programs can operate in a stand-alone manner or with host communication.

The S/370 host system supports the 3770 under DOS/VS, OS/VS1, OS/VS2 and VM/370 (CMS). 3770 programs are created and tested at the host system and are transmitted by the user to the 3770.

DMS/3770 generates a 3770 application program which supports data collection and maintenance from the 3770 console. Local data sets may be either indexed or relative in organization. Host data sets may have any form of organization which the user-written host program will support.

HIGHLIGHTS

- Improved programmer productivity.
- The cost of maintaining 3770 application programs should be reduced because of system modularity and standardized documentation.
- Tedious aspects of 3770 programming are removed without prohibiting unique implementation via user exits.
- Distribution of function or data from the host system to the 3770 or vice versa.
- Application may be described on the Interactive Forms Preparation facility or by using the DMS/3770 forms.
- Full Screen Processing facility.

DESCRIPTION

- Field by field support.

The Interactive Forms Preparation Facility (IFP) is a productivity tool that aids the application designer in describing the interface with the display operator. This facility operates under TSO, CICS/VS and CMS. The IFP provides for online entry of the information necessary to generate screen handler programs by using a 3271 or 3272 and one 3277 mdl 2 Display Station or one 3275 Display Station (or equivalent 3274/3276/3278 combination). This facility provides the capability to improve productivity with functions such as:

- Full screen entry of display and print layouts.
- Left-right and up-down scrolling capability.
- Automatic prompting for field definitions.
- Restart capability.
- Help panels.

DMS/3770 forms allow an application programmer to describe the 3770 interface with the display operator. In order to use the screen handler function of DMS/3770 for specifying operator communications, certain forms must be filled out, keyed and input to the DMS/3770 screen handler generator. The forms are divided into two groups: (1) data definition and (2) screen handler definition. Data definition consists of the buffer definition form. This form allows the user to specify the formats of buffers or records. A DMS/3770 data definition processor edits this form and then generates, in card form, the appropriate 3770 code for the definitions. These definitions can then be added to a MACLIB or source statement library for reference at assembly time for the application.

There are two forms which provide for the screen handler definition. Contents of these forms allow input of basic program information of field editing characteristics.

The host communication function supports the BSC mode of line use. SDLC support is also available.

Five operational functions may be selected by the application programmer to be provided in the generated functional program:

- Add** --- Selected input data fields from the panel described by the application programmer are collected and arranged in the order specified by the buffer description and are stored in the local/host data sets selected by the operator.
- Display** --- Previously entered data is retrieved and merged with the panel described by the application programmer, and is displayed on the operator console of the 3770. A record may be retrieved by the operator by entering the key of the record, by entering the relative record number of the record, or by entering a null key which signifies "next record".
- Verify** --- Previously entered data is retrieved by key or by entering a null key ("next record"). The operator is supplied with the prompts from the application programmer specified panel and is required to rekey the entry values. If the existing data and the newly keyed data match, the next field is processed. Three attempts at each field are allowed before the new value is accepted in the case of mismatch. The original data is not shown to the verify operator to maintain keying independence. Indexed data sets include a verification indicator. The indicator will be changed to a "V" if the record was verified correct as is, and will be changed to a "C" if the record was altered during the verify operation.
- Update** --- Previously entered data is retrieved by key or by entering a null key ("next record"). The data is then merged with the panel described by the application programmer, and is displayed on the operator console one field at a time. After each input value is displayed, the operator is given the opportunity to alter it. After the last field, the record is rewritten to the source data set. If an indexed data set is being processed, the verification indicator will be changed to a "U" if a field is updated.
- Delete** --- The record is selected by the operator by key only, is merged with the application programmer specified panel and is displayed on the operator console. The operator is then prompted to continue or to abort the delete request. "No" implies abort, "yes" implies continue. The record is then removed from the data set by altering the key so that it is no longer selectable. (The deleted record may be returned to active status by the operator.)

Continuous running routines -- the operator has the option of performing a selected function in a continuous mode.

DMS/3770 requires at the host a number of input, output and work files to retain information as it is processing the various screen handler forms. These files are:

1. Input file.
2. Layout & field processing file (work).
3. Mapping file (work).
4. Generated output file.

CUSTOMER RESPONSIBILITIES

To install and use the DMS/3770 program product the user must:

1. Acquire a knowledge of the functions provided by the different facilities.
2. Learn the new macros provided for implementing these facilities.
3. Learn how to use the IFP facility or the forms provided for the screen handler generation.
4. Provide the necessary data set and program ID's to be used.
5. Provide the necessary host application programs and install CICS/VS or IMS/VS if host communications is used.
6. Provide any necessary user programming to perform functions not provided by DMS/3770. This may be done via user exits.
7. Provide the NCP/VS and Access Method Generations if online diskette transmission or DMS/3770 Host Communications is used.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

DMS/3770 requires the following system configuration:

- An IBM S/370 mdl 115 or larger for DOS/VS, an IBM mdl 135 or larger for OS/VS1 or an IBM mdl 145 or larger for OS/VS2 and comparable mdls of the IBM 3031, 3032, and 3033. The machine configuration for DMS/3770 varies according to the user's application needs. The requirement for operation under CICS/VS or IMS/VS is any S/370 with enough real storage to meet the combined operating requirements of CICS/VS or IMS/VS, the host operating system, the appropriate access methods and other

**IBM PERSONAL COMPUTER MACRO ASSEMBLER
6024002****PURPOSE**

The Macro Assembler operates with the IBM Personal Computer Disk Operating System (DOS). Programs written in Assembler language are assembled into executable machine code that may run several times faster than equivalent high-level language routines. Additionally, the Assembler permits the programmer to design detailed program functions that are often impossible in a higher-level language. Assembler-produced programs, called "object" files, may be called from programs written from the following IBM Personal Computer languages: BASIC, Pascal, and FORTRAN.

HIGHLIGHTS

- Relocatable object modules
 - Definition of macros to generate commonly-used instruction sequences
 - Two versions: 96KB macro and 64KB subset
- Machine language of each instruction
 - Start and end addresses
 - Name, length, class of each segment
 - Public and local names and their attributes
 - Line numbers
 - Alphabetic cross-reference of variables
- Compatible with IBM Personal Computer BASIC, Pascal, and FORTRAN programs

The Assembler language program is created using a text editor such as the EDLIN utility program that is packaged with DOS, or a full-screen text editor such as the Personal Editor (6024051) which is a separate licensed program. The Macro Assembler is then used to assemble the program. Next, the DOS Linker translates the Assembler relocatable output into a load module, ready for loading and execution. While this process must take place on a 64KB or larger diskette system, the load module itself could be run on a diskette system with as little as 32KB memory. When a load module is designed for use as a subroutine of a higher-level language program (IBM Personal Computer BASIC, Pascal, or FORTRAN), the appropriate instructions must be included in the calling program.

Both versions of the Macro Assembler are co-resident on one diskette. A reference manual is packaged with the diskette.

CUSTOMER RESPONSIBILITIES

Customers are responsible for producing backup copies of the original diskettes when copying is permitted according to the terms and conditions of the IBM Program License Agreement and perform backup and recovery procedures for data diskettes.

BRANCH OFFICE RESPONSIBILITIES (None)**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

An IBM 5160 Personal Computer XT or an IBM 5150 Personal Computer with at least 96KB of memory and one diskette drive. One of the following display options required for text entry:

- IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
- IBM Color Display and the Color/Graphics Monitor Adapter
- A 40- or 80-column black/white or 40- or 80-column color monitor with the IBM Color/Graphics Monitor Adapter

A minimum 96KB, one diskette drive system is required to produce an assembler language object module using the full Macro Assembler version. A subset version is provided to assemble programs on a 64KB system. This version does not support macros, repeat functions (REPT, IRP, IRPC), record pseudo-ops, or structure pseudo-ops.

SOFTWARE REQUIREMENTS

Both Assembler versions must be executed under control of the IBM Personal Computer Disk Operating System (DOS) Version 1 or subsequent versions or releases. When used with the IBM Personal Computer Disk Operating System Version 2.0, the Macro Assembler may reside on a fixed disk drive, and it may access fixed disk files. The DOS Linker program (on the DOS Diskette) is also required for the linkage editor process. A text editing program (EDLIN) for entry of the Assembler source program is resident on the DOS Diskette. If full-screen text editing is required, the Personal Editor is available as a separate product.

PACKAGING

IBM Personal Computer Macro Assembler Reference Manual - The correct procedures for writing, assembling, linking and running an Assembler program are described in the *Macro Assembler Reference Manual*. A complete instruction set reference is included. Details about the Linker program and EDLIN are included in the *IBM Personal Computer Disk Operating System Manual*.

**IBM PERSONAL COMPUTER BASIC COMPILER
6024003**

PURPOSE

With BASIC Compiler, programs written in IBM Personal Computer BASIC (Interpreter) may be converted to object code for improved run-time performance. Most functions supported by the Disk and Advanced versions of the BASIC Interpreter are also supported by the BASIC Compiler.

HIGHLIGHTS

Programs may be written and tested using the BASIC Interpreter and the BASIC program editor. Performance gains of several times over interpreter timings are possible (results vary by program). Object modules may be linked with subroutines written with the IBM Personal Computer Macro Assembler. Compiled programs may not be listed or modified, as source or BASIC Interpreter files can, thus providing some application security. Some double-precision arithmetic is supported by the compiler (trig functions, FOR-NEXT loop variables). The compiler checks every program statement for syntax errors during compilation. (BASIC Interpreter checks syntax of statements during program execution. It may miss errors in untested statements.) Demo program provided for training purposes. Compiler "metacommands" (directives) are available to control output formats and run-time options.

DESCRIPTION

The BASIC Compiler permits a programmer to convert an existing program written in IBM Personal Computer BASIC (Interpreter) to object code for a significant improvement in run-time performance. A high degree of compatibility between the interpreter and compiler has been maintained to minimize program modifications.

Each BASIC program to be compiled must be created as a source (ASCII) file using the BASIC program editor or an editor such as the EDLIN utility program on the DOS diskette. The compiler is then used to compile the program, producing a machine language file. Finally, a Linker program resident on the BASIC Compiler diskette is used to convert the machine language file into one that is ready for loading and execution (load module). The compiled load module contains some language functions that the interpreter has in the system unit's read-only-memory (ROM). For this reason, the compiled program may be larger in memory than the interpreter version plus the BASIC or BASICA (resident) Interpreter extensions.

CUSTOMER RESPONSIBILITIES

The customer is responsible for producing backup copies of the original compiler diskettes.

Application programs using compiled code may require licensed run-time libraries. Information concerning distribution *must* be obtained from IBM.

Usage of the run-time module is an option taken at compile time. Programs compiled without this option can be distributed with no additional considerations, but may require significantly more diskette space.

Since there are some minor differences between the language functions supported by the BASIC Interpreter and Compiler versions, the customer should be prepared to make changes to an existing interpreter program prior to compilation. These differences are summarized in the Compatibility section below.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

A minimum 64KB, one-diskette drive system is required to compile a BASIC program, although the program itself may be executable on a smaller system (two drives are recommended for easier operation).

While the IBM Monochrome Display with the IBM Monochrome Display and Printer Adapter as well as the IBM Color Display with the Color/Graphics Monitor Adapter (40- or 80-column formats) are supported, 80-columns are recommended for displaying compiler messages and listings.

SOFTWARE REQUIREMENTS

The IBM Personal Computer DOS Diskette provides the necessary I/O routines and Linker. When used with DOS Version 2.0, the BASIC Compiler may reside on a fixed disk drive, and it may access fixed disk files.

COMPATIBILITY

BASIC Interpreter Command, Function, or Statement	BASIC Compiler Differences
LOAD, SAVE, AUTO, EDIT, LIST, ILIST, DELETE, MERGE, NEW, RENUM, CONT	Not supported on compiler. These commands are normally associated with program editing in the interpreter environment.
CHAIN, COMMON	Compiler function is a subset of interpreter. MERGE, DELETE and ALL options operate on lines in an interpretive program only. COMMON must appear in each program; variables must be listed in the same order in each program.
Commands referencing "CAS1:" (LIST, RUN, LOAD, SAVE, etc.) and MOTOR DEF FN, DEFINT/SNG/DBL/STR, and DIM	Cassette operations are not supported. In a compiler program these statements must appear before functions or variables are referenced.
Dynamic array dimensioning and ERASE statement	Not supported.
Integer overflow error handling	Subset of interpreter function. /D compiler option available to provide additional support.
"Soft Key" support (default character strings assigned to function keys F1-F10)	Defaults are not supported. Programs may assign values using KEY statement.
String handling	Character-string length in interpretive BASIC is 256 characters; in compiled BASIC it may be up to 32,767 characters. The string descriptor (referred to by VARPTR and some assembler language subroutines) is three bytes long in the interpreter; four bytes in the compiler.
DRAW, PLAY	"X String" and "=variable" require use of VARPTR.
OPEN COM	LEN = number option must be added to support GET or PUT

DOCUMENTATION

IBM Personal Computer BASIC Compiler Manual.

The *BASIC Compiler Manual* should be used with the *BASIC Reference Manual* (6025013) and the *Disk Operating System Manual* (6172220). The *BASIC Reference Manual* contains additional cross-reference information to the compiler product, and will be shipped with new system units.

PACKAGING

The BASIC Compiler is resident on two diskettes. It is packaged with the *IBM Personal Computer BASIC Compiler Manual*.

PROGRAM PRODUCTS

VISICALC*
6024004**PURPOSE**

VisiCalc is an electronic spreadsheet application.

HIGHLIGHTS

- A "worksheet" of 254 rows and 63 columns
- Automatic recalculation of entire worksheet with new or changed data
- Automatic recalculation which takes care of the order of recalculation
- Step-by-step instructions with examples for all major features
- Quick Reference Summary card for easy reference
- Overlay of multiple worksheets to a single worksheet
- Variable column width
- Ability to view two parts of worksheet simultaneously
- Horizontal and Vertical dual-window synchronization
- Extensive functions and operators
- Fixed Title option for scrolling
- Replicate function for repetitive entries
- Transcendental functions
- Scientific notation available
- Communicates with other programs through the DIF** format

DESCRIPTION

VisiCalc is a program that creates worksheets in which a user can create dynamic tables of information. Each worksheet is composed of 254 rows and 63 columns which allow for 16,002 (254 X 63) unique locations or "cells". VisiCalc allows the user to perform processing in these tables by using algebraic formulas in cell locations in which the variables are other cell locations: When the value in one cell location changes, the entire worksheet including cell formulas is automatically recalculated. The display screen is called the window to the worksheet in which the resultant values (the result of calculating the formulas) are displayed. The formulas can be changed in place (edited), or moved or duplicated (by single cell or block of cells) to another location on the worksheet and saved on disk or diskette for later editing/processing. Two or more worksheets can be "overlaid", allowing for combination of data. Blocks of the worksheet can be saved in DIF** format which can then be read by applications supporting the DIF** format such as VisiPlot***, and Multiplan by Microsoft. DIF format does not include cell formulas, only the resultant values. This application is known also as an "electronic spreadsheet".

VisiCalc for the IBM Personal Computer is a unique tool which allows the businessman, the accountant, the analyst, and the planner an efficient way to solve their problems with no knowledge of a traditional programming language. VisiCalc combines the convenience and familiarity of a pocket calculator with the powerful memory and electronic screen capabilities of the IBM Personal Computer. Taking advantage of the tutorial nature of the documentation, new users will be able to build a spread sheet of numeric values easily, which they can then modify, causing the complete spread sheet to be recalculated using the new value or values entered.

Users can add labels, headings, and lines to their data to allow the printing of reports displaying the different "what if" situations which can be computed with the simple change of one or more of the data elements.

The VisiCalc program provides the facility to arrange data into a grid of up to 63 columns and 254 rows. Any element in this grid can be a numeric value, a label, or a formula. These formulas allow elements of the grid to relate to other elements, and have a wide range of flexibility. The formulas can also use the standard functions provided by VisiCalc. Some of these are: Summation, net present value, integer, and trigonometric functions.

CUSTOMER RESPONSIBILITIES

The customer must perform an initial setup procedure to format blank diskette(s) and copy portions of DOS onto the diskette(s). A specification file must be created for unique requirements; or, one of the sample files can be used. A DOS batch file can be prepared to automatically "boot" the emulation program at power-on time.

BRANCH OFFICE RESPONSIBILITIES (None)

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

An IBM 5150 Personal Computer with at least 64KB of memory, and one diskette drive or an IBM 5160 Personal Computer XT is required. In addition, one of the following 80-column display options is required:

- IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter (1504900)
- IBM Color Display and the IBM Color/Graphics Monitor Adapter
- An 80-column black/white or 80-column color monitor with the IBM Color/Graphics Monitor Adapter

SOFTWARE REQUIREMENTS

IBM Personal Computer Disk Operating System (DOS) Version 1.1 or 2.0

The VisiCalc* program resides on diskette only. VisiCalc* data files may reside on diskette or fixed disk.

PACKAGING

VisiCalc is distributed with the following:

User's Reference Manual ... Quick Reference Summary Card ... one program diskette ... one backup program diskette

- Trademark of Personal Software, Inc.
- ** Trademark of Software Arts, Inc.
- *** Trademark of VisiCorp.



PROGRAM PRODUCTS

**EASYWRITER VERSION 1.1
6024005****PURPOSE**

EasyWriter is a versatile and easy-to-use word processor featuring a menu-driven interface that allows users with varied skills to be productive quickly.

HIGHLIGHTS

- Full-screen editing
- Variable margin size
- Variable line spacing
- Insert and delete characters, words and lines
- Undelete (bring back) deleted characters and words
- Help menus on screen
- Automatic page numbering
- Search and replace
- Margin justification
- Tab set
- Titles and headings
- Block moves and copies
- Line centering
- Word count
- Linking and appending files
- VisiCalc* print files may be converted and merged into EasyWriter documents with the transfer program.

DESCRIPTION

EasyWriter allows users to write letters, reports, articles, even books. The text can be edited on the screen before it's printed, allowing the user to make changes, prepare personalized form letters, and much more.

Once EasyWriter is loaded into the computer's memory, EasyWriter displays the first of three system menus -- the File System menu. From this menu the user can save, revise, delete, link, protect, edit, append and format a file. The user can print a file from any menu. The Help menu describes options available to the user while text is being worked on. The Additional Commands menu allows the user to perform special functions such as setting margins and tabs as well as displaying the document in a print format.

All 12 fonts of the IBM 5152 model 2 Graphics Printer are available to the user. In addition, print files can be transmitted over the Asynchronous Communications Adapter to a serial printer.

The simple text entry and the full-function, full-screen text editor facilitate: Adding, inserting, deleting, and correcting of existing files; horizontal and vertical scrolling through text; and global selective search and replace. This is combined with the flexibility of formatting the output to the printer.

CUSTOMER RESPONSIBILITIES

Customers are responsible for producing backup copies of the original diskettes, when copying is permitted, according to the terms and conditions of the IBM Program License Agreement. Customers must install DOS on the EasyWriter program diskette according to instructions in the *EasyWriter Reference Manual*.

BRANCH OFFICE RESPONSIBILITIES (None)**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

An IBM 5150 Personal Computer with at least 64KB of memory and one diskette drive or an IBM 5160 Personal Computer XT is required. In addition, one of the following 80-column display options is required:

- IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
- IBM Color Display and the Color/Graphics Monitor Adapter
- An 80-column black/white or 80-column color monitor with the IBM Color/Graphics Monitor Adapter

The available work area in a Personal Computer with 64KB is 13.9KB. To avoid an out of space condition when running on a 64KB system, the user may split a large file into two smaller files. These may be linked together and treated as a single document. In a 96KB or larger system, EasyWriter supports a larger document size, up to a maximum of 24KB characters.

SOFTWARE REQUIREMENTS

IBM Personal Computer Disk Operating System Version 1 or subsequent versions and releases. The EasyWriter program resides on diskette only. EasyWriter data files may reside on diskette or fixed disk. Any DOS formatted diskette may be used for EasyWriter files.

PACKAGING

Reference Manual ... Quick Reference Summary card ... one program diskette

* VisiCalc is a trademark of Personal Software, Inc.

**IBM PERSONAL COMPUTER PASCAL COMPILER
6024010****PURPOSE**

The IBM PC Pascal Compiler operates with the IBM Personal Computer Disk Operating System (DOS). It provides the capability to compile Pascal programs conforming to ISO Working Draft #6 (with the exception of conformant arrays).

HIGHLIGHTS

- Generally conforms to ISO Draft (ISO/TC 97/SC 5 N595)
- Separate compilation of large program segments
- Object modules may be combined with subroutines written in IBM PC FORTRAN or Macro Assembler
- Variable length strings
- Super-array type supported
- Machine-oriented constructs
- Compiler Directives and Metacommands
- Flags for Jumps, Globals, Identifier level, Control level header, trailer, general listing format textual error and warning messages
- Extended CASE range
- Bitwise logical Boolean operators
- Extended Ininsics
- Extended I/O

DESCRIPTION

The Pascal Compiler is available as an optional software product. The IBM Personal Computer Pascal version supports all of the facilities of the International Standards Organization (ISO) Working Draft #6, with the exception of conformant array parameters, which are instead provided by the "super array" type. Many additional features are also supported.

The Pascal program must be created as a source (text) file using a text editor such as the EDLIN utility program that is packaged with DOS on the DOS Diskette, or the Personal Editor, which is a separate IBM product. The Pascal Compiler is then used to compile the program, producing a machine language (object) file in relocatable format. Finally, the Linker program, packaged with DOS on the DOS Diskette, is used to convert the relocatable program into one that is ready for loading and execution at a specific memory address.

CUSTOMER RESPONSIBILITIES

The customer is responsible for producing backup copies of the original compiler diskettes. Since the reference manual does not provide a tutorial on the language, the customer should have some prior knowledge of Pascal.

BRANCH OFFICE RESPONSIBILITIES (None)**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

An IBM 5150 Personal Computer with at least 128KB of memory, and two diskette drives ... one of the following display options required for text entry:

- IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
- IBM Color Display and the Color/Graphics Monitor Adapter
- A 40- or 80-column black/white or 40- or 80-column color monitor with the IBM Color/Graphics Monitor Adapter

The IBM 5152 model 2 Graphics Printer is recommended

SOFTWARE REQUIREMENTS

- IBM Personal Computer Disk Operating System (DOS) Version 1 or subsequent versions or releases
- If a compiled program performs diskette I/O, the IBM Personal Computer DOS must be diskette and memory resident.

PACKAGING

A *Pascal Compiler Reference Manual*. Since the Disk Operating System (DOS) is used during the program entry, compilation, linking, and execution phases, the *DOS Reference Manual* is required.

The Pascal Compiler comes on three diskettes.

**IBM PERSONAL COMPUTER COBOL COMPILER
6024011****PURPOSE**

With the COBOL compiler, programs may be written in ANSI standard COBOL. These programs are then compiled to an interpretive object code for execution on the IBM Personal Computer.

The COBOL compiler for the Personal Computer is designed according to the specifications for American National Standard (ANS) Programming Language COBOL (X3.23-1974) as understood and interpreted by IBM as of February 1982. American National Standard COBOL is compatible with, and identical to, ISO 1989-1978 standard of the International Organization for Standardization.

HIGHLIGHTS

The following functional modules are supported:

- 1 NUC1, 2 (Nucleus)
- 1 TBL 1, 2 (Table-handling)
- 1 SEQ1, 2 (Sequential I-O) except RERUN
- 1 REL 0, 2 (Relative I-O) except RERUN
- 1 INX 0, 2 (Segmentation)
- 1 LIB 0, 2 (Library)
- 1 IPC 0, 2 (Inter-program Communication)

Additional Features

- From ANS Level 2 Nucleus:
 - Level 88 conditions
 - AND, OR, NOT conditions
 - Nested IF statements
 - STRING and UNSTRING
 - PERFORM VARYING...UNTIL
- From ANS Level 2 Table-Handling:
 - SEARCH ALL statement
- From ANS Level 1 Debug (DEB 0,2)
 - SOURCE-COMPUTER paragraph WITH DEBUGGING MODE clause

Other IBM Personal Computer COBOL Features

- Object modules may be linked with modules produced by the IBM Personal Computer Macro Assembler
- ACCEPT and DISPLAY extensions for formatted screen handling
- CHAIN to other programs

DESCRIPTION

The COBOL compiler for the Personal Computer is designed according to the specifications for American National Standard (ANS) Programming Language COBOL (X3.23-1974) as understood and interpreted by IBM as of February 1982. American National Standard COBOL is compatible with, and identical to, ISO 1989-1978 standard of the International Organization for Standardization.

Each COBOL program must be created as a source (text) file using a text editor such as the EDLIN utility program that is packaged with the IBM Personal Computer DOS on the DOS Diskette, or the Personal Editor, which has full-screen function. The COBOL Compiler is then used to compile the program, producing an object file in relocatable format. Finally, the Linker program is used to convert the relocatable file into one ready for loading and execution using the COBOL run-time library.

CUSTOMER RESPONSIBILITIES

The customer is responsible for producing backup copies of the original compiler diskettes. Since the reference manual does not provide a tutorial on the language, the user should have some prior knowledge of COBOL. Programs may be written on standard COBOL coding forms.

The COBOL run-time library contains proprietary code. A distribution agreement between the customer and IBM is required before application programs can be distributed to others. For additional information, see the *COBOL Reference Manual*, or write to IBM, PO Box 1328-P, Boca Raton, Florida 33432.

BRANCH OFFICE RESPONSIBILITIES (None)**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

An IBM 5150 Personal Computer with a minimum of 64KB memory and two diskette drives or an IBM 5160 Personal Computer XT is required to compile a COBOL program, although the program itself may be executable on a smaller system. An 80-column display is recommended for displaying compiler messages and listings. One of the following display options is required:

- An IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
- An IBM Color Display and the Color/Graphics Monitor Adapter
- A 40- or 80-column black/white or 40- or 80-column Color monitor with the IBM Color/Graphics Monitor Adapter

The IBM 5152 model 2 Graphics Printer is recommended.

SOFTWARE REQUIREMENTS

The IBM Personal Computer Disk Operating System (DOS) Version 1 or subsequent versions or releases is required. When the IBM Personal Computer Disk Operating System Version 2.0 is used, the COBOL compiler may be resident on a fixed disk drive and it may access fixed disk files.

PACKAGING

IBM Personal Computer COBOL Reference Manual. Since the IBM Personal Computer Disk Operating System (DOS) is used during the program compilation, linking, and execution phases, the *DOS Reference Manual* is required. If the Personal Editor is used to enter the programs, the *Personal Editor Reference Manual* is required. The COBOL Compiler is resident on two diskettes packaged with the *IBM Personal Computer COBOL Reference Manual*.

PROGRAM PRODUCTS

UCSD p-System* with UCSD Pascal*
6024016
UCSD p-System with FORTRAN-77
6024017**PURPOSE**

The UCSD p-System consists of an operating system and either one or two languages for the IBM Personal Computer. The p-System provides the programmer with an extended Version IV.0 of the operating system, including a full-screen editor, program debugger, graphics support, an assembler, file handler, native code generator, and a print spooler. The system is available with either UCSD Pascal, FORTRAN-77, or both languages.

p-System with FORTRAN-77 - FORTRAN-77 Compiler

* UCSD p-System and UCSD Pascal are trademarks of the Regents of the University of California.

HIGHLIGHTS

- The p-System provides an excellent environment for program development.
- The language compilers generate "p-code", a portable, machine-independent format.
- A Native Code Generator may be used to convert p-code to efficient code for better performance.
- Machine-level reference and tutorial documentation is provided. FORTRAN-77 is ANSI-1977 level, supporting a wide range of engineering and scientific applications.
- It provides extensions to UCSD Pascal for development and commercial programming.
- Structured programming produces programs that are more efficient and easier to maintain.

DESCRIPTION

The UCSD p-System, with either UCSD Pascal or FORTRAN-77, is designed to run on an IBM Personal Computer with a minimum of 64KB and two diskette drives. A program is entered via the p-System's editor, then compiled to p-code and stored on diskette. The p-code version can then be executed as needed. The p-System filer maintains a library of user-written programs on diskette. For convenience, run-time or execution routines may be moved to an application program diskette.

CUSTOMER RESPONSIBILITIES

The customer is responsible for producing backup copies of the original diskette or for copying UCSD p-System files onto application program diskettes. Such copying is provided for convenience, but UCSD p-System resident diskettes may not be distributed to other users.

BRANCH OFFICE RESPONSIBILITIES (None)**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

A minimum 64KB, two diskette drive system is required to run the UCSD p-System, although some application programs may execute in less memory.

Both 40- and 80-column display output is supported although 80-column displays (IBM Monochrome or Color Display) are recommended.

SOFTWARE REQUIREMENTS

Run-time routines may be packaged with application programs to provide the necessary execution prerequisites, although licensing of such routines is required for redistribution to others.

DATA SECURITY

The customer is responsible for the protection of data from unintended modification, destruction, or disclosure, and for the accuracy and integrity of the results.

DOCUMENTATION

Publications are packaged with diskettes for the products described above. They are:

Development (p-System)

Beginner's Guide for the UCSD p-System ... User's Guide for the UCSD p-System ... Internal Architecture Guide for the UCSD p-System ... Assembler Reference Manual for the UCSD p-System

FORTRAN-77 Compiler

FORTRAN-77 Reference Manual for the UCSD p-System

UCSD Pascal Compiler

UCSD Pascal Reference for the UCSD p-System

PACKAGING

The three major p-System components are the development (operating) system, FORTRAN-77 compiler, and UCSD Pascal compiler. They are packaged as four products on diskettes with related publications. They are available as the development system with a language. The second language is available with the development system or at a later time.

p-System with UCSD Pascal - UCSD Pascal Compiler

**MULTIPLAN by MICROSOFT
6024022****PURPOSE**

The IBM Personal Computer Multiplan is an advanced electronic spreadsheet for financial modeling and reporting.

HIGHLIGHTS

- Provides a "worksheet" of 255 rows X 63 columns
- Tutorial models on diskette
- Online help text
- Linking of active model to models on secondary (disk) storage
- Full support of IBM Personal Computer keyboard
- Full support of color capabilities
- Variable column width
- Natural language commands and variable (cell) names up to 8 display windows
- Extensive functions and operators
- Automatic recalculation which takes care of the order of recalculation
- Sorting of alphabetic or numeric data
- Cell protection
- Continuous formatting (allows entries across cell boundaries)
- Full-line (cell) editing
- Iterative solutions to simultaneous equations in more than one variable

DESCRIPTION

The IBM Personal Computer Multiplan is a spread-sheet simulator which is applicable to many different kinds of numeric modeling and planning. It provides a framework for holding the relationships between constant and varying elements of a numeric model. This gives the user the opportunity to do projections, what-ifs, sensitivity analysis, budget and resource planning, scheduling, and a host of other applications that involve extensive manipulation of numbers and formulas.

The electronic worksheet is represented by a grid of cells. The user fills out the worksheet by entering words, numbers, or formulas into the cells. In this respect, the "electronic worksheet" is like a ledger with headings, values, and algebraic formulas filled via the keyboard, and the display screen provides a window to view the worksheet. Two or more completely different parts of the worksheet can be viewed through windows, or entire areas of the worksheet can be given a name which can be used in formulas and commands to refer to all the cells in the area. Cells may be "designed" (formatted) to further reflect the type of data they contain. For applications which require a "third dimension" (depth), Multiplan allows creation of more than one sheet. The active sheet may then refer to named-cells on different, inactive sheets.

After backing up the diskettes and transferring DOS to the program diskette, Multiplan is loaded by inserting the program diskette and turning on the computer. The user may obtain help at any time during the session by pressing "H" for help from the main menu or "?" from any sub-menu.

CUSTOMER RESPONSIBILITIES

Customers are responsible for producing backup copies of the original diskettes when copying is permitted according to the terms and conditions of the IBM Program License Agreement and perform backup and recovery procedures for data diskettes.

BRANCH OFFICE RESPONSIBILITIES (None)**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

An IBM 5150 Personal Computer with at least 64KB of memory and one diskette drive, or an IBM 5160 Personal Computer XT is required. In addition, one of the following display options is required:

- IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
- IBM Color Display and the Color/Graphics Monitor Adapter
- A 40- or 80-column black/white or 40- or 80-column color monitor with the IBM Color/Graphics Monitor Adapter

The IBM 5152 model 2 Graphics Printer is required in order to print a worksheet.

SOFTWARE REQUIREMENTS

IBM Personal Computer Disk Operating System (DOS) Version 1 or subsequent versions or releases. When used with the IBM Personal Computer Disk Operating System Version 2.0, Multiplan may be resident on a fixed disk drive and it will support files on the fixed disk.

COMPATIBILITY

Multiplan can read DIF* files from diskette put there by Multiplan or any of the VisiCalc** series packages that support DIF* format. Note that DIF* format does not pass formulas - only constants and labels.

PACKAGING

Multiplan is distributed with the following:

User's Reference Manual ... Reference Card ... one program diskette ... one tutorial diskette.

* Trademark of Software Arts, Inc.

** Trademark of Personal Software, Inc.

ASYNCHRONOUS COMMUNICATIONS SUPPORT**VERSION 2****6024032****PURPOSE**

This support allows users, with no additional programming, to use their IBM Personal Computers as asynchronous (start/stop) TTY ASR 33/35 terminals.

HIGHLIGHTS

- The user may interactively specify:
 - Bit rate (75 bps to 9600 bps)
 - Parity
 - Number of stop bits
 - Line turnaround characters
 - Local or host ECHO/no ECHO
 - XON/XOFF support
- Specifications for interaction with a particular host may be stored for later use, eliminating the need to respecify at each initiation.
- Programs and data may be sent from an IBM Personal Computer to a host system, or received from a host system and placed in an IBM Personal Computer file.
- Menu-selectable options:
 - Dow Jones News Service*
 - The Source**
- Files can be transferred between an IBM Personal Computer and most host systems.
- Binary files can be converted to ASCII format (or vice versa) using the utility program supplied.
- Either of two Asynchronous Communications Adapter ports can be used if two asynchronous cards are installed.
- While receiving from the host, there is an option to print data or store it on a file.

DESCRIPTION

Asynchronous Communications Support Version 2 provides improved ease-of-use, file transfer capability, and additional functions. Version 1 is no longer available.

In addition to supporting the system as an interactive terminal, the package allows the IBM Personal Computer to exchange program and data files with the host system with which it is communicating. The user has flexibility in specifying TTY ASR 33/35 terminal protocol, for attachment to a variety of host computers. It also provides for communication between two IBM Personal Computers for transferring program and data files.

Asynchronous Communication Support is designed to allow connection to most host systems which support TTY ASR 33/35 asynchronous terminals. Common settings such as parity, stop bits, and bps rates are specified interactively at program initiation.

CUSTOMER RESPONSIBILITIES

Customers are responsible for producing backup copies of the original diskette, when copying is permitted, according to the terms and conditions of the IBM Program License Agreement, acquiring the necessary communications modems, cables, subscriptions, and passwords.

BRANCH OFFICE RESPONSIBILITIES (None)**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

- An IBM 5160 Personal Computer XT or an IBM 5150 Personal Computer with at least 64KB of memory, one diskette drive, and an Asynchronous Communications adapter.
- One of the following display options is required:
 - IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
 - IBM Color Display and the Color/Graphics Monitor Adapter
 - A 40- or 80-column black/white or 40- or 80-column color monitor with the IBM Color/Graphics Monitor Adapter
- A customer-supplied full-duplex modem or direct cable connection to a local host computer
- A customer-provided EIA RS232-C cable for adapter to modem connection

SOFTWARE REQUIREMENTS

- IBM Personal Computer Disk Operating System (DOS) Version 1 or subsequent versions and releases IBM Disk BASIC.
- When used with the IBM Personal Computer Disk Operating System Version 2.0, the Asynchronous Communications Support

program may reside on a fixed disk drive and it can support fixed disk files.

PACKAGING

The Asynchronous Communications Support Program is resident on one diskette and comes with the following documentation:

Asynchronous Communications Support Program

- * Dow Jones is a trademark of Dow Jones and Company, Incorporated.
- ** The Source is a service mark of Source Telecomputing Corporation, a subsidiary of The Reader's Digest Association, Inc.

CP/M-86* OPERATING SYSTEM 6024035

PURPOSE

CP/M-86 is a single-user operating system for the IBM Personal Computer. It manages information stored on diskettes and also provides an interface between a program and the IBM Personal Computer hardware.

HIGHLIGHTS

- Management of data files
- Cataloging
- Creating text and object files
- Copying files to diskette and other media
- Renaming and erasing files
- Verification of directory
- Write and run programs written in Assembler language.

Programming Interface

- Function calls for device handling and memory management
- Escape sequences for cursor and color control
- Light-pen input

Programming Utilities

- Line-oriented text editor
- Assembler
- Command-file generator
- Debugging program

Device Handling

- XON/XOFF and ETX/ACK protocols for Asynchronous Communications Adapter
- Selectable bps rate, parity, stop bits, and number of data bits
- Logical and physical devices
- Automatic Processing of Command Sequences
- Time-of-day and date
- Programmable function keys by using a utility or user program
- On-screen HELP function
- Status line displays user number, date, and time-of-day

Utilities and Commands

- | | |
|----------|---|
| ASM86 | - Assembles INTEL 8088 source code into machine code |
| ASSIGN | - Assigns physical devices (e.g., printer) to logical devices (e.g., console-output) |
| COPYDISK | - Copies contents of an entire diskette to another diskette |
| DDT86 | - Allows monitoring and testing the execution of programs |
| DIR | - Displays the names of files cataloged in online directory |
| DIRS | - Displays the names of files cataloged with current user number and the SYS attribute |
| ED | - Allows editing of text files |
| ERA | - Removes Zfiles from the directory |
| FUNCTION | - Allows assignment of text and control characters to function and keypad keys |
| GENCMD | - Produces command (CMD) files |
| HELP | - Summarizes information for CP/M-86 commands |
| NEWDISK | - Formats diskettes and optionally transfers a copy of the operating system |
| PIP | - Allows copying, editing, combining, transmitting, and renaming diskette files |
| PROTOCOL | - Sets XON, ETX, NONE protocols |
| REN | - Changes the name of a file |
| SPEED | - Specifies bps rate, parity, stop bits, number of data bits, for Asynchronous Communications Adapter |
| STAT | - Gives statistical information about diskette files |
| SUBMIT | - Processes afile of commands |
| TOD | - Sets time of day and date |
| TYPE | - Displays text files on screen |
| USER | - Sets user number |

DESCRIPTION

CP/M-86 is a single-user operating system for the IBM Personal Computer. It manages information stored on diskettes and also provides an interface between a program and the IBM Personal Computer hardware. Up to two physical drives or four logical drives are supported by utility programs that perform the following tasks: Formatting diskettes, copying files to other devices, and providing data about diskette files. Also supported by CP/M-86 are the IBM 5152 Model 2 Graphics Printer, the Asynchronous Communications Adapter, the IBM Monochrome Display, and the Color/Graphics Monitor Adapter (including customer-supplied light-pen) and the IBM Color Display. Dynamic memory management controls the allocation of memory and assigns specific memory areas to application programs. Program development utilities include an editor, an assembler, a debugging program, and a program to produce command files.

CP/M-86 may reside on its original (packaged) diskette, a copy, or as part of a diskette containing other programs. If any of these are present in Drive A when the computer is turned on, or whenever System Reset is performed, CP/M-86 will be loaded into memory. The operating system, or control program, is now ready to accept user commands to

run one of the CP/M-86 utility programs, execute a built-in command, or start a user program. Unless system I/O devices require reassignment (e.g., using the Asynchronous Communications Adapter for printer output), no configuration steps are necessary.

CUSTOMER RESPONSIBILITIES

The customer is responsible for producing backup copies of the original diskette. While CP/M-86 files may be copied to an application program diskette for convenience, such a diskette may not be distributed to other users.

BRANCH OFFICE RESPONSIBILITIES (None)

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

CP/M-86 requires at least one diskette drive and 32KB of memory. The DDT86 debugging program requires 48KB, while the ASM86 Assembler requires 64KB of memory. The operating system resides in 19KB of memory

One of the following display options is required:

- IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
- IBM Color Display and the Color/Graphics Monitor Adapter
- A 40- or 80-column black/white or 40- or 80-column color monitor with the IBM Color/Graphics Monitor Adapter

SOFTWARE REQUIREMENTS

CP/M-86 does not require as a prerequisite, nor is it compatible with, either the IBM Personal Computer DOS or the UCSD p-System**.

COMPATIBILITY

Application programs supported by other versions of CP/M-86 (e.g., CP/M-80) will run on the IBM Personal Computer after undergoing a migration process. This process includes transferring the original program source code from the other computer (usually via a communications link), modifying any program statements affected by language or hardware differences, and recompiling the program using an appropriate language compiler. Although CP/M-86 provides an 8088 Assembler, IBM does not offer CP/M-86 language compilers.

CONVERSION

CP/M-86 files on non-IBM computers must be "communicated" between machines to account for differences in diskette formats.

DATA SECURITY

The customer is responsible for the protection of data from unintended modification, destruction, or disclosure, and for the accuracy and integrity of the results.

PACKAGING

The CP/M-86 manual explains the use of the utilities and commands by giving examples and sample sessions.

CP/M-86 is resident on a single diskette, packaged with a *CP/M-86 Operating System Manual*.

* Trademark of Digital Research, Inc.

** Trademark of the Regents of the University of California.

**SNA 3270 EMULATION and SNA RJE SUPPORT
6024036****PURPOSE**

The SNA 3270 Emulation and SNA RJE Support Program provides significant connectivity enhancements for the IBM Personal Computer. These extensions provide additional flexibility for interactive and office system use of the IBM Personal Computer as an intelligent work station. Operating in SNA 3270 emulation mode, the Personal Computer appears to the host system as an IBM 3274 Model 51C.

HIGHLIGHTS

- Communications Interface
 - Supports IBM SDLC Communications Adapter
 - Both switched and leased line (including multipoint) support
 - Modem support
 - EIA RS232-C Interface
 - Half duplex
 - External clocking
 - Up to 4800 bps
 - Constant request to send and line turn-around
 - Online diagnostics with line trace, error logging, and analysis
 - SNA 3270 emulation
 - The IBM Personal Computer appears to the host system as an IBM 3274 model 51C Control Unit.
 - The IBM Personal Computer uses the same screen formats as supported by the IBM 3278 Display Station, except for the status line. The following features are provided:
 - Logical Unit Type 2 (LU2)
 - 24 - 3270 program function keys
 - Local print key
 - Audible alarm
 - EBCDIC line transmission support
 - Keyboard numeric lock
 - 3279 base color mode support
 - 3279 Color Emulation
 - Status line messages
 - User-definable 3270 keys
 - 3287 Models 1 and 2 printer emulation:
 - For local copy
 - Host-initiated screen print
- The IBM Personal Computer will connect to host subsystems that support the above devices and features/options. A configuration utility to tailor the communications environment is supplied.
- SNA 3770 RJE support
 - The IBM Personal Computer appears to the host system as an IBM 3770 communications terminal with the following features:
 - Logical Unit type 1 (LU1)
 - FM Header Type 1
 - TS Profile 3 and FM Profile 3
 - Outbound from host compression
 - ASCII or EBCDIC line transmission support
 - Transparency
 - Device support for console, card/punch, and printer
 - The IBM Personal Computer will connect to host subsystems that support the above devices and features/options. A configuration utility to tailor the communications environment is supplied.
 - Transmit and receive source and object data in IBM Personal Computer DOS-compatible format
 - Formatted printing:
 - Channel control
 - Page size
 - Tab setting
 - Set line density (1 to 72 lpi)
 - Selectable diskette drives
 - Print to diskette or printer
 - End of job statistics
 - Multiple data set print/punch output
 - Multiple job file support from keyboard or diskette

DESCRIPTION

When used with the IBM SDLC Adapter, SNA 3270 Emulation and RJE Support licensed program permits the IBM Personal Computer to act as a terminal that can communicate with a host system in one of two modes, either supporting SNA 3270 or SNA 3770 RJE.

It includes access method software to support the IBM SDLC Adapter, with additional support to provide both SNA 3270 Emulation and SNA 3770 RJE interfaces to the user.

CUSTOMER RESPONSIBILITIES

Customers are responsible for producing backup copies of the original diskette, when copying is permitted, according to the terms and conditions of the IBM Program License Agreement, acquiring the necessary communications modems, cables, subscriptions, and passwords.

BRANCH OFFICE RESPONSIBILITIES (None)**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

- An IBM 5160 Personal Computer XT or an IBM 5150 Personal Computer with at least 128KB of memory, and one diskette drive.
- One of the following 80-column display options:
 - IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
 - IBM Color Display and the Color/Graphics Monitor Adapter
 - An 80-column black/white or 80-column color monitor with the IBM Color/Graphics Monitor Adapter
- SDLC Communications Adapter (1502090)
- Communications Adapter Cable (1502067)
- Synchronous Communications modem with clocking up to 4800 bps on a switched or leased line
- Host Computer system with compatible IBM SNA 3270 Display System support

SOFTWARE REQUIREMENTS

- IBM Personal Computer Disk Operating System (DOS) Version 1 or subsequent versions and releases
- When used with the IBM Personal Computer Disk Operating System Version 2.0, the SNA 3270 Emulation and SNA RJE Support Program may be resident on a fixed disk drive and may access fixed disk files.

PACKAGING

The SNA 3270 Emulation and SNA RJE Support Program is resident on a single diskette which is shipped with a *User's Guide*.

PROGRAM PRODUCTS

**BINARY SYNCHRONOUS 3270 EMULATION PROGRAM
6024037**

PURPOSE

The Binary Synchronous Communications is a connectivity enhancement to the IBM Personal Computer. This extension provides additional flexibility for interactive and office system use of the IBM Personal Computer as an intelligent work station. Operating in BSC 3270 emulation mode, the Personal Computer appears to the host system as one of the following IBM 3270 BSC devices:

3271 mdl 2/3277 mdl 2	Leased line
3274 mdl 51C/3278 mdl 2	Leased line
3275 mdl 2	Switched and leased line
3276 mdl 2	Leased line

HIGHLIGHTS

- Communications Interface
 - Supports IBM BSC Communications Adapter (1502075)
 - Both switched and leased line support
 - Modem support
- EIA RS232-C interface
 - Half duplex
 - External clocking
 - Up to 9600 bps
- Constant line trace, error logging and communications statistics accumulation
- BSC 3270 emulation

The IBM Personal Computer appears to the host system as one of the following IBM 3270 BSC devices:

 - 3271 model 2/3277 model 2 (leased line)
 - 3274 model 51C/3278 model 2 (leased line)
 - 3275 model 2 (switched and leased line)
 - 3276 model 2 (leased line)
- The IBM Personal Computer uses the same screen formats as supported by the IBM 3275, 3276, 3277 and 3278 except for the status line. Only the following features are provided:
 - 12 program function keys
 - Local print key
 - Audible alarm
 - EBCDIC line transmission support
 - Keyboard numeric lock
 - IBM 3279 base color mode support
 - Status line messages
- Printer support
 - 3284 model 3 (when configured as a 3275)
 - 3284 model 2
 - 3286 model 2
 - 3288 model 2

The IBM Personal Computer will connect to host subsystems that support the above devices and features/options Configuration utility to tailor the communications environment
- Additional non-3270 functions provided:
 - User-definable 3270 keys
 - PRINT command allows users to route printer directed data to a file
 - SEND command allows ASCII file data to be written to the unprotected fields on the display for modification and/or transmission to the host
 - TRACE command formats and prints or displays the communications line trace
 - STATS command displays communications statistics

DESCRIPTION

When used with the IBM BSC Communications Adapter, the BSC 3270 Emulation licensed program permits the IBM Personal Computer to act as a terminal that can communicate with a host system supporting BSC 3270.

It includes access method software to support the IBM BSC Communications Adapter with additional support to provide BSC 3270 Emulation.

The *User's Guide* describes both installation and operation. A configuration program uses menus to prompt the user for various options available using default values for the most common configurations.

CUSTOMER RESPONSIBILITIES

Customers are responsible for producing backup copies of the original diskette, when copying is permitted, according to the terms and conditions of the IBM Program License Agreement, and acquiring the necessary communications modem, cables, subscriptions, and passwords.

BRANCH OFFICE RESPONSIBILITIES (None)

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

- An IBM 5160 Personal Computer XT or an IBM 5150 Personal Computer with at least 128KB of memory and one diskette drive
- One of the following 80-column display options:
 - IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
 - IBM Color Display and the Color/Graphics Monitor Adapter
 - An 80-column black/white or 80-column color monitor with the IBM Color/Graphics Monitor Adapter
- BSC Communications Adapter (1502075)
- Communications Adapter Cable (1502067)
- Synchronous Communications modem with clocking up to 9600 bps on a switched or leased line
- Host Computer system with compatible IBM 3270 Display System support
- IBM 5152 model 2 Graphics Printer

SOFTWARE REQUIREMENTS

IBM Personal Computer Disk Operating System (DOS) Version 1 or subsequent versions and releases ... when used with the IBM Personal Computer Disk Operating System Version 2.0, the Binary Synchronous 3270 Emulation Program may reside on a fixed disk drive and it may access files on disk.

DATA SECURITY

The customer is responsible for the protection of data from unintended modification, destruction, or disclosure and for the accuracy and integrity of the results.

PACKAGING

Personal Computer Binary Synchronous 3270 Emulation User's Guide (packaged with the diskette) ... this program is resident on a single diskette ... The user's guide is packaged with the diskette.

**IBM PERSONAL COMPUTER PEACHTREE BY
PEACHTREE SOFTWARE INCORPORATED
6024039****PURPOSE**

PeachText is a powerful word processor that can be learned quickly. Like other word processors, PeachText has the basic ability to prepare, revise and type a document. But PeachText can be used for much more than basic word processing. Through the use of logical commands (such as IF/THEN) and data that can change throughout documents (variables), PeachText can make decisions and pull information into appropriate places.

HIGHLIGHTS

- 80-column display of upper and lower case characters
- Full-screen editor
- Use of full function keyboard
- Online help text
- Ability to display and/or merge part of a second document while editing another
- Pauses can be built into a document to allow keyboard entry of variables while printing
- Use of conditional commands to retrieve and print data from a data file
- Display of document on screen allows user to view the print format of the document prior to printing
- Allows proportional printing on some specialty printers
- Global and selective search and replace
- PeachText creates DOS-ASCII files
- Automatically configured for the IBM Graphics Printer
- Word wrap-around and automatic carriage returns
- Special program utility mode for programmers
- Block operations
- Ability to use files larger than available memory work space by paging from diskette

DESCRIPTION

The PeachText program may be learned through a series of lessons in a tutorial format. This tutorial is friendly and easy to use and takes the beginner through the basic features of the program as well as the more advanced features. Error messages are clear and informative and provide the user with suggestions concerning the options which are available. The help screen provides information about function key usage and cursor movement activities, edit and print commands. The Edit Status Screen and Print Status Screen display information about the current activity, plus command options. The PeachText program operates in two modes, edit and print. Each mode has a command screen, from which the user can enter commands to manipulate text and/or format text. The user also has the option to enter imbedded commands which will be interpreted by the formatter at print time. The text can be printed to the display screen allowing the user to view the final format prior to printing.

CUSTOMER RESPONSIBILITIES

To successfully install and use the program, the customer should read the *User's Reference Manual* to understand the operation of the system, and perform the following tasks:

- Making a backup copy of the program diskette
- Completing the "Getting Started" chapter of the *User's Reference Manual*
- Performing backup and recovery procedures

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

- An IBM 5160 Personal Computer XT or an IBM 5150 Personal Computer with a minimum of 64KB of memory and one diskette drive.
- One of the following 80-column display options:
 - An IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
 - An IBM Color Display with both the Color/Graphics Monitor Adapter and the Printer Adapter
 - A direct-drive 80-column black and white or 80-column color monitor with both the Color/Graphics Monitor Adapter and the Printer Adapter
- An IBM 5152 model 2 Graphics Printer

SOFTWARE REQUIREMENTS

IBM Personal Computer Disk Operating System (DOS) Version 1.1 or subsequent versions and releases. With IBM Personal Computer Disk Operating System Version 2.0, PeachText may reside on a fixed disk drive and may access fixed disk files.

PACKAGING

PeachText is distributed with the following:

User's Reference Manual ... one program diskette ... one demonstration diskette ... function key template ... Reference Card.



PROGRAM PRODUCTS

**IBM 3101 EMULATION PROGRAM
6024042****PURPOSE**

The IBM 3101 Emulation Program allows the Personal Computer to connect to another computer system as if it were an IBM 3101 Display terminal. This allows the user to access a host system for interactive applications residing there as well as the normal stand-alone processing which is available when the IBM 3101 Emulation Program is not executing.

** The Source is a service mark of Source Telecomputing Corporation, a subsidiary of The Reader's Digest Association, Inc.

HIGHLIGHTS

The 3101 Emulation Program emulates the IBM 3101 model 20, with some differences. Users may specify line characteristics and keyboard mapping. Sample specification files are provided for:

- VM/370, MVS/TSO
- IBM 7426 Terminal Interface Unit (TIU) for IBM 8100
- Yale IUP for Series/1
- 3101 Pass-through (PVM)
- Dow Jones News Service*
- The Source**
- Communications with another IBM Personal Computer

DESCRIPTION

The IBM 3101 Emulation Program, provides four main functions:

- Emulates the IBM 3101 Display Terminal according to user-selected options contained in specification files
- Provides several specification files as examples of popular 3101 configurations
- Transmits ASCII format files to and from host computer and local storage diskettes
- Converts ASCII format diskette files to and from binary format

The customer must perform an initial setup procedure to format blank diskette(s) and copy portions of DOS onto the diskette(s). A specification file must be created for unique requirements; or, one of the sample files can be used. A DOS batch file can be prepared to automatically "boot" the emulation program at power-on time.

CUSTOMER RESPONSIBILITIES

Customers are responsible for producing backup copies of the original diskette, when copying is permitted, according to the terms and conditions of the IBM Program License Agreement, and acquiring the necessary communications modems, cables, subscriptions, and passwords.

BRANCH OFFICE RESPONSIBILITIES (None)**SPECIFIED OPERATING ENVIRONMENT****HARDWARE REQUIREMENTS**

- An IBM 5160 Personal Computer XT, or an IBM 5150 Personal Computer with at least 64KB of memory and one diskette drive
- One of the following 80-column display options:
 - IBM 5151 Monochrome Display and the IBM Monochrome Display and Printer Adapter
 - IBM Color Display and the Color/Graphics Monitor Adapter
 - An 80-column black/white or 80-column color monitor with the IBM Color/Graphics Monitor Adapter
- Asynchronous Communications Adapter
- User-provided, full-duplex modem or direct cable connection to a local host computer
- User-provided EIA RS232-C cable for adapter to modem connection

SOFTWARE REQUIREMENTS

IBM Personal Computer Disk Operating System (DOS) Version 1 or subsequent versions or releases is required. When used with the IBM Personal Computer Disk Operating System Version 2.0, the IBM 3101 Emulation Program may reside on a fixed disk drive, and may access files on the fixed disk.

COMPATIBILITY

Some IBM 3101 functions not supported are:

- Transparent mode
 - Half-duplex modems
 - Reverse channel and controlled request-to-send
 - Non-EIA RS232-C interfaces
 - Reverse video
 - Non-blinking cursor
 - Highlighting via color/graphics monitor adapter
 - Program mode and ATTR keys
 - Local mode
 - Print line function
 - Print and send message functions, and send mark function
 - Foreign language features
- * Dow Jones is a Trademark of Dow Jones and Company, Inc.

**IBM PERSONAL COMPUTER
DISK OPERATING SYSTEM (DOS) Version 2.0
BASIC LANGUAGE EXTENSIONS Version 2.0
6024061**

DOS VERSION 2.0

PURPOSE

The IBM Personal Computer Disk Operating System (DOS) provides the required support between the IBM Personal Computer hardware and an application program. It supports one or more 5-1/4-inch diskette drives, single- or dual-sided, and one or two fixed disks. In addition, DOS provides a user with the ability to display a diskette directory, and rename, erase, display, compare, or copy files. DOS also permits "chaining" a series of programs in a predefined "job stream". Either a job stream or a single program may be designated for automatic execution when the system is first turned on.

HIGHLIGHTS

- Supports diskette drives and fixed disk. Formatted capacity increased to 180KB for single-sided; 360KB for dual-sided diskettes
- Fixed disk initialization program for fixed disk support
- DOS can be started from diskette or fixed disk
- File space allocated dynamically as data is added
- Backup, restore commands to support fixed disk
- Tree-structured directories
- Command to display the directory structure
- Commands to create and remove subdirectories
- Sequential and direct access of data files
- File recovery utility
- Current date and time used in directory entries
- Supports "job stream" sequence of programs as batch files. Conditional (IF-THEN-ELSE) logic supported
- Automatic execution of program or job stream following power-on
- Graphics screen dump to printer
- Global filename characters for filename searches
- Multiple disk I/O memory buffers for improved performance
- Accepts commands entered in upper or lower case
- Line editor, debug, disk format, disk check, diskette copy, diskette compare programs
- Linker for language compilers
- User-installable device drivers may be added for new hardware support
- Optional verify after write
- Extended screen and keyboard controls
- Redirected I/O (example: Keyboard input and direct output to a file)
- Piping: Output from program "A" used as input to program "B"
- Divert parallel printer output to Asynchronous Communications Adapter (example: attach a serial printer)
- Background file print utility permits simultaneous file printing with other activity
- Extended device error trapping

DESCRIPTION

DOS provides an input-output interface for programs written for the BASIC interpreter or any high-level compiler language supported by DOS on the IBM Personal Computer. DOS provides line editor and debug utility programs to aid in program development. A linker program is provided to convert language compiler relocatable modules to executable load modules. DOS Version 2.0 offers function not available in previous versions (1.0 and 1.1) with a higher user memory requirement (DOS 2.0 is approximately 12KB larger than DOS 1.1). Where standard (documented) programming protocols have been observed, most DOS 1.0 and 1.1 programs should run under Version 2.0 without change. Examples of non-standard protocols are access of absolute memory locations where DOS resides and direct calls to the BIOS. Since DOS 2.0 uses more memory, some programs may no longer be able to fit in the same size machines. The program will still require the same amount of user memory - but with DOS 2.0 taking more memory, the amount remaining for the program will be less. In these cases, a program may have to be divided into smaller segments, or more memory may have to be added to the system. The IBM Personal Computer DOS resides on the DOS diskette. A second diskette contains the linker and the sample programs. If the DOS diskette is present in diskette drive "A:", or if DOS is resident on the fixed disk, when the system is started or restarted, DOS will automatically be loaded into random access memory. DOS can also be copied to any formatted diskette to provide the same function. If automatic program execution is not used each time DOS is initialized, DOS will ask the user for the current date and time. This information will be used to identify the most recent update to a file. If the AUTOEXEC option is used and "unattended" operation is desired, date and time prompting can be bypassed. DOS Version 2.0 uses approximately 24KB of random access storage. This is an increase over DOS Versions 1.0 and 1.1. On some systems, this means that additional memory may be required to permit an application program to be loaded and run. In general, 64KB is a minimum memory requirement for DOS 2.0 systems. The recommended memory for a system with a fixed disk is 128KB or more. Note: Prior to running a BASIC language program performing diskette I/O, one of the two language extensions, Disk BASIC or

Advanced BASIC, must be loaded into memory. See the section on IBM Personal Computer BASIC Language Extensions for additional information about memory requirements.

DOS Version 2.0 Functions

Note: (N) = new DOS 2.0 Function

DOS Command or Utility	Function
ASSIGN	Substitute diskette drive assignments (N)
BACKUP	Backup fixed disk files to diskette (N)
BAT	Batch file support
BREAK	Check for Ctrl/Break Interrupt (N)
CHDIR	Change directory (N)
CHKDSK	Check diskette or fixed disk
CLS	Clear screen (N)
COMP	Compare files
CONFIG.SYS	Configuration File (N)
COPY	Copy files
CTTY	Substitute screen and keyboard (N)
DATE	Set date
DEBUG	Load, alter, display/execute files
DEL,ERASE	Delete files
DIR	List directory
DISKCOMP	Compare diskettes
DISKCOPY	Copy diskette
EDLIN	Line editor
EXE2BIN	Convert .EXE files to .COM format
FDISK	Initialize a fixed disk (N)
FIND	Search for string in file (N)
FORMAT	Format diskette or fixed disk
GRAPHICS	Graphics screen dump (N)
LINK	Link-edit a compiled program
MKDIR	Create a sub-directory (N)
MODE	Set display or printer options
MORE	Pause after displaying screenful (N)
PATH	Specify directory paths (N)
PAUSE	Remark within batch file, then wait
PRINT	Print files in "background" (N)
PROMPT	Change DOS prompt (N)
RECOVER	Recover file (N)
REM	Remark from batch file
RENAME,REN	Rename a file
RESTORE	Restore files from diskette to fixed disk (N)
RMDIR	Remove Directory (N)
SET	Set environment (N)
SORT	Sort data (N)
SYS	Transfer DOS to another diskette or fixed disk
TIME	Set time of day
TREE	Display directory path (N)
TYPE	Display file contents
VER	Display DOS version (N)
VERIFY	Write-verify data to diskette (N)
VOL	Display disk(ette) label (N)

BASIC LANGUAGE EXTENSIONS, VERSION 2.0

PURPOSE

The IBM Personal Computer BASIC Interpreter is structured in three functional levels: ROM Interpreter (Cassette), Disk, and Advanced. The Disk and Advanced BASIC language extensions are both resident on the DOS diskette. Version 2.0 of BASIC will only work with Version 2.0 of DOS.

HIGHLIGHTS

- Superset of function to many microcomputer BASICs
- Disk BASIC is a superset of Cassette-level BASIC, and Advanced BASIC is a superset of both
- Provides new graphics, music, and function key enhancements
- Reduces the need for special machine language subroutines
- Compatible with the IBM Personal Computer BASIC Compiler (6024003)
- Provides high-level communications support
- Advanced graphics supported: Paint, Circle, Get/Put display contents, Store and Draw line segments, line styling, tiling, viewports, windows
- Advanced light-pen and joystick support
- Event trapping of communications, function keys, joystick or light pen, music, and timer activity
- Path name support for tree-structured directories

DESCRIPTION

Disk BASIC and Advanced BASIC extensions are optional, and may be loaded into memory from the DOS diskette or from a fixed disk. Cassette BASIC provides the necessary cassette input/output instructions (the IBM 5160 Personal Computer XT does not support cassette attachment) as well as support for the display, keyboard,

**IBM Personal Computer DOS V2
BASIC Language Extensions V2 (cont'd)**

printer, light-pen, and joysticks. In addition, it provides a full complement of editing, logic, math, and string functions. Cassette BASIC is standard on the IBM 5150 Personal Computer and the IBM 5160 Personal Computer XT in the form of built-in read only memory. The Disk BASIC extensions to the language provide a full set of instructions, commands, and built-in function which support the Disk Operating System and add date, time of day, and communications capabilities. Advanced BASIC extensions include all Disk BASIC functions as well as enhanced display graphics, light-pen, and joystick support. Advanced BASIC includes both the Graphics Macro Language and the Music Macro Language (trademarks of Microsoft, Inc.). In addition, Advanced BASIC supports interrupts from the light-pen, game controllers, function keys, and communications adapters.

BASIC Language Extensions, Version 2.0 Functions

(N) = new function in Version 2.0

Disk Basic	Advanced Basic	Function
CHAIN	CHAIN	Chain to next program
CHDIR	CHDIR	Change Directory (N)
CIRCLE	---	Draw a circle
CLOSE	CLOSE	Close an I/O device
COMMON	COMMON	Pass variables to chained program
COM	COM	Enable communications interrupt
CVI,CVS,	CVI,CVS,	
CVD	CVD	Convert data from disk/diskette file
DATE	DATE	Current date
---	DRAW	Draw a predefined "picture"
EOF	EOF	End of file indicator
FIELD	FIELD	Define disk/diskette file records
FILES	FILES	Display disk/diskette directory
GET	GET	Read a random file record
---	GET	Read graphics image from display
INPUT#	INPUT#	Input from disk or communications
INPUT)	INPUT)	Input from communications
INP	INP	Input byte from external device
KILL	KILL	Delete disk/diskette file
LINE	LINE	Input variable length line from disk/diskette
INPUT#	INPUT#	
LLIST	LLIST	List a program on the printer
LOAD	LOAD	Load a program from disk/diskette
LOC	LOC	Return next disk/diskette file record number
LOF	LOF	Return count of characters in communication channel
LSET	LSET	Move data into random file buffer
MERGE	MERGE	Merge a program from disk/diskette
MKDIR	MKDIR	Make directory (N)
MKI,MKS	MKI,MKS	
MKD	MKD	Convert data to random buffer format
NAME	NAME	Rename a disk/diskette file
---	ONKEY	
---	GOSUB	Branch on function key
---	On COM	
---	GOSUB	Branch on communications interrupt
---	ON PEN,	
---	STRIG GOSUB	Branch on light-pen or joystick
---	ON PLAY	Continuous music during program run (N)
---	ON TIMER	Branch on time interval (N)
OPEN	OPEN	Open an I/O device
---	PAINT	Fill enclosed area with color
---	PEN	Enable light-pen interrupt
---	PLAY	Play predefined music
---	PMAP	Map an expression to relative or actual coordinates (N)
PRINT#	PRINT#	Write to I/O device in print format
PUT	PUT	Write buffer to a random file
---	PUT	Write graphics pattern to display
RMDIR	RMDIR	Remove directory if empty (N)
RUN	RUN	Run a disk/diskette resident program
SAVE	SAVE	Save a program on disk/diskette
---	STICK	Read setting of joystick or enable joystick interrupt
SYSTEM	SYSTEM	Return to operating system environment
TIME)	TIME	Time of day
TIMER	TIMER	Number of seconds since midnight or system reset (N)
VARPTR)	VARPTR)	Memory address of file buffer
---	VIEW	Define display viewports for graphics output (N)
WIDTH#	WIDTH#	Set width of data for device
---	WINDOW	Define logical limits for graphics output (N)
WRITE#	WRITE#	Write to a sequential disk/diskette file

CUSTOMER RESPONSIBILITIES

The customer is responsible for producing a backup copy of the original DOS diskette, and for creating copies of DOS on other diskettes or fixed disk drives as required. All newly purchased diskettes must be initialized using the DOS FORMAT utility. Fixed disks must be initialized with both the FDISK and FORMAT utilities.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

The IBM Personal Computer DOS Version 2.0 requires an IBM 5160 Personal Computer XT or an IBM 5150 Personal Computer with a minimum of 64KB and one diskette drive. A minimum of 128KB is recommended if a fixed disk drive is installed. Some user application programs may require more than the stated minimum amount of memory.

The IBM Personal Computer BASIC version 2.0 requires an IBM 5160 Personal Computer XT or an IBM 5150 Personal Computer with a minimum of 48KB of memory and one diskette drive. For most applications, however, 64KB or 96KB of memory will be required. Since BASIC does not address more than a 64KB workspace, more than 96KB of user memory is normally not used.

SOFTWARE REQUIREMENTS

The IBM Personal Computer Disk Operating System (DOS) Version 2.0 is a prerequisite to the use of the IBM Personal Computer BASIC language extensions, version 2.0.

PACKAGING

The IBM Personal Computer Disk Operating System Version 2.0 is resident on two diskettes. One diskette contains DOS and the BASIC language extensions. The second diskette contains the Linker program and sample programs.

SYSTEM CONTROL PROGRAMMING

**DISK ORIENTED SYSTEM/3 MODEL 10/MODEL 8
5702-SC1**

PURPOSE

IBM System/3 Disk System Management Programs: The disk system management programs are designed to generate and maintain a disk resident system which facilitates the compilation, generation, and execution of programs. The disk resident system must reside on an IBM 5444 Disk Storage Drive.

HIGHLIGHTS

The management programs consist of a supervisor and a scheduler which provide the user with the advantages of:

- Reduced card handling.
- Automatic job-to-job transition.
- Selective retrieval of programs stored in object libraries on disk.
- Selective retrieval of programs and procedures stored in source libraries on disk.
- Functional ability of expanded core storage (program overlay).
- Support of ROLL IN/ROLL OUT capability - The ability to roll out a program during its execution, bring in an inquiry program to be executed and upon its completion, restart the original program. To use ROLL IN/ROLL OUT, a 5471 Printer-KeyBoard is required.
- Support of Dual Programming feature - Through the use of operations control and dual program loading features, an expanded version of the supervisor controls program initiation, execution, and termination asynchronously in each of two partitions. Neither the printer, 3881, MFCU and/or 1442 can be used by both program levels. Disk Data files may be shared, but only one program level may write to a shared file. The 5471 Printer-KeyBoard may be used by both program levels for either object program input/output or operations control information. Three programs which will not run in the Dual Program mode but can run in a dedicated mode with the Dual Program Supervisor are the Basic Assembler program (5702-AS1), the Utility program for the 1255 Magnetic Character Reader (5702-UT2), and the Library Maintenance program (5702-SC1).
- Data Management and I/O support for the control of Input/Output Services.
- Execution of programs from cataloged procedures - Operation Control Language Procedures can be cataloged in the Source Program Library and called by the scheduler at job execution time.

DESCRIPTION

Library Maintenance Program: Allows the user to produce, maintain, and service the system disk and the source and object program libraries. The libraries may reside on any 5444 Disk Storage Drive. The system residence must be on either the fixed or removable disk of Drive 1. The principle functions of the program are to add or delete the source programs, procedures, and object programs in the user's program libraries, to allocate or re-allocate disk space to the libraries, to display library contents, and to copy any or all of a library from one disk to another.

Disk Utility Programs: These programs are provided to allow the user to prepare and maintain his disks. They are:

- Disk Initialization - Performs surface analysis on the user's disk and formats the disk according to disk system management requirements.
- Alternate Track Assignment - Allows the user to assign an alternate track in place of a defective one and print the data content of the area in error.
- Alternate Track Rebuild - Permits the user to correct data on the assigned alternate track.
- File and Volume Display - Permits the user to display the entire contents of the volume table of contents on any disk or individually by file name.
- File Delete - Is one means for deleting temporary data files from a disk and the only means for the user to delete permanent data files from a disk.

Copy/Dump Program: This program supports both file-to-file copies (COPY) and volume-to-volume copies (DUMP).

The file copy routines provide the user with an easy to use method of creating a file backup on another disk, diskette, cards, tape, or printer. Additionally, it provides an easy method of moving files from one location to another, with both file limit modification and reorganization. The program supports one input and one output per execution. Disk input can be a sequential, indexed, or direct file.

A sequential file can be copied to an indexed file, and tape, card, and diskette files are supported for input and output. When copying a file, the printer may be specified in addition to other output. Records may be deleted from a file by specifying a deletion code and position within each record; these deleted records may be printed.

The volume copy function of the Copy/Dump Program copies an entire disk volume to another disk volume for backup.

The Copy/Dump Program allows for intermediate mountings of the output disk so that files and entire disk volumes may be copied on a one drive system. Intermediate mounting is only permitted for the 5444 Disk Storage Drive.

1255 and 1419 Data Management: SCP subroutines are supplied to perform device control and data management services for the 1255 and 1419 Magnetic Character Readers. The 1255 subroutine (SUBR08) and the 1419 subroutine (SUBR09) are used with a user-written RPG II or Assembler program, and are functionally equivalent to the mdls 12 and 15 1255 (SUBR08) and 1419 (SUBR09) SCP support.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirement: The Disk System Control Programming operates on an IBM System/3 mdl 10 which includes as a minimum an IBM 5410 Processing Unit mdl A13 (12K bytes), an IBM 5424 MFCU mdl A1 or an IBM 1442 Card Read Punch mdl 6, an IBM 5203 Printer or 1403 Printer and an IBM 5444 Disk Storage Drive mdl 1.

A minimum System/3 mdl 8 includes an IBM 5408 Processing Unit mdl A14 (16K bytes), an IBM 5203 Printer, an IBM 5444 Disk Storage Drive mdl A1, and either an IBM 3741 Data Station directly attached or an IBM 5471 Printer-KeyBoard.

Additional main storage and disk capacity will be utilized if available. The following configurations require at least 16K bytes of main storage:

- Dual Programming and IBM 5445/5448 Disk Storage Drive
- Dual Programming and IBM 3410/3411 Magnetic Tape Subsystem

Certain other configurations may require a minimum system of more than 12K: (1) when the supervisor requirement is greater than 4K (see "Supervisor Sizes" at the end of the SCP writeup for mdl 10); or (2) when program products require it.

SOFTWARE REQUIREMENTS (None)

DOCUMENTATION

(available from Mechanicsburg)

System/3 Model 8 Introduction (GC21-5114) ... System/3 Disk System Introduction (GC21-7510) ... System/3 Models 8 and 10 System Control Programming Reference Manual (GC21-7512) ... System/3 Model 8 Operator's Guide (GC21-7634) ... System/3 Model 10 Disk System Operator's Guide (GC21-7508) ... System/3 Models 8 and 10 Halt Guide (GC21-7540) ... System/3 Models 4, 6, 8, 10, and 12 System Generation Reference Manual (GC21-5126) ... System/3 Disk Concepts and Planning Guide, (GC21-7571) ... System/3 Models 12 and 15 1255 and 1419 Magnetic Character Readers Reference and Program Logic Manual (GC21-5132) ... System/3 Bibliography (GC20-8080).

REMOTE JOB ENTRY STATION

(Feature #6004-#6006)

PURPOSE

The Disk version of the RJE Program provides the user with the same functional capabilities as the card version. Additional function to support the 5444 Disk Storage Drive as an RJE I/O device is included. The RJE support requires a logging device. Therefore, if the dual program feature is to be used and the non-RJE program requires use of the printer, an IBM 5471 printer-keyboard is required. This program is loaded and executed under control of Disk System Management programs.

PERFORMANCE

The RJE Work Station support requires a partition size of approximately 5,120 bytes of main storage.

DOCUMENTATION

(available from Mechanicsburg)

Remote Job Entry Workstation Reference Manual (GC21-7531) ... System/3 Bibliography (GC20-8080).

**MACROS FEATURE
(Feature #6020-#6021)**

PURPOSE

This feature is applicable to System/3 model 8. The feature makes available to the user data management and input/output support for the control of input/output services through assembler languages. The I/O services are available to users of assembler languages through the system generation link processor (macro processor) in conjunction with the disk system input/output service macros. The keyword macro statements coded by the user are expanded by the macro process or using the macro prototype definitions. The expanded code is in a form that can be processed by an assembler. The macro processor is included in the user's system at the user's option.

Disk-oriented System/3 mdl 10/mdl 8 (cont'd)

The Macros feature (#6020-#6021) is made available to support the user who has requirements that are unsupported in other programming support and it is recommended that it be used only in that environment.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: Same as for 5702-SC1.

SOFTWARE REQUIREMENTS: 5702-SC1.

DOCUMENTATION

(available from Mechanicsburg)

System/3 Models 8, 10, and 12 System Control Programming Macros Reference Manual (GC21-7562) ... System/3 Bibliography (GC20-8080).

**5445 DISK STORAGE DRIVE FEATURE
(Feature #6022-#6023)**

PURPOSE

This feature is not applicable to System/3 model 8. The IBM 5445 Disk Storage Drive Feature provides support of the 5445 Disk Storage Drive as an input/output and data storage device. The 5445 Disk Storage Drive is not supported for either system or library residence.

DESCRIPTION

In addition to the disk system management functions, the following facilities are provided:

Disk Utility Programs: The Disk Utility Programs which are provided for the disk user to prepare and maintain his 5445 disks will include:

- Disk Initialization Utility
- Alternate Track Assignment Utility
- Alternate Track Rebuild
- Volume and File Display
- File Delete

Copy/Dump Program: This program provides the user with an easy-to-use method of copying a file or a complete disk backup on another disk. All features of the Copy/Dump Program for the 5445 are provided for the 5444 user with the exception that no intermediate mountings of the output pack on the 5445 are allowed for the COPYPACK function.

5445 Data Interchange Utility Program: This program is used prior to taking a 2316 Disk Pack from System/3 to System/360 or System/370 for processing, or prior to using the disk pack on System/3 after returning from System/360 or System/370. To use a 2316 Disk Pack in an interchange environment, it must have been initialized on System/3, and the interchange files must have been allocated on System/3. System/360 or System/370 OS or DOS may read, update, or in OS only, OUTPUT to these files, but may not create or extend them since OS and DOS do not create or update the System/3 Volume Table of Contents (VTOC).

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirement: In addition to the requirement of 5702-SC1, this feature requires an IBM 5445 Disk Storage Drive.

SOFTWARE REQUIREMENTS: 5702-SC1.

**MAGNETIC TAPE SUPPORT FEATURE
(Feature #6024-#6025)**

PURPOSE

This feature is applicable to System/3 model 8. The Disk SCP Magnetic Tape Support feature provides support for magnetic tape as a data storage device on System/3 model 10. The features provided are:

- Fixed and variable length records
- Blocked and unblocked records
- Physical block size from 18 bytes to 32K bytes
- Multi-volume files
- Support for unlabelled or labelled (ANSI or IBM Standard labels) tapes
- ASCII and EBCDIC data support
- Tape Error Statistics

DESCRIPTION

Tape Initialization Program: Allows the magnetic tape users to create and delete standard tape volume labels, check for unexpired labels and to display existing volume and data file labels.

Tape Error Summary Program: Prints tape error statistics that have been accumulated during processing.

Dump/Restore Program: Provides capability for model 10 tape-disk configurations to obtain backup of disk packs. It copies an entire 5444 or 5445 or 5448 disk volume to tape and restores a disk from a tape previously created by this program. Some of the options supported are

7- or 9-track, EBCDIC only, one pack per tape reel but multiple reel files are supported, and requires only minimum main storage.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: In addition to the requirements of 5702-SC1, this feature requires the IBM 3410/3411 Magnetic Tape Subsystem. All available features of these tape drives are supported by this feature.

SOFTWARE REQUIREMENTS: 5702-SC1.

DOCUMENTATION

(available from Mechanicsburg)

IBM System/3 Magnetic Tape Program Planning Manual (GC21-5040) ... System/3 Bibliography (GC20-8080).

**OVERLAY LINKAGE EDITOR AND CHECKPOINT/RESTART FEATURE
(Feature #6026-6027)**

PURPOSE

This feature is applicable to System/3 model 8. The Overlay Linkage Editor facility creates loadable programs from multiple relocatable modules. Output from the Overlay Linkage Editor may be cataloged in the Object Library and/or punched into cards. Overlay structures may be created automatically or as designated by the user from relocatable program modules.

The Checkpoint facility provides the user with the ability to write checkpoint records when using problem programs that have Checkpoint/Restart capabilities. Restart provides the facility to resume the execution of programs from the last checkpoint rather than from the beginning, if processing is terminated via a machine failure or an operator-initiated immediate cancel.

This feature is a prerequisite for the Basic Assembler program (5702-AS1), Subset ANS COBOL (5702-CB1), and Disk FORTRAN (5702-F01).

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: Same as for 5702-SC1.

SOFTWARE REQUIREMENTS: 5702-SC1.

DOCUMENTATION

(available from Mechanicsburg)

Overlay Linkage Editor Reference Manual (GC21-7561) ... System/3 Bibliography (GC20-8080).

**BSCA MULTILINE/MULTIPOINT FEATURE
(Feature #6030 or #6031)**

PURPOSE

The BSCA Multiline/Multi-point feature provides communications support when used in conjunction with the System/3 Macros feature #6020 or #6021. Configurations supported are point-to-point nonswitched, point-to-point switched and multipoint leased line with the System/3 as a multi-dropped terminal or control station. Also provided is the capability to operate two BSCA lines simultaneously on one System/3. The two BSCAs may have different configurations.

For a list of supported BSC devices and of the communications modes in which each device is supported (e.g., point-to-point, multipoint, etc.), see page M5408 or M5410. Support for the 3270 terminals via the Local Display Adapter (model 8 only) is also included.

Program counters will be maintained on the disk file to accumulate performance information per BSC line. Counters will be logged to the file at close time. A utility program will be provided to display the counters.

The BSCA IOS routines depend on the model 10 Disk System Control Programming (5702-SC1) for systems functions. Additional storage is required in the supervisor for support of BSCA. RPG II Telecommunications feature (5702-RG1) must not be used in the same RPG II generated program to which subroutines using the Multiline/Multi-point feature are linked.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: The BSCA Multiline/Multi-point Feature requires for source program compilation the same minimum system as the IBM Disk model 10 System Control Programming (5702-SC1). For execution of an object program on the IBM 5410 Processing Unit using BSCA (#2074 or #2084) to control communication with multidropped terminals on a multipoint line, a minimum of 16K bytes of storage and a log device are required.

SYSTEM CONTROL PROGRAMMING

Disk-oriented System/3 mdl 10/mdl 8 (cont'd)

For execution of an object program on an IBM 5408 Processing Unit using either the ICA (#4645 with #6202 or #4801 or #4802) or the BSCA (#2074) to control communications with multi-dropped terminals on a multipoint line, a minimum model 8 System and a log device are required.

SOFTWARE REQUIREMENTS

5702-SC1, 5702-SC1 feature #6020/#6021; 5702-AS1 or its equivalent.

DOCUMENTATION
(available from Mechanicsburg)

System/3 Multiline/Multipoint Binary Synchronous Communications Reference Manual (GC21-7573) ... System/3 Bibliography (GC20-8080)

COMMUNICATIONS CONTROL PROGRAM
(Feature #6033)

PURPOSE

The Communications Control Program (CCP) feature provides control program services needed for telecommunications systems. The services are:

- High Level language (RPG II, COBOL, FORTRAN) access to MLTA, BSCA (including the Integrated Communications Adapter) and Local Display Adapter attached terminals.
- Program Fetch as a result of terminal operator request.
- Resource Management to reduce contention between programs accessing the same files, provide access to terminals and manage storage available for application programs.
- Concurrent program execution allowing multiple application programs within the available storage.
- Terminal Monitoring to accept data and terminal commands.
- Display Format Facility (DFF) which permits the support of 3270 systems with a minimum of coding in high level languages.

DESCRIPTION

Terminals and Features Supported: The following terminals may be used with the Communications Control Program:

- **Through the Multiple Line Terminal Adapter (MLTA) (model 10 only):**
 - 1050 Data Communication System
Multipoint switched
Multipoint nonswitched
 - 2740 Communication Terminal model 1
Basic
Checking
Dial
Dial with checking
Dial with transmit control
Dial with transmit control and checking
Station control
Station control with checking
 - 2740 Communication Terminal model 2
Station control
Station control with checking
Station control with buffer receive
Station control with buffer receive and checking
 - 2741 Communication Terminal
Basic
Switched
 - 3767 Communications Terminal
Treated as a 2740 Communication Terminal (model 1 or 2) or as a 2741 Communication Terminal
 - Communicating Magnetic Card SELECTRIC® Typewriter (appears identical to a 2741)
Point-to-point switched
 - System/7 (appears identical to a 2740 model 1)
Checking
Dial with checking
Station control with checking
 - 5100 Portable Computer (appears identical to a 2741)

• **With the Binary Synchronous Communications Adapter (BSCA):**

- 3270 Information Display System
Point-to-point nonswitched
Multipoint nonswitched
Point-to-point switched (3275 only)
 - 3735 Programmable Terminal
Switched
Multipoint nonswitched
 - 3741 Data Station model 2 and 3741 Programmable Workstation model 4
Point-to-point (switched and nonswitched)
Multipoint tributary
 - 5110 Computer (as a data mode CPU)
Point-to-point (switched and nonswitched)
Multipoint tributary
 - 5231 model 2 (appears as a 3741-2 or 4)
Point-to-point (switched and nonswitched)
Multipoint tributary
 - 5280 Distributed Data System
Point-to-point (switched and nonswitched)
Multipoint tributary
 - Series/1
Switched
Nonswitched point-to-point
 - System/3
Switched
Nonswitched point-to-point
Multipoint control station
Multipoint tributary
 - System/7
Switched
Nonswitched point-to-point
Multipoint (System/3 is control station)
 - System/32
Switched
Nonswitched point-to-point
Multipoint (System/3 is tributary)
 - System/34
Switched
Nonswitched point-to-point
Multipoint (System/3 is control station)
 - System/360, System/370
Switched
Nonswitched point-to-point
Multipoint (System/3 is tributary)
- **With the Local Display Adapter (model 8 only)**
- 3270 terminals only
3277 Display Station (model 1 or 2)
3284 Printers (model 1 or 2)
3286 Printers (model 1 or 2)
3288 Printer (model 2)

In addition to controlling terminals, the System/3 can operate as a tributary terminal (BSCA only) to a host System/360 or System/370. In this configuration, the System/3 is a sub-host controlling terminals, and is itself a terminal to another system.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Hardware Requirements - IBM Model 10: The following is the minimum hardware necessary for a communications-based information system using the Communications Control Program:

- IBM 5410 model A15 Processing Unit (24,576 bytes of main storage)
- IBM 5410 model A16 Processing Unit (32,768 bytes of main storage) if DFF is used to support an IBM 3270 Information Display System
- One IBM 5444 model 2 Disk Storage Drive
- IBM 5471 Printer-Key-board
- IBM 5424 Multi-Function Card Unit (MFCU) or IBM 1442 Card Read/Punch (required during CCP generation, but not required for operation)
- IBM 5203 or 1403 Printer (required during CCP generation, but not required for operation)
- Multiple Line Terminal Adapter RPQ (RPQs S40028 through S40033) or one Binary Synchronous Communications Adapter
- At least one communications terminal of a type listed under "Terminals and Features Supported".

With the above configuration, no more than one application program may be executing at a time. The minimum main storage size in which concurrent execution of more than one program is supported is 32,768

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bytes (IBM 5410 model A16) and is 49,152 bytes (IBM 5410 model A17) if DFF is used to support the IBM 3270 Information Display System.

Additional Hardware Supported - Model 10: The following additional hardware facilities are supported by the Communications Control Program:

- Up to 49,152 bytes of main storage (65,536 bytes by RPQ)
- IBM 5444 Disk Storage Drive model 2, 3, A01, A02, A03
- One or two IBM 5445 Disk Storage Drives (for data files only)
- IBM 5448 Disk Storage Drive model A1 (for data files only)
- Both 5424 MFCU and 1442 Card Read/Punch (by RPQ)
- One directly attached 3741 Data Station/Programmable Workstation
- Two Binary Synchronous Communications Adapters and one Multiple-Line Terminal Adapter with up to eight lines
- Dual Program Feature (see Note)

Note: The Communications Control Program does not require the dual program feature to allow more than one program to be executed at a time. Use of the dual program feature is not prohibited during execution of the CCP, but any program executed in the other program level does not run under control of the CCP. The Communications Control Program cannot be run in both program levels concurrently.

Hardware Requirements - Model 8: The following is the minimum hardware necessary for a Model 8 CCP System.

- IBM 5408 model A16 (32K bytes)
- One IBM 5444 model A2 Disk Storage System
- IBM 5203 Printer (required during CCP generation, but not required for operation)
- IBM 5471 Printer-Keyboard
- Integrated Communications Adapter (#4645) and local/remote interface, or the Local Display Adapter
- At least one Communications terminal of a type listed under Terminals and Features Supported
- The minimum main storage size in which concurrent execution of more than one program is supported is 48K (IBM 5408 model A17) if DFF is used to support the IBM 3270 Information Display System.

Additional Hardware Supported - Model 8: The following additional facilities are supported by CCP on a model 8.

- Up to 64K bytes of Main Storage
- IBM 5444 Disk Storage Drive model A3 or a second model A2
- IBM 5448 Disk Storage Drive model A1 (for data files only)
- One Binary Synchronous Communications Adapter
- Dual Program feature (see note above under "Additional Hardware Supported - Model 10")
- One directly-attached IBM 3741 Data Station/Programmable Workstation

Note: MLTA and MLTA IOCS are not available for the model 8. Local Display Adapter is not available for the model 10.

SOFTWARE REQUIREMENTS

Execution of the Communications Control Program requires Disk System Management, including all modules for the appropriate IOCS.

A generation of the Communications Control Program requires Disk System Management, including:

- Macros feature (5702-SC1, feature #6020/#6021)
- Overlay Linkage Editor and Checkpoint/Restart feature (5702-SC1, feature #6026/#6027)
- The appropriate communications IOCS (program number 5799-WAU for MLTA and/or program number 5702-SC1, feature #6030/#6031, for the BSCA ML/MP feature)

No special programming systems requirements exist for the running of system assignments.

For the preparation of application programs, an applicable compiler or assembler is required.

Program Prerequisites: 5702-SC1; 5702-SC1, feature #6020/#6021; 5702-SC1, feature #6026/#6027; 5799-WAU and/or 5702-SC1, feature #6030/#6031.

DOCUMENTATION
(available from Mechanicsburg)

System/3 CCP Programmer's Reference Manual (GC21-7579) ... System/3 CCP Terminal Operator's Guide (GC21-7580) ... System/3 Models 8, 10, and 12 CCP System Operator's Guide (GC21-7581) ... System/3 Models 8, 10, and 12 CCP System Reference (GC21-7588) ... System/3 CCP Messages Manual GC21-5170 ... System/3 CCP General Information Manual (GC21-7578) ... System/3 Bibliography (GC21-8080).

3881 OPTICAL MARK READER FEATURE
(Feature #6034-#6035)

PURPOSE

Provides the user with system subroutines for data management and input control of the optical mark reader attached to System/3 model 10. These subroutines are used with the SPECIAL exit function of RPG II or with the Basic Assembler program.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: In addition to the requirements for 5702-SC1, this feature requires an IBM 3881 Optical Mark Reader. This feature operates on a minimum IBM System/3 model 10 Disk System with 12K bytes of main storage and with the SIOC Feature. This feature is applicable to IBM System/3 model 8 and requires a minimum system and the SIOC.

SOFTWARE REQUIREMENTS

5702-SC1; 5702-RG1 or 5702-AS1.

DOCUMENTATION
(available from Mechanicsburg)

3881 Optical Mark Reader Model 1 Program Reference and Logic Manual (GC21-5103) ... System/3 Bibliography (GC20-8080).

MULTI-LEAVING REMOTE JOB ENTRY WORKSTATION PROGRAM
(Feature #6036-#6037)

PURPOSE

Permits a System/3 Disk System equipped with a Binary Synchronous Communications Adapter with EBCDIC (Text Transparency optional) to function as a Multi-leaving Remote Job Entry Workstation communicating over a point-to-point (switched or nonswitched) line to a System/370 operating under control of one of the following:

- HASP II (Version 3.1 or 4.0)
- ASP (Version 2.6 or 3.0)
- Remote Entry Services (RES) of JES under OS/VS1 Release 2
- Multi-leaving Workstation facilities of JES2/JES3 under OS/VS2 Release 2
- RSCS of VM/370

DESCRIPTION

Any job which can be entered into the central system from locally-attached similarly-functioned I/O devices can be entered from the System/3 MRJE Workstation. Workstation input may be read from any of the devices indicated below. Operator messages and output data sets may be directed to any of the devices shown below. Output may be returned to the submitting workstation or routed to another workstation or directed to local central system I/O devices. (Not all of these devices are available for System/3-8.)

	Input*	Messages	Output
5424 MFCU	x		x
1442 Card Read Punch	x		x
3741 directly attached	x		x
5471 Printer-Keyboard	x	x	
5203 Printer		x	x
1403 Printer		x	x
5444 Disk Storage Drive	x		x
5445 Disk Storage	x		x
5448 Disk Storage	x		x
3410/3411 Mag. Tape	x		x

* Input may be from a combination of these devices.

All disk files created by the workstation program are standard System/3 consecutive files and may be accessed by any of the following programs: MRJE/WS

Print Utility, SCP Copy/Dump program, or user-written RPG II, COBOL, FORTRAN, or Assembler programs.

When using the Workstation program, the following restrictions apply:

- Column binary is not supported.
- Reading and punching OS object decks requires the BSCA Text Transparency feature and a 1442 Card Read Punch.
- For unit record devices (including the 3741), input record lengths can be 80 or 96 bytes; however, only the first 80 bytes of the input records will be processed by the Workstation program.
- Files processed with the READFILE command can contain records of other than 80 or 96 bytes. The file will be transmitted to the host central as 80-byte records. (Regrouping the data is the user's responsibility.)
- Print records which exceed the line length of the System/3 Printer will be truncated.

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- The Workstation program requires a logging device.
- The 5471 Printer-Keyboard is required only if MRJE is an 'Inquiry' program.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: In addition to the minimum requirements for 5702-SC1, this feature requires the BSCA (#2074) with EBCDIC. A minimum program level size of 8.5K bytes is required for execution.

This feature is applicable to System/3 model 8 and can use the Integrated Communications Adapter (#4645 & #6202) or BSCA (#2074).

SOFTWARE REQUIREMENTS

5702-SC1; 5702-SC1 feature #6026/#6027.

DOCUMENTATION

(available from Mechanicsburg)

MRJE/WS Support Reference Manual (GC21-7621) ... System/3 Bibliography (GC20-8080).

**IBM 3741 DATA STATION FEATURE
(Feature #6066-#6067)**

PURPOSE

This feature provides support for the 3741 Data Station (model 1 or 2) and Programmable Workstation (model 3 or 4) as an input/output device directly attached to a System/3. For 3741 models 3 and 4, System/3 does not support the Application Control Language (ACL).

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS>

Minimum System Requirements: In addition to the requirement for 5702-SC1, this feature requires a 3741 directly attached.

SOFTWARE REQUIREMENTS: 5702-SC1.

DOCUMENTATION

(available from Mechanicsburg)

System/3 3741 Reference Manual (GC21-5113) ... System/3 Bibliography (GC20-8080).

**5448 DISK STORAGE DRIVE FEATURE
(Feature #6074)**

PURPOSE

The 5448 Disk Storage Drive on the System/3 models 8 and 10 is supported by the SCP as an input/output and data storage device. The 5448 is not supported for either system or library residence. Except for split cylinder files and offline multivolume files, the 5448 file organizations (sequential, indexed, and direct) and access methods are the same as for the 5445.

Note: To access files on the 5448, the RPG II compiler requires the Disk RPG II 5445 Disk Storage Drive feature (5702-RG1, feature #6014), and the Disk Sort program requires the Disk Sort 5445 Disk Storage feature (5702-SM1, feature #6010).

Disk Utility Programs: The Disk Utility Programs used to prepare and maintain the 5448 include the following:

	DESCRIPTION
\$INIT	Disk Initialization
\$ALT	Alternate Track Assignment
\$BUILD	Alternate Track Rebuild
\$LABEL	File and Volume Label Display
\$DELETE	File Delete Program
\$COPY	Copy/Dump Program
\$DCOPY	Dump/Restore Program
\$PCOPY	Disk Pack Backup/Restore Program

Copy/Dump Programs: By using unit codes D1 and D2, \$COPY can be used to copy files or entire volumes. For the COPYFILE function, all the features for 5444 and 5445 copies are supported. Using the COPY-PACK function, a volume can be copied as follows: 5444 to 5444 ... 5448 to 5448.

Dump/Restore Program: By using the unit code D1 or D2, the \$DCOPY program can be used to dump a 5448 volume to magnetic tape for backup, or to restore a 5448 volume from a tape created by this program. It is not possible to restore a 5444 or 5445 tape to a 5448, nor is it possible to restore a 5448 tape to a 5444 or 5445.

Disk Pack Backup/Restore Program: The Disk Pack Backup/Restore Program (\$PCOPY) provides a method to backup a 5448 volume (D1 or D2) onto two 5440 disk cartridges and to restore a 5448 volume from two 5440 disk cartridges created by this program. When the 5440 disk cartridges contain a 5448 backup, they are protected and may only be accessed by \$PCOPY or \$INIT (using TYPE-CLEAR).

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: An IBM System/3 model 8 includes: IBM 5408 Processing Unit model A14 (16K bytes) ... IBM 5444 Disk Storage Drive model A2 ... IBM 5448 Disk Storage Drive model A1 ... plus other devices required for a model 8.

A System/3 model 10 includes: IBM 5410 Processing Unit model A13 (12K bytes) ... IBM 5444 Disk Storage Drive model 2 or A2 ... IBM 5448 Disk Storage Drive model A1 ... plus other devices required for a model 10 Disk System.

SOFTWARE REQUIREMENTS: 5702-SC1.

DOCUMENTATION

(available from Mechanicsburg)

IBM System/3 5448 Disk Storage Drive Program Reference Manual (GC21-5168) ... System/3 Bibliography (GC20-8080).

SYSTEM/3 MODEL 10 DISK AND MODEL 8 SYSTEM SUPERVISOR SIZES

The size of the Disk System supervisor varies depending on the configuration. The following table can be used for planning purposes.

Disk Drives**	Dedicated System		Dual Programming	
	w/ console	w/o console	w/ console	w/o console
R1,F1	3.00K	2.75K	3.75K*	3.50K*
R1,F1,R2	3.25K	3.00K	4.00K	4.00K
R1,F1,R2,F2	3.25K	3.00K	4.00K	4.00K
R1,F1,D1 (5445)	3.75K	3.75K*	4.75K	4.50K
R1,F1,D1,D2 (5445)	4.00K	3.75K	4.75K	4.50K
R1,F1,D1,D2 (5448)	4.75K	4.50K	5.50K	5.50K
R1,F1,R2,F2,D1 (5445)	4.00K	3.75K	4.75K	4.50K
R1,F1,R2,F2,D1,D2 (5445)	4.00K	3.75K	4.75K	4.50K
R1,F1,R2,F2,D1,D2 (5448)	4.75K	4.50K	5.75K	5.50K

****Notes:**

- K = 1024 bytes (decimal)
- R1,F1 = 5444 drive 1
- R2/R2,F2 = 5444 drive 2
- D1 = 5445 drive 1
- D1,D2 = 5448/5445 drive 1 and drive2

For tape support, add 0.50K to the above numbers.

For configurations indicated with an asterisk, add 0.75K instead of 0.50K.

For BSCA support (with LINE 1 and LINE 2, ICA, local display adapter or ML/MP), add 0.25K to the above numbers. ICA and display adapter are supported on the model 8 only. BSCA support is not required if only running MRJE, since MRJE supplies its own BSCA support.

For 3741 directly attached, add 0.75K to the above numbers.

Multiple Program Requests: System/3 Program Products and System Control Programming of program type 5702 which are ordered from PIDfor shipment at the same time may be shipped to the user stacked on a 5440 disk cartridge.

**MODEL 4 and MODEL 6 BASE SCP
5703-SC1**

PURPOSE

These programs perform the system control functions that are basic to a commercially-oriented IBM System/3 model 6 installation, or to an IBM System/3 model 4 installation. They are designed to run on either a model 4 or a model 6, except as noted in the program descriptions.

DESCRIPTION

Disk System Management Programs: The disk system management programs are designed to generate and maintain a disk resident system which facilitates the compilation, generation, and execution of programs.

The management programs consist of a supervisor and a scheduler which provide the user with the advantages of:

- Automatic job-to-job transition.
- Selective retrieval of programs stored in object libraries on disk.
- Selective retrieval of programs and procedures stored in libraries on disk.
- Functional ability of expanded core storage (program overlay).
- Support of ROLL IN/ROLL OUT capability - the ability to roll out a program during its execution, bring in an inquiry program to be executed and upon its completion, restart the original program at point of interruption.
- Data Management and I/O Support for the control of Input/Output Services.
- Execution of programs from cataloged procedures - Operation Control Language Procedures can be cataloged in the Source Program Library and called by the scheduler at job execution time.

Library Maintenance Program: Allows the user to create, maintain, and service the source and object program libraries. The libraries may reside on any drive. The system residence must be on either the fixed or removable disk of Drive 1. The principle functions of the program are to add or delete the source programs, procedures, and object programs in the user's program libraries, to allocate or re-allocate disk space to the libraries, to display library contents, and to copy any or all of the library from one disk to another.

Utility Programs: These programs are provided to allow the user to prepare and maintain his disks.

They are:

- Disk Initialization Utility - Performs surface analysis on the user's disk and formats the disk according to disk system management requirements.
- Alternate Track Assignment Utility - Allows the user to assign an alternate track in place of a defective one and print the data content of the area in error.
- Alternate Track Rebuild - Permits the user to correct data on the assigned alternate track.
- File and Volume Display - Permits the user to display the entire contents of the volume table of contents on any disk or individually by file name.
- File Delete - Is one means for deleting temporary files from a disk and the only means for the user to delete permanent data files from a disk.

Copy/Dump Program: This program supports both file-to-file copies (COPY) and volume-to-volume copies (DUMP).

The file copy routines provide the user with an easy-to-use method of creating a file backup on another disk, diskette, cards, or printer. Additionally, it provides an easy method of moving files from one location to another, with both file limit modification and reorganization. The program supports one input and one output per execution. Disk input can be sequential, indexed, or direct file.

A sequential file can be copied to an indexed file, and card and diskette files are supported for input and output. When copying a file, the printer may be specified in addition to other output. Records may be deleted from a file by specifying a deletion code and position within each record; these deleted records may be printed.

The volume copy function of the Copy/Dump program copies an entire disk volume to another disk volume for backup.

The program allows for intermediate mountings of the output disk so that files and entire volumes may be copied on a one-drive system.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

An IBM System/3 model 4 workstation system includes: IBM 5404 Processing Unit model A18 (64K bytes) ... IBM 5447 Disk Storage and Control ... IBM 5213 Printer ... IBM 3277 Display Station model 1 ... at least one locally attached terminal. (Note: The IBM 3277 is supported only by CCP; the Base SCP does not use the 3277.)

A minimum IBM System/3 model 6 configuration includes: IBM 5406 Processing Unit model B2 (8K bytes) ... IBM 5444 Disk Storage Drive ... IBM 5213 Printer or 2222 Printer.

Devices Supported:

Model 4	Model 6	Description
	X	129 Card Recorder model 1, 2 or 3
	X	2222 Printer model 1 or 2
	X	2265 Display Station model 2 (5406-B3 or B4 is required)
	X	5213 Printer model 1, 2 or 3
X		5213 Printer model 3
X		5404 Processing Unit model A18
	X	5406 Processing Unit model B2, B3 or B4
	X	5444 Disk Storage Drive model 1, 2 or 3
X		5447 Disk Storage and Control model A1 or A2
	X	5496 Data Recorder model 1

SOFTWARE REQUIREMENTS: None

DOCUMENTATION

(available from Mechanicsburg)

System/3 Model 4 Introduction (GC21-5146) ... System/3 Models 4 and 6 Operation Control Language and Disk Utility Programs Reference Manual (GC21-7516) ... System/3 Model 4 Operator's Guide (GC21-5149) ... System/3 Model 6 Operator's Guide (GC21-7501) ... System/3 Models 4 and 6 Halt Guide (GC21-7541) ... System/3 Models 4, 6, 8, 10, and 12 System Generation Reference Manual GC21-5126) ... System/3 Disk Concepts and Planning Guide GC21-7571 ... System/3 Bibliography (GC20-8080).

**OVERLAY LINKAGE EDITOR FEATURE
(Feature #6010-#6011)**

PURPOSE

The Overlay Linkage Editor facility creates loadable programs from multiple relocatable modules. Output from the Overlay Linkage Editor may be cataloged in the Object Library and/or (model 6 only) punched into cards or written to diskette. Overlay structures may be created automatically or as designated by the user from relocatable program modules.

This feature is a prerequisite for Disk FORTRAN IV (5703-F01), for CCP/Disk Sort program (5703-SM2) and for the DFGR and PFGR functions of CCP (5703-SC1, feature #6033).

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: Same as for 5703-SC1, except that for IBM System/3 model 6, an IBM 5406 Processing Unit model B3 or B4 is required.

SOFTWARE REQUIREMENTS: 5703-SC1.

DOCUMENTATION

(available from Mechanicsburg)

Overlay Linkage Editor Reference Manual (GC21-7561) ... System/3 Bibliography (GC20-8080).

**MULTI-LEAVING REMOTE JOB ENTRY
WORKSTATION PROGRAM
Feature #6014-#6015**

PURPOSE

Permits a System/3 Model 4 or Model 6 equipped with a Binary Synchronous Communications Adapter with EBCDIC (Text Transparency optional) to function as a MULTI-LEAVING Remote Job Remote Job Entry Workstation communicating over a point-to-point (switched or nonswitched) line to a System/370 operating under control of one of the following:

- HASP II (Version 3.1 or 4.0)
- ASP (Version 2.6 or 3.0)
- Remote Entry Services (RES) of JES under OS/VS1 Release 2
- Multi-leaving Workstation facilities of JES2/JES3 under OS/VS2 Release 2

DESCRIPTION

Any job which can be entered into the central system for locally-attached, similarly-functioned I/O devices can be entered from the System/3 RJE Workstation. Workstation input may be read from any of the devices indicated below. Operator messages and output data sets may be directed to any of the devices shown below. Output may be returned to the submitting workstation or routed to another workstation or directed to local central system I/O devices.

SYSTEM CONTROL PROGRAMMING

System/3 Mdl 4 and Mdl 6 Base SCP (cont'd)

	Input*	Messages	Output
Console Keyboard	x		
5496 Data Recorder	x		x
129 Card Data Recorder	x		x
3741 directly attached	x		x
5213 Printer		x	x
2222 Printer		x	x
5444 Disk Storage Drive	x		x
5447 Disk Storage & Control	x		x

* Input may be from a combination of these devices.

All disk files created by the workstation program are standard System/3 consecutive files and may be accessed by any of the following programs: MRJE/WS Print Utility, SCP Copy/Dump program, or a user-written RPG II or FORTRAN programs.

When using the MULTI-LEAVING Workstation program, the following restrictions apply: Column binary is not supported; OS object decks cannot be read or punched; only the first 80 bytes of input records will be processed by the Workstation program; input record lengths cannot exceed 96 bytes.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Same as for 5703-SC1, except that for System/3 model 6, an IBM 5406 Processing Unit model B3 or B4 is required. For either IBM System/3 model 4 or System/3 model 6, a BSCA (#2074) with EBCDIC is required.

SOFTWARE REQUIREMENTS

5703-SC1; 5703-SC1 feature #6010/#6011.

DOCUMENTATION

(available from Mechanicsburg)

MRJE/WS Support Reference Manual (GC21-7621) ... System/3 Bibliography (GC20-8080).

**IBM 3741 DATA STATION FEATURE
Feature #6026-#6027)**

PURPOSE

This feature provides support for the IBM 3741 Data Station (model 1 or 2) and Programmable Workstation (model 3 or 4) as an input/output device directly attached to the System/3. For IBM 3741 models 3 and 4, the IBM System/3 does not support the Application Control Language (ACL).

This feature is not supported for System/3 model 4.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: In addition to the requirement for 5703-SC1, this feature requires at least 12K of main storage and a 3741 directly attached.

SOFTWARE REQUIREMENTS: (5703-SC1).

DOCUMENTATION

(available from Mechanicsburg)

System/3 3741 Reference Manual (GC21-5113) ... System/3 Bibliography (GC20-8080).

**COMMUNICATIONS CONTROL PROGRAM
Feature #6033 (model 4 only)**

PURPOSE

The IBM System/3 model 4 Communications Control Program (CCP) provides control program services needed for local or remote communication with workstations.

The services are:

- RPG II access to terminals attached to the CPU and to the Binary Synchronous Communications Adapter (BSCA).
- Program Fetch as a result of terminal operator request.
- Resource Management to reduce contention between programs accessing the same files, provide access to terminals and manage storage available for application programs.
- Concurrent program execution allowing multiple application programs within the available storage.
- Terminal Monitoring to accept data and terminal commands.
- Display Format Facility (DFF) which permits the support of 3270 systems with a minimum of coding in RPG II.

Terminals and Features Supported: The following terminals may be used with the Communications Control Program:

Directly To The CPU

- 3270 terminals only
- 3277 Display Station (model 1 or 2)
- 3284 Printer (model 1 or 2)
- 3286 Printer (model 1 or 2)
- 3288 Printer (model 2)

Note: A maximum of 5 terminals may be attached to the CPU.

With the Binary Synchronous Communications Adapter (BSCA)

- 3270 Information Display System
 - Point-to-point nonswitched
 - Multipoint nonswitched
 - Point-to-point switched (3275 only)
- 3735 Programmable Terminal
 - Switched Multipoint
- 3741 Data Station model 2 and 3741 Programmable Workstation model 4
 - Point-to-point (switched and nonswitched)
 - Multipoint tributary
- IBM 5110 Computer System (as a data mode CPU)
 - Point-to-point (switched and nonswitched)
 - Multipoint tributary
- 5231 model 2 (appears identical to 3741 model 2 or 4)
 - Point-to-point (switched or nonswitched)
 - Multipoint tributary
- IBM 5280 Distributed Data System
 - Point-to-point (switched and nonswitched)
 - Multipoint Tributary
- Series/1
 - Switched
 - Nonswitched point-to-point
- System/3
 - Switched
 - Nonswitched point-to-point
 - Multipoint control station
 - Multipoint tributary
- System/7
 - Switched
 - Nonswitched point-to-point
 - Multipoint (System/3 is control station)
- System/32
 - Switched
 - Nonswitched point-to-point
 - Multipoint (System/3 is control station)
- System/34
 - Switched
 - Nonswitched point-to-point
 - Multipoint (System/3 is control station)
- System/360, System/370
 - Switched
 - Nonswitched point-to-point
 - Multipoint (System/3 is tributary)

In addition to controlling terminals, the System/3 can operate as a tributary terminal (BSCA only) to a host System/360 or System/370. In this configuration, the System/3 is a sub-host controlling terminals and is itself a terminal to another system.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: The Communications Control Program requires an IBM System/3 model 4 which includes an IBM 5404 Processing Unit model A18 (64K bytes)... An IBM 5447 Disk Storage and Control... An IBM 5213 model 3 Printer... An IBM 3277 model 1 Display Station (for CCP messages)... and one of the devices listed under "Terminals and Features Supported".

SOFTWARE REQUIREMENTS

Since CCP is pre-generated by IBM, to install CCP the user simply copies one of two versions from the distribution disk cartridge.



SYSTEM CONTROL PROGRAMMING

System/3 Mdl 4 and Mdl 6 Base SCP (cont'd)

Execution of CCP requires the System Control Programming (5703-SC1).

No special programming systems requirement exists for the running of system assignments. The use of the Display Format Generator routines and the Printer Format Generator routines require the Overlay Linkage Editor (5703-SC1, feature #6011).

For the preparation of application programs, the RPG II Compiler (5703-RG1) is required. For the preparation of sort jobs to be run under control of CCP, the CCP/Disk Sort program (5703-SM2) is required.

SOFTWARE REQUIREMENTS

5703-SC1; 5703-SC1 feature #6011.

COMPATIBILITY

This Communications Control program is upward compatible with with the CCP for the model 8 and 10 (5702-SC1, feature #6033). The interface between the system and the operator is different from that of the model 8 or 10.

DOCUMENTATION

(available from Mechanicsburg)

Model 4 Introduction (GC21-5146) ... *Model 4 CCP Concepts and System Design Guide* (GC21-5148) ... *Model 4 CCP Programmer's Reference Manual* (GC21-5150) ... *Model 4 Operator's Guide* (GC21-5149) ... *Terminal Operator's Guide*, (GC21-7580) ... *CCP Messages Manual* (GC21-5170) ... *System/3 Bibliography* (GC20-8080).

SYSTEM CONTROL PROGRAMMING
**SYSTEM/3 MODEL 15
SYSTEM CONTROL PROGRAMMING
5704-SC1, 5704-SC2**
PURPOSE

These programs perform the system's control functions for the installation. They are supplied by IBM with the system at no additional charge.

System Control Programming (SCP) must be ordered from PID prior to Order Confirmation (OC) time.

DESCRIPTION

The SCP consists of Disk System Management, System Control Programs, and System Service Programs. Operation of the system is by means of Operator Control Commands (OCC) and Operation Control Language (OCL) statements. Libraries on disk store object programs, source programs and OCL procedures.

SCP 5704-SC1 is designed to support model 15A, 15B and 15C. Model 15A has 5444 Disk Storage Drives and, optionally, 5445 Disk Storage. Models 15B and 15C have the 3340 Direct Access Storage Facility. SCP 5704-SC2 is designed to support model 15D, which has the 3340 Direct Access Storage Facility and, optionally, the 3344 Direct Access Storage.

For 5704-SC1, the SCP and libraries must reside on a 5444 or 3340. System residence (pack or area from which Initial Program Load occurs and which contains the SCP library) must be on drive 1. The user libraries may reside on either of the 5444 drives or on drive 1 or 2 of a 3340.

On the 3340, programs are stored in special areas on a 3348 data module called 5444 simulation areas. Each 5444 simulation area is large enough to contain data from one 5440 disk cartridge. Two 5444 simulation areas on a data module mounted on 3340 drive 1 can be used by system programming and are referred to as R1 and F1. Two 5444 simulation areas on a data module mounted on drive 2 can be used by system programming and are referred to as R2 and F2. Use of these areas for program residence is the same as an actual 5444 disk storage drive.

For 5704-SC2, the SCP and libraries must reside on a 3340 or 3344. System residence can be on drive 1 (3340) or drive 3 (3344 only). The user libraries may reside on any drive.

On the 3340 or 3344, programs are stored in 5444 simulation areas. However, assignments of these areas can be made by the user.

On the 3344 (model 15D only) each drive contains four main data areas and eight 5444 simulation areas. The main data areas are supported in similar fashion to those on a 3348 data module. A simulation area on drive 1 (3340) or drive 3 (3344 only) is set by IPL as F1 (or R1) by the user and can be used for system programming by the three partitions. Then, from three to nine additional simulation areas can be referred to as R1 (or F1), F2 and R2 by the three partitions. The designation of units (except for IPL unit) as F1, R1, F2 and R2 is accomplished by partition OCL assignment.

Both data files and program libraries can reside on a 5444. Only data files can reside on a 5445; programs can be stored in data files on a 5445, but to use them, they must be cataloged into the 5444 library. On a 3340 or 3344, data files reside in the main data area, and libraries reside in 5444 simulation areas.

System/3 model 15 differs from other System/3 models in these ways:

- Support of different devices and features
- Multiprogramming
- Spooling of a unit record input and/or output
- Different Operator Interface

Disk System Management: The Disk System Management consists of a supervisor, scheduler and data management facilities for operation and support of the system and for execution of user programs. Highlights include:

- Automatic Job-to-Job transition in any partition.
- Selective retrieval of object programs, source programs, and procedures from libraries on disk.
- Execution of programs by using cataloged procedures - OCL procedures can be cataloged in the library and called by the scheduler at execution time.
- Support of ROLLOUT/ROLLIN capability - The ability to roll out a program during its execution, bring in an inquiry program to be executed and upon its completion, restart the original program. ROLLOUT/ROLLIN is supported by RPG II, COBOL, and FORTRAN, and is available to Assembler users; it is not supported for Sorts, Utilities and System Control and Service Programs. (ROLLOUT/ROLLIN is supported in Partition 1 only and is not supported by 5704-SC2.)

- Support of Checkpoint/Restart capability - The ability to write checkpoint records when using problem programs that have Checkpoint/Restart capabilities (such as COBOL). Restart provides the facility to resume the execution of programs from the last checkpoint rather than from the beginning, if processing is terminated via a machine failure or an operator initiated immediate cancel. (Checkpoint/Restart is supported in Partition 1 only and, using 5704-SC2, checkpointed programs must be 48K or less and must not be using file sharing or external buffers.)
- The Tape Sort program supports Checkpoint/Restart but uses its own routines rather than the system routines.
- CRT/Keyboard simplifies operational control and speeds communications between the operator and the system.
- New halt approach - The need for operator intervention when system errors are encountered is reduced to a minimum through the use of system assigned automatic error defaults. The user has the flexibility of being able to specify the severity level of errors that he wishes his operator to control.
- Reduced system overhead—Improved transient handling, reduced interpartition interlock time and faster operator communication with the CRT should reduce system overhead (i.e., time required for such functions as initiate/terminate, open/close, allocate) as compared with the model 10.

The Interval timer - a standard feature on all 5415 Processing Units - is supported in one of the following levels:

- The time-of-day function is used by the system to time-stamp certain messages in the System History Area, and it can be used in application programs written in RPG II, COBOL, FORTRAN or Assembler.
- Full timer support, in addition to the time-of-day function, allows the user to time intervals.

Multiprogramming

- System/3 model 15 allows the concurrent execution of one user program in each of the two program partitions (5704-SC1) or three program partitions (5704-SC2). Programs share the CPU facilities, thus reducing the time that the system is in an unproductive waiting state.
- The supervisor controls priority for CPU processing, giving one partition priority over the other partition. All programs operate with interrupts enabled - when an interrupt occurs, the supervisor gains control, processes the interrupt, and gives control to the highest priority program that is in a ready state. Control is given up by a high priority program when it encounters a condition that prevents further processing. Control is taken away from a lower priority program at the completion of an event for which the higher priority program is waiting.

Spooling

- Spooling uses either a 5445 or a main data area on a 3340/3344 for intermediate storage of unit record input and output. It allows a single input or output device to serve all partitions.
- Spooling increases throughput by reducing the time the CPU waits for the completion of unit-record I/O operations. With spooling, the unit-record input and output is performed at disk I/O speed. A job's normal punched-card input (including operation control statements) is read from the card reader and stored on disk in an input queue before the start of the job. Similarly, a job's output is stored on disk in an output queue and printed and/or punched at a later time.
- One of the following levels of spooling support may be selected during system generation: Printing only ... printing and punching ... printing and input ... printing, punching and input. The selected level of support may be used in any or all partitions.
- The following devices are supported for spooling input and/or output: MFCU1, MFCU2, MFCM1, MFCM2, 1442, 2501, 1403. The 3741 directly attached is supported by spooling as an input device.

Data Management: Data Management routines provide an interface between the user program and the required data file(s). Data Management services are provided for disk files, tape files, card files, diskette files, printer files, and CRT files. In addition, a device-independent access method is supported.

Disk Data Management: Records may span physical disk boundaries (sectors, tracks, cylinders); the user need not be aware of the physical boundaries when he writes programs to access the data. Record sizes may range from 1 byte to 64K bytes, although a particular program (such as RPG II) may restrict the maximum size. The fixed length records may be blocked or unblocked for processing, and the blocking factor may vary from program to program.

System/3 Model 15 SCP (cont'd)

The following table shows the file organizations and maximum number of files for the 5444, 5445, 3340, and 3344.

File Organizations Supported				
	Sequential	Indexed	Direct	Number of Files (Max)
5444 disk	X	X	X	50
5445 disk	X	X	X	50 or 1000
3340 data module				
Main data area	X	X	X	1000
Simulation area	X	--	X	50
3344 disk				
Main data area	X	X	X	1000
Simulation area	X	--	X	50

A file may be large enough to require more than one disk pack. Multivolume sequential or indexed files may be online (all volumes mounted during file allocation) or offline (all volumes not necessarily mounted during file allocation); multi-volume direct files must be online. Offline multi-volume files are not allowed on the IPL drive. Multi-volume files are not supported under CCP, and they cannot be shared.

External buffers (5704-SC2 only): An optional data management technique allows disk I/O buffers to be outside of the object program but within the partition.

File Sharing: Both SCPs allow the sharing of a disk file between partitions. However, 5704-SC2 has very few restrictions compared with 5704-SC1.

Standard System/3 disk labels are mandatory for all disk files. Data and labels are stored as 8-bit bytes on disk.

Tape Data Management: The 3410/3411 Magnetic Tape Subsystem is supported by data management. Magnetic tape is used as a data storage medium only; libraries and programs are not supported on tape, but they can be contained in data files on tape. The following features are supported by the SCP tape data management routines:

- Fixed or variable length records
- Blocked or unblocked records
- Physical block size from 18 bytes to 32K bytes
- Multi-volume files
- Multi-file volumes
- Unlabeled or labeled (ANSI or IBM Standard labels) tapes. (Non-standard labels on input will be bypassed.)
- Recording format: EBCDIC or ASCII
- Tape Error Statistics

Tape support is functionally equivalent to tape support on other System/3 models, except that only the model 15 supports multi-file tape volumes.

Card I/O Data Management

5424 MFCU - read 96 columns ... punch 96 columns ... print ... feed ... deferred punch or print ... stacker select ... single or double buffering ... combined file processing ... 64 EBCDIC characters for read, punch, or print ... same as model 10 support.

2560 MFCM - read 1-80 columns ... punch 1-80 columns ... print 1-64 positions on 1-6 lines ... feed ... stacker select ... single or double buffering ... deferred punch or print ... combined file processing ... 256 EBCDIC characters for read or punch; 64 characters for print.

1442 - read 80 columns ... punch 1-80 columns ... read card image (column binary) ... feed ... stacker select ... single or double buffering ... combined file processing ... 256 EBCDIC characters for read or punch (except for card image mode) ... same as model 10 support.

2501 - read 1-80 columns ... read card image (column binary) ... single or double buffering ... 256 EBCDIC characters (except for card image mode).

Diskette Data Management

3741 Directly attached - read 1-128 characters ... write 1-128 characters ... single or double buffering ... 256 EBCDIC characters ... support similar to card I/O support ... for 3741 models 3 and 4, does not support the Application Control Language (ACL).

Printer Data Management

1403 - print 132-character line ... skip to line number before or after print ... space 0, 1, 2, or 3 before or after print ... page overflow detection ... Universal Character Set ... same as model 10 support.

3284 - print 120-, 126-, or 132-character line ... skip to line number before or after print ... space 0, 1, 2, or 3 before print ... space 1, 2, or 3 after print ... page overflow detection ... 64 EBCDIC character set.

CRT/Keyboard Data Management: The 3277-1 Display Station is supported for output records, and in conjunction with the 78-key Operator Console Keyboard, for input and update records. The top 7 lines (each 40 characters) of the CRT screen are used, to a maximum area of 279 positions (the last position of this area is reserved for system use). Data can be displayed using any of the 64 EBCDIC

characters allowed by the 3277. The program function keys 1-9 can be individually allocated by user programs.

Device Independent Data Management: A sequential file that uses Device Independent Data Management can be assigned at program execution time to one of the following devices: 1403, 3284, 5424, 2560, 1442, 2501, 3741 directly attached, 5444, 5445, 3340, 3344 or 3410/3411.

The following functions are supported: Double buffering, MFCU card printing, fixed length record processing, multi-volume tape file processing, and support of EBCDIC formats.

The following functions are not supported: stacker selection, forms control, record updating, record addition, combined file processing, multi-volume disk file processing, variable-length record processing, deferred opening of tape files, and support of ASCII formats.

Communications Management: Five communications interfaces are provided: RPG II Telecommunications (BSCA) support, RPG II 3270 Display Control Feature, BSCA Multiline/Multipoint (ML/MP) support, Multiple Line Terminal Adapter (MLTA) IOCS, and the Communications Control Program. The Terminal Support Chart shows the terminals supported by each interface. Refer to System/3 model 15 RPG pages for information on RPG II support. The MLTA IOCS is provided as a PSHRPQ and the Communications Control Program is an SCP feature.

BSCA Multiline/Multipoint Support: Configurations supported are point-to-point nonswitched, point-to-point switched and multipoint leased line with the System/3 as a multi-dropped terminal or a control station. Also provided is the capability to operate two BSCA lines simultaneously on one System/3. The two BSCAs may have different configurations. For a list of BSC devices and of the communications modes in which each device is supported (e.g., point-to-point, multipoint, etc.), see M5415 page. Support for 3270 terminals via the Display Adapter (#4601) is also included.

Program counters are maintained on disk to accumulate performance information per BSC line. Counters are logged at CLOSE time. A utility program allows the counters to be displayed.

RPG II Telecommunications Specifications must not be used in the same RPG II program to which subroutines using Multiline/Multipoint support are linked.

For compilation, ML/MP requires the SCP, including the macros, and requires an Assembler.

Other I/O Data Management: Two different SCP subroutines (SUBR07 and SUBR08) are supplied to perform device control and data management services for the 1255 Magnetic Character Reader. Each subroutine is used with a user-written RPG II or Assembler program.

An SCP subroutine (SUBR09) is supplied to perform device control and data management services for the 1419 Magnetic Character Reader. The subroutine is used with a user-written RPG II or Assembler program.

An SCP subroutine is supplied to perform device control and data management services for the 3881 Optical Mark Reader. The subroutine is used with a user-written RPG II or Assembler program and is functionally equivalent to the model 10 3881 feature.

SYSTEM CONTROL PROGRAMMING

System/3 Model 15 SCP (cont'd)

TERMINAL SUPPORT CHART FOR SYSTEM/3 MODEL 15

Terminals Operating with S/3-15	Type Comm (1)	Programming Support				Communication Code (2)					Communication Network (3)			
		RPGII	MLMP	MLTA	CCP	EBCDIC Nor	Tran	ASCII Nor	Tran	PTTC	Point-to-Point		Multi-Point Trib	Ctrl Stat
											Sw	Nonsw		
1050	SS	-	-	X	X	-	-	-	-	X	X	X	-	X
2740 mdl 1	SS	-	-	X	X	-	-	-	-	X	X	X	-	X
2740 mdl 2	SS	-	-	X	X	-	-	-	-	X	-	X	-	X
2741	SS	-	-	X	X	-	-	-	-	X	X	X	-	-
3767 (as 274X)	SS	-	-	X	X	-	-	-	-	X	X	X	-	X
5100/5110 (as a 2741)	SS	-	-	X	X	-	-	-	-	X	X	X	-	-
CMCST	SS	-	-	X	X	-	-	-	-	X	X	-	-	-
S/7 ACC	SS	-	-	X	X	-	-	-	-	X	X	X	-	X
5100 (Note 7)	SS	-	-	X	X	-	-	-	-	X	X	X	-	-
S/360 & 370	BSC	X	X	-	X	X	X	X	-	-	X	X	X	-
S/360 mdl 20	BSC	X	X	-	X	X	X	X	-	-	X	X	-	-
1130 (Note 5)	BSC	X	-	-	-	X	X	-	-	-	X	X	-	-
2780	BSC	X	X	-	-	X	X	X	-	-	X	X	-	-
2770	BSC	X	X	-	-	X	X	X	-	-	X	X	-	-
S/7	BSC	X	X	-	X	X	X	X	-	-	X	X	-	X(4)
2972 mdls 8,11	BSC	-	X	-	-	X	-	-	-	-	-	-	-	X
3735	BSC	-	X	-	X	X	-	X	-	-	X	-	-	X
S/3	BSC	X	X	-	X	X	X	X	-	-	X	X	X	X(4)
3270	BSC	-	X	-	X	X	-	X	-	-	X(6)	-	-	X
3600 (Note 5)	BSC	-	X	-	X	X	X	-	-	-	-	-	-	X
3741 mdls 2, 4	BSC	X	X	-	X	X	X	-	-	-	X	X	-	X(4)
Series/1	BSC	X	X	-	X	X	X	X	-	-	X	X	-	-
S/32 & S/34	BSC	X	X	-	X	X	X	X	-	-	X	X	-	X(4)
5280 (as a 3741)	BSC	X	X	-	X	X	X	X	-	-	X	X	-	X(4)
5110	BSC	X	X	-	X	X	X	-	-	-	X	X	-	X(4)
5231 mdl 2 (as a 3741)	BSC	X	X	-	X	X	-	-	-	-	X	X	-	X(4)
6670 (as a 2770)	BSC	X	X	-	-	X	X	X	-	-	X	X	-	X

Legend:

- X = Supported
- = Not Supported

Notes:

1. Type Comm - Type of Communication
 - SS = Start/Stop
 - BSC = Binary Synchronous Communication
2. Communication Code (as supported by System/3 model 15)
 - Nor = Normal
 - Tran = Transparency
 - PTTC = Paper Tape Transmission Code
3. Communication Network
 - Point-to-Point Switched (Sw)
 - Point-to-Point Nonswitched (Nonsw)
 - Multipoint, System/3 as a tributary station (Trib)
 - Multipoint, System/3 as a control station (Ctrl Stat)
4. Not supported by RPG II.
5. Requires no-charge RPQ.
6. 3275 only.
7. The 5100 is supported by CCP as a 2741.

System Control and Service Programs: These programs allow the user to prepare and service his disks, and to perform basic functions necessary for the operation of the system. They are:

Library Maintenance Program: Allows the user to produce and service the source and object program libraries. The principal functions of the program are as follows:

- Add (or delete) source programs, procedures and object programs to (or from) the user's program libraries.
- Allocate or re-allocate disk space to the libraries or to the system history area.
- Display library contents.
- Copy any or all of a library from one disk to another.
- Copy a module into a library from a disk file.
- Copy a module from a library to a disk file.
- Modify entries in the source library.

Libraries may reside on either a 5444 or in a 5444 simulation area on a 3340/3344. Control statements may be entered from the system input device: MFCU, MFCM, 1442, 2501, 3741 directly attached, or 3277 keyboard. Library entries may be "punched" on the system punch device: MFCU, MFCM, 1442, or 3741 directly

attached. Printed output may be on either the 1403 or 3284 Printer.

With 5704-SC2, the library entry retrieval subroutine (SUBR15) may be incorporated into a user-written RPG II or Assembler program in order to retrieve entries from any disk library (object, routine, source, procedure).

Copy/Dump Program: Used in the system generation process to provide the user with a system tailored for his installation. The program supports both file-to-file copies (COPY) and volume-to-volume copies (DUMP).

The file copy routines provide the user with an easy to use method of creating a file backup on another disk, tape, or printer. Additionally, it provides an easy method of moving files from one location to another, with both file limit modifications and reorganization. The program supports one input and one output per execution. Disk input can be a sequential, indexed, or direct file.

A sequential file can be copied to an indexed file, and tape, card and diskette files are supported for input and output. When copying a file, the printer may be specified in addition to other output. Records may be deleted from files by specifying a deletion code and position within each record. These deleted records may be printed. Using 5704-SC2, a direct file may be created from a sequential or direct file.

The volume copy allows the user to copy an entire volume to another volume for backup. The following combinations are supported:

5704-SC1: 5444 to 5444 ... 5445 to 5445 ... 3340 to 3340.

5704-SC2: 3340 to 3340 ... 3344 to 3344 ... 3340 to 3344 ... 3344 to 3340.

For the 3340 and 3344, either a main data area or simulation area can be copied. A simulation area can be copied only to another simulation area; a main data area can be copied only to another main data area.

Dump/Restore Program: Copies a disk volume to magnetic tape and restores a disk volume from a tape previously created by this program. For 5444 or 5444 simulation area, backup can be on diskettes.

Dump: 5444 to tape or diskettes ... 5445 to tape ... 3340/3344 main data area to tape ... 5444 simulation area to tape or diskettes.

Restore: 5444 on tape or diskettes to 5444 or 5444 simulation area ... 5445 on tape to 5445 ... 3340/3344 main data area on tape to 3340/3344 main data area ... 5444 simulation area on tape or diskettes to 5444 or 5444 simulation area.

System/3 Model 15 SCP (cont'd)

A tape created by this program can be used only by this program to restore the disk data at some future time, and cannot be accessed as a typical data file.

Other Disk Programs: The following programs are used for all disk units unless otherwise indicated.

Disk Initialization Program - Performs surface analysis on the user's disk and formats the disk according to disk system management requirements. (Not used for 5444 simulation areas.)

Alternate Track Assignment - Allows the user to assign an alternate track in place of a defective one and print the data content of the area in error.

Alternate Track Rebuild - Permits the user to correct data on the assigned alternate track.

File and Volume Label Display - Permits the user to display the entire Volume Table of Contents (VTOC) of a disk, or the information pertaining to a single file.

File Delete - is one means for deleting temporary data files from a disk and the only means for the user to delete permanent data files from a disk.

The following programs are used only for the disks indicated:

System History Area Display (5445, 3340 or 3344) - Permits the user to display or copy the contents of the system history area.

1000-File VTOC Conversion (5445, 3340 or 3344) - Permits the user to convert a 50-file VTOC on a 5445 to a 1000-file VTOC. For any disk with a 1000-file VTOC, this program can be used to compress the entries in the VTOC. For the 5704-SC2 user, only the compress function is supported.

Simulation Area Program (3340 or 3344) - This program is used to service the 5444 simulation areas on a 3340 or 3344. Copy, clear, rename, and display functions are provided.

Reassign Alternate Track (3340)—Permits the user to reassign the location of the alternate tracks on a data module so it can be used on a System/360 or System/370. The module is physically interchangeable, but the data is not.

Recover Index (3340 or 3344) - Permits the user to recover the index of an indexed file following abnormal program termination.

File Compress (3340 or 3344) - Permits the user to rearrange files to make one contiguous space out of the unused space between files. Using 5704-SC2, all of the files in a main data area may be copied to tape and be restored individually to disk.

Spool File Copy Program (5704-SC2 only) - Provides the user with access to the spool queues from a program partition—either a batch partition or a CCP partition. With this program, the user can: (1) copy the \$SPOOL file to disk or tape; (2) copy jobs into the reader queue from a file or terminal; (3) copy print steps to a file; (4) copy punch steps to a file; and (5) copy spool queue status displays to a file or terminal.

5445 Data Interchange Utility (5445) (5704-SC1 only) - This program is used prior to taking a 2316 Disk Pack from System/3 to System/360 or System/370 for processing, or prior to using the disk pack on System/3 after returning from System/360 or System/370. To use a 2316 Disk Pack in an interchange environment, it must have been initialized on System/3 and the interchange files must have been allocated on System/3. System/360 or System/370 OS or DOS may read, update, or in OS only, OUTPUT to these files, but may not create or extend them since OS and DOS do not create or update the System/3 Volume Table of Contents (VTOC).

Other Tape Programs (3410/3411):

Tape Initialization Program - Allows the users of magnetic tape to create and delete standard tape volume labels, check for unexpired files and to display existing volume and data file labels.

Tape Error Summary Program - Prints magnetic tape error statistics that have been accumulated during processing.

Overlay Linkage Editor: The Overlay Linkage Editor creates loadable programs from multiple relocatable modules. Output from the Overlay Linkage Editor may be cataloged in the object library and/or punched into cards or written on a diskette. Overlay structures may be created automatically or as designated by the user from relocatable program modules. The Overlay Linkage Editor is used by the RPG II, COBOL, and FORTRAN Compilers, by the Basic Assembler Program, by the CCP/Disk Sort Program and by the System Generation procedures.

System Generation: When a user installs a system, he performs a "System Generation" (SYSGEN) to create a supervisor and data management support for his particular configuration, and to include the program products he has ordered. During system generation, the source library, object library, and system history area are established. The characteristics of the required spooling support are also defined.

Macros: Macros provide data management and input/output support for the control of input/output services through assembler languages. The I/O services are available to users of assembler languages through the macro processor in conjunction with the disk system input/output service macros. The keyword macro statements coded by the user are expanded by the macro processor using the macro prototype definitions. The expanded code is in a form that can be processed by an assembler.

Macros provide system services, general I/O support, unit record device support, disk device support, tape device support, and CRT/Keyboard support.

MRJE/WS: System/3 model 15 MULTI-LEAVING Remote Job Entry Workstation (MRJE/WS) Program permits a model 15 equipped with a BSCA with EBCDIC (Text Transparency optional) to function as a MULTI-LEAVING Remote Job Entry Work Station communicating over a point-to-point (switched or nonswitched) line to a 370.

This program, included with the base SCP 5704-SC2 (model 15D), is functionally identical to the MRJE/WS feature for System/3 models 15A, 15B, and 15C (see 5704-SC1 feature #6001/#6002 in the SCP section). In addition, the 3344 Direct Access Storage is supported for input and output.

Concurrent CE Diagnostics: CE diagnostics for selected devices and functions are distributed with SCP and generated as a user system. These diagnostic functions can be executed under SCP control in one partition while another program (such as CCP) is being executed in another partition.

SCP Main Storage Requirements: (These figures are provided for planning purposes only and are subject to change.)

Supervisor Requirements: The base supervisor supports multiprogramming and certain I/O devices. The size of the resident supervisor support depends on the options selected during system generation:

	5704-SC1 (Rel. 6)	5704-SC2 (Rel. 2)
Base Supervisor	17.45K	21.07K*
Options:		
3340 Support	0.94	N/A
3410/3411 Support	1.16	1.16
3741 Support	0.50	0.50
3284 Support	0.50	0.50
5424 MFCU Support	N/A	0.65
2560 MFCM Support	N/A	0.69
1442 Support	N/A	0.25
2501 Support	N/A	0.21
I/O Storage Protection	0.49	0.49
Unit Record Restart	0.34	0.25**
Memory Resident Overlays	0.50	0.50
Second 1403 Printer	N/A	2.02
BSCA/DA/LCA/MLTA/SIOC	1.41	--
Add for SIOC	0.40	--
BSCA/DA/LCA/MLTA/BSCC	--	1.17
96K to 256 CPU	--	1.27
384K or 512K CPU	--	0.16
Add for BSCA/DA/LCA	--	0.09
Add for MLTA	--	0.41
Add for SIOC	--	0.35
Add for BSCC	--	
Interval Timer		
Either Time of day only	0.45	0.47
Or full timer support	2.00	2.00
Spooling		
Minimum	7.11	7.11
Maximum	17.21	20.79
CCP		
Minimum	1.69	1.91
Maximum	6.32	6.65

* Includes 3340/3344 support.

** Includes extended restart as well as unit record restart.

The size of the supervisor is a multiple of 2K bytes.

The requirement for spooling depends on the devices and partitions selected for spooling. For example, with 7.11K spooling support, printer output from one partition can be spooled.

In addition to the resident supervisor requirements listed above, a resident file share common area is also required for SCP 5704-SC2. This area is a minimum of 2.00K and resides at the upper limit of main storage.

Depending on what modules are included during system generation, the size of the actual supervisor may not agree exactly with the size computed from the published tables.

Refer to *System Generation Reference Manual*, GC21-7616, for additional information regarding storage requirements.

System/3 Model 15 SCP (cont'd)

System Control and Service Programs

	Minimum Partition
Library Maintenance Program	10 K+
Copy/Dump Program	10 K+
Dump/Restore Program	8 K+
Disk Programs	
Disk Initialization	8 K+
Alternate Track Assignment	8 K+
Alternate Track Rebuild	8 K
File and Volume Label Display	
50-File VTOC	8 K
1000-File VTOC	10 K-18K
File Delete	8 K
System History Area Display	8 K
1000-File VTOC Conversion	8 K
3340 Simulation Area Program	10K
Reassign Alternate Track	8 K
Recover Index	10 K
File Compress	10 K
Spool File Copy	10 K
5445 Data Interchange Utility	8 K
Tape Programs	
Tape Initialization	8 K
Tape Error Summary	8 K
Overlay Linkage Editor	10 K+
System Generation	30 K
Macro Processor	12 K+

+ These programs use additional storage, if available.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: For an IBM System/3 model 15 with 5415 A Processing Unit:

- 5415 Processing Unit model A17 (48K bytes)
- 3277 Display Station model 1 with feature #4632 (Operator Console Keyboard)
- 5444 Disk Storage Drive
- 1403 Printer
- One of the following:
 - 5424 MFCU
 - 2560 MFCM
 - 1442 Card Read Punch

For a System/3 model 15 with 5415B or 5415C Processing Unit:

- 5415 Processing Unit model B17 (48K bytes) or model C21 (160K bytes)
- 3277 Display Station model 1 with #4632 (Operator Console Keyboard)
- 3340 Direct Access Storage Facility
- 1403 Printer
- One of the following:
 - 5424 MFCU
 - 2560 MFCM
 - 1442 Card Read Punch
 - 3741 Data Station, directly attached
 - 3741 Programmable Workstation, directly attached

For a System/3 model 15 with 5415D Processing Unit:

- 5415 Processing Unit model D19 (96K bytes)
- 3277 Display Station model 1 with #4632 (Operator Console Keyboard)
- 3340 Direct Access Storage Facility
- 1403 Printer
- One of the following:
 - 5424 MFCU
 - 2560 MFCM
 - 1442 Card Read Punch
 - 3741 Data Station, directly attached
 - 3741 Programmable Workstation, directly attached

The following devices are supported by SCP 5704-SC1 and its data management facilities:

- 5444 Disk Storage Drive models A2 and A3
- 5445 Disk Storage models 1, 2, and 3 (maximum 4)
- 3340 Direct Access Storage Facility models A2, B1 and B2 (3340 is mutually exclusive with 5444 and 5445)
- 3410/3411 Magnetic Tape Subsystem models 1, 2 and 3 (maximum 4 tape units)
- 1403 Printer models 2, 5 and N1
- 3277 Display Station model 1 (console)
- 5424 MFCU model A1 or A2
- 2560 MFCM model A1 or A2
- 1442 Card Read Punch model 6 or 7
- 2501 Card Reader model A1 or A2
- 3284 Printer model 1 (console)

- 1255 Magnetic Character Reader models 1, 2 and 3
- 1419 Magnetic Character Reader model 1
- 3881 Optical Mark Reader model 1
- 3741 Data Station models 1 and 2 (directly attached)
- 3741 Programmable Workstation models 3 and 4 (directly attached)

SCP 5704-SC2 and its data management facilities support the above devices with the following exceptions/additions:

- 5444 Disk Storage Drives are not supported.
- 5445 Disk Storage is not supported.
- 3344 Direct Access Storage model B2 is supported.

SOFTWARE REQUIREMENTS (None)

DOCUMENTATION
(available from Mechanicsburg)

Model 15 Introduction (GC21-5094) ... SCP Reference Manual (GC21-5077 for 5704-SC1) and (GC21-5162 for 5704-SC2) ... Operator's Guide (GC21-5075) ... Messages (GC21-5076) ... System Generation (GC21-7616) ... 3340 Reference Manual (GC21-5111) ... 3741 Reference Manual, GC21-5113 ... User's Guide to Spooling, GC21-7632 ... Disk Concepts and Planning (GC21-7571) ... System/3 Bibliography (GC20-8080).

**SYSTEM/3 MODEL 15
MULTI-LEAVING REMOTE JOB ENTRY
WORKSTATION PROGRAM
5704-SC1 FEATURE #6001-#6002**

PURPOSE

5704-SC1 feature #6001-#6002 is used with SCP 5704-SC1, and uses 5444, 5445 or 3340 disks.

Permits an IBM System/3 model 15 equipped with a Binary Synchronous Communications Adapter with EBCDIC (Text Transparency optional) to function as a MULTI-LEAVING Remote Job Entry Work Station communicating over a point-to-point (switched or non-switched) line to a System/370 operating under control of one of the following:

- HASP II (Version 3.1 or 4.0)
- ASP (Version 2.6 or 3.1)
- Remote Entry Services (RES) of JES under OS/VS1
- MULTI-LEAVING Work Station facilities of JES2/JES3 under OS/VS2
- VM/370 Remote Spooling Communications Subsystem (RSCS)

Any job which can be entered into the central system from locally-attached, similarly-functioned I/O devices can be entered from the System/3 model 15 workstation.

Workstation input may be read from any of the devices indicated below. Operator messages and output data sets may be directed to any of the devices shown below. Output may be returned to the submitting work station or routed to another work station or directed to local central system I/O devices.

	Input*	Messages	Output
5424 MFCU	X		X
2560 MFCM	X		X
1442 Card Read Punch**	X		X
2501 Card Reader	X		X
3741 directly attached**	X		X
1403 Printer		X	X
3284 Printer		X	
5444 Disk Storage Drive	X		X
5445 Disk Storage	X		X
3340 Direct Access Storage Facility	X		X
3410/3411 Magnetic Tape	X		X
3277 Display Station	X	X	

* Input may be from a combination of these devices.

** Cannot be used for both input and output simultaneously.

All disk files created by the work station program are standard System/3 consecutive files and may be accessed by any of the following programs: MRJE/WS Print Utility, SCP Copy/Dump Program, or user-written RPG II, COBOL, FORTRAN or Assembler programs.

When using the Workstation program, the following restrictions apply:

- Column binary is not supported.
- Reading and punching of OS object decks requires the BSCA Text Transparency Feature and either a 2560 MFCM or 1442 Card Read Punch; OS object decks can be read from the 2501 Card Reader.
- For unit record devices (including the 3741), input record length can be 80 or 96 bytes; however, only the first 80 bytes of the input records will be processed by the workstation program.

System/3 Model 15 SCP (cont'd)

- Files processed with the READFILE command can contain records of other than 80 or 96 bytes. The file will be transmitted to the host central as 80-byte records. (Regrouping the data is the user's responsibility.)
- Print records which exceed the line length of the System/3 printer will be truncated.

COMPATIBILITY

The model 15 MRJE/WS Program is functionally compatible with the MRJE/WS programs for model 6, 8, 10 or 12. Differences exist only in MRJE/WS messages, MRJE/WS commands and the MRJE/WS program generation, which are designed to be easier to use on the model 15.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: In addition to the minimum requirements for SCP, this feature requires a Binary Synchronous Communications Adapter (#2074) with EBCDIC. A minimum partition size of 16K bytes is required for execution.

DOCUMENTATION

(available from Mechanicsburg)

Model 15 MRJE/WS Reference Manual (GC21-5115) ... System/3 Bibliography (GC20-8080).

**SYSTEM/3 MODEL 15
COMMUNICATIONS CONTROL PROGRAM
5704-SC1, FEATURE #6033-#6070/#6071
5704-SC2, FEATURE #6011/#6012**

PURPOSE

The Communications Control Program provides control program services needed for telecommunications systems.

5704-SC1 feature #6033 is resident on a 5444 Disk Storage Drive; 5704-SC1 feature 6070/6071 is resident on a 5444 simulation area on a 3340 Direct Access Storage Facility. Each feature requires the services of the supervisor and other SCP facilities of 5704-SC1.

5704-SC2 feature #6011/#6012 is resident on a 5444 simulation area on a 3340 Direct Access Storage Facility or 3344 Direct Access Storage, and it requires the services of the supervisor and other SCP facilities of 5704-SC2.

The services included in CCP are:

- High-Level language (COBOL, FORTRAN and RPG II) access to asynchronous start-stop (MLTA) and binary synchronous (BSCA, BSCC, DA, LCA) terminals.
- Program Fetch as a result of terminal operator requests.
- Resource Management to reduce contention between programs accessing the same files, provide access to terminals and manage storage available for application programs.
- Concurrent program execution allowing multiple application programs within the available storage.
- Terminal Monitoring to accept data and terminal commands.
- Display Format Facility (DFF) which permits the support of 3270 systems with a minimum of coding in high-level languages.

The Communications Control Program is designed to be an integral part of the SCP. CCP will control program execution in one partition of a multi-partition system. The minimum partition size is 16K bytes, exclusive of user program areas; there is no limit on the maximum size of the partition. One to 15 programs can run concurrently under CCP; each program can range in size from 4K to 32K bytes. By contrast, under CCP on the model 4, 8, 10, or 12, 1 to 8 programs can run concurrently, and each program can range in size up to 48K bytes. In the minimum system configuration, more than one program may be executed under control of CCP.

Using model 15A or 15B the minimum system required to support CCP with DFF and multiple tasks is 64K. With a 48K system, DFF cannot be used, and the user may be limited to a single task.

CCP Device Support (System)

	Generation	Execution
5444 Disk Storage Drive mdl A2 or A3	Yes	Yes
5445 Disk Storage mdl 1, 2 or 3 (5704-SC1 only)	Opt	Opt
3340 Direct Access Storage Facility mdl A2, B1 or B2	Yes	Yes
3344 Direct Access Storage mdl B2 (5704-SC2 only)	Yes	Yes
3410/3411 Magnetic Tape Subsystem mdl 1, 2 or 3	No	No
1403 Printer mdl 2, 5 or N1	Req	Opt
3277 Display Station mdl 1 (console)	Req	Req
5424 MFCU mdl A1 or A2	Opt	Opt
2560 MFCM mdl A1 or A2	Opt	Opt
1442 Card Read Punch mdl 6 or 7	Opt	Opt
2501 Card Reader mdl A1 or A2	Opt	Opt
3284 Printer mdl 1 (console)	Opt	No
1255 MCR mdl 1, 2 or 3	No	No
3881 OMR mdl 1	No	No
3741 Data Station mdl 1, 2, 3 or 4 (directly attached)	Opt	Opt

Terminals and Features Supported: Table 1 lists the devices supported by CCP on System/3 model 15. Table 2 lists the devices of the 3270 Information Display System that are supported by model 15 CCP. Both tables show the communications interface used to attach each device.

Listed below are the particular features supported by CCP for each terminal, system, or device.

Asynchronous (start-stop) Terminals (via MLTA)

- 1050 Data Communication System
 - Multipoint switched
 - Multipoint nonswitched
- 2740 Communication Terminal Model 1
 - Basic
 - Checking
 - Dial
 - Dial with checking
 - Dial with transmit control
 - Dial with transmit control and checking
 - Station Control
 - Station Control with checking
- 2740 Communication Terminal Model 2
 - Station Control
 - Station Control with checking
 - Station Control with Buffer Receive
 - Station Control with Buffer Receive and checking
- 2741 Communication Terminal
 - Basic
 - Switched
- 3767 Communication Terminal
 - Treated as a 2740 Communication Terminal (model 1 or 2) or as a 2741 Communication Terminal
- System/7
 - Supported as a 2740-1
 - Checking
 - Dial with checking
 - Station Control with Checking
- Communicating Magnetic Card Selectric® Typewriter
 - Point-to-point switched (appears identical to 2741)

With Binary Synchronous Terminals

- 3270 Information Display System
 - Multipoint nonswitched
 - Point-to-point switched (3275 only)
- 3735 Programmable Terminal
 - Switched
 - Multipoint
- 5110 Computer (as a data mode CPU)
 - Point-to-point (switched or nonswitched)
 - Multipoint tributary
- 5231 model 2 (supported as a 3741 model 2 or 4)
 - Point-to-point switched or nonswitched

SYSTEM CONTROL PROGRAMMING

System/3 Model 15 SCP (cont'd)

- 3741 Data Station model 2 and 3741 Programmable Workstation model 4
 - Point-to-point (switched and nonswitched)
 - Multipoint tributary
- 5280 Distributed Data System
 - Point-to-point (switched and nonswitched)
 - Multipoint tributary
- Series/1
 - Point-to-point (switched or nonswitched)
- System/3
 - Point-to-point nonswitched or switched
 - Multipoint control station
 - Multipoint tributary
- System/7
 - Point-to-point nonswitched or switched
 - Multipoint tributary
- System/32
 - Point-to-point nonswitched or switched
 - Multipoint tributary
- System/34
 - Point-to-Point nonswitched or switched
 - Multipoint tributary
- System/360 and System/370
 - Point-to-point nonswitched or switched
 - Multipoint with System/3 as tributary

In addition to controlling the terminals previously listed, the System/3 operates as a tributary terminal (BSCA only) to a host System/360 or System/370. In this configuration, the System/3 is a sub-host controlling terminals and is itself a terminal to another system.

Refer to the "Terminal Support Chart" in the System/3 model 15 CCP programming pages for more information.

Terminals equivalent to those listed may also work, but the user must establish the equivalency, and IBM assumes no responsibility for impact of changes made to programming support.

COMPATIBILITY

The System/3 model 15 Communications Control Program is upward compatible with the Communications Control Program for the model 4 (5703-SC1, feature #6033), for the model 8 and 10 (5702-SC1, feature #6033) or for the model 12 (5705-SC1, feature #6070). The interface between the system and the operator is different than that of the model 4, 8, 10 or 12.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: In addition to the minimum system requirements of the SCP, the Communications Control Program requires one of the following: MLTA (RPQ S40028) or BSCA or BSCC or LCA or Display Adapter (#4601). In addition, at least one communications terminal of a type listed under "Terminals and Features Supported" must be included.

SOFTWARE REQUIREMENTS

Generation and execution of the model 15 Communications Control Program requires System/3 model 15 System Control Programming. If the MLTA is to be supported, the MLTA IOCS must be available.

No special programming system requirements exist for the running system assignments. For the preparation of application programs, an applicable compiler or assembler is required.

DOCUMENTATION
(available from Mechanicsburg)

CCP System Reference Manual (GC21-7620) ... CCP Programmers Reference (GC21-7579) ... CCP System Operator's Guide (GC21-7619) ... CCP Terminal Operator's Guide (GC21-7580) ... CCP General Information (GC21-7578) ... CCP System Design Guide (GC21-5165) ... System/3 Bibliography (GC20-8080).

Table 1: Devices Supported by System/3 Model 15 CCP

	System/3-15 Communications Interface			
	Display Adapter	BSCA	BSCC (15D only)	MLTA
1050 Data Communication System				X
2740 Communication Terminal model 1				X
model 2				X
2741 Communication Terminal				X
3270 Information Display System (see Table 2)	X	X	X	X
3600 Finance Communication System		X	X	X
3735 Programmable Buffered Terminal		X	X	
3741 Data Station model 2		X	X	
3741 Programmable Workstation model 4		X	X	
3767 Communication Terminal				X
5100 Portable Computer				X
5230 Data Collection System (5231 Controller model 2)		X	X	
5280 Distributed Data System Communicating Magnetic Card		X	X	
Selectric Typewriter				X
System/3		X	X	
System/7		X	X	X
System/32		X	X	
System/34		X	X	
System/360		X		
System/370		X		

Notes:

- MLTA is mutually exclusive with BSCC.
- Display Adapter is mutually exclusive with BSCA-2.
- LCA is mutually exclusive with BSCA-1.

Table 2: 3270 Devices Supported by System/3 Model 15 CCP

	System/3-15 Communications Interface			
	Display Adapter	BSCA	BSCC (15D only)	3270 Control Units
				3271 3274 3276
3271 Control Unit mdl 1		X	X	X
mdl 2		X	X	X
3274 mdl 1C Control Unit		X	X	X
3275 Display Station (nonsw) mdl 1		X	X	X
mdl 2		X	X	X
3275 Display Station (switched)		X		
3276-2 Control Unit		X	X	X
3277 Display Station mdl 1		X		X X
mdl 2		X		X X
3278-2 Display Station				X X
3284 Printer mdl 1	X			X X
mdl 2	X			X X
3286 Printer mdl 1	X			X X
mdl 2	X			X X
3287 Printer mdl 1	X			X X X
mdl 2	X			X X X
3288 Line Printer mdl 2	X			X X
3289 Printer mdl 1				X X
mdl 2				X X

SYSTEM CONTROL PROGRAMMING

**SYSTEM/3 MODEL 12
SYSTEM CONTROL PROGRAMMING
5705-SC1**

PURPOSE

The System/3 model 12 System Control Programming (SCP) consists of Disk System Management and System Utility Programs. These programs perform the system's control functions. They are supplied by IBM with the system at no additional charge.

DESCRIPTION

Program Residence: The SCP and libraries must reside on a 3340 Direct Access Storage Facility (DASF). These programs are stored in special areas on a 3340 data module called 5440 simulation areas. Each simulation area is large enough to contain data from one 5540 Disk Cartridge (2.45 million bytes). Two simulation areas on a data module mounted on 3340 Drive 1 can be used by system programming and are referred to as R1 and F1. Two simulation areas on a data module mounted on Drive 2 can be used by system programming and are referred to as R2 and F2. Use of these areas for program residence is the same as on an actual 5444 Disk Storage Drive.

System residence (pack from which Initial Program Load occurs and which contains the SCP library) must be on Drive 1 of a 3340 DASF. Libraries on the 3340 store object programs, source programs and Operation Control Language (OCL) procedures; the user libraries may reside on either Drive 1 or Drive 2 of a 3340 DASF. Data files reside in the main data area (40.8 million bytes per drive) of a 3340 data module.

Disk System Management: The Disk System Management consists of a supervisor, scheduler and data management facilities for operation and support of the system and for execution of user programs.

HIGHLIGHTS

- Automatic job-to-job transition.
 - Selective retrieval of object programs, source programs, and procedures from libraries on disk.
 - Execution of programs by using catalogued procedures - OCL procedures can be catalogued in the library and called by the scheduler at execution time.
 - Support of ROLLOUT/ROLLIN capability - The ability to roll out a program during its execution, bring in an inquiry program to be executed and upon its completion, restart the original program. ROLLOUT/ROLLIN is supported by RPG II and FORTRAN, and is available to Assembler users; it is not supported for COBOL, Sorts, CCP, Utilities and System Control and Utility Programs. To use ROLLOUT/ROLLIN, a 5471 Printer-KeyBoard is required. ROLLOUT/ROLLIN is supported in Program Level 1 only.
 - Support of Checkpoint/Restart capability - The ability to write checkpoint records when using problem programs that have Checkpoint/Restart capabilities* (such as COBOL). Restart provides the facility to resume the execution of programs from the last checkpoint rather than from the beginning, if processing is terminated for any reason (except controlled cancel) before the normal end of job. Checkpoint/Restart is supported in Program Level 1 only.
 - * The Tape Sort Program supports Checkpoint/Restart but uses its own routines rather than the system routines.
 - Support of Dual Program Feature (DPF) - DPF allows two programs to reside in main storage at the same time. An expanded version of the supervisor controls program initiation, execution, and termination asynchronously in each of two main storage areas called program levels. Except for the 3340 DASF and the 5471 Printer-KeyBoard, both program levels cannot use the same device at the same time. (Through the use of Print Spooling, the printer can serve both program levels.) Disk data files may be shared, but only one program level may write to a shared file. The 5471 Printer-KeyBoard may be used by both program levels for either object program input/output of data, or operation control information. The Library Maintenance Program, the Macro Processor of the SCP (5705-SC1), the Basic Assembler (5705-AS1), and the Auto Report facility of RPG II (5705-RG1) will not run in the Dual Program mode but can run in a dedicated mode with the Dual Program Supervisor.
 - Print Spooling - Print Spooling uses the 3340 DASF for intermediate storage of 5203 or 1403 Printer output. It allows a single printer to serve both program levels.
- Print Spooling increases throughput by reducing the time the CPU waits for the completion of printer operations. With spooling, the printer output is performed at disk I/O speed. A job's printed output is stored in a disk area called a print queue, and printed at a later time.
- Print Spooling requires as a prerequisite, either the 5471 Printer-KeyBoard, or the Dual Program feature on the 5412 CPU.

Data Management: Data Management routines provide an interface between the user program and the required data file(s). Data Manage-

ment services are provided for disk, card, printer, diskette, printer-keyboard, and tape files.

Disk Data Management: For data files on the 3340 DASF, the following file organizations are supported: Sequential, Indexed or Direct. Processing of these files can be consecutive, sequential, or random. Split cylinder files are not supported.

Records may span physical disk boundaries (sectors, tracks, cylinders); the user need not be aware of the physical boundaries when writing programs to access the data. The fixed length records may be blocked or unblocked for processing, and the blocking factor may vary from program to program.

The main data area of a 3340 data module may contain a maximum of 1,000 files. A file may be large enough to require more than one disk pack. Multivolume sequential or indexed files may be online or offline. Multivolume direct files must be online. Offline multivolume files are allowed on Drive 2 only.

A simulation area may contain up to 50 files. Indexed and multivolume files are not supported in the simulation areas.

Standard System/3 Disk Labels are mandatory for all disk files. Data and labels are stored as 8-bit bytes on disk.

Tape Data Management: The 3410/3411 Magnetic Tape Subsystem is supported by data management. Magnetic tape is used as a data storage medium only; libraries and programs are not supported on tape, but they can be contained in data files on tape.

The following features are supported by the SCP tape data management routines:

- Fixed- or variable-length records
- Blocked or unblocked records
- Physical block size from 18 bytes to 32K bytes
- Multivolume files
- Unlabeled or labeled (ANSI or IBM Standard labels) tapes (non-standard labels on input will be bypassed)
- Recording format: EBCDIC or ASCII
- Tape Error Statistics

Tape support is functionally equivalent to model 10 tape support.

Card I/O Data Management

5424 MFCU - read 1-96 columns ... punch 1-96 columns ... print ... feed ... deferred punch or print ... stacker select ... single or double buffering ... combined file processing ... 64 EBCDIC characters for read, punch, or print ... same as model 10 support.

1442 - read 80 columns ... punch 1-80 columns ... read card image (column binary) ... feed ... stacker select ... single or double buffering ... combined file processing ... 256 EBCDIC characters for read or punch (except for card image model) ... same as model 10 support.

Printer Data Management

1403 - print 132-character line ... skip to line number before or after print ... space 0, 1, 2 or 3 before or after print ... page overflow detection ... Universal Character Set ... same as model 10 support.

5203 - print 96-, 120- or 132-character line ... skip to line number before or after print ... space 0, 1, 2 or 3 before or after print ... page overflow detection ... Universal Character Set ... Dual Feed Carriage ... same as model 10 support.

Diskette Data Management

3741 directly attached - read 1-128 characters ... write 1-128 characters ... single or double buffering ... 256 EBCDIC characters ... support similar to card I/O support ... for 3741 models 3 and 4, the Application Control Language (ACL), is not supported by data management.

Printer-KeyBoard Data Management

5471 Printer-KeyBoard - read 1-125 characters ... print 1-125 characters ... 64 EBCDIC character set (except minus zero) ... same as model 10 support.

Communications Management: Four communications interfaces are provided: RPG II Telecommunications (BSCA) support, BSCA Multiline/Multipoint (ML/MP) support, Multiple Line Terminal Adapter (MLTA) IOCS, and the Communications Control Program. The Terminal Support Chart shows the terminals supported by each interface. Refer to System/3 model 12 RPG II in the Program Product section for information on RPG II support. The MLTA IOCS is provided as a PSHRPO, (5799-WKH), and the Communications Control Program is an SCP feature (see 5705-SC1, feature #6070).

BSCA Multiline/Multipoint Support: Configurations supported are point-to-point nonswitched, point-to-point switched and multipoint leased line with the System/3 as a multi-dropped terminal or a control station. Also provided is the capability to operate two BSCA lines simultaneously on one System/3. The two BSCAs may have different

System/3 Mdl 12 SCP (cont'd)

configurations. For a list of BSC devices and of the communications modes in which each device is supported (e.g., point-to-point, multipoint, etc.), see page M5412. Support for the 3270 terminals via the Local Display Adapter is also included.

Program counters are maintained on disk to accumulate performance information per BSC line. Counters are logged at CLOSE time. A utility program allows the counters to be displayed.

RPG II Telecommunications Specifications must not be used in the same RPG II program to which subroutines using Multiline/Multipoint support are linked.

For compilation, ML/MP requires the SCP (5705-SC1), including the macros, and an assembler.

3881 Data Management: An SCP subroutine is supplied to perform device control and data management services for the 3881 Optical Mark Reader. The subroutine is used with a user-written RPG II or Assembler program and is functionally equivalent to the model 10 3881 feature.

1255 and 1419 Data Management: SCP subroutines are supplied to perform device control and data management services for the 1255 and 1419 Magnetic Character Readers.

The 1255 Subroutine (SUBR08) and the 1419 Subroutine (SUBR09) are used with a user-written RPG II or Assembler program and are functionally equivalent to the model 15 1255 (SUBR08) and 1419 (SUBR09) SCP support.

Concurrent CE Diagnostics: CE diagnostics for selected devices and functions are distributed with the SCP and generated as a user option. These diagnostic functions can be executed under SCP control in program level 1 while another program is being executed in program level 2.

SYSTEM CONTROL PROGRAMMING

System/3 Mdl 12 SCP (cont'd)

TERMINAL SUPPORT CHART FOR SYSTEM/3 MODEL 15

Terminals Operating with S/3-15	Type Comm (1)	Programming Support				Communication Code (2)					Communication Network (3)			
		RPGII	MLMP	MLTA	CCP	EBCDIC Nor	Tran	ASCII Nor	Tran	PTTC	Point-to-Point Sw	Point-to-Point Nonsw	Multi-Point Trib	Ctrl Stat
1050	SS	-	-	X	X	-	-	-	-	X	X	X	-	X
2740 mdl 1	SS	-	-	X	X	-	-	-	-	X	X	X	-	X
2740 mdl 2	SS	-	-	X	X	-	-	-	-	X	-	X	-	X
2741	SS	-	-	X	X	-	-	-	-	X	X	X	-	-
3767 (Note 7)	SS	-	-	X	X	-	-	-	-	X	X	X	-	X
5100/5110 (Note 8)	SS	-	-	X	X	-	-	-	-	X	X	X	-	-
CMCST	SS	-	-	X	X	-	-	-	-	X	X	-	-	-
S/7 ACC	SS	-	-	X	X	-	-	-	-	X	X	X	-	X
S/360 & 370	BSC	X	X	-	X	X	X	X	-	-	X	X	X	-
S/360 mdl 20	BSC	X	X	-	X	X	X	X	-	-	X	X	-	-
1130 (Note 5)	BSC	X	X	-	-	X	X	-	-	-	X	X	-	-
2780	BSC	X	X	-	-	X	X	X	-	-	X	X	-	-
2770	BSC	X	X	-	-	X	X	X	-	-	X	X	-	-
S/7	BSC	X	X	-	X	X	X	X	-	-	X	X	-	X(4)
2972 mdls 8,11	BSC	-	X	-	-	X	-	-	-	-	-	-	-	X
3735	BSC	-	X	-	X	X	-	X	-	-	X	-	-	X
S/3 mdls 4,6,8, 10,12,15	BSC	X	X	-	X	X	X	X	-	-	X	X	X	X(4)
3270	BSC	-	X	-	X	X	-	X	-	-	X(6)	-	-	X
3741 mdls 2, 4	BSC	X	X	-	X	X	X	X	-	-	X	X	-	X(4)
Series/1	BSC	X	X	-	X	X	X	X	-	-	X	X	-	-
S/32 & S/34	BSC	X	X	-	X	X	X	X	-	-	X	X	-	X(4)
5110	BSC	X	X	-	X	X	X	X	-	-	X	X	-	X(4)
5280 (as a 3741)	BSC	X	X	-	X	X	X	X	-	-	X	X	-	X(4)
5231 mdl 2 (as a 3741)	BSC	X	-	-	X	X	-	-	-	-	X	X	-	X(4)
6670 (as a 2770)	BSC	X	X	-	-	X	X	X	-	-	X	X	-	-

Legend:
 X = Supported
 - = Not Supported

- Notes:
- Type Comm - Type of Communication
 SS = Start/Stop
 BSC = Binary Synchronous Communication
 - Communication Code (as supported by System/3-12)
 Nor = Normal
 Tran = Transparency
 PTTC = Paper Tape Transmission Code
 - Communication Network
 Point-to-Point Switched (Sw)
 Point-to-Point Nonswitched (Nonsw)
 Multipoint, System/3 as a tributary station (Trib)
 Multipoint, System/3 as a control station (Ctrl Stat)
 - Not supported by RPG II
 - Requires no-charge RPO.
 - Only the 3275 (supported by ML/MP)
 - The 3767 is supported as a 2740 model 1 or 2 or a 2741 by CCP.
 - The 5100 is supported as a 2741 by CCP.

System Control and Utility Programs:

These programs allow the user to prepare and maintain modules, and to perform basic functions necessary for the operation of the system. They are:

Library Maintenance Program: Allows the user to produce, maintain, and service the source and object program libraries. The principal functions of the program are as follows:

- Add (or delete) source programs, procedures and object programs to (or from) the user's program libraries.
- Allocate or re-allocate disk space to the libraries.
- Print or punch library contents.
- Copy a part or all of a library from one simulation area to another.
- Copy a module into a library from a diskette (3741 directly attached), card, or disk file (either on the simulation area or main data area).
- Modify entries in the source library.
- Copy a module from a library to a disk file located on the simulation area or main data area.

The Library Maintenance program requires a dedicated system.

Copy/Dump Program: This program supports both file-to-file copies (COPY) and volume-to-volume copies (DUMP).

The 'file copy' routines provide the user with an easy-to-use method of creating a file backup on another disk, diskette, cards, tape, or printer.

Additionally, it provides an easy method of moving files from one location to another, with both file limit modifications and reorganization. The program supports one input and one output per execution. Disk input can be a sequential, indexed, or direct file. A sequential file can be copied to an indexed file, and tape, card and diskette files are supported for input and output. When copying a file, the printer may be specified in addition to tape, card, diskette, or disk output. Records may be deleted from files by specifying a deletion code and position within each record. These deleted records may be printed.

The volume copy function of the Copy/Dump Program copies the main data area from one data module to another (the Simulation Area Program copies the simulation areas).

Simulation Area Program: This program is used to service the simulation areas of a 3340 data module. Copy, clear, move, rename, and display functions are provided.

Dump/Restore Program: Copies an entire main data area (D1, D2) to magnetic tape and restores a main data area from a tape previously created by this program. Copies an entire simulation area (R1, F1, R2, F2) to magnetic tape or diskettes and restores a simulation area from tape or diskettes previously created by this program.

A tape or diskettes created by this program can be used only by this program to restore the disk data at some future time, and can't be accessed as a typical data file.

Spool Writer Program: This program controls the printing of the spooled output and handles Operator Control Command (OCC) requests. The program operates in a program level (or on a dedicated system) and is executed like any other program. The Spool Writer requires, as a prerequisite, either the 5471 Printer-Keyboards, or the Dual Program Feature on the 5412 CPU.

Execution of the program is controlled by the operator, using OCC commands. On a dedicated system (without the Dual Program Feature), commands are entered via the 5471 Printer-Keyboards. On a DPF system, commands are entered via the system input device or the 5471 Printer-Keyboards (optional on a DPF system).

Other Disk Utilities (3340)

Disk Initialization Program - Formats the data module according to disk system management requirements.

Alternate Track Assignment Program - Allows the user to assign an alternate track in place of a defective one and print the data content of the area in error.

Alternate Track Rebuild Program - Permits the user to correct data on the assigned alternate track.

File and Volume Label Display Program - Permits the user to display the entire Volume Table of Contents (VTOC) of either a simulation

System/3 Mdl 12 SCP (cont'd)

area or main data area or the VTOC information pertaining to a single file.

File Delete Program - Is one means for deleting temporary data files from a simulation area or main data area and the only means for the user to delete permanent data files from either a simulation area or main data area.

Re-assign Alternate Track Program - Permits the user to re-assign the location of the alternate tracks on a data module so it can be used on a System/360 or System/370. The module is physically interchangeable, but the data is not.

Recovery Index Program - Permits the user to recover the index of an indexed file following abnormal program termination.

Tape Utilities (3410/3411)

Tape Initialization Program - Allows the users of magnetic tape to create and delete standard tape volume labels, check for unexpired files and to display existing volume and data file labels.

Tape Error Summary Program - Prints magnetic tape error statistics that have been accumulated during processing.

Overlay Linkage Editor: The Overlay Linkage Editor creates loadable programs from multiple relocatable modules. Output from the Overlay Linkage Editor may be cataloged in the object library and/or punched into cards or written on a diskette. Overlay structures may be created automatically or as designated by the user from relocatable program modules. The Overlay Linkage Editor is used by the COBOL and FORTRAN Compilers, by the Basic Assembler Program, and by the System Generation procedures. (RPG II uses its own Linkage Editor.)

System Generation: When a user installs a system, System Generation (SYSGEN) is performed to create a supervisor and data management support for the particular configuration, and to include the program products the user has ordered. During system generation, the source library and object library are established. The characteristics of the required spooling support are also defined.

Macros: Macros provide data management and input/output support for the control of input/output services through an assembler language. The I/O services are available to users of an assembler language through the macro processor in conjunction with the disk system input/output service macros. The keyword macro statements coded by the user are expanded by the macro process or using the macro prototype definitions. The expanded code is in a form that can be processed by an assembler.

Macros provide system services, general I/O support, unit record device support, disk device support, tape device support, and communications support.

SCP Main Storage Requirements

Supervisor Requirements: The minimum main storage requirement for the supervisor on the model B16 (32K), B17 (48K), and B18 (64K), is 7.2K bytes. For the C19 (80K) and C20 (96K), the minimum main storage requirement is 8.8K bytes. The minimum supervisor on both the B-models and the C-models supports the following configuration:

- 3340 DASF model C2
- 5203 or 1403 Printer
- 5424 MFCU or 1442 Card Read Punch

For the Dual Program Feature, on the B-models, add 0.9K bytes; on the C-models, the minimum supervisor supports the Dual Program feature.

For print spooling support on the B-models, add 4.8K bytes for one program level, or 6.1K bytes for two program levels; on the C-models, add 5.1K bytes for one program level, or 6.4K bytes for two program levels.

Additional supervisor main storage is required, on any model, to support:

BSCA-2 or ICA or LDA and/or MLMP:	0.3K bytes
3410/3411 Magnetic Tape Subsystem:	0.7K bytes
5471 Printer-Keyboard:	0.3K bytes
3741 Data/Programmable Workstation, directly attached:	0.6K bytes

Additional supervisor main storage is required, on C-models using CCP, for a CCP intercept routine: 0.5K bytes.

When calculating the main storage requirements for program level 1 on any model or for program level 2 on B-models, the supervisor size (including optional print spooling) must be rounded up to the nearest multiple of 0.25K bytes.

When calculating the main storage requirements for program level 2 on the C-models, the supervisor size (excluding any spooling support) must be rounded up to the nearest multiple of 2.0K bytes.

System Control and Utility Programs

	Minimum Program Level
Library Maintenance Program	8K*
Copy/Dump Program	8K*
Simulation Area Program	8K*
Dump/Restore Program	8K
Spool Writer Program	8K
Disk Programs	
Disk Initialization	8K
Alternate Track Assignment	8K
Alternate Track Rebuild	8K
File and Volume Label Display	8K**
File Delete	8K
Recover Index	10K*
Reassign Alternate Track	8K
File Compress	10K*
Recover Index	10K
Tape Programs	
Tape Initialization	8K
Tape Error Summary	8K
Overlay Linkage Editor	8K
Macro Processor	12K*

* These programs use additional storage, if available.

** 8K for simulation areas; 10-18K for main data areas. Total memory required is a function of the number of files and the use of the SORT function.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: As a minimum, the System Control and Utility Programs require a configuration of the IBM System/3 model 12 which includes an IBM 5412 Processing Unit model B16 (32K) ... an IBM 3340 DASF ... an IBM 5203 or 1403 Printer ... and an IBM 5424 MFCU or an IBM 1442 Card Read Punch or a directly-attached IBM 3741 Data Station/Programmable Workstation. Additionally, a C19 or C20 Processing Unit requires the Dual Program feature (#3500) for IBM Programming Systems Support.

SCP services are also provided for the IBM 3410/3411 Magnetic Tape Subsystem ... the IBM 5471 Printer-Keyboard ... and the IBM 3881 Optical Mark Reader model 1... the IBM 1255 Magnetic Character Reader model 1, 2 and 3... and the IBM 1419 Magnetic Character Reader model 1 (requires an RPQ on the 1419).

SOFTWARE REQUIREMENTS (None)

DOCUMENTATION

(available from Mechanicsburg)

System/3 Model 12 Introduction (GC21-5116) ... System/3 Model 12 System Control Programming Reference Manual (GC21-5130) ... System/3 Model 12 User's Guide (GC21-5142) ... System/3 Multiline/Multipoint BSC Reference Manual (GC21-7573) ... 3881 Optical Mark Reader Model 1 Program Reference and Logic Manual (GC21-5103) ... Tape Program Planning Manual (GC21-5040) ... System/3 Models 12 and 15 1255 and 1419 Magnetic Character Readers Reference and Program Logic Manual (GC21-5132) ... System/3 Bibliography (GC20-8080).

MULTI-LEAVING REMOTE JOB ENTRY WORKSTATION PROGRAM

Feature #6001

PURPOSE

Permits a System/3 Disk System equipped with an Integrated Communications Adapter (remote only) or a Binary Synchronous Communications Adapter with EBCDIC (Text Transparency optional) to function as a MULTI-LEAVING Remote Job Entry Work Station communicating over a point-to-point (switched or non-switched) line to a S/360 or S/370. MRJE/WS operates with one of the following:

- HASP II (Version 3.1 or 4.0)
- ASP (Version 2.6 or 3.1)
- Remote Entry Services (RES) of JES under OS/VS1
- MULTI-LEAVING Workstation facilities of JES2/JES3 under OS/VS2
- Remote spooling capability of VM/370 (RSCS)

DESCRIPTION

Any job which can be entered into the central system from locally attached, similarly-functioned I/O devices can be entered from the System/3 MRJE Workstation. Workstation input may be read from the 5424 MFCU, the 1442 Card Read Punch, the directly-attached 3741 Data Station/Programmable Workstation, the 3340 Direct Access Storage Facility, the 5471 Printer-Keyboard, the 3410/3411 Magnetic Tape Subsystem or from a combination of these devices. Operator

System/3 Mdl 12 SCP (cont'd)

messages may be directed to either the System/3 printer or the 5471 Printer-Keyboard.

Output data sets may be directed to the System/3 printer (5203 or 1403 both of which can be spooled), the 5424 MFCU, the 1442 Card Read Punch, the directly attached 3741 Data Station/Programmable Workstation, or written to disk or magnetic tape. Output may be returned to the submitting work station or routed to another workstation or directed to local central system I/O devices.

All files created by the MRJE/WS program are standard System/3 consecutive files and may be accessed by user-written RPG II, COBOL, FORTRAN and Assembler Programs, or by the Copy/Dump program. Also, the MRJE/WS Print Utility can be used to print data which was directed to disk or tape data sets during an MRJE/WS session.

When using the MRJE/WS Program, the following restrictions apply:

- Column binary is not supported.
- Reading or punching of OS object decks requires the BSCA Text Transparency feature and a 1442 Card Read Punch.
- Input record lengths may be greater than 96 bytes; however, the input file will be transmitted to the host central as 80-byte records, and it will be the users' responsibility to regroup the data.
- Print records which exceed the print positions of the System/3 printer will be truncated.
- The Workstation Program requires a logging device.

The 5471 Printer-Keyboard is required only if the MRJE/WS is an Inquiry program, or if the MRJE/WS output is being spooled.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: In addition to the minimum requirements of 5705-SC1, this feature requires a Binary Synchronous Communications Adapter (#2074 or #2084) with EBCDIC or the Integrated Communications Adapter (#4645 and #6202). A minimum program level size of 14K bytes is required for execution.

SOFTWARE REQUIREMENTS (5705-SC1)

COMPATIBILITY

The model 12 MRJE/WS program is functionally compatible with the MRJE/WS programs for System/3 model 6, 8 or 10.

DOCUMENTATION

(available from Mechanicsburg)

System/3 MRJE/WS Reference Manual (GC21-7621) ... System/3 Bibliography (GC20-8080).

SYSTEM/3 MODEL 12 COMMUNICATIONS CONTROL PROGRAM Feature #6070

PURPOSE

The Communication Control Program (CCP) provides control program services needed for telecommunications systems. This SCP feature is resident on a 3340 Direct Access Storage Facility and requires the services of the Supervisor and other SCP facilities (5705-SC1).

The services included are:

- High-Level language (COBOL, FORTRAN, and RPG II) access to MLTA, BSCA (including the Integrated Communications Adapter), and Local Display Adapter attached terminals.
- Program Fetch as a result of terminal operator requests.
- Resource Management to reduce contention between programs accessing the same files, provide access to terminals and manage storage available for application programs.
- Concurrent program execution allowing multiple application programs within the available storage.
- Terminal Monitoring to accept data and terminal commands.
- Display Format Facility (DFF) which permits the support of 3270 systems with a minimum of coding in high-level languages.

The Communications Control Program is designed to be an integral part of the SCP. CCP will control program execution in one program level on a system with the Dual Program feature. The minimum main memory requirements for CCP (exclusive of Supervisor requirements) are: 18K, plus 4K for DFF, plus a user program (5K minimum). One to eight programs can run concurrently.

Terminals and Features Supported: The following terminals may be used with the Communications Control Program:

Through the Multiple Line Terminal Adapter (MLTA):

- 1050 Data Communication System
 - Multipoint switched
 - Multipoint nonswitched
- 2740 Communication Terminal model 1
 - Basic
 - Checking
 - Dial
 - Dial with checking
 - Dial with transmit control
 - Dial with transmit control and checking
 - Station Control
 - Station Control with checking
- 2740 Communication Terminal model 2
 - Station Control
 - Station Control with checking
 - Station Control with buffer receive
 - Station Control with buffer receive and checking
- 2741 Communication Terminal
 - Basic
 - Switched
- 3767 Terminal
 - Supported by CCP as a 2740 model 1 or 2 or a 2741.
 - Transparent to MLTA.
- Communicating Magnetic Card Selectric® Typewriter (appears identical to 2741)
 - Point-to-point switched
- System/7 (appears identical to a 2740 model 1)
 - Checking
 - Dial with checking
 - Station control with checking

With the Binary Synchronous Communications Adapter (BSCA), or the Integrated Communications Adapter (ICA):

- 3270 Information Display System
 - Point-to-Point nonswitched
 - Multipoint nonswitched
 - Switched - 3275 only
- 3735 Programmable Terminal
 - Switched
 - Multipoint
- 5231 model 2 (appears identical to a 3741-2, 4)
 - Point-to-point switched or nonswitched
- 3741 Data Station model 2 and 3741 Programmable Workstation Station model 4
 - Point-to-Point (switched and nonswitched)
 - Multipoint tributary
- 5110 Computer (as a data mode CPU)
 - Point-to-point (switched and nonswitched)
 - Multipoint tributary
- 5280 Distributed Data System
 - Switched
 - Nonswitched point-to-point
 - Multipoint tributary
- Series/1
 - Switched
 - Nonswitched point-to-point
- System/3
 - Switched
 - Nonswitched point-to-point
 - Multipoint control station
 - Multipoint tributary
- System/7
 - Switched
 - Nonswitched Point-to-point
 - Multipoint (System/3 is control station)
- System/32
 - Switched
 - Nonswitched point-to-point
 - Multipoint (System/3 is control station)
- System/34
 - Switched
 - Nonswitched point-to-point
 - Multipoint (System/3 is control station)

SYSTEM CONTROL PROGRAMMING

System/3 Mdl 12 SCP (cont'd)

- System/360 and System/370
 - Switched
 - Nonswitched point-to-point
 - Multipoint (System/3 is tributary)

With the Local Display Adapter:

- 3277 Display Station
- 3284 Printer, model 1 or 2
- 3286 Printer, model 1 or 2
- 3288 Printer, model 2

In addition to controlling the terminals previously listed, the System/3 operates as a multipoint tributary (BSCA only) to a host S/360 or S/370. In this configuration, the System/3 is a sub-host controlling terminals and is itself a terminal to another system.

Refer to the "Terminal Support Chart" in the model 12 SCP section for more information.

Terminals equivalent to those listed may also work, but the user must establish the equivalency, and IBM assumes no responsibility for impact of changes made to programming support.

COMPATIBILITY

The System/3 model 12 Communications Control Program is upward compatible with the Communications Control Program for the System/3 model 4 (feature #6033) and for the System/3 model 8 and 10 (5702-SC1, feature #6033). The interface between the system and the operator is different than that of the model 4, 8, or 10.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements: CCP requires an IBM System/3 model 12 which includes as a minimum, an IBM 5412 Processing Unit model B17 (48K bytes) ... an IBM 3340 DASD ... an IBM 5203 or 1403 Printer ... an IBM 5424 MFCU or an IBM 1442 Card Read Punch or a directly-attached IBM 3741 Data Station/Programmable Workstation ... an IBM 5471 Printer-Keyboard ... a Binary Synchronous Communications Adapter or the Multiple Line Terminal Adapter (MLTA) RPQ (RPQs S40028 through S40033) or the Integrated Communications Adapter (#4645) or the Local Display Adapter (#4702) ... and at least one communications terminal of a type listed under "Terminals and Features Supported". Additionally, if CCP is to run on a C-model CPU, that model requires the Dual Program feature (#3500) for IBM Programming Systems Support.

CCP will operate with the Dual Program feature (DPF), however, CCP does not require the DPF to allow more than one program to be executed at a time. Use of the DPF is not prohibited during execution of the CCP, but any program executed in the other program level does not run under control of the CCP. CCP cannot be run in both program levels concurrently.

CCP Device Support (System)

	Generation	Execution
3340 Direct Access Storage Facility model C2	Req	Req
3410/3411 Magnetic Tape Unit model 1, 2 or 3	No	No
5203 Printer, model 1, 2 or 3	Req*	Opt
1403 Printer, model 2, 5 or N1	Req*	Opt
5424 MFCU, model A1 or A2	Opt	Opt
1442 Card Read Punch, model 6 or 7	Opt	Opt
5471 Printer-Keyboard, model 1	Opt	Req
3741 Data Station/Programmable Workstation model 1, 2, 3 or 4 (directly attached)	Opt	Opt
1255 MCR model 1, 2 or 3	No	No
3881 OMR model 1	No	No

* Either a 5203 or 1403 Printer is required during CCP generation.

SOFTWARE REQUIREMENTS

Generation and execution of the model 12 Communications Control Program requires IBM System/3 model 12 System Control Programming (5705-SC1). If the MLTA is to be supported, the MLTA IOCS (5799-WKH) must also be available.

No special programming system requirements exist for the running of system assignments. For the preparation of application programs, an applicable compiler or assembler is required.

Note: While MLTA can run in either program level on the B-model CPU, it can run in only program level one on the C-models.

DOCUMENTATION

(available from Mechanicsburg)

System/3 CCP General Information Manual (GC21-7578) ... System/3 CCP Program Reference Manual (GC21-7579) ... System/3 CCP Terminal Operator's Guide (GC21-7580) ... System/3 Models 10 and 12 CCP System Operator's Guide (GC21-7581) ... System/3 Models 10 and 12 CCP System Reference Manual (GC21-7588) ... System/3 Bibliography (GC20-8080).

SYSTEM CONTROL PROGRAMMING

**SYSTEM/7 PROGRAM PREPARATION FACILITIES
5707-AA1**

PURPOSE

System/7 Program Preparation Facilities provides stand-alone program preparation capability for the System/7. This capability is complementary to the MSP/7 Host Program Preparation Facility II and allows the user to select which of the two methods most suitably meets the user's requirements for System/7 program preparation.

System/7 Program Preparation Facilities provides the following System/7 stand-alone components:

- Disk Support System/7 (5707-AG1)
- Source Library Editor (5707-AE1)
- System/7 Macro Library/Relocatable (MACLIB/R) (5707-AC1)
- System/7 Macro Assembler (ASM/7) (5707-AD1)
- System/7 Linkage Editor (LINK/7) (5707-AF1)
- System/7 Procedure Library (5707-AB1)

System/7 program preparation can also be provided concurrently with an application via the online batch facility (EXECUTIVE/7).

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

Minimum System Requirements for the System/7 Program Preparation Facilities include:

- IBM 5010 Processor Module with a minimum of 12K words of storage for program preparation offline and a minimum of 20K words of storage for program preparation online. (Cycle Steal Disk is strongly recommended when using online program preparation facilities.)
- IBM 5022 Disk Storage Module model 1 or 2 (2 platter).
- 5028 Operator Station.

Support is also included for the IBM 129 Card Data Recorder, 7431 Serial Printer, 2502 model A2 Card Reader and the Line Printer available with the IBM 5024 I/O Attachment Enclosure. These devices should be considered for ease of use and performance improvements. The nucleus provided must be reassembled if support for the IBM 5496 Data Recorder is desired. The 5496 is supported only as an input/output source device.

Emulated 5022s on an IBM 3348 Data Module are supported: However, the minimum system configuration when using the IBM 3340 Direct Access Storage Facility (DASF) is 28K words of storage.

SOFTWARE REQUIREMENTS (None)

The group order number, 5707-AA1, provides all modules of the System/7 Program Preparations Facilities.

- System/7 Program Preparation Facilities (5707-AA1)
- System/7 Procedure Library** (5707-AB1)*
- System/7 Macro Library/Relocatable*** (5707-AC1)*
- System/7 Macro Assembler (5707-AD1)*
- System/7 Source Library Editor (5707-AE1)*
- System/7 Linkage Editor (5707-AF1)*
- System/7 Disk Support for System/7 (8-12K) (5707-AG1)

- * Orderable only under group order 5707-AA1, not orderable separately.
- ** Contains cataloged procedures.
- *** Contains both source and object libraries (\$SYSCODE).

The Disk Support System/7 (5707-AG1) can be ordered separately. The 8K version excludes stand-alone program preparations and is available on tape cassette. The 12K version with stand-alone program preparation is available on 5440 only.

**SYSTEM/7 PROCEDURE LIBRARY
5707-AB1**

PURPOSE

The Procedure Library contains predefined catalog procedures to support stand-alone program preparation via the System/7 Program Preparation Facilities. The procedures are shipped as part of 5707-AA1. The user may add procedures to this library as required.

**SYSTEM/7 MACRO LIBRARY/RELOCATABLE
5707-AC1**

PURPOSE

Macro Library/Relocatable provides MSP/7 support macros to operate in the Linkage Editor and TASKING environment. Functions include:

DESCRIPTION

Specification Macros

- Environmental characteristics.
- Physical and operational characteristics of the system.

System Macros

- System Initialization.
- Start timers, prepare feature modules for operation, etc.
- Timer control functions that provide for program timers, time-of-day clocks, and scheduling of periodic program execution.
- Two-way communication between operator and system through the Operator Station printer-keyboard.
- Program checkout and debugging facilities providing storage dump, snapshot dump, and storage patch via printer/keyboard or paper tape.
- Error recovery to handle machine check, power failure, and program check interrupts.

Access Macros: Macros to control the functions of Digital, Analog and Operator Station input/output. These include interrupt handling and error recovery routines.

• 2790 Control Support

- Macros allowing use of the System/7, with 2790 control, as the system controller for 2790 system units. (Supports one to four 2790 Controls per System/7.)
- Macros for area station and attached device definition, building Transaction Control List, and Data Entry Unit List.
- Units supported include: 2791 Area Stations ... 2792 Remote Communications Controller ... 2793 Area Stations ... 2795 Data Entry Unit ... 2796 Data Entry Unit ... 2797 Data Entry Unit ... 2798 Guidance Display Unit ... 1053 Output Typewriter ... 1035 Badge Reader.
- Online Diagnostics for both area stations and 2792. Invokable from any local or remote area station or from 5028 or 2792. Prerequisite for systems with 2792, more than 16 area stations, or when system availability is critical. The 2790 online diagnostics may reside either on disk or in storage. If disk resident is specified, the 2790 diagnostics will be loaded into a partition when required. The disk-resident version requires the partition queuing facilities.

• Asynchronous Communication Control Support

- Macros to initiate and control data transfer via the asynchronous communication adapter.
- A transparent data scheme to permit the transfer of load modules to the System/7 for execution or punching to paper tape.
- Macros to simulate 2740 model 1 terminal with error checking, which allows System/7 to send and receive data under control of DOS/VS BTAM, QTAM, and VSAM; OS/VS BTAM, TCAM, and VTAM.

• Binary Synchronous Communications Adapter Support via the Communications Access Method.

The BSCA feature allows remote connection of a System/7 as a processor terminal to:

- S/370 models 115, 125, and 135 (via the Integrated Communications Adapter).
- S/370 models 115 or larger (via a 2701, 2703, 3704, or 3705).
- System/3 model 6, 10 or 15 (via the System/3 BSCA).
- Another System/7 (via the BSCA).
- System/32 (via the System/32 BSCA).

Both EBCDIC and ASCII transmission codes are supported under software control. Transparent mode is standard but allowed only with EBCDIC. Note: S/370 model 135 ICA will not allow transparent and non-transparent code support on the same line.)

Communication may be over any 2- or 4-wire links on point-to-point (switched or nonswitched) or multipoint configurations. In point-to-point configurations, the System/7 is supported as a processor terminal. In a multipoint configuration, System/7 is supported as a tributary station only with no multipoint central capability available. Transmission is half duplex, and data transfers in and out of System/7 storage are by means of a direct storage access mechanism on a cycle stealing basis.

The System/7 BSCA provides the capability of remote initial program load (IPL) from another system. Initiation of the IPL is controlled by the remote system. A System/7 can be IPL'd from a remote system when it is configured as a processor terminal on a point-to-point switched line or as a tributary station in a multipoint

System/7 Program Preparation Facilities (cont'd)

configuration. The IPL message is transmitted in transparent EBCDIC only.

The System/7 BSCA is supported as a BSC terminal by: BTAM under DOS/VS; BTAM and TCAM under OS/VS1 and OS/VS2; 3704/3705 emulation mode; System/3 Multiline/Multipoint (ML/MP), RPG II and Communication Control Program (CCP).

Other Function Macros

- Data conversion macros
- Multiply-Divide
- Square Root
- Simultaneous Disk Services
- Dynamic Buffer Management
- Variable-Length Character Manipulation
- Double-Word Integer Arithmetic

Basic Disk Support Macros

- Seek, Read, Write, and Write-Verify functions.
- Multiple sector operations, including cylinder overflow support.
- Multiple 5022 Modules are supported. (Seeks may be overlapped.)
- Error handling routines.

Symbolic File Support Macros

5022 Disk Module

- System/3 compatible, Volume Table of Contents (VTOC).
- Directorized data sets with sub-allocation of data set space into subdata sets called members.
- Programs stored to disk as members of a directorized data set.
- Data sets comprised of one or more tracks, members comprised of one or more sectors.

3340 Direct Access Storage Facility (DASF)

- S/370-Compatible Volume Table of Contents (VTOC)
- Each 3348 data module can emulate multiple 5022 disk modules (emulation by programming)
- Emulated 5022s support all functions provided by Symbolic File Support (SFS) for 5022 Disk Modules.
- New Direct Access Method for 3340 on System/7 (NDAM/7) compatible with OS/VS and DOS/VS, and S/370 DOS/VS. Can be created, written into, and read from by System/7, S/370 OS/VS, and S/370 DOS/VS.
- All models of the 3348 Data Module are supported, including the fixed head data area.

Support provides:

- Storage Resident (non-disk support) and Disk Resident Versions (full support).
- Access routines to load data sets or members
- OPEN routine to locate data sets or members and make available for access.
- Access routines to SEEK, READ, WRITE, GET, PUT data sets or member records.
- CLOSE routines to make data sets or members unavailable for access.
- Retrieval and execution of program members via @FETCH macro.
- Programs which are FETCHed into storage may contain a single overlay area defined at link-edit time by Link/7 for loading called routines.

Access routines support:

- Basic Access Method - Access to data sets or members by relative sector number. One request allows read and write of multiple sectors across track and cylinder boundaries.
- Direct Access Method - Access to fixed-length records of data sets or members randomly by relative record number. GET and PUT of records also provides for sequential input/output of records (record number is incremented by one after each access).
- Program Access Method - Supports the loading and retrieval of a program to a program member already defined under the Disk Support System.
- Variable Segment Access Method - Access to variable-length records as if they were on a sequential device. Provides for backspace of records, rewind of data set, etc.
- Sequential Access Method - Provides sequential device independent I/O for 5022 disk, 129 and 5496 data recorders. 7431 serial printer, 5028 operator station, and the 2502 Card Reader and Line Printer available with the 5024 I/O Attachment Enclosure.
- New Direct Access Method - (NDAM/7). Access to data sets organized in a 370-compatible format. Method used is direct, fixed length (within a data set), unblocked, relative record access.
- Communications Access Method - Supports BSCA at the logical (GET/PUT) record level and the physical record (READ/WRITE) level.

The allocation of disk space and the use of the OPEN facility allows the user to reference a data area on disk by symbolic name rather than disk address. OPEN logically connects a disk data area to the symbolic name referenced in the application program and can be either within the program at assembly time or in conjunction with the Disk Support System at the time the program is loaded for execution.

Note: System/3 - System/7 data interchange

- System/3 to System/7: System/3 files (data sets) marked as Direct Indexed and Consecutive may be read on the System/7 using the Basic Access Method or the Direct Access Method.
- System/3 files (data sets) marked as Variable-Length Spanned Unblocked Sequential may be accessed on the System/7 using Basic Access Method or the Variable Segment Access Method. System/7 FORTRAN uses VSAM and DAM.
- System/7 to System/3: System/7 data sets marked as Direct (built by the Direct Access Method) may be opened by System/3 data management and accessed as a consecutive or direct file. System/7 data sets marked as variable sequential (loaded by the Variable Segment Access Method) may be accessed by System/3 data management as a variable consecutive file. System/3 FORTRAN uses both direct and variable sequential files. The System/7 directorized data sets and members of directorized data sets are not available to System/3 Support Facilities.

Message Buffering Facility: A facility which provides for routing of text messages to symbolic devices with independent disk buffering of messages, and on line operator and program control of the devices. Data sets on a 5022 Disk Module or in an emulated 5022 on a 3348 Data Module can be used for disk buffering.

Output devices supported include 1053 Printer (on 2790 only), 7431 Matrix Printer, 129 Card Data Recorder, 5496 Data Recorder, 5028 Operator Station, Binary Synchronous Communications Control (feature #2074 on 5010), the Asynchronous Communications Control (feature #1610 on 5010), and the line printer available with the 5024 I/O Attachment Enclosure.

Data Interchange Facility: A program for data transmission, via BSCA, between a System/7 and a System/3, System/32, S/370 or another System/7. The program runs in a partition of a user-generated MSP/7 Release 9 system and will operate in the following manner.

- Single Partition - Data Interchange Facility is the only job running.
- Multiple Partition - Data Interchange is running with other realtime jobs and/or a batch job.
- Data Interchange Facility must be loaded into a realtime partition.
- Data is transferred to/from a System/7 disk file. Data sets on a 5022 Disk Module or in an emulated 5022 on a 3348 Data Module can be used for disk buffering.
- The user is required to write a communication program for the host system (System/3, System/32, S/370 or another System/7).

The programming interface information that is required by the user to write a host program is documented in the System/7 publication *MSP/7 Macro Library/Relocatable: Coding the I/O Macros* (GC34-0020). In addition, sample RPG II T/P programs for the System/3 and the System/32 are included in this manual. These sample programs illustrate the host program requirements for the System/3 or the System/32 to communicate with a System/7 that is using the Data Interchange Facility.

Online Batch Facility (EXECUTIVE/7)

- Concurrent execution of batch programs including program preparation with realtime operations.
- Storage protection of realtime programs from online batch processing.
- Interactive or unattended mode for online batch processing.
- Automatic clearing of online batch programs from the card reader when errors occur (unattended mode).
- Priority queuing by hardware level of 5022 Disk I/O requests.
- @RELEV macro which releases current level for execution of other programs on the same level.
- Establishment and processing of a permanent system REFER library supporting both realtime and batch programs.

Partition Queuing Facilities

- Facility for a generated storage load to be subdivided into separate areas called partitions to effectively utilize storage.
- Ability to operate online batch in a partition.
- Batch Save/Restore facility to preempt and utilize the batch partition.

SYSTEM CONTROL PROGRAMMING

System/7 Program Preparation Facilities (cont'd)

- Automatic recovery capability that allows the user to specify the program that will be executed after a power failure as well as the partition in which it will be executed. Power Failure Detect (#5731) is required on the 5026 Enclosure in order to use this facility.

TASKING

MSP/7 Support Macros provide facility:

- To ensure serial use of a non-reentrant program.
- To maintain registers and work area after program suspension and reactivation.

WAIT/POST Macros: The program WAITING for the completion of an event can relinquish control and free its interrupt level for other use. The WAIT/POST Macros:

- Save registers in dynamically allocated storage.
- Automatically restore register contents and reactivate the supported program when completion of the event is POSTED.
- Facilitate overlap of processing with input/output operations.

**SYSTEM/7 MACRO ASSEMBLER (ASM/7)
5707-AD1**

PURPOSE

ASM/7 is a System/7 Language Translator that translates symbolic instructions into machine language instruction, assigns storage locations, and performs auxiliary functions necessary to produce executable machine language programs. In addition, ASM/7:

- Produces object modules suitable for input to the storage load formatting utility or the Linkage Editor.
- Allows user macros.
- Provides conditional assembly instructions.

Minimum system requirements in the minimum configuration required by the stand-alone System/7 Program Preparation Facilities.

**SYSTEM/7 SOURCE LIBRARY EDITOR
5707-AE1**

PURPOSE

The Source Library Editor service program is provided to facilitate entry and manipulation of source data such as FORTRAN and Assembler source, catalog procedures, source PTF application, etc.

**SYSTEM/7 LINKAGE EDITOR (LINK/7)
5707-AF1**

PURPOSE

The Linkage Editor combines separately assembled or compiled object modules into a load module suitable for input to the storage load formatting utility of DSS/7 and subsequent execution. It also combines previously edited load modules with each other or with object modules.

HIGHLIGHTS

In addition to its primary function of linking or combining of program modules, the Linkage Editor:

- Incorporates program segments from a library into load modules, either automatically or upon request.
- Aids in construction of overlay program segments.
- Aids program modification by replacing program segments.
- Allows the user to define a single overlay area in each partition for subroutines to be loaded-on-call.

Minimum system requirements is the minimum configuration required by the stand-alone System/7 Program Preparation Facilities.

**DISK SUPPORT SYSTEM/7
5707-AG1**

PURPOSE

This version of DSS/7 is an extended version of the 4K DSS/7. In the 8-12K environment, support is provided for the 5022 Disk, the 129 Data Recorder, the 7431 Serial Printer and the 5028 Operator Station via the Sequential Access Method. This provides device independence and permits the user to alter device assignments at execution time. In an 8K System/7 the user can execute service programs which do not require device support beyond the 5022, 129, 7431, or 5028. In addition to these devices DSS/7 also supports the 2502 model A2 Card Reader and the Line Printer available with the 5024 I/O Attachment Enclosure. This DSS/7 support requires a 5010 E processor.

DSS/7 utilizes an enhanced command language which permits the:

- Loading and execution of the System/7 Program Preparation Facilities
- Loading and execution of user programs (non-real time)
- Loading and execution of a complete storage load (realtime)

- Loading and execution of disk resident service programs
- Accessing and execution of predefined catalog procedures
- Association of symbolic file names with physical devices
- Establishment and processing of a permanent system REFER library supporting both realtime and batch programs
- Passing of parameter information
- Selection of alternate command language input streams

The MSP/7 service programs provided include:

- Device Independent Copy
- Disk to Print
- Disk Delete, Rename Data Set or Member
- Define Data Set or Members
- Disk Initialize
- Disk Patch
- Define Auto Restart
- Service Program Monitor
- Load Module Formatting

Also, the stand-alone program preparation components execute as service programs in the 12K DSS/7 environment. With additional storage, program preparation, service programs, and user batch programs can be supported online concurrently with realtime programs. The user is responsible for generating a storage load supporting online batch operations.

DOCUMENTATION

(available from Mechanicsburg)

Understanding MSP/7 (GC34-0027) ... MSP/7 Binary Synchronous Communications: Program Logic Manual (GY34-0012) ... IBM System/7 Macro Assembler: Program Logic Manual (GY34-0013) ... IBM System/7 Linkage Editor: Program Logic Manual (GY34-0014) ... IBM System/7 Source Library Editor: Program Logic Manual (GY34-0015) ... IBM System/7 Disk Support System (DSS/7): Program Logic Manual (GY34-0011) ... IBM System/7 Macro Library/Relocatable: Program Logic Manual (GY34-0010) ... IBM System/7 Symbolic File Support (SFS): Program Logic Manual (GY34-0018) ... MSP/7 Subject Guide (GC34-0035).

**MSP/7 DISK SUPPORT SYSTEM (DSS/7)
5707-SC2****PURPOSE**

The MSP/7 Disk Support System is a group of IBM-supplied programs which reside on the 5022 Disk Storage Module and provide program initiation capability using the 5028 Operator Station, and service programs to support disk organization and maintenance. The Disk Support System supports both Direct Program Control and Cycle Steal 5022s.

DESCRIPTION

This version of DSS/7 (5707-SC2) requires a 4K System/7 and does not support System/7 Program Preparation Facilities. The 8-12K version of DSS/7 (5707-AG1) is required for program preparation.

Operator Station commands allow:

- Load and execution of IBM-supplied disk-resident support service programs.
- Load and execution of disk-resident user programs.
- Association of symbolic file names to disk data sets or members at IPL time (requires symbolic file support macros).

Disk Support Service Programs:

- The Disk Initialization Service Program (\$UDINT) Formats the Disk Volume ... Performs Surface Analysis ... Performs alternate track assignment or deassignment ... Verifies Disk Data.
- The Designate Restart Service Program (\$UDARP) provides support of the Auto-Restart Facility on disk. The restart program is linked to the Automatic IPL Function of the Auto-Restart feature (#5731). The restart program information can also be printed to the Operator Console Printer.
- The Define Disk File Service Program (\$UDEF) provides allocation of disk space into data sets through a System/3 compatible Volume Table of Contents (VTOC) and provides for suballocation of directorized data set space into subsets called members. The utility determines if sufficient space is available and allocates a data set or member. An entry is made in the directory and/or VTOC.
- The Delete Data Set Utility (\$UDDL) deletes or re-names existing data sets or members. The VTOC directory entry is changed optionally, the area formerly occupied by the data set or member may be set to zero.
- The Program Load to Disk Service Program (\$UDLDR) loads programs from paper tape to a disk volume. Output of FORMAT/7 or the 1130 or 1800 Edit program is loaded to a previously defined program member of a Directorized Data Set.
- The Disk Dump Service Program (\$UDDMP) dumps data in hexadecimal representation from the disk to the Operator Station printer. An edited dump of VTOC or the directory of a directorized data set may be requested.
- The Disk Copy Service Program (\$UDCPY) copies data from one disk volume to another disk volume or to another location of the same disk volume. The data copies may be designated by data set name, member name, or absolute disk addresses.
- The Disk Patch Utility (\$UDPAT) allows data stored on disk to be modified by input from paper tape or the keyboard of the 5028 Operator Station.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

Minimum Storage Requirements: To execute the Disk Support System, an IBM System/7 with 4,096 words of storage, an IBM 5022 Disk Module (mdls 1, 2, 3, or 4) and an IBM 5028 Operator Station. The 5022 may be either a Direct Program Control or Cycle Steal (#2664). The IBM 5010 Processor Module must have Cycle Steal Basic (#2662) installed to operate with a Cycle Steal 5022.

DOCUMENTATION
(available from Mechanicsburg)

IBM System/7 Disk Support System (DSS/7): Program Logic Manual (GY34-0011).

SYSTEM/7 HOST MACRO ASSEMBLER (ASM/7)

OS-VS (5744-AB1)
DOS-VS (5747-AB1)

PURPOSE

ASM/7 is a System/7 Language Translator that translates symbolic instructions into machine language instructions, assigns storage locations, and performs auxiliary functions necessary to produce executable machine-language programs. ASM/7 is language compatible with the stand-alone ASM/7.

In addition, ASM/7:

- Produces object modules suitable for input to the storage load formatting utility or the Linkage Editor.
- Allows user macros.
- Provides conditional assembly instructions.
- Supports new instructions for System/7 mdl E processor.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

Minimum System Requirements for Execution on an IBM S/370 Operating Under:

Disk Operating System - Virtual Storage (DOS-VS)

- 14K bytes of storage exclusive of System Control and Basic IOCS.

In addition, ASM/7 requires auxiliary storage as follows:

- Three IBM 2311, 2314/2319, or 3330 disk storage extents as work files, or
- Three IBM 2400- or 3400-series magnetic tape units (either 7-track or 9-track) as work files. The data conversion feature is required for 7-track operation.
- Must be link-edited using the NOREL option and executed in Virtual=Real Mode.

Operating System - Virtual Storage (OS-VS)

- 44K bytes of storage exclusive of data management and supervisor services.

In addition, ASM/7 requires space in auxiliary storage for the following data sets:

- System Input.
- Three Intermediate (work storage).
- Macro Instruction Library (this requirement may be satisfied by DASD system residence or private library).
- Print Output (selectable through JCL).
- Object Module (selectable through JCL).
- Punch Output (selectable through JCL).

SYSTEM/7 HOST LINKAGE EDITOR (LINK/7)

OS-VS (5744-AC1)
DOS-VS (5747-AC1)

PURPOSE

The Linkage Editor combines separately assembled or compiled object modules into a load module suitable for input to FORMAT/7 and subsequent execution. It also combines previously edited load modules with each other or with object modules.

HIGHLIGHTS

In addition to its primary function of linking or combining of host or stand-alone program modules, the Linkage Editor:

- Incorporates program segments from a library into load modules, either automatically or upon request.
- Aids in construction of overlay program segments.
- Aids program modification by replacing program segments.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

Minimum System Requirements for Execution on an IBM S/370 Operating Under:

Disk Operating System - Virtual Storage (DOS/VS)

- 24K bytes of storage exclusive of system control and Basic IOCS.
- Auxiliary storage for at least two intermediate work areas (DASD).

Operating System - Virtual Storage (OS/VS)

- 44K bytes of storage exclusive of data management and supervisory services.

In addition to the standard system residence, the Linkage Editor requires space in auxiliary storage for at least the following data sets:

- System Input.
- One Intermediate (requires DASD).



SYSTEM CONTROL PROGRAMMING

System/7 DSS/7 (cont'd)

- Print Output (selectable through JCL).
- Output Load Modules (requires DASD).

**SYSTEM/7 HOST STORAGE LOAD
FORMATTING PROGRAM (FORMAT/7)
OS-VS (5744-AD1)
DOS-VS (5747-AD1)**

PURPOSE

FORMAT/7 allows the user to generate loadable System/7 storage loads from ASM/7 output. The output storage load can be directed to disk for transmission via the ACCA connection or to cards for later conversion. For the DOS user with a 1018 Paper Tape Punch, the storage load can go directly to paper tape.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

**Minimum System Requirements for Execution on an IBM S/370
Operating Under:**

Disk Operating System - Virtual Storage (DOS/VS)

- 14K bytes of storage exclusive of System Control and Basic IOCS.

Operating System - Virtual Storage (OS/VS)

- 44K bytes of storage exclusive of data management and supervisory services.

**5280 SYSTEM CONTROL PROGRAMMING
5708-SC1****PURPOSE**

System Control Programming (SCP) provides the capability to perform basic functions necessary for the operation of the system. The SCP has been designed for ease of installation and is provided by IBM at no additional charge.

DESCRIPTION

Included in the SCP are:

System Configuration Program: Allows the user to describe the physical and logical configuration of a 5280 system to be used in a specific operating environment. Output of this program is an IPL diskette, which contains user-specified system characteristics.

Execution of the System Configuration Program is an interactive process of responding to displayed prompts to describe the system configuration (for example, keyboard types, number of diskette drives and the number and size of partitions.) This procedure is typically performed during initial installation of the SCP on the user's system, but may be repeated as required, to reflect a change in the system configuration or to change the number and/or size of partitions required for a specific operating environment.

Initial Program Loader: A unique IPL, providing a single partition 'starter' system for any 5280 system. The Initial Program Loader initializes the system for program execution by loading a storage map, tables and common subroutines into main storage.

Programming Maintenance Program: Provides the capability to make program patches, formal changes to IBM programs, replace program modules and display the PTF log number of changes made to a module or the whole system.

Close Failure Recovery Program: Provides the capability for the user to scan a data set and specify an EOD (end of data) record. The program is designed for circumstances, such as power failure, that prevent the normal closing of a data set, which may result in data loss.

SPECIFIED OPERATING ENVIRONMENT

Support will be provided for this licensed program when it is operated in the following specified operating environment:

HARDWARE REQUIREMENTS

The IBM 5280 System Control Programming runs on any IBM 5280 system. Minimum main storage partition size requirements are as follows: For the System Configuration Program - 16K; for the PTF/Patch Program and the Close Failure Recovery Program - 9K.

SOFTWARE REQUIREMENTS (None)**DOCUMENTATION**

(available from Mechanicsburg)

*IBM 5280 System Control Programming Specifications (GC21-7797)
... IBM 5280 System Control Programming Reference/Operation
Manual (GC21-7824).*

SYSTEM/32 SYSTEM CONTROL PROGRAMMING 5725-SC1

PURPOSE

System/32 System Control Programming provides these major capabilities:

- Operation Control Language
- System Utilities
- Data Management
- System History Area
- 2K SCP Main Storage Requirement
- Rollout/Rollin Inquiry
- Overlay Linkage Editor
- System/32 Macros
- Job Stream Support
- 1255 MICR Device Support
- Synchronous Data Link Control (SDLC) as a part of the Systems Network Architecture (SNA)
- Binary Synchronous Communications (BSC)
- Word Processing Feature

DESCRIPTION

Operation Control Language (OCL): System/32 OCL is highly compatible with System/3 OCL with the following exceptions:

- A command statement which has the capability to pass parameters to the indicated procedure is used in place of the System/3 CALL.
- Capability for specifying default values for missing OCL parameters.
- Logical IF statement provides for intelligence within procedures. It is possible to execute different jobs based on tests performed in OCL.
- Other differences brought about by devices and system function.

System Utilities: In addition to the function provided by System/3 SCP Utilities, System/32 also provides a complete set of utilities to copy data, programs and procedures for transferring data from the diskettes and to the disk and vice versa. Procedures, distributed as part of the SCP, allow easier execution of the most frequently desired utility functions by entering a one-statement command. The SCP utilities support the diskette in both 128 bytes per sector and 512 bytes per sector formats.

Data Management: System/32 provides data management support for the disk, the display screen, the keyboard and printing, all of which are functionally equivalent to that provided on System/3 mdl 6. In addition, a new combined buffered data management is provided for the display and the keyboard, which makes the programming of interactive data entry easier. The diskette drive is supported only by Load/Dump utilities.

System History Area: System/32 provides a history area on disk which contains all recently executed OCL statements and all messages issued to SYSLOG. The messages and data may be retrieved and redisplayed on the display or printed. Either all the OCL statements or only those originally displayed may be printed as a hard copy log of the activity of the system.

2K SCP Main Storage Requirement: Only 2K bytes of main storage are required for the supervisor. The remainder is available for user programming.

Rollout/Rollin Inquiry: The user may interrupt a processing program, inquire into a file and return to the processing program. The processing program will be rolled out to disk; the inquiry program will be executed and the processing program will be rolled back into main storage and processing resumed.

Overlay Linkage Editor: The Overlay Linkage Editor Facility converts relocatable object modules, produced by the Basic Assembler and FORTRAN, to executable programs. Overlay structures may be created automatically or as designated by the user.

This facility is not required for Assembler subroutines included in RPG II programs that have been previously assembled.

System/32 Macros: System/32 Macros will provide support to the Assembler user through the Macro Processor for the following System Control Program facilities: Disk functions, printer operation, keyboard and display screen access, Scientific Macros, and binary synchronous communications. The macros themselves provide no capability that is not available elsewhere in the system (for example, RPG II, FORTRAN IV, and System Utilities).

The macros are supplied to provide an interface to existing SCP support for the user who desires to use the Assembler for some purpose, and it is recommended that they be used only to meet those requirements.

Job Stream Support: An SCP command statement reads a prepared job stream, consisting of OCL, source code and data from either cards or diskette into the System/32 library as a procedure. This procedure can then be executed with OCL, source and data being read from the procedure.

1255 MICR Device Support: An SCP subroutine, similar to that provided on System/3 mdls 12 and 15, performs device control and data management services for the 1255 Magnetic Character Reader. The subroutine can be used with user-written RPG II or Basic Assembler programs.

Synchronous Data Link Control (SDLC) as a part of the Systems Network Architecture (SNA): System/32 batch workstation system utility program (SCP) provides data communications capability with a S/370 (mdls 115 through 168) operating under DOS/VS, OS/VS1, OS/VS2, or any of these operating systems when running under VM/370. Attachment of System/32 is with a 3704 or 3705 operating under the Network Control Program/VS (NCP/VS).

These SNA/SDLC utility programs provide communications with the following subsystems:

- POWER/VS
- Remote Entry Services (RES)
- Job Entry Subsystem 2 (JES2)
- CICS/DOS/VS
- CICS/OS/VS
- IMS/OS/VS

Highlights of the batch workstation programs are:

- Batch input (JCL and/or data) from disk storage
- Batch output to either the print facility or disk storage
- Individual printer and 'punch' data sets can be directed to disk storage for creation of permanent individual files.
- Keyboard/display screen combination functions as a console for operator communication.
- Utility program statements may be entered through the keyboard or from a file on disk storage.
- All utility program statements and central system commands and all messages are logged in the System/32 History File.
- Compression and expansion of blanks and duplicate characters (POWER/VS, RES and JES2 only)
- Multiple buffers provided to enhance data transmission.
- Utility program will utilize more than 22K if available.
- Central system programming support is generated specifying 3770 as the supported terminal.

Note: Card I/O, the Mag Card Unit, the 1255 Magnetic Character Reader or the diskette drive cannot be operated within the same program as the Batch Workstation system utility program.

Binary Synchronous Communications: The SCP provides the Binary Synchronous Communications (BSC) data management for System/32 RPG II. For the devices supported, this BSC data management appears the same as the program support provided by the System/3 RPG II Telecommunications feature. A system utility is also provided to select certain communications characteristics at program execution time such as: Line type, terminal address, line speed, error retry count, etc.

Multi-leaving Remote Job Entry Workstation Program (MRJE/WS): The MRJE/WS System Utility program permits a System/32 to function as a remote job entry (RJE) workstation for submission of jobs to a central S/370. The central OS processing is performed under control of one of the following: HASP II, ASP, RES or OS/VS1, JES2, or JES3 of OS/VS2. The System/32 MRJE/WS program will also operate with VM/370 Remote Spooling Communications Subsystem (RSCS) as a HASP Workstation. The workstation program operates under control of the System/32 SCP and communicates with the central system over a point-to-point (switched or nonswitched) communication line via the Binary Synchronous Communications Adapter. Central system RJE programming support should be generated specifying System/3 as the supported terminal.

Highlights of the MRJE/WS Program are:

- Full multi-leaving support permits concurrent System/32 device operation.
- Card I/O operation is simulated by disk storage.

System/32 SCP (cont'd)

- Compression and expansion of blanks and duplicate characters is performed for increased line utilization.
- At user option, the program automatically selects a default for any message requiring an operator response.
- Disk storage is supported for jobstream input and output and for individual data set output.
- A Print Utility program is provided for transferring 'punch' and printer data streams to the print facility which were directed to disk storage during the RJE session.
- MRJE/WS program statements may be entered through the keyboard or from a file on disk storage.
- Keyboard/display screen combination functions as a console for operator communication.
- All MRJE/WS program statements and central system commands and all messages are logged in the System/32 History File.
- MRJE/WS program will utilize more than 14K if available.

Note: Card I/O, the 5321 Mag Card Unit, the 1255 Magnetic Character Reader or the diskette drive cannot be operated within the same program as the MRJE/WS Program.

SPECIFIED OPERATING ENVIRONMENT**HARDWARE REQUIREMENTS**

The IBM System Control Programming (SCP) runs on all models of IBM System/32 and supports all features. The system configuration required to support SDLC (#6301) via System/32 SCP requires a minimum of 24K bytes of main storage. A minimum of one Additional Storage feature (#1005) must be installed.

SOFTWARE REQUIREMENTS

All IBM licensed programs for IBM System/32 are designed to operate in an environment that includes IBM System/32 SCP (5725-SC1) or its equivalent.

DOCUMENTATION

(available from Mechanicsburg)

System/32 System Data Areas and Diagnostic Aids (SY21-0532)
...System/32 Control Storage Logic Manual (SY21-0533) ... System/32
Word Processing Logic Manual (SY34-0069).

WORD PROCESSING FEATURE (#6002)**PURPOSE**

System Control Programming Word Processing feature (#6002) provides these additional capabilities:

- Extended printing support
- Character set extensions for upper/lowercase keyboard/display
- Job-to-Job Transition without operator intervention
- Mag Card Unit access method
- Linked Direct Access Method (LDAM) for document libraries
- System utilities for document library maintenance
- Word Processing Communications Utility

DESCRIPTION

Extended Printing Support: The System/32 printing function is extended to support superscript and subscript printing and to provide additional translate tables and code required to permit printing upper/lowercase data using the 48- and 64-character monospace (EBCDIC) belts.

Character Set Extensions for the Keyboard/Display: The System/32 Console Keyboard/Display capability is extended to include user-controlled definition. The SCP feature (#6002) supports user-redefinition of the keyboard both in character set and in character arrangement. A predefined set of character/graphics and arrangements can be selected by the operator through OCL statements at job initiation time. The various offerings of characters and the arrangements were selected to support word/text processing applications with nine magnetic keyboard arrangements. Two System/32 arrangements are provided. Support of the new code key functions is via application programming. See Type Catalog for details. (Does not support ASCII arrangements.)

Job-to-Job Transition: Job-to-Job Transition is provided to support the word processing user transition between jobs without operator intervention.

Magnetic Card Unit Access Method: The access method provides data transfer between System/32 and the 5321 Magnetic Card Unit at application program request. I/O control commands are supported by Basic Assembler. The File Conversion utility provides stand-alone access to magnetic card data.

Linked Direct Access Method (LDAM): Feature #6002 provides additional fixed disk data management support for System/32. It supports (a) storing variable length data such as text and (b) the dynamic reuse of file space without reorganization. In brief, this is accomplished through the use of two files: (1) an indexed sequential file which contains the data IDs, starting addresses, etc. and also a dynamic table of available space; (2) the 'member' file of user data consisting of linked direct sectors with embedded chained addresses. File organization, definition, load, dump and application use is supported at the user level through provided utilities and System/32 Basic Assembler licensed program.

System Utilities: Feature #6002 provides a complete set of utilities initiated via System/32 console input to initialize, reorganize and/or dump LDAM members to and from diskette; document deletion is supported from System/32 console or application program.

The Word Processing Communications Utility (WPCU) is provided as a System/32 Word Processing feature (#6002) enhancement to support the transfer of documents or data files between a Word Processing System/32 and another word processing system:

Office Systems 6/430, 6/440 or 6/450
6640 Document Printer
System/32 (with feature #6002 WPCU)
Magnetic Card II Typewriter - Communicating

WPCU is invoked at the System/32 using a procedure statement and prompts via the System/32 console display, or through standard System/32 OCL and utility control statements to define the remote device, mode of operation (transmit/receive), line speed, transparency option, and other information. This utility can transmit or receive multiple LDAM document library members (document or tabular data files) or a single System/32 data file (records accessed consecutively).

Data Transmission is accomplished using the existing Binary Synchronous Communications Adapter (BSCA) #2074 on the System/32 over point-to-point switched or nonswitched lines. Communications with an Office System/6, Magnetic Card II Typewriter - Communicating or a 6640 Document Printer are at speeds of up to 2400 bps in EBCDIC nontransparent mode only. System/32-to-System/32 communications are at speeds of up to 4800 bps (switched) or up to 7200 bps (nonswitched) in EBCDIC transparent or nontransparent mode. Character set translation is supported for all valid magnetic card keyboard character sets supported by the SCP.



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SYSTEM CONTROL PROGRAMMING

System/32 SCP (cont'd)

Release 2 of the Word Processor/32 licensed program will support the writing of systems formatted data (documents) to the LDAM Document Library.

Prerequisites: BSCA feature #2074 on the 5320.

SPECIFIED OPERATING ENVIRONMENT

HARDWARE REQUIREMENTS

IBM SCP Word Processing feature (#6002) requires 4.6K of high-end user storage when LDAM or Job-to-Job transition functions are used. Otherwise, regular SCP main storage requirements apply. SCP Word Processing feature (#6002) supports all IBM 5320 'B' and 'C' models and the following Special Features: #4530 Half Line Space Printing, #4900 5321 Magnetic Card Unit Attachment, #3400 Dual Case Keyboard and Display, and #1005 Additional Storage. 96-character print belts do not require #6002 for support.

SOFTWARE REQUIREMENTS

IBM System/32 SCP Word Processing Feature (#6002) requires the current version of IBM System/32 System Control Programming (5725-SC1) for support.

DOCUMENTATION

(available from Mechanicsburg)

Word Processing SCP Reference Manual (GC34-0078) ... Word Processing SCP PLM (SY34-0069).

TERMS and CONDITIONS: See PP Index

SYSTEM CONTROL PROGRAMMING

**DISTRIBUTED INTELLIGENCE SYSTEM
 HIGH-LEVEL HOST SUPPORT OF SYSTEM/7
 ATTACHMENT TO SYSTEM/370
 5744-BK1**

PURPOSE

The Distributed Intelligence System System Control Programming provides the means for operating a host S/370 connected to one or more System/7s.

Each System/7 is attached to the S/370 using the high-speed S-Based Control Unit/Sensor-Based Control Adapter (SBCU/SBCA) attachments. Distributed Intelligence System supports the S/370 and each System/7 as a single system with distributed facilities. The System/7 applications programmer using Distributed Intelligence System has available for use, through the high-level Distributed Intelligence System functions, the power of a S/370 for data analysis and storage.

Distributed Intelligence System provides System Control Programming code on the S/370 under OS/VS1 and on the System/7 under MSP/7.

The Distributed Intelligence System functions provide the user with the ability to move data between the S/370 system and each satellite System/7, and the ability to load and execute application programs in a given system in the network.

In general, almost all Distributed Intelligence System functions are symmetrical; i.e., each processor may invoke any command.

HIGHLIGHTS

- Distributed Intelligence System supports S/370 mdls 135, 145, 155 II, 158, 165 II and 168 with the SBCU custom product (RPQ D08116) and System/7 with the SBCA custom product (RPQ D08119).
- Requests for Distributed Intelligence System functions may be initiated by either the S/370 system or any System/7.
- Distributed Intelligence System provides inter-partition data handling and transaction synchronization functions which provide a high-level interface between Distributed Intelligence System and CICS or IMS.
- High-level language support is available through PL/I and FORTRAN in the S/370; and FORTRAN and APG/7 (5734-XC3) in the System/7.

Program Movement and Execution:

- System/7 application programs are on S/370 disk in a partitioned data set. The user may also specify programs to be loaded into pageable or page-fixed S/370 storage for high-speed access.
- System/7 application programs may be loaded and executed by a command from the S/370 or System/7.
- System/7 application programs may be executed in either IPL or program segment mode.
- S/370 programs must reside on S/370 disk in one of a number of partitioned data sets. These programs may be loaded and executed, in the Distributed Intelligence System partition or in a background partition, by a command from the S/370 program, System/7, or S/370 console operator dynamically or at initialization time. The operating system facilities for program retention will be used.

Data Definition and Movement:

- A given program can move data to itself or to any other program in the network with a single command. These programs may reside in any VS1 partition or the Distributed Intelligence System partition of the S/370 or on the System/7.
- A System/7 application program either in the Distributed Intelligence System partition or another partition may move data to a System/7 program, a storage area obtained within Distributed Intelligence System, or a S/370 disk file.
- A System/7 application program may move data to or from a System/370 program (either in the Distributed Intelligence System partition or another partition), a storage area on the S/370 obtained within Distributed Intelligence System, or a S/370 disk file.
- User's standard S/370 disk data sets can be processed by Distributed Intelligence System access commands (providing VSAM, BDAM or BSAM support).
- S/370 work data files may be dynamically selected from a pool of VSAM disk data files according to user's processing and performance requirements. The files are accessed via Distributed Intelligence System commands and may be returned to the pool dynamically.

Control Services:

- Program synchronization commands may be invoked from S/370 or System/7.

- Dumps of System/7 storage on S/370 may be invoked by S/370 or System/7 programs, or System/370 console operator.
- Initiation and termination of logging and tracing functions may be invoked by the S/370 console operator. User logging functions may be invoked by S/370 or System/7.
- Communication with the S/370 console operator with option to receive a reply may be invoked by S/370 or System/7.

Use: Distributed Intelligence System consists of control software which resides on both the S/370 and System/7. To use the S/370-System/7 multisystem configuration, application programs must use Distributed Intelligence System in the following manner:

- The Distributed Intelligence System partition is initiated as an OS/VS1 job by using OS/VS1 Job Control Language (JCL).
- The S/370 or System/7 user programs can invoke the Distributed Intelligence System subroutines, from a high level language (FORTRAN or PL/I from the System/370; and a FORTRAN or APG/7 from the System/7).
- The System/7 or S/370 assembler language programs invoke Distributed Intelligence System macros.

CUSTOMER RESPONSIBILITIES
The customer:

- Is responsible for providing the necessary cabling between the SBCU/SBCA.
- Is responsible for proper generation of Distributed Intelligence System to match the system configuration.
- Must ensure that the macros provided with S/370 Distributed Intelligence System are installed in the OS/VS1 macro library or another S/370 library, and that the FORTRAN subroutines, PL/I and APG/7 subroutines have been installed in the FORTRAN, APG/7 and PL/I libraries, if Distributed Intelligence System functions are to be invoked through these high-level languages.
- Must have knowledge of Distributed Intelligence System, MSP/7, and S/370 Assembler, FORTRAN, APG/7 or PL/I languages in order to code the Distributed System Application.
- Must provide sufficient S/370 direct access storage to contain any System/7 programs and data sets desired as resident on the S/370.
- Is responsible for providing protection against accidental loss or misuse of their data.

SPECIFIED OPERATING ENVIRONMENT
HARDWARE REQUIREMENTS

Minimum Machine Configurations: The Distributed Intelligence System minimum IBM S/370 configuration is:

Supported on mdls 135, 145, 155II, 158 165II and 168 CPU, the minimum configuration is that required for the OS/VS1 operating system used plus a minimum of 6K page-fixed for Distributed Intelligence System. However, 30K is recommended. Additionally, a minimum of 64K of real storage for paging is recommended in S/370 for Distributed Intelligence System and other VS1 applications. Mdl 135 must have the Conditional Swapping feature (#1051). Mdl 145 must have either Conditional Swapping feature (#1051) or Advanced Control Program Support feature (#1001). Sensor-Based Control Unit (SBCU) custom product (RPQ D08116) attached to a selector/block multiplexer channel.

The minimum IBM System/7 configuration is:

- IBM 5010 Processor Module mdl A06 (minimum 6K storage of which Distributed Intelligence System requires 2K words) ...
- Sensor-Based Control Adapter custom product (RPQ D08119) ...
- IBM 5028 Operator Station.

SOFTWARE REQUIREMENTS

IBM S/370 Programs: The Distributed Intelligence System S/370-resident programs operate under OS/VS1 (5741-031). Distributed Intelligence System runs in a Virtual (V=V) environment, but requires a minimum of 6K of page-fixed storage; however, 30K is recommended to support its functions. In addition, 64K of real pageable storage will be required by Distributed Intelligence System. The Distributed Intelligence System partition size in virtual storage will depend on user routines included in these partitions. To this partition size must be added space for buffered queues, storage files, and user programs, which are to be executed in the Distributed Intelligence System partition. Any other access method the user wishes to support may be included as part of the supervisor. For example, if the Virtual Storage Access Method (VSAM) is to be supported, it should be included as part of the pageable System Queue Area.



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SYSTEM CONTROL PROGRAMMING

**Distributed Intelligence System High-Level
Host Support of System/7 Attach to S/370 (cont'd)**

Distributed Intelligence System adds SVC routines and a resident attention handling routine to the OS/VS1 Nucleus and a minimum of six modules (appendages, error routines, SVCs) to SYS1.SVCLIB

IBM System/7 Programs: MSP/7 supports Distributed Intelligence System. IBM System/7 Host Program Preparation Facilities II programs (OS/VS1) are required for System/7 program generation.

DOCUMENTATION

(available from Mechanicsburg)

SBCU General Information Manual (GA34-1511) ... SBCA General Information Manual (GA34-1512) ... General Information Manual (GC34-0056) ... OS/VS1: Program Logic Manual (GY34-0019) ... Program Listings (Microfiche) (GJD1-1795).

RPQs ACCEPTED: Yes