IBM System/3
Model 8
Introduction

This manual provides new users of System/3 with a basic introduction to the Model 8. There are six chapters. . .

Chapter 1   *System Summary*...briefly describes the devices available for the Model 8.

Chapter 2   *System/3 Model 8 Programming Support*...summarizes the system control programs (SCP) and program products (PP).

Chapter 3   *Communications Programming*...discusses the communications programming support.

Chapter 4   *System Operation*...explains the use of the Model 8 from the standpoint of the operator.

Chapter 5   *Configurations*...lists Model 8 CPU models and input/output devices and includes a table comparing Model 10 devices and Model 8 devices.

Chapter 6   *Publications*...lists System/3 publications that are applicable for the Model 8.

Appendix A describes the SCP facilities in greater detail.

The *Glossary of Technical Terms* contains definitions of terms applicable to the IBM System/3 Model 8.

The reader is expected to have a basic knowledge of data processing and fundamental operating system concepts. Additional information regarding disk concepts can be found in *IBM System/3 Disk Concepts and Planning Guide* GC21-7571. Additional information about Operation Control Language can be found in *IBM System/3 Model 10 Disk System Control Programming Reference Manual*, GC21-7512.

The System/3 Model 8 offers two basic data processing environments:

1. Batch processing using a directly attached 3741 Data Station or 3741 Programmable Work Station as an input/output device.
2. Terminal capability to provide both online Data Entry and Inquiry.

In addition, the Model 8 can be used as a Remote Job Entry Work Station for a larger system (System/360 or System/370).
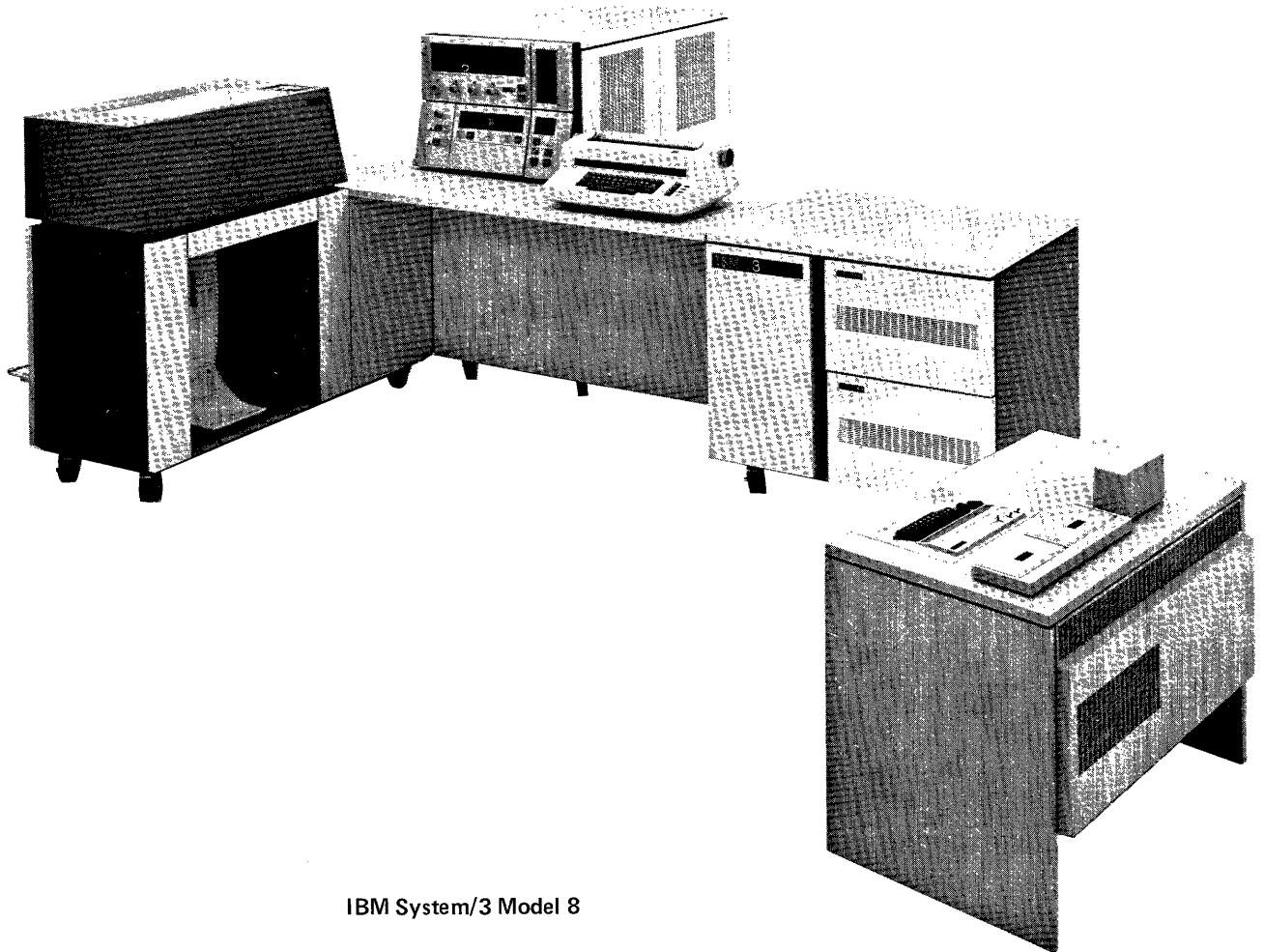
IBM System/3 Model 8

A minimum system consists of a 5408 Processing Unit (16K bytes), a 5444 Disk Storage Drive, a 5203 Printer, and either a 5471 Printer-Keyboard or a 3741 (Data Station or Programmable Work Station).

The 5408 Processing Unit (CPU) is available with 16K, 32K, 48K, and 64K bytes of storage. The CPU has the same instruction set, cycle time, and access time as System/3 Model 10.

5408
Processing Unit
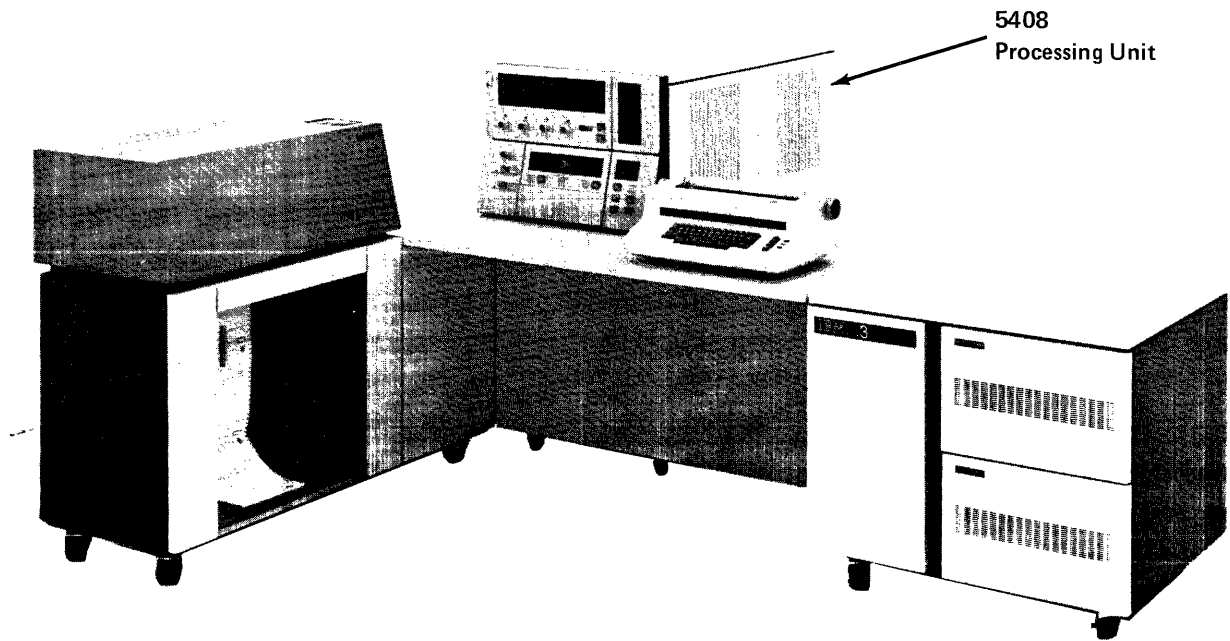
Highlights

- Main storage is Metal Oxide Semiconductor Field Effect Transistor (MOSFET). Highly integrated Monolithic Systems Technology (MST) is used for logic circuitry.

- Data and instructions are stored as EBCDIC characters; each EBCDIC character is stored in an 8-bit byte, and a ninth bit is added for parity checking.

- Main storage cycle time is 1.52 microseconds.

- Instruction execution and I/O data handling utilizes the "Cycle Steal" technique, providing overlap of I/O and processing.

Features

Serial I/O Channel (SIOC)

The SIOC is used to attach a 1255 Magnetic Character Reader (Model 1, 2, or 3) or a 3881 Optical Mark Reader (Model 1).

- 1255 Magnetic Character Reader

  —Model 1 - reads and/or sorts up to 500 six-inch documents per minute into six stackers.

  —Model 2 - reads and/or sorts up to 750 six-inch documents per minute into six stackers.

  —Model 3 - reads and/or sorts up to 750 six-inch documents per minute into twelve stackers.

- 3881 Optical Mark Reader

  —Model 1 - reads data sheets at varying speeds up to 6000 documents per hour and 4000 8-1/2" x 11" pages per hour.

Dual Programming Feature (DPF)

The DPF provides the capability to independently load and process two programs simultaneously. Independent operator control of each program is also provided so that either program may be initiated, restarted after a program halt, run to completion, or terminated, without regard to the other program (other than availability of main storage and I/O units).

Integrated Communications Adapter (ICA)

The ICA provides up to three communications interfaces: two local and one remote. When more than one interface is present, only one can be active at a time as selected by the operator through a manually controlled switch. EBCDIC or ASCII transmission code, but not both, may be used.

- 8000 bps Local Interface...permits local attachment of one 3271 Model 1 or 2 Control Unit, or one 3275 Model 1 or 2 Display Station to the 5408 without the use of a communications line or modems.

- 2400 bps Local Interface...permits local attachment of one binary synchronous IBM terminal, such as a 3741 Model 2 or 4, to the 5408 without the use of a communications line or modems.

- Synchronous Line, Medium Speed...provides one medium speed binary synchronous communications line interface to an external modem. The communications network attachment may be point-to-point (switched), point-to-point (nonswitched), or multipoint (control station). Maximum transmission rate is 4800 bps for switched operation and 7200 bps for nonswitched operation.

Binary Synchronous Communications Adapter (BSCA)

The BSCA permits communication in binary synchronous mode with other systems and terminals. System/3 can operate on a multipoint line as either a control station or a tributary station, or on a point-to-point switched or leased communication line.
Auto-answer capability is standard in switched network versions.

EBCDIC or ASCII transmission code, but not both, may be used.

The BSCA cannot be installed with the SIOC.

Subfeatures include:

* EIA Local Attachment (EIA/CCITT Local Attachment in World Trade) ...permits attachment of one 3271 Control Unit or one 3275 Display Station to the System/3 without the use of a data communications line and modems at either device.

* 1200 bps Integrated Modem...for binary synchronous data transmission at 1200 bps over nonswitched facilities or switched network. (In World Trade, nonswitched facilities only)

* Station Selection

* Auto Call

* Text Transparency

* Internal Clock

IBM 5444 DISK STORAGE DRIVE

The IBM 5444 Disk Storage Drive provides System/3 Model 8 with direct access storage having capacities from approximately 2.5 million to 10 million bytes. A 5444 is required on every System/3 Model 8.

The 5444 Models A1 and A2 have one permanent and one removable disk, while Model A3 has only the one removable disk. The 5444 uses the removable 5440 Disk Cartridge that is interchangeable between Models A1, A2, and A3.

These models are the same high speed access disk drives that are available on the System/3 Models 10 and 15.

5444 Disk Storage Drives can be attached to the Model 8 to give data capacities as follows:

One 5444 Model A1—2.45 million bytes
One 5444 Model A2—4.9 million bytes
One 5444 Model A2 and one 5444 Model A3—7.35 million bytes
Two 5444 Model A2's—9.8 million bytes

**5444
Disk Storage
Drive**
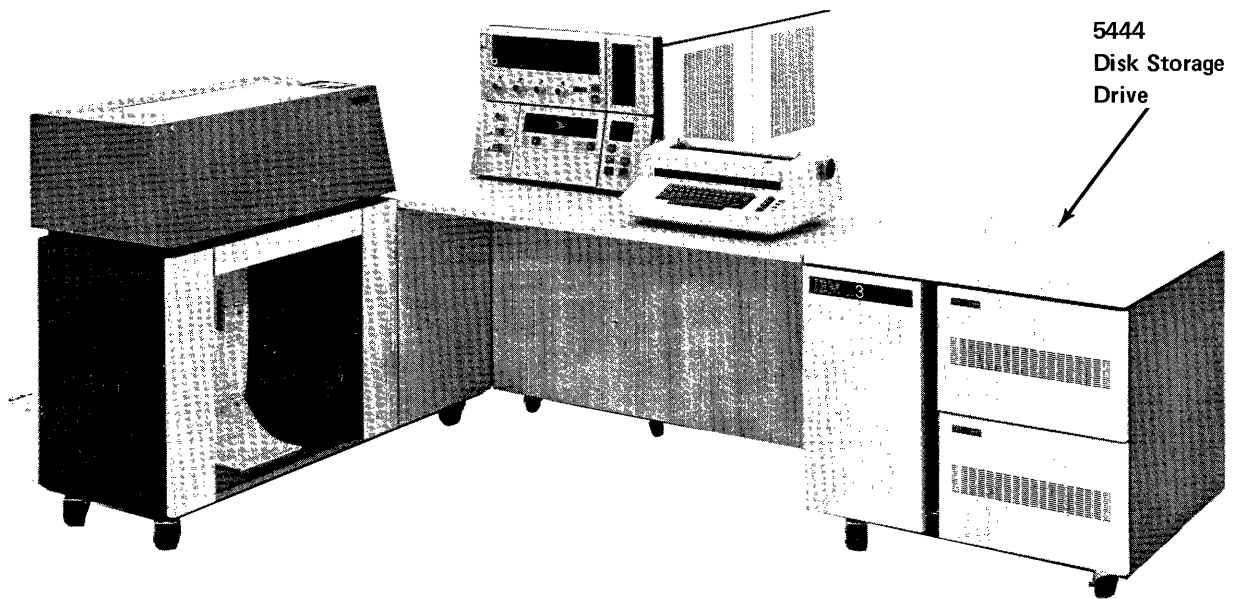
One of three models of the IBM 5203 Printer may be attached to a System/3 Model 8:

Model 1 - 100 lines per minute
Model 2 - 200 lines per minute
Model 3 - 300 lines per minute

Each model can have 96, 120, or 132 print positions. The character set can be expanded from 48 characters (basic) to as many as 120 characters by using the Interchangeable Chain Cartridge (for Models 1 and 2) or the Interchangeable Train Cartridge (for Model 3).

The 5203 printer use a type cartridge with 240 characters. The standard set of graphics, repeated five times on the cartridge, permits the rated throughput shown above. This rated throughput is based on a 48-character set with single-line spacing.

Vertical spacing can be set at 6 or 8 lines per inch by the operator. Horizontal spacing is 10 characters to the inch.

In addition to the standard carriage, a Dual Feed Carriage special feature may be installed. This feature allows two sets of forms, nonoverlapped, to be printed simultaneously, each independently controlled. When this feature is used, the number of horizontal printing positions is reduced by 17.

5203
Printer
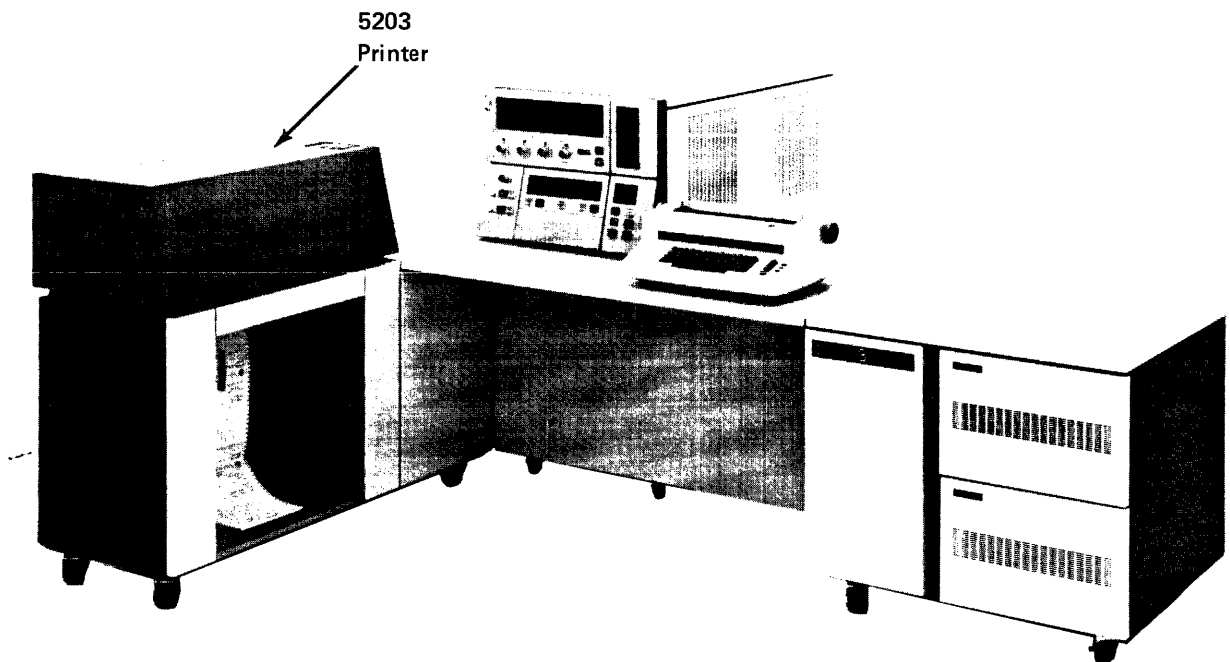
IBM 5471 PRINTER-KEYBOARD

The IBM 5471 Printer-Keyboard is a Selectric type printer-keyboard which may be optionally attached to System/3 Model 8. It is mounted on the console work table, and serves primarily as an operator/system communication device, an inquiry device, or a secondary printer.

The keyboard is typewriter style with 44 character keys, shift, space and carrier return.

The printer operates at a rated speed of 15.5 characters per second. A 15-inch carriage provides a writing line of 125 characters at 10 characters per inch. Vertical spacing is 6 lines per inch. Forms are fed and controlled by a pin feed platen.

A minimum system configuration must include either a 5471 or a 3741 (directly attached), but both devices may be attached.
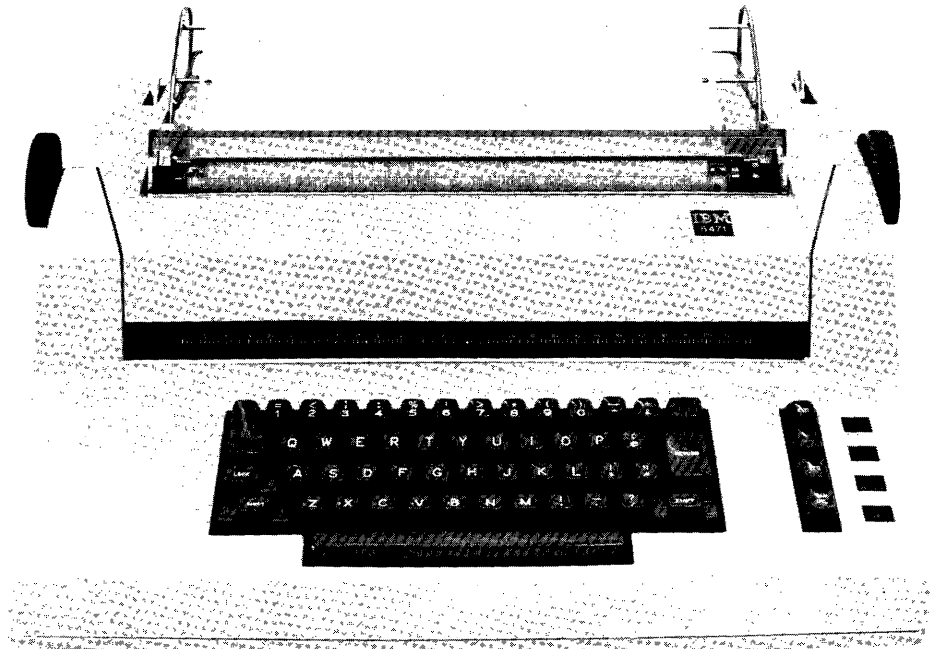
5471 Printer-Keyboard

The 3741 can be used in the following ways:

- as an offline data entry device (as part of the IBM 3740 Data Entry System)

- as an online input/output device attached directly to the Model 8

- as a terminal device in a communications environment

The 3741 Data Station is a single operator key entry station used to record data onto magnetic disk. The Data Station is available in two models (Model 1 and 2).

The IBM 3741 Programmable Work Station (Models 3 and 4), provides additional functions beyond the scope of the 3741 Data Station. It has the capability to operate under the control of an application program written in Application Control Language (ACL). System/3 does not support the Application Control Language; however ACL can be used for offline applications.

One 3741 (Model 1, 2, 3, or 4) may be attached directly to the System/3 Model 8 to provide, in addition to the input or output of data, necessary system input and output functions. For example, when attached directly to the Model 8, System/3 Operation Control Language can be entered by means of the 3741. The Model 2 or 4 can also be used with System/3 Model 8 via its BSCA or ICA attachments for the input or output of data only.

Each model contains a single disk drive, sometimes referred to as a diskette.

Characteristics of the four models of the 3741 are as follows:

Model 1 - A single data entry station...record size 1-128 characters ...10 program levels standard...240-character (6 rows of 40 characters) CRT display...operator guidance.

Model 2 - Same functional characteristics as Model 1...also includes a binary synchronous communications adapter...switched or non-switched, point-to-point, or non-switched multipoint...auto answer, EBCDIC transparency standard (except when transmitting or receiving blocked data)...can be used as a remote terminal at 1200, 2000 or 2400 bps over appropriate communications facilities.

Model 3 - Executes programs written in the Application Control Language. Optionally can create object programs from source programs. Can operate with the same functional characteristics as a Model 1 when not under ACL program control.

Model 4 - Same functional characteristics as Model 3. Adds the binary synchronous communications capability of the Model 2 and can operate with the same functional characteristics as the Model 2 when not under ACL program control.

The 3741 directly attached to System/3 provides input/output rates of approximately 1500 records per minute reading from the diskette and approximately 1000 records per minute writing to the diskette.

These rates depend on the complexity of the application and on the following assumptions:

- Records are transferred between the 3741 and a 5444 Disk Storage Drive.

- For the 3741, 128-byte records are used and the device is double buffered.

- For the 5444, block size is 1024 bytes (8 records per block) and the device is double buffered.

- The system is dedicated (the Dual Programming Feature is not used) and the operation is error-free with no alternate tracks assigned on the disk.

A minimum system configuration must include either a 5471 or a 3741 (directly attached), but both devices may be attached.
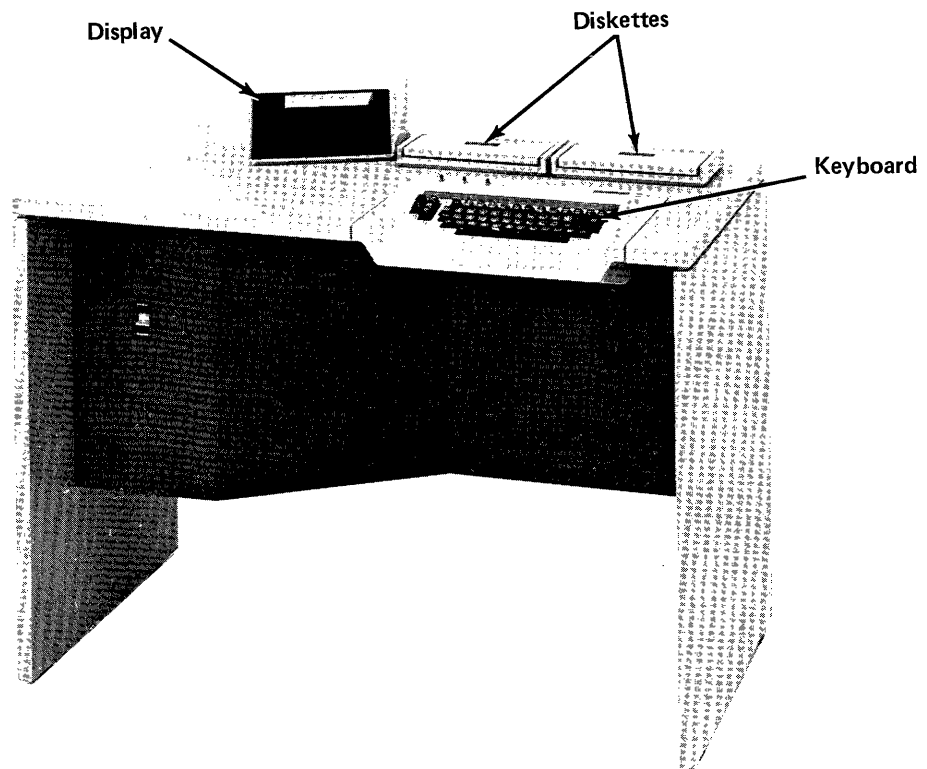
IBM 3741 Data Station/Programmable Work Station

An optional feature for the 3741 provides a second disk drive that allows the user to accomplish the following functions when the 3741 is used offline:

- Merge...records can be merged from the second diskette and the keyboard onto the first diskette.

- Copy...a data file from the second diskette can be copied onto the first diskette.

- Pooling...data can be copied from more than one diskette onto a single diskette.

When directly attached to System/3, the two diskettes are not separately addressable; rather, they are used to simplify on-line operation when handling large quantities of data. For example, when reading data into System/3, control can automatically be switched between the first and second diskettes to provide for a continuous input of data.

Another optional feature for the 3741—record insert—provides the capability to add records within an existing data set. This feature can be useful when updating files in an offline data entry application.

Note. In this publication, references to the 3741 are as an I/O device directly attached to the system; references to the 3741 used as a terminal device are so noted.

Chapter 2. System/3 Model 8 Programming Support

T he System/3 Model 8 is supported by the same programs that are available for the System/3 Model 10 Disk System; these programs include:

- System Control Programming (SCP)—programs fundamental to the operation and support of the system.

- Program Products (PP)—programs that perform a function for the user and interact with, and rely upon, system control programming.

System/3 Model 8 programs are stored online in libraries on 5444 Disk to permit loading into main storage as needed. (See Figure 1.)

IPL initializes the
system and loads
the supervisor

5444 Disk

Main Storage

Supervisor Area

Disk System Management
Initial Program Loader
Supervisor

Scheduler
Data Management Routines

System Service Programs
Library Maintenance
System Utilities

Program Products
Disk RPGII
Subset ANS COBOL
FORTRAN IV
Basic Assembler
Disk Sort
1255 Utility
DATA/3

The supervisor
remains in storage
while the system
is in operation; it
loads the other Model 8
programs as their functions
are required.

Figure 1. System/3 Model 8 Programming Support.

SCP consists of the disk system management programs and system utility programs. These programs are stored in *libraries* on 5444 disks and are loaded into main storage, as required. An *object library* stores the system programs, program products, and user-generated object programs; a *source library* stores source programs and operation control language procedures. These libraries may be on the same or on different disks, and they may reside on a disk along with data files.

Disk System Management

- Initial Program Loader—Starts operation of the system by loading the supervisor into main storage. On the Model 8, initial program loading is from the 5444 Disk Storage Drive only.

- Supervisor—Controls overall system operations and provides general functions required by the scheduler and all processing programs. The supervisor resides in the lowest area of main storage throughout system operation.

- Scheduler—Loaded by the supervisor to initiate the execution of each new program and to establish which system facilities are to be evoked while that program is running.

- Data Management—Data management routines can be included in user problem programs to relieve the programmer of the detailed programming associated with the transfer of data between auxiliary storage and programs.

System Utility Programs

System utility programs are provided to enable the user to service his libraries, data files, application programs, and input/output units.

Some of the system utility programs are listed below. See Appendix A for more information on these and other System Control Programs.

- Library Maintenance Program—allows the user to produce, maintain, and service the source and object libraries.

- Diskette Copy/Dump Program—copies data between a 5444 Disk Storage Drive and a directly attached 3741.

- Copy/Dump Program—supports 5444 file-to-file copies and 5444 volume-to-volume copies.

- Disk Initialization Program—performs surface analysis and formats the 5444 disk according to SCP requirements.

- File and Volume Label Display Program—displays information about the contents of a 5444 disk.

- File Delete Program—deletes data files from a 5444 disk.

PROGRAM PRODUCTS

Program products are used to satisfy specific application requirements. They operate under control of the system control programming (SCP), and they are disk resident on the 5444 Disk Storage Drive.

The following program products are available for use on the Model 8:

- Disk RPG II

- Subset ANS COBOL

- FORTRAN IV

- Basic Assembler Program

- Disk Sort Program

- 1255 Utility Program

- DATA/3 (an application program product)

Figure 2 summarizes device support for System/3 Model 8 program products. Figure 3 is a comparison table of the Model 8 and Model 10 Programming support.

Device (Models)	RPG II		COBOL		FORTRAN		Assembler		Disk Sort	1255 Utility	DATA/3	
	Compile	Execute	Compile	Execute	Compile	Execute	Assemble	Execute			Generation	Execution
5444 (A1, A2 or A3)	Req	Req	Req	Req	Req	Req	Req	Req	Req	Req	Req	Req
5203 (1, 2 or 3)	Opt	Opt	Req	Opt	Req	Opt	Req	Opt	Req	Req	Req	Opt
5471	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt (1)	Opt (1)	Opt	Opt
3741 (1, 2, 3 or 4) (directly attached)	Opt	Opt	Opt	No	Opt	No	Opt	Opt	Opt (1)	Opt (1)	Opt	Opt
1255 (1, 2 or 3)	No	No	No	No	No	No	No	Opt	No	Req	No	No
3881	No	Opt	No	No	No	No	No	Opt	No	No	No	No
BSCA or ICA	No	Opt	No	No	No	No	No	Opt	No	No	No	Req
Program Level- minimum size	5.25K	5K	12K	5K	9K	5K	8K	5K	5K	8K	20K	21K

Notes: Req = required
Opt = optional
No   = not supported
(1) = For control statements and messages only

Figure 2. Program Product Device Support

Name	Number	Model 10 Disk System	Model 8
System Control Programming			
Basic SCP	5702-SC1	x	x
RJE (Feature 6004/6006)		x	x
Macros (Feature 6020/6021)		x	x
5445 (Feature 6022/6023)		x	
Tape (Feature 6024/6025)		x	
Overlay Linkage Editor and Checkpoint/Restart (Feature 6026/6027)		x	x
ML/MP (Feature 6030/6031)		x	x
CCP (Feature 6033)		x	x
3881 (Feature 6034/6035)		x	x
MRJE (Feature 6036/6037)		x	x
3741 (Feature 6066/6067)		x	x
Program Products			
Disk RPG II	5702-RG1	x	x
Telecommunications (Feature 6000/6002)		x	x
5445 (Feature 6012/6014)		x	
Tape (Feature 6016/6018)		x	
Auto Report (Feature 6028/6029)		x	x
Disk Sort Program	5702-SM1	x	x
5445 (Feature 6008/6010)		x	
Subset ANS COBOL	5702-CB1	x	x
Disk FORTRAN IV	5702-FO1	x	x
Disk Resident Card Utilities	5702-UT1	x	
1255 Utility	5702-UT2	x	x
Tape Sort Program	5702-SM2	x	
Basic Assembler Program	5702-AS1	x	x
DATA/3	5702-XX1	x	x

Some programs are not used on the Model 8 because of differences in configuration requirements.

Figure 3. Model 8, Model 10 Programming Support Comparison Table

Disk RPG II (Program Product 5702-RG1)

Input to the RPG II compiler is an RPG II source language program, and output is a machine language object program, either cataloged in an object library or written on 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 application program to be written. The program can be described on specification sheets prior to entering the source statements into the system. The specification sheets are: control card and file description, extension and line counter, input, calculation, and output-format.

Available optional features for the RPG II compiler include:

- Auto Report—enhances the RPG II language by providing functions that eliminate much of the preparation and coding usually required.

- Telecommunications Support—supports BSCA files as input, output, combined, or demand files in RPG II. A telecommunications specification sheet is used to describe the communications environment. See Chapter 3 (Communications Programming).

Source programs can be read from the system input device (3741 or 5471) or from the source library. Work files for the compiler are on a 5444 Disk Storage Drive.

Object programs support sequential, direct and indexed file organizations on the 5444. Files on the 3741 are sequential only.

Subset ANS COBOL (Program Product 5702-CB1)

The COBOL compiler requires as input a COBOL source language program and produces as output, by means of the system's overlay linkage editor, a machine language object program, either cataloged in an object library or written onto a diskette. A source program listing, diagnostic messages, and a main storage map can be requested.

The following functional processing modules of the American National Standards Institute (ANSI) Standard COBOL are included in this 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

Source programs can be read from the system input device (3741 or 5471) or from the source library. Work files for the compiler are on a 5444 Disk Storage Drive.

Object programs support sequential, direct, and indexed file organizations on the 5444. Files on the 3741 are sequential only, and they can be processed by a COBOL object program after the data is copied to a 5444 using an SCP utility program. (The System/3 COBOL language does not support the 3741.)

FORTRAN IV (Program Product 5702-FO1)

The System/3 FORTRAN compiler requires as input a FORTRAN IV source language program and produces as output, by means of the system's overlay linkage editor, a machine language object program, either cataloged in an object library or written onto a diskette. A source program listing, diagnostic messages, and main storage map can be requested.

The System/3 FORTRAN IV language contains those features defined in American National Standard Basic FORTRAN, X3.10-1966 and additional language features often available only with full FORTRAN IV compilers.

Source programs can be read from the system input device (5471 or 3741) or from a source library. Work files for the compiler are on a 5444 Disk Storage Drive.

Object programs support sequential and direct file organizations on the 5444. Files on the 3741 are sequential only, and they can be processed by a FORTRAN object program after the data is copied to a 5444 disk using an SCP utility program. (The System/3 FORTRAN language does not support the 3741.)

The System/3 FORTRAN IV Library contains:

- Mathematical subroutines to perform arithmetic operations.

- Service subroutines to provide program diagnostic aids and program control.

- A commercial subroutine package to perform functions equivalent to the 1130 Commercial Subroutine Package, insofar as they are meaningful to System/3.

Basic Assembler Program (Program Product 5702-AS1)

The Basic Assembler Program processes source programs written in the Basic Assembler Language and produces executable object programs.

The Basic Assembler can also be used for assembly of relocatable subroutines for use with RPG II, COBOL or FORTRAN. These subroutines are coded by the user and assembled separately. The process of program linking is accomplished during compilation of the source programs by means of the overlay linkage editor (COBOL and FORTRAN) or RPG II linkage editor.

Source programs can be read from the system input device (5471 or 3741), from a source library, or from a source file generated by the macro processor.

Disk Sort Program (Program Product 5702-SM1)

The Disk Sort Program sorts a file into ascending or descending sequence requiring three files: an input file, a work file, and an output file.

Input file. Disk sort accepts input from a 5444 Disk Storage Drive. A disk input file can have sequential, indexed or direct organization.

Work file. The work file is on a 5444 Disk Storage Drive. Work space can be specified by the user or can be automatically allocated by the program.

Output file. The output file is on a 5444 Disk Storage Drive; it can have sequential organization only. Output of the program is one of three formats—tags, tag-along, or summary tag-along:

- Tags—A file of three-byte binary relative record numbers in the sequence specified by the user. This is also referred to as an "addrout" sort.

- Tag-along—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 tag-along field, the user can, in effect, accomplish a record sort.

- Summary Tag-along—Records containing identical control fields are combined by summarizing (totaling) specified fields into one record.

Functions. 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 tests in any combination

    Control fields may be in different locations in records within the file.

Use of Disk Sort. Specifications are described on a simple, RPG-like coding sheet. The specifications are entered into the system using the system input device (5471 or 3741) or they can be stored in the procedure or source library on disk. Sort diagnostics and messages can be printed on the 5203 Printer.

1255 Utility Program (Program Product 5702-UT2)

The Utility Program for the 1255 Magnetic Character Reader provides a means of reading MICR encoded documents from the 1255 Model 1, 2 or 3, 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.

DATA/3 (Program Product Application 5702-XX1)

DATA/3 is used to generate RPG II source programs that support a terminal-oriented system. See Chapter 3, "Communications Programming."

When the Model 8 is used for online data entry and inquiry with local or remote CRT's, the following programming facilities are available:

- DATA/3 (an application program product)

- BSCA Multiline/Multipoint (ML/MP) (a function of the SCP)

- Communications Control Program (CCP) (a function of the SCP)

When the Model 8 is used with local or remote terminals, the following programming can be used:

- RPG II Telecommunications Feature (a function of the RPG II program product)

- BSCA Multiline/Multipoint (ML/MP) (a function of the SCP)

- Communications Control Program (CCP) (a function of the SCP)

When the Model 8 is used as a work station for a System/360 or System/370, the following programs can be used:

- Remote Job Entry Work Station support (a function of the SCP)

- MULTI-LEAVING* Remote Job Entry Work Station support (a function of the SCP)

*Trademark

RPG II TELECOMMUNICATIONS FEATURE

The RPG II Telecommunications Feature allows the user to describe BSCA files in his application program. The System/3 thus supported can be used in the following networks: point-to-point switched, point-to-point nonswitched, or multipoint (as a tributary station).

RPG II programs may be generated to send or receive binary synchronous data over voice grade or high speed communications lines in one of the following modes:

- Receive only

- Receive with conversational reply

- Transmit only

- Transmit with conversational reply

- Transmit and receive

The following RPG II language features are supported for communications:

- Input, output, and combined files

- Demand files

- Blocking and deblocking of records

- Dual I/O areas

These BSCA and ICA features, options and capabilities are supported by the RPG II Telecommunications Feature:

- Manual call
- Manual answer
- Auto call (BSCA only)
- Auto answer
- Medium speed
- High speed (BSCA only)
- Station selection (BSCA only)
- EBCDIC data transparency
- Intermediate block checking
- EBCDIC or ASCII code

The communications environment is described as RPG II Telecommunications Specifications which are included in the RPG II source program.

DATA/3

DATA/3 provides a simplified method of performing operations using 3270 Information Display Terminals. By using the Dual Programming Feature, one part of the system can do batch processing while the other part is executing terminal-oriented programs created by DATA/3.

During execution of DATA/3 generated programs, the terminal operators can:

- inquire into files
- update files, or
- enter data into files.

Programs generated by DATA/3 operate in one of the following environments in either a dedicated system or with dual programming:

- Under control of the Communications Control Program (CCP).
- Under control of disk system management.

DATA/3 generates RPG II source programs, which are then compiled like any other RPG II program; a source program can be modified prior to compilation.

Highlights

- Uses RPG-like program definition and a data definition coding form.
- Offers up to four separate program security checks. Two are available in the DATA/3 generated program; two additional checks are available when running under CCP.
- Offers standard prompting and operational techniques for the user.

MULTILINE/MULTIPOINT (ML/MP)

Multiline/Multipoint is a binary synchronous communications (BSC) feature of System/3 system control programming. ML/MP provides the assembler programmer access to the BSC I/O routines that support the Binary Synchronous Communications Adapter (BSCA) or the Integrated Communications Adapter (ICA) as an I/O device.

ML/MP enables the assembler programmer to transmit and receive binary synchronous data over two telecommunications lines simultaneously (each line requires a BSCA or ICA). The two lines can be used in the same program or can be used independently in separate program levels. The lines can be nonswitched or switched.

The ML/MP user specifies the functions of ML/MP I/O routines by using macro instructions. Linkage to the ML/MP routines is assembled as part of the user's program. The Overlay Linkage Editor is then used to incorporate the ML/MP routines in the user's object program.

COMMUNICATIONS CONTROL PROGRAM (CCP)

The Communications Control Program is a system control programming feature that controls concurrent execution of several application programs, thereby providing System/3 Model 8 with multitasking. CCP can be used in one program level of a dual programming system, or it can be used in a dedicated system. (For use on the Model 8, CCP requires that a 5471 Printer-Keyboard be included in the minimum configuration.)

Multitasking

Multitasking is a special form of dual programming where two or more programs, called tasks, execute concurrently within a single program level. The purpose of multitasking is to make more efficient use of CPU time.

Main Tasks and Subtasks

In multitasking, one main program, the main task, attaches one or more subprograms or subtasks. The main task gets control from the supervisor and then initiates, or attaches, the subtasks. The main task and its attached subtasks always reside in the same program level.

In System/3 Model 8, the communications control program (CCP) is the main task permitting several application programs (up to 8 subtasks) to execute concurrently, though independently of one another. CCP provides the control program services needed to operate a communications-based information processing system. CCP enables an online network of terminals to call a predefined set of application programs as needed and access a common set of disk files.

Control Program Services

Five types of control program services are performed:

- Task management—Several user application programs, initiated independently, can execute concurrently under CCP.

- Communications management—CCP controls input from and output to terminals in the system.

- Program management—CCP handles requests from terminals and the system operator to concurrently execute application programs.

- File management—CCP manages access by user programs to user data files.

- Display format facility for the 3270.

Programming Facilities

Programs that run under CCP can be written in the following languages:

- RPG II—the EXIT/RLABL operation or a special file is used for terminal input/output.

- COBOL and FORTRAN—the CALL statement is used for terminal input/output.

- Basic Assembler—a macro instruction can be used for terminal input/output.

Figure 4 shows CCP (the main task) controlling three user application programs (the subtasks).
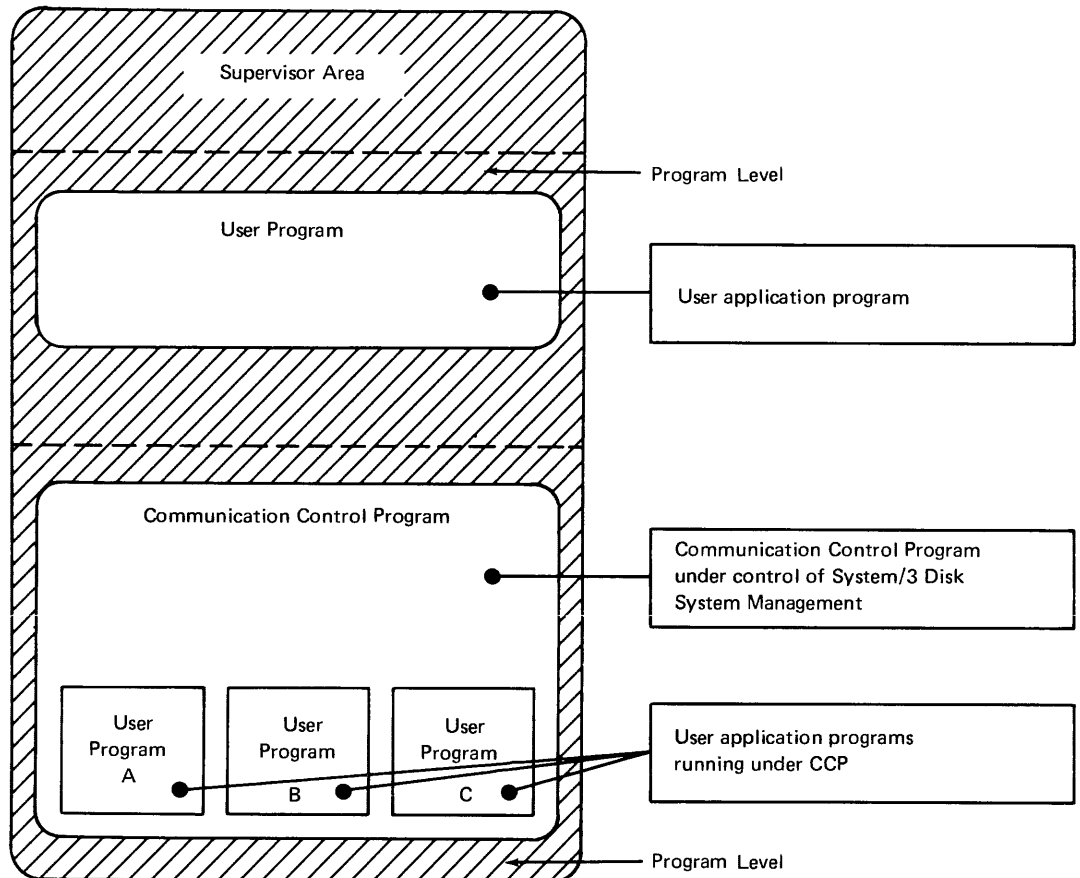
Figure 4. Communications Control Program (CCP).

REMOTE JOB ENTRY WORK STATION

The Remote Job Entry (RJE) Work Station support is a feature of the SCP that provides the System/3 user with the ability to submit OS/360 jobs, via the BSCA, to a central computer. Output from the OS/360 jobs can be returned to the submitting System/3, directed to another work station, or directed to the central computer I/O devices.

The System/3 Work Station support works in conjunction with the central OS/360 RJE program.

RJE uses a unique job entry control language (JECL), which provides the flexibility and control required for remote job entry.

MULTI-LEAVING REMOTE JOB ENTRY WORK STATION

The MULTI-LEAVING Remote Job Entry Work Station (MRJE/WS) program is a feature of the SCP that provides the System/3 user with the ability to submit OS jobs via the BSCA or ICA. Output from the OS jobs can be returned to the submitting System/3, directed to another work station, or directed to the central System I/O devices. The telecommunications programming of the System/3 MRJE/WS performs the functions necessary to establish line connections, send and receive data, and execute the correct termination procedures.

The System/3 MRJE Work Station program supports communications with the following central processing system facilities: RES, JES2, JES3, HASP-II V3.1, HASP-II V4.0, ASP V2.6, and ASP V3.0. These facilities support a line discipline which permits maximum overlapping of I/O devices at the work station and the central system through the intermixing of input and output data streams on the communication lines. This fully synchronized, two-directional transmission of a variable number of data streams between two computers using BSC facilities is called MULTI-LEAVING.

Input to the MRJE/WS program may be from the following System/3 Model 8 devices:

IBM 5444 Disk Storage Drive
IBM 5471 Printer-Keyboard

Output to the MRJE/WS program may be directed to the following Model 8 devices:

IBM 5203 Printer
IBM 5471 Printer-Keyboard
IBM 5444 Disk Storage Drive

Both the programmer and the operator play an important role in the efficient operation of a data processing system.

- The programmer writes and tests programs, prepares the required control statements, and documents the programs and their operation.

- The operator sets up the system and initiates program execution—using the instructions given by the programmer.

ROLE OF THE PROGRAMMER

- Design an application and/or individual programs.

- Code the programs in a source language, such as RPG II, using coding sheets as a guide.

- Prepare operation control language (OCL) statements to be used to compile the source programs.

- Compile the source programs to generate object programs.

- Prepare OCL statements required for the execution of the object programs.

- Prepare test data.

- Test and debug the programs.

- Document the programs, their functions and operating procedures; prepare run sheets for the operator, including setup of input/output devices.

- Explain to the operator how the programs are to be used.

OPERATOR'S DUTIES

The operator's primary duties in a computer installation are:

- Start up the system.

- Prepare the I/O devices for each individual job using the instructions (program run sheet) provided by the programmer.

- Initiate the execution of jobs.

- Interpret and respond to the system's or programs' requests for information or action.

- Cancel the execution of a job in case, for instance, of an unexpected error in the program.

- Occasionally prepare OCL statements to use the System Utility Programs.

SYSTEM ACTION

For its part, the system:

- Stops when a condition occurs that requires the attention of the operator.

- Provides information such as diagnostic, warning, or informational messages.

- Allows the operator in many cases to select one of several options to a halt condition

Halt codes are displayed in a message display unit on the CPU. Using the Halt Guide publication, the system operator can determine the meaning of the two-position code and take whatever recovery action is required.

CONTROLLING PROGRAM PROCESSING

A program and the environment in which it is to be run must be defined to the system by means of Operation Control Language (OCL) statements. Operation Control Language statements specify:

- System information and options.

- Assignment of system devices.

- Whether programs are to be compiled, link-edited, and/or executed.

- The library or device from which the user or system program is to be loaded.

- The files to be processed and the location of these files.

OCL statements are read from the system input device (5471 or 3741), or in the case of procedures, from the procedure library on a 5444 Disk Storage Drive. All OCL statements—except the comment (*), end-of-job (/&), and end-of-file (/*) statements, begin with a // in positions 1 and 2.

The following list illustrates the variety of options the user can specify in his OCL on the Model 8.

Statement Identifier	Keyword	Explanation
// DATE		Sets the date
// LOAD		Identifies program to be executed: Object program is in system input device (LOAD *) or in object library (LOAD name,unit)
// CALL		Identifies an OCL procedure.
// FILE		Describes data files to be used in program.
	NAME	Name of file in program
	UNIT	Unit containing file
	PACK	Name of disk
	LABEL	Name of file on disk
	RECORDS	Number of records in disk file
	TRACKS	Number of tracks in disk file
	RETAIN	Retention code
	DATE	Creation date
	LOCATION	Location of file on disk
	HIKEY	Used for multivolume indexed files
// BSCA		Allows change of BSCA/ICA lines
	LINE	Change to line 1 or 2
// SWITCH	Sets user program switches	
// COMPILE	For program compilations	
	SOURCE	Name of source program
	UNIT	Location of source program
	OBJECT	Location of object program
// PAUSE		Halt and wait for operator action
// RUN		End of OCL for a program
// READER		Change system input device: CONSOLE, 3741
// PUNCH		System punch device: 3741

// LOG		Change system logging device: CONSOLE, PRINTER, ON, OFF
// FORMS		Change lines per page
	DEVICE	Which printer or carriage is used
	LINES	Number of lines per page
// IMAGE		Change printer chain image
// HALT		Halt at end of program
// NOHALT		Do not halt at end of program
// LOCKOUT		Improve program load time in DPF system
// PARTITION		Set size of program level in DPF system
*		Comment
/&		End of job
/*		End of data

OCL statements for a job may be prepared in advance and stored in the procedure library on a 5444. Use of these cataloged procedures is then simplified because only a few OCL statements are needed to execute the entire job stream.

EXAMPLES OF OPERATION

Several examples will illustrate the operation of a Model 8.

- Model 8 with a 5471 Printer-Keyboard as the system input device.
- Model 8 with a 3741 Data Station/Programmable Work Station as the system input device.
- Model 8 with both a 5471 and 3741 available.

The 3741 in these cases is directly attached to the Model 8, rather than being used as a terminal device.

Model 8 with 5471

Compiling a Source Program

Generally, only two OCL statements are needed to compile a program; these are used to call a procedure stored in the procedure library on a 5444 Disk Storage Drive. The operator enters these two OCL statements on the 5471.

Following the OCL statements, the source program can be entered, one statement at a time on the 5471. Alternatively, the source program may have been previously placed in the source library on disk and does not need to be reentered.

The object program generated by the compiler is stored in the object library on a 5444.

Changing the Source Program

Once a program is in the source library on a 5444, the MODIFY function of the library maintenance program can be used to make changes to the source program. These changes are entered on the 5471.

Executing an Object Program

By entering different OCL statements on the 5471, the operator can cause a specific object program to be executed. The OCL statements define any 5444 files that may be required by the program; most often these are prepared previously by the programmer and stored in a procedure library on a 5444 disk. The operator can then call the previously cataloged procedure from the library.

Prior to execution of the program, the operator must set up the various devices required by the program.

Model 8 with 3741

Compiling a Source Program

The OCL statements required to compile a source program may be in the same diskette data set as the source statements, or they may be in a separate data set on the same or different diskette. If the OCL is in a different data set, the operator may be required to intervene between the reading of the OCL and source program.

As in the preceding example, the source program may alternatively be stored in a source library on a 5444, rather than on a diskette.

Changing the Source Program

Changes to a source program may involve any combination of the following:

- Adding one or more statements.

- Deleting one or more statements.

- Changing a particular statement. ′

For source programs on a diskette, these changes can be made offline on the 3741. For adding statements to an existing program, the second disk feature or record insert feature of the 3741 is useful.

Or, the program may be copied to a source library on a 5444 from the diskette, and the MODIFY function of the library maintenance program can be used to perform these functions. Control statements for this program, as well as all changes, are entered by means of a diskette data set.

Executing an Object Program

An object program may be stored in the object library on a 5444 or in a data set on a diskette.

If it is stored in an object library, the operator needs to enter only the necessary OCL statements (by means of a diskette data set) to cause the program to be executed.

If the object program is stored on a diskette, both OCL and program may be in the same data set, or different data sets on one or more diskettes.

Using the 3741

The operator is responsible for locating the proper data sets on a diskette. Label processing is not performed by the System/3. Up to 19 data sets may be stored on a diskette.

Model 8 with both 5471 and 3741

Generally, OCL will be entered by means of the 5471 and data will be entered on a 3741.

For example, batches of data may be keyed offline on one or more diskettes. These diskettes can be used for only the data, without the need to store OCL statements on them. The OCL necessary to run the jobs that process this data can be on another diskette, in a procedure library on a 5444, or entered each day on the 5471.

Figures 5 through 10 show the devices supported by System/3 Model 8. Figure 11 shows the differences in attachable devices and available processing unit storage between the Model 10 Disk System and the Model 8. Figure 12 shows the configuration possibilities for the Model 8.

Processing Unit Models		
5408 Model	**Storage Size (Bytes)**	**Designation**
A14	16,384	16K
A16	32,768	32K
A17	49,152	48K
A18	65,536	64K

Figure 5. 5408 Processing Unit Models

5471 Printer-Keyboard
Characteristics   • Selectric type Printer-Keyboard   • 44 character keys, shift, space, carrier return   • Rated speed—15.5 characters per second   • 15 inch carriage   • 125 print positions   • 6 lines per inch pin feed platen

Figure 6. Printer-Keyboard

5444 Disk Storage Drive	
Minimum access time	28 Milliseconds
Average access time	126 Milliseconds
Maximum access time	255 Milliseconds
Data Transfer Rate	199,000 bytes per second
Rotational Speed	1500 rpm
Bytes per sector	256
Sectors per track	24
Bytes per track	6144
Tracks per cylinder	2
Bytes per cylinder	12,288
Cylinders per disk	200 or 100
Bytes per disk	2,457,600 or 1,228,800
Tracks per disk	400 or 200
Sectors per disk	9600 or 4800

Configurations	Storage (In millions of bytes)
(1) Model A1	2.45
(1) Model A2	4.9
(1) Model A2 and (1) Model A3	7.35
(2) Model A2	9.8

Figure 7. 5444 Disk Storage Drive

5203 Printer		
Model	Maximum Print Speed	Print Positions
1	100 Lines Per Minute	96, 120, or 132
2	200 Lines Per Minute	96, 120, or 132
3	300 Lines Per Minute	96, 120, or 132

Figure 8. 5203 Printer

3741 Data Station/Programmable Work Station	
Model	Name
1	Data Station
2	Data Station with BSCA
3	Programmable Work Station
4	Programmable Work Station with BSCA

Diskette	
Bytes Per Record	1-128
Records Per Track	26
Tracks Per Diskette	73
Data Sets Per Diskette	1—19
Records Per Diskette	1898

Figure 9. 3741 Data Station/Programmable Work Station

BSCA/ICA Terminal Support

Terminals Operating with S/3-8	Programming Support			Communications Code				Communication Network			
				EBCDIC		ASCII		Point-to-Point		Multi-Point	
	RPG II	MLMP	CCP	Normal	Trans-parency	Normal	Trans-parency	Switched	Non-Switch	Tributary Station	Control Station
S/360 & S/370	X	X	X	X	X	X	—	X	X	X^2	—
S/360 Model 20	X	X	X	X	X	X	—	X	X	—	—
1130	X	X	—	X	X	—	—	X	X	—	—
2780	X	X	—	X	X	X	—	X	X	—	—
2770	X	X	—	X	X	X	—	X	X	—	—
S/7	X	X	X	X	X	X	—	X	X	—	X^1
2972-8, 11	—	X	—	X	—	—	—	—	—	—	X
3735	—	X	X	X	—	X	—	X	X	—	X
S/3-6, 10, 15	X	X	X	X	X	X	—	X	X	X^2	X^1
3270	—	X	X	X	—	X	—	—	—	—	X
3741 Model 2 & 4	X	—	—	X	X	—	—	X	X	—	—

Notes: X = Supported
        — = Not supported
        1 = Not supported by RPG II
        2 = System/3 Model 8 can be a tributary
            using the BSCA only.

Figure 10. BSCA/ICA Terminal Support

	Model 10 Disk System	Model 8
Processing Unit Storage Size (Select One)	12K, 16K, 24K, 32K, 48K, or 64K (RPQ)	16K, 32K, 48K, or 64K
5444 Disk Storage Drive (Select One Configuration)	• 5444-1 • 5444-2 • 5444-2 and 5444-3 • 5444-2 and 5444-2 • 5444-A1 • 5444-A2 • 5444-A2 and 5444-A3 • 5444-A2 and 5444-A2	• 5444-A1 • 5444-A2 • 5444-A2 and 5444-A3 • 5444-A2 and 5444-A2
5445 Disk Storage Drive (Select One Configuration)	• 5445-1 • 5445-1 and 5445-2 } Optional • 5445-3	Not applicable
Card Device (Select One Configuration)	• 5424 (A1 or A2) • 1442 (6 or 7) • 5424 (A1 or A2) and 1442 (6 or 7) • 5424 (A1 or A2) and 2501 (A1 or A2) } RPQ • 1442 (6 or 7) and 2501 (A1 or A2)	Not applicable
Printers	• 5203 (1, 2, or 3) • 1403-2 } Select One • 1403-N1	• 5203 (1, 2, or 3)
3410/3411 Magnetic Tape Subsystem — Models 1, 2, or 3 (Select One Configuration)	• 3411 • 3411 and 3410 • 3411, 3410, and 3410 } Optional • 3411, 3410, 3410, and 3410	Not applicable
Other Devices	• 3741-2 or -4 (via LCA) • 3741-1, 2, 3, or 4 (direct attachment) • 5471 • 5475 • 1231-1 (RPQ) • 1255 (1, 2, or 3) } via • 1270 (WTC only) } SIOC • 3881-1 } Optional	• 3741-1, 2, 3, or 4 (direct attachment) } one • 5471 } required • 3741-2 or -4 (via ICA) • 1255 (1, 2, or 3) } via • 3881-1 } SIOC } Optional

Note: Each bullet represents a valid configuration for that device or device category. One configuration is required for each device or device category unless otherwise specified.

Figure 11. Comparison Table — System/3 Models 10 and 8

```
┌──────────────┐   ┌──────────────┐   ┌──────────────┐   ┌──────────────┐   ┌──────────────┐
│              │   │ Optional     │   │ Standard     │   │ 3741 Data    │   │              │
│ 5203 Printer │   │ 5444 Disk    │   │ 5444 Disk    │   │ Station or   │   │ 5471 Printer │
│              │   │ Storage Drive│   │ Storage Drive│   │ Programmable │   │ Keyboard     │
│              │   │ (Second Drive)│  │ (First Drive)│   │ Work Station │   │              │
└──────────────┘   └──────────────┘   └──────────────┘   └──────────────┘   └──────────────┘
```

One must be selected, both may be selected.

5408 Processing Unit

| 5203 Printer Attachment Feature | 5444 Second Disk Attachment Feature | 3741 Attachment Feature |

5471 Printer Keyboard Attachment Feature

Storage:
16,384
32,768
49,152
65,536

Mutually Exclusive

Serial I/O Channel Feature

Binary Synchronous Communications Adapter Feature

Integrated Communications Adapter Feature

1255 Magnetic Character Reader

OR

3881 Optical Mark Reader

Data Set

Switch

2,400 BPS Local Interface

Synchronous-Line Medium Speed

8,000 BPS Local Interface

The minimum configuration of the System/3 Model 8 is:

- 5408 Processing Unit
- 16K Bytes of Storage
- 5203 Printer
- 5444 Disk Storage Drive
- 5471 Printer Keyboard or 3741
    (Directly Attached)

Features which may be specified are:

- 5408 Processing Unit:
    32K, 48K, or 64K Bytes of Storage
- 5203 Printer, Models 1, 2, or 3
- 5444 Disk Storage Drive Combinations:
    Model A1
    Model A2
    Model A2(2)
    Model A2 and A3
- Integrated Communications Adapter (ICA)
- Binary Synchronous Communications Adapter (BSCA)
- Serial I/O Channel (SIOC)
- Both the 5471 and 3741 may be attached

Figure 12. System/3 Model 8 Configuration

The following publications provide pertinent information for the support of the Model 8 system. (Not all of the devices and features discussed in these publications are available for the System/3 Model 8.)

FOR SYSTEM CONTROL PROGRAMMING (5702-SC1)

IBM System/3 Model 10 Disk System Control Programming Reference Manual, GC21-7512

IBM System/3 Model 10 Disk System Halt Guide, GC21-7540

IBM System/3 Overlay Linkage Editor Reference Manual, GC21-7561

IBM System/3 Model 10 Disk System Control Programming Macros Reference Manual, GC21-7562

IBM System/3, IBM 3881 Optical Mark Reader Model 1 Program Reference and Logic Manual, GC21-5103

For Communications Programming

IBM System/3 Communications Control Program General Information Manual, GC21-7578

IBM System/3 Communications Control Program Programmer's Reference, GC21-7579

IBM System/3 Communications Control Program Terminal Operator's Guide, GC21-7580

IBM System/3 Model 10 Disk System Communications Control Program System Operator's Guide, GC21-7581

IBM System/3 Model 10 Disk System Communications Control Program System Reference, GC21-7588

IBM System/3 MULTI-LEAVING Remote Job Entry Work Station Support Reference *Manual,* GC21-7621

IBM System/3 Remote Job Entry Work Station Support Reference Manual, GC21-7531

IBM System/3 Remote Job Entry Work Station Support Reference Manual (World Trade Only), GC19-0007

IBM System/3 Multiline/Multipoint Binary Synchronous Communications Reference Manual, GC21-7573

FOR PROGRAM PRODUCTS

RPG II (5702-RG1)

Introduction to RPG II, GC21-7514

IBM System/3 Disk Systems RPG II Auto Report Feature General Information Manual, GC21-7563

IBM System/3 RPG II Reference Manual, SC21-7504

IBM System/3 RPG II Auto Report Feature Reference Manual, SC21-5057

IBM System/3 RPG II Telecommunications Programming Reference Manual, SC21-7507

IBM System/3 RPG II Disk File Processing Programmer's Guide, GC21-7566

IBM System/3 RPG II Additional Topics Programmer's Guide, GC21-7567

COBOL (5702-CB1)

IBM System/3 Models 10 and 15 Subset American National Standard COBOL Compiler and Library General Information Manual, GC28-6453

IBM System/3 Subset American National Standard COBOL Reference Manual, GC28-6452

IBM System/3 Subset American National Standard COBOL Compiler and Library Messages, SC28-6455

IBM System/3 Subset American National Standard COBOL Compiler and Library Programmer's Guide, SC28-6459

FORTRAN (5702-FO1)

IBM System/3 FORTRAN IV General Information, GC28-6867

IBM System/3 FORTRAN IV Reference Manual, SC28-6874

IBM System/3 FORTRAN IV Commercial Subroutines Manual, SC28-6875

Basic Assembler (5702-AS1)

IBM System/3 Basic Assembler Reference Manual, SC21-7509

Disk Sort Program (5702-SM1)

IBM System/3 Disk Sort Reference Manual, SC21-7522

1255 Utility Program (5702-UT2)

IBM System/3 Disk System Utility Program for the IBM 1255 Magnetic Character Reader Reference Manual, SC21-7521

DATA/3 (5702-XX1)

IBM System/3 DATA/3 Reference Manual, SC21-5102

FOR HARDWARE

IBM System/3 Installation Manual–Physical Planning, GA21-9084

IBM System/3 Serial Input/Output Channel, Original Equipment Manufacturers Information, GA21-9130

IBM 3881 Optical Mark Reader Models 1 and 2 Reference Manual and Operator's Guide, GA21-9143

FOR DISKETTE I/O

IBM 3740 Data Entry System–System Summary and Installation Planning, GA21-9152

IBM 3741 Data Station Reference Manual, GA21-9183

IBM 3741 Data Station Operator's Guide, GA21-9131

IBM 3741 Models 3 and 4 Programmable Work Station, Programming Reference Manual, GA21-9194

IBM 3741 Models 3 and 4 Programmable Work Station General Information, GA21-9196

OTHER PUBLICATIONS

IBM System/3 Disk Concepts and Planning Guide, GC21-7571

IBM System/3 3735 Support Program Coding Manual, GC21-5096

IBM General Information: Binary Synchronous Communications, GA27-3004

Introduction to Teleprocessing, GC20-8095

Data Communications Primer, GC20-1668

This appendix contains additional information about system control programming:

- Data management
- System utility programs
- Additional SCP facilities
- Main storage requirements

DATA MANAGEMENT

Data management routines provide an interface between the user program and the required data files. Data management services are provided for disk files, diskette files, printer files, and printer-keyboard files.

Disk Data Management

The following file organizations are supported on the 5444 Disk Storage Drives:

- Sequential—records are arranged in a physical sequence, but not necessarily a logical sequence.
- Indexed—records are arranged in a logical sequence by key; an index to these keys permits random processing of individual records.
- Direct—records are arranged so that there is a relationship between the contents of the records and their positions in the file.

These files may be processed consecutively, sequentially, or randomly. A maximum of 50 files can be stored on one disk.

The following features are supported by the SCP disk data management routines:

- Records may span physical disk boundaries (sectors, tracks, cylinders). The user does not need to be aware of the physical boundaries when he writes programs to access the data.
- Record sizes from 1 byte to 32K bytes may be used. (A particular program may restrict the maximum size; for example, using RPG II the maximum disk record is 9999 bytes.)
- The fixed length records may be blocked or unblocked. The blocking factor may vary from program to program.
- Multivolume files—sequential or indexed, may be either online or offline but direct multivolume files must be online.

Diskette Data Management

The following features are supported by the SCP diskette data management for a 3741 directly attached to the System/3:

- Fixed length, unblocked records
- Logical sequential organization
- Record sizes from 1 to 128 bytes
- Single or double buffering
- Only one diskette file may be used at a time
- A diskette file may be contained in one or more data sets on one or more diskettes.

Printer Data Management

The following features are supported by printer data management for the 5203 Printer:

- Print 96-, 120- or 132-position line.
- Skip to specified line number before or after print.
- Space 0, 1, 2, or 3 lines before or after print.
- Page overflow detection.
- Supports dual feed carriage, interchangeable chain cartridge, and universal character set features.

Printer-Keyboard Data Management

The following features are supported by 5471 Printer-Keyboard data management:

- Record length from 1 to 125 bytes.
- One space before or after print.

SYSTEM UTILITY PROGRAMS

The system utility programs allow the user to prepare and maintain his disks, and perform basic functions necessary for the operation of the system.

Library Maintenance Program

The library maintenance program allows the user to create, maintain, and service the source and object libraries. The principle functions of the library maintenance program are to:

- Add, delete, or rename source programs, procedures, and object programs in the user's program libraries.
- Allocate or re-allocate disk space to the libraries.
- 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 or from a diskette data set.
- Copy a module to a diskette from a library.
- Modify entries in the source library.

The library maintenance program requires a dedicated system; that is, it cannot be used when a program is running in the other program level.

Diskette Copy/Dump Program

The diskette copy/dump program copies records between the directly attached 3741 and a 5444 Disk Storage Drive. Features include:

- An easy-to-use method of copying records from a 3741 to a 5444 for processing, and for copying records from a 5444 to a 3741 for offline use or storage.
- One input and one output per execution.
- Sequential, indexed, or direct 5444 disk files as input.

Copy/Dump Program

The copy/dump program supports both file-to-file copies (COPY) and volume-to-volume copies (DUMP) for the 5444 Disk Storage Drive.
The file-to-file routines:

- Provide an easy to use method of creating a file backup on another disk or on the printer.
- Provide a method of moving files from one location to another, allowing both file limit modification and reorganization.
- Support one input and one output per execution.
- Support sequential, indexed, or direct disk files as input.
- Allow printer output in addition to disk output.
- Support the deletion of records from files through the specification of a deletion code and position within each record. The deleted records can be printed.

The volume-to-volume routines allow the user to copy an entire 5444 disk volume to another disk volume for backup.

Programs for Supporting the 5444 Disk Storage Drive

- Disk Initialization Program—performs surface analysis on the user's disk and formats the disk according to SCP requirements.
- Alternate Track Assignment—assigns an alternate track in place of a defective one and prints the data content of the area in error.
- Alternate Track Rebuild—corrects data on the assigned alternate track.
- File and Volume Label Display—displays the entire volume table of contents of a disk, or the information pertaining to a single file.
- File Delete Program—deletes data files from a disk.

ADDITIONAL SYSTEM CONTROL PROGRAMMING FACILITIES

Overlay Linkage Editor

The overlay linkage editor creates loadable programs from multiple relocatable object modules. Output from the overlay linkage editor can be cataloged in the object library and/or written on a diskette. Overlay structures can be created automatically or as designated by the user. The overlay linkage editor is used by the COBOL and FORTRAN compilers, and by the basic assembler program.

Note. The RPG II compiler uses the RPG II linkage editor, rather than the system's overlay linkage editor.

System Generation

When a user installs a system, a system generation (SYSGEN) is performed to create a supervisor and data management support for the particular configuration, and to include the program products that have been ordered. During system generation, the source and object libraries are established.

Roll-in/Roll-out Capability

Roll-in/roll-out is the ability to roll out a program during its execution, bring in an inquiry program, execute the inquiry program, and restart (roll-in) the original program when the inquiry program has finished executing. Roll-in/roll-out is:

- Supported in program level 1 only.
- Supported by RPG II and FORTRAN.
- Available to Basic Assembler users.
- Not supported for sorts, utilities, system utility programs or by COBOL.

Checkpoint/Restart Capability

Checkpoint/restart is the ability to write checkpoint records that allow the user to resume execution of programs from the last checkpoint (rather than from the beginning) in case processing is terminated due to a machine failure or an operator initiated cancel. Checkpoint/restart is:

- Supported in program level 1 only.
- Supported by COBOL.
- Available to Basic Assembler users.

Macros

The macro processor uses macro prototype definitions to expand keyword macro statements coded by the user. The resulting expanded code is in a form that can be processed by the Basic Assembler. Macros provide:

- System services
- General I/O support
- Disk device support
- Diskette device support
- Printer device support
- Printer-Keyboard device support
- Communications support (ML/MP)

Label Processing

Data files on a 5444 disk are identified and accessed by standard System/3 labels, which are stored in a volume table of contents (VTOC) on each disk.

Data sets on a 3741 diskette are identified by labels, but System/3 does not access the data by means of the label. The user positions a diskette at the proper data set label for processing prior to putting the 3741 online to System/3.

Libraries

The *source library* is an area on disk for storing procedures and source statements. *Procedures* are groups of OCL statements used to load programs. The statements can be followed by input data for the programs. (Procedures for utility programs can, for example, contain utility control statements.) *Source statements* are sets of data, the most common of which are RPG II source programs and disk sort sequence specifications.

The *object library* is an area on disk for storing object programs and routines. *Object programs* are programs and subroutines in such a form that they can be loaded for execution. (They are sometimes called *executable object programs.*) Routines are programs and subroutines that need to be link-edited into object programs before they can be loaded for execution. (They are sometimes called *nonexecutable object programs.*)

Dual Programming

Under normal operating conditions, only one program can be processed at a time. With the dual programming feature (DPF) you can have two programs in main storage at the same time. Only one program can be executing instructions at any one time.

When DPF is being used, main storage contains the supervisor and two programs. Control is transferred from one program to the other whenever the program that is executing must await completion of an input or output operation. For example, one program requests a print operation, but the printer is still busy with a previous request. Control is then transferred to the other program level.

Similarly, one program requests that a record be read for processing. Since the program must wait until reading is completed before it can process the data, control is transferred to the other program level. Similarly, control is transferred when a halt occurs in one program level.

Most programs wait a significant amount of time for I/O completion. If both programs are waiting, the program whose I/O is completed first receives control.

Figure 13 shows how main storage is organized in a DPF environment. The storage areas occupied by the two programs are called program level 1 and program level 2. Each level must have a minimum of 5K bytes if each level is executing instructions. The library maintenance program (SCP), 1255 utility program (PP), and basic assembler program (PP) require a dedicated system. They cannot be executed when the other program level is active.

```
+-------------------------+
|                         |
|      Supervisor         |
|                         |
+-------------------------+
|                         |
|    Program Level 1       |
|                         |
+-------------------------+
|                         |
|    Program Level 2       |
|                         |
+-------------------------+
```
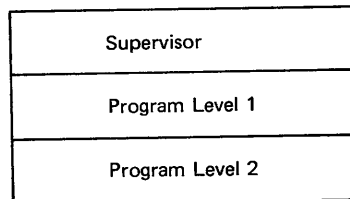
Figure 13. Main Storage in a DPF Environment

System Input

The system input device is called the READER, and on the Model 8 it can be assigned by the user to either the 5471 Printer-Keyboard or to the 3741 Data Station/Programmable Work Station directly attached.

The reader is used for certain system functions; the device used as the reader may also be used in application programs where the device is supported.

The reader is used to:

- Read operation control language (OCL) statements.

- Read control statements for the system utility programs.

- Load object programs.

- Read input for the MODIFY function and the reader-to-library function of the Library Maintenance Program.

- Read source input for

    −Macro processor
    −RPG II compiler, including Auto Report specifications and compile-time tables
    −COBOL compiler
    −FORTRAN compiler
    −Assembler

- Read relocatable input for the overlay linkage editor

- Read specifications for the Disk Sort Program and the 1255 Utility

- Read specifications for the following CCP programs:

    −Assignment build
    −Assignment list
    −User security information build
    −Display format generator
    −Disk-to-printer dump program
    −File recovery program
    −CCP startup
    −CCP generation

System Output

The system output device is called the PUNCH, and on the Model 8 it can be assigned only to a directly attached 3741.

The 3741 assigned as the punch can also be used for output data from a user application program.

The punch is used to:

- Provide optional output from the overlay linkage editor.

- Provide optional output from the RPG II compiler.

- Provide output from the library-to-punch function of the library maintenance program.

- Provide output by the CCP generation print/punch utility.

MAIN STORAGE REQUIREMENTS

Main storage requirements for the supervisor depend on these system generation options selected by the user:

- Dual Programming Feature
- Number of disk drives
- 5471 Printer-Keyboard
- BSCA/ICA
- 3741 Data Station, directly attached

The following table can be used for planning purposes:

Disk Drives*	Dedicated System		Dual Programming	
	with 5471	no 5471	with 5471	no 5471
R1, F1	3.00K	3.00K	3.75K	3.50K
R1, F1, R2 or R1, F1, R2, F2	3.25K	3.00K	4.00K	4.00K

*Notes:
K = 1024 bytes (decimal
R1, F1 = 5444 Drive 1 (one fixed disk and one removable disk)
R2 = 5444 Drive 2 (removable disk)
F2 = 5444 Drive 2 (fixed disk)

For BSCA or ICA (with 1 or 2 lines, or with ML/MP), add 0.25K bytes to the above numbers.
For 3741 directly attached, add 0.50K bytes to the above numbers.

Main storage requirements for selected SCP programs are as follows, (size is the minimum main storage, in bytes, excluding supervisor requirements).

Program	Size
Library maintenance	5K (Note 1, 2)
Diskette copy/dump	5K (Note 1)
Copy/dump	5K (Note 1)
Disk initialization	5K
Alternate track assignment	5K
Alternate track rebuild	5K
File and volume label display	5K
File delete	5K
Overlay linkage editor	7K (Note 1)
Macro processor	12K (Note 1, 2)

Note 1. Uses more main storage, if available.

Note 2. Requires a dedicated system (cannot be used with dual programming).

This glossary contains terms used in this manual, other System/3 terms, and general data processing terms. If you do not find the term you are looking for, refer to the *IBM Data Processing Glossary,* GC20-1699.

IBM is grateful to the American National Standards Institute (ANSI) for permission to reprint its definitions from the *American National Standard Vocabulary for Information Processing* (Copyright 1970 by American National Standards Institute, Incorporated), which was prepared by Subcommittee X3K5 on Terminology and Glossary of American National Standards Committee X3.

access method. A technique for moving data between main storage and input/output devices.

*access time. (1) The time interval between the instant at which data are called for from a storage device and the instant delivery begins. (2) The time interval between the instant at which data are requested to be stored and the instant at which storage is started.

alternate track. On a direct access device (disk drive), a track designated to contain data in place of a defective primary track.

American National Standards Institute. An organization sponsored by the Business Equipment Manufacturers Association (BEMA) for the purpose of establishing voluntary industry standards. Abbreviated ANSI.

APAR. Authorized Program Analysis Report. A request for correction of a problem caused by a defect in a current unaltered release of a program.

application program. A program written for or by a user that applies to his own work.

*ASCII (American National Standard Code for Information Interchange, X3.4-1968). The standard code, using a coded character set consisting of 7-bit coded characters (8 bits including parity check), used for information interchange among data processing systems, communications systems, and associated equipment. The ASCII set consists of control characters and graphic characters. Synonymous with USASCII.

*assemble. To prepare a machine language program from a symbolic language program by substituting absolute operation codes for symbolic operation codes and absolute or relocatable addresses for symbolic addresses.

*assembler. A computer program that assembles.

assembler language. A source language that includes symbolic machine language statements in which there is a one-to-one correspondence with the instruction formats and data formats of the computer.

asynchronous transmission. Transmission in which each information character is individually synchronized (usually by the use of start bits and stop bits).

auxiliary storage. (1) Data storage other than main storage; for example, storage on magnetic tape or direct access devices. Synonymous with external storage, secondary storage. (2) *A storage that supplements another storage. Contrast with *main storage.*

backup copy. A copy of a file that is kept for reference in case the original file is destroyed.

batch processing. (1) Pertaining to the technique of executing a set of computer programs such that each is completed before the next program of the set is started. (2) Pertaining to the sequential input of computer programs or data. (3) See also *stacked job processing.*

*binary digit. In binary notation, either of the characters 0 or 1. Abbreviated bit.

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*American National Standard Definition

binary synchronous communication. Communication using binary synchronous transmission. Abbreviated BSC.

binary synchronous transmission. Data transmission in which synchronization of characters is controlled by timing signals generated at the sending and receiving stations. Contrast with *asynchronous transmission.*

block. (1) *A collection of contiguous records recorded as a unit. Blocks are separated by block gaps and each block may contain one or more records. (2) *A group of contiguous characters recorded as a unit. (3) To record data in a block. (4) In System/3, blocks of logical data on a direct access storage device are not separated by gaps.

blocking. Combining two or more records into one block.

blocking factor. The number of logical records combined into one physical record or block.

bps. Bits per second.

BSCA. Binary Synchronous Communications Adapter. A device used for *binary synchronous communication.*

buffer. An area of storage that is temporarily reserved for use in performing an input/output operation, into which data is read or from which data is written. Synonymous with I/O area.

byte. (1) The representation of a character. (2) In System/3, a sequence of eight adjacent binary digits that are operated upon as a unit and that constitute the smallest addressable unit in the system.

cataloged procedure. A set of operation control language statements that has been placed in a library called the source library, and can be retrieved as required by calling it by name. Control statements for some System/3 programs may also be included in a cataloged procedure.

cathode ray tube. An electronic vacuum tube, such as a television picture tube, that can be used to display graphic images. Normally, displays codes or words to convey information to an operator. Abbreviated CRT.

CCITT. Consulative Committee International Telegraph and Telephone.

CCP. Communications Control Program. A function of System/3 SCP that provides the control program services needed to operate a communications-based information processing system.

***central processing unit.** A unit of a computer that includes the circuits controlling the interpretation and execution of instructions. Synonymous with main frame. Abbreviated CPU.

channel. A hardware device that connects the CPU and main storage with the I/O control units.

***character.** A letter, digit, or other symbol that is used as part of the organization, control, or representation of data.

character set. (1) *A set of unique representations called characters. (2) The System/3 64-character set includes 26 alphabetic, 10 numeric, and 28 special characters including a blank character. It is a subset of the EBCDIC character set which contains 256 characters.

checkpoint. (1) *A place in a routine where a check, or a recording of data for restart purposes, is performed. (2) A point at which information about the status of a job and the system can be recorded so that the job step can be later restarted. (3) To record such information.

checkpoint/restart facility. A facility for restarting execution of a program at some point other than at the beginning, after the program was terminated due to a program or system failure. A restart begins at a checkpoint of a job step, and uses checkpoint records to reinitialize the system.

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*American National Standard Definition

*COBOL. COmmon Business-Oriented Language. A business data processing language.

*code. (1) A set of unambiguous rules specifying the way in which data may be represented; for example, the set of correspondences in the standard code for information interchange. Synonymous with coding scheme. (2) In telecommunications, a system of rules and conventions according to which the signals representing data can be formed, transmitted, received, and processed. (3) In data processing, to represent data or a computer program in a symbolic form that can be accepted by a data processor. (4) To write a routine.

collating sequence. Any logical sequence used to order items of data.

*compile. To prepare a machine language program from a computer program written in another programming language by making use of the overall logic structure of the program, or generating more than one machine instruction for each symbolic statement, or both, as well as performing the function of an assembler.

*compiler. A program that compiles.

*computer. A data processor that can perform substantial computation including numerous arithmetic or logic operations, without intervention by a human operator during the run.

computing system RPQ. A customer request for a price quotation on alterations or additions to the functional capabilities of the computing system. The RPQ may be used in conjunction with programming RPQ's to solve unique data processing problems. See also *programming RPQ, RPQ.*

configuration. The group of machines, devices, and programs that make up a data processing system.

consecutive processing. The treatment of data with respect to its location in external storage, and in a sequence governed by the physical order of the data in the file. Contrast with *sequential processing, random processing.*

*console. That part of a computer used for communication between the operator or maintenance engineer and the computer.

contention. (1) A condition on a communication channel when two or more locations try to transmit at the same time. (2) Unregulated bidding for a resource by multiple users.

control field. In sorting or merging records, a group of bytes in a record used in determining sequence.

control program. A program that is designed to schedule and supervise the performance of data processing work by a computing system.

conversion. (1) The process of changing from one method of data processing to another or from one data processing system to another. (2) The process of changing from one form of representation to another, e.g., to change from decimal representation to binary representation.

*copy. To reproduce data in a new location or other destination, leaving the source data unchanged, although the physical form of the result may differ from that of the source.

cps. Characters per second.

*CPU. Central processing unit.

CRT. Cathode Ray Tube. A display device on which images are produced on a cathode ray tube.

cursor. A movable spot of light on the cathode ray tube of a console or display unit that indicates where the next character will be entered.

cylinder. The tracks of a disk storage device that can be accessed without repositioning the access mechanism.

data. *A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by humans or automatic means.

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*American National Standard Definition

data file. A collection of related data records organized in a specific manner. For example, a payroll file (one record for each employee, showing his rate of pay, deductions, etc.) or an inventory file (one record for each inventory item, showing the cost, selling price, number in stock, etc.).

data management. A major function of the SCP that involves organizing, locating, storing, retrieving, and maintaining data.

data set. (1) The major unit of data storage and retrieval in the operating system, consisting of a collection of data in one of several prescribed arrangements and described by control information to which the system has access. (2) A device that performs the modulation/demodulation and control functions necessary to provide compatibility between business machines and communications facilities. Abbreviated DS.

deblocking. The action of making the first and each subsequent logical record of a block available for processing, one record at a time.

***debug.** To detect, locate, and remove mistakes from a routine, or malfunctions from a computer. Synonymous with troubleshoot.

default value. The choice among exclusive alternatives made by the system when no explicit choice is specified by the user.

direct access storage device. A device in which the access time is effectively independent of the location of the data.

direct organization. A file organization in which, for purposes of storage and retrieval, there is a relationship between the contents of the records and their positions in the file. Contrast with *indexed organization, sequential organization.*

directory. An index that is used by a control program to locate one or more blocks of data that are stored in separate areas of a direct access storage device.

disk. Loosely, a disk storage device.

diskette. The square plastic container and its enclosed disk.

disk pack. A removable direct access storage volume containing magnetic disks on which data is stored. Disk packs are mounted on a disk storage drive. (Disk cartridges, also removable direct access storage volumes, are used on the IBM 5444 Disk Storage Drive.)

***dump.** (1) To copy the contents of all or part of a storage, usually from an internal storage into an external storage. (2) A process as in (1). (3) The data resulting from the process in (1).

EBCDIC. Extended binary coded decimal interchange code. A set of 256 characters, each represented by eight bits.

EIA. Electronics Industries Association.

error recovery procedures. Procedures designed to help isolate and, where possible, to recover from errors in equipment. The procedures are often used in conjunction with programs that record the statistics of machine malfunctions. Abbreviated ERP.

execute. To carry out an instruction or group of instructions, as in a program.

FDP. See *field developed program.*

FET. See MOSFET.

field developed program. A licensed program that performs a function for the user. It may interact with program products and/or system control programming, or it may be a stand-alone program. Field developed programs are normally developed by IBM branch office personnel to perform end-use or transitional functions for the user, contain logic directly related to the user's data, and are usable or adaptable to meet specific functional requirements. Abbreviated FDP.

***file.** A collection of related records treated as a unit.

***file maintenance.** The activity of keeping a file up to date by adding, changing, or deleting data.

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*American National Standard Definition

fixed-length record. A record having the same length as all other records with which it is logically or physically associated. Contrast with *variable-length record.*

*FORTRAN. FORmula TRANslating system. A language primarily used to express computer programs by arithmetic formulas.

hard copy. *A printed copy of machine output in a visually readable form; for example,* printed reports, listings, documents, and summaries.

*hardware. Physical equipment, as opposed to the computer program or method of use; for example, mechanical, magnetic, electrical or electronic devices. Contrast with *software.*

hexadecimal. Pertaining to a number system with a base of 16; valid digits range from 0 through F, where F represents the highest units position (15).

host computer. The primary or controlling computer in a teleprocessing environment.

ICA. Integrated Communications Adapter.

index. (1) *An ordered reference list of the contents of a file or document, together with keys or reference notations for identification or location of those contents. (2) A table used to locate the records of an indexed file.

indexed organization. A file organization in which records are arranged in logical sequence by key. Indexes to these keys permit random processing of individual records. Contrast with *direct organization, sequential organization.*

initial program load. The initialization procedure that causes an operating system to commence operation. Abbreviated IPL.

*initial program loader. The procedure that causes the initial part of an operating system or other program to be loaded such that the program can then proceed under its own control. Abbreviated IPL.

*input. (1) Pertaining to a device, process, or channel involved in the insertion of data or states, or to the data or states involved. (2) Same as input device. (3) Same as input data.

input/output. (1) *Pertaining to either input or output, or both. (2) A general term for the equipment used to communicate with a computer, commonly called I/O. (3) The data involved in such communication. (4) The media carrying the data for input/output.

inquiry. A request for information from storage; for example, a request for the available quantity of an item of inventory.

installation. A particular computing system, in terms of the work it does and the people who manage it, operate it, apply it to problems, service it, and use the results it produces.

installed user program. A licensed program that performs a function for the user. It may interact with program products and/or system control programming, or it may be a stand-alone program. Installed user programs are produced by or for an individual user, contain logic directly related to the user's data, and are usable or adaptable to meet specific functional requirements. Abbreviated IUP.

*interrupt. To stop a process in such a way that it can be resumed.

I/O. See *input/output.*

I/O area. Same as *buffer.*

IOCS. Input/output control system. A group of routines for handling the transfer of data between main storage and I/O devices.

IPL. (1) *initial program loader.* (2) *initial program load.*

IUP. See *installed user program.*

job. *A specified group of tasks prescribed as a unit of work for a computer. By extension, a job usually includes all necessary computer programs, linkages, files, and instructions to the operating system.

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*American National Standard Definition

job step. A unit of work associated with one processing program or one catalogued procedure and related data. A job consists of one or more job steps.

job stream. The sequence of operation control statements and data submitted to an operating system or an input unit especially activated for this purpose by the operator.

K. 1024 bytes; used in referring to storage capacity.

*key. One or more characters within an item of data that are used to identify it or control its use.

keyword. (1) A symbol that identifies a parameter. (2) A part of a statement that consists of a specific character string (such as NAME-).

keyword parameter. A parameter that consists of a keyword, followed by one or more values.

label. An identification record for a tape or disk file.

*language. A set of representations, conventions, and rules used to convey information.

language translator. A general term for any assembler, compiler, or other routine that accepts statements in one language and produces equivalent statements in another language.

leased line. A communication service used exclusively by one particular customer. Referred to as private line service.

librarian. The set of programs that maintains, services, and organizes the source and object libraries.

library. A set of programs, procedures, routines, etc., on a direct access storage device. See *source library, object library.*

linkage editor. A program that prepares the output of language translators for execution. It combines separately produced object modules; resolves symbolic cross references among them; generates overlay structures on request; and produces excutable code (a load module) that is ready to be loaded into main storage.

listing. A printout, usually prepared by a language translator, that lists the source language statements and contents of a program.

load. To enter data or programs into storage.

log device. A device used to record system activity.

*main storage. The general purpose storage of a computer. Contrast with *auxiliary storage.*

merge. (1) *To combine items from two or more similarly ordered sets into one set that is arranged in the same order. (2) A program or routine that performs this function.

microsecond. One-millionth of a second.

millisecond. One-thousandth of a second.

ML/MP. Multiline/Multipoint. A communications facility of System/3 SCP.

MLTA. Multiple Line Terminal Adapter.

modem. (1) *(MOdulator-DEModulator) A device that modulates and demodulates signals transmitted over communication facilities. (2) See also *data set* (2).

MOSFET. Metal Oxide Semiconductor Field Effect Transistor. Type of main storage used in computers. Also referred to as FET (Field Effect Transistor).

multitasking. The concurrent execution of one main task and one or more subtasks in the same partition.

multi-volume file. A file that requires more than one volume of a storage medium.

network. In teleprocessing, a number of communication lines connecting a computer with remote terminals.

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*American National Standard Definition

*object code. Output from a compiler or assembler which is itself executable machine code or is suitable for processing to produce executable machine code.

object library. An area on a direct access storage device used to store object programs and routines.

*object module. A module that is the output of an assembler or compiler and is input to a linkage editor.

*object program. A fully compiled or assembled program that is ready to be loaded into the computer. Contrast with *source program.*

OCL. Operation Control Language.

*offline. Pertaining to equipment or devices not under control of the central processing unit.

*online. (1) Pertaining to equipment or devices under control of the central processing unit. (2) Pertaining to a user's ability to interact with a computer.

*operating system. Software which controls the execution of computer programs and which may provide scheduling, debugging, input/output control, accounting, compilation, storage assignment, data management, and related services.

operation control language. A programming language used to code operation control statements. Abbreviated OCL.

operation control statement. A statement in a job or job step that is used in identifying the job or describing its requirements to the operating system.

operator message. A message from the operating system or a user program directing the operator to perform a specific function, such as mounting a disk pack or informing him of specific conditions within the system, such as an error condition.

*output. (1) Pertaining to a device, process or channel involved in an output process, or to the data or states involved. (2) Same as output device. (3) Same as output data.

overlay linkage editor. See *linkage editor.*

overlay program. A program in which certain sections can use the same storage locations at different times during execution.

pack. (1)*To compress data in a storage medium by taking advantage of known characteristics of the data, in such a way that the original data can be recovered; for example, to compress data in a storage medium by making use of bit or byte locations that would otherwise go unused. (2) See *disk pack.*

parameter. (1) *A variable that is given a constant value for a specific purpose or process. (2) See *keyword parameter.*

partition. A subdivision of main storage.

permanent file. A disk file that is normally created for continuing use. Contrast with *scratch file, temporary file.*

point-to-point line. A line that connects a single remote station to the computer; it may be either switched or nonswitched.

point-to-point transmission. Transmission of data directly between two points without the use of any intermediate terminal or computer.

PP. Program product.

primary track. On a direct access device, the original track on which data is stored. See also *alternate track.*

procedure. (1)*The course of action taken for the solution of a problem. (2) A set of job definitions, including operation control statements, stored in a source library.

program level. A subdivision of main storage.

*program library. A collection of available computer programs and routines.

*programming language. A language used to prepare computer programs.

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*American National Standard Definition

programming RPQ. A customer request for a price quotation on alterations or additions to the functional capabilities of system control programming or program products. The RPQ may be used in conjunction with *computing system RPQ's* to solve unique data processing problems. Abbreviated PRPQ.

program product. A licensed program that performs a function for the user and usually interacts with and relies upon system control programming. A program product contains logic related to the user's data and is usable or adaptable to meet his specific requirements.

random processing. The treatment of data with respect to its location in external storage, and in an arbitrary sequence governed by the input against which it is to be processed. Contrast with *consecutive processing, sequential processing.*

*record. A collection of related items of data, treated as a unit; for example, one line of an invoice may form a record; a complete set of such records may form a file.

remote job entry. Submission of job control statements and data from a remote terminal, causing the jobs described to be scheduled and executed as though encountered in the input stream. Abbreviated RJE.

restart. The process of resuming a job at a checkpoint within the job step that caused abnormal termination. See *checkpoint/restart facility.*

roll-in/roll-out. Same as rollout/rollin.

rollout/rollin. An optional feature of the operating system that allows the temporary reassignment of a main storage partition from one program to another.

*routine. An ordered set of instructions that may have some general or frequent use.

RPG II. Report Program Generator, Version 2. A business-oriented data processing language.

RPQ. Request for price quotation. See *computing system RPQ, programming RPQ.*

scheduler. The part of a control program that reads and interprets job definitions, schedules the jobs for processing, and initiates and terminates the processing of job steps.

scratch file. A disk file that is normally created and deleted in the same job step. Contrast with *permanent file, temporary file.*

secondary storage. Same as *auxiliary storage.*

sector. The smallest addressable part of a disk storage device.

seek. To position the access mechanism of a direct access device at a specified location.

sequence. (1)*An arrangement of items according to a specified set of rules. (2)In sorting, a group of records whose control fields are in ascending or descending order, according to the collating sequence.

sequential organization. A file organization in which records are arranged in a physical sequence. The records are not necessarily in logical sequence. Contrast with *direct organization, indexed organization.*

sequential processing. A treatment of data with respect to its location in external storage, and in a sequence governed by the logical order of the data in the file. Contrast with *consecutive processing, random processing.*

SIOC. Serial input/output channel.

*software. A set of programs, procedures, and possibly associated documentation, concerned with the operation of a data processing system. Contrast with *hardware.*

source language. (1)*The language from which a statement is translated. (2)Used to code source statements.

source library. An area on a direct access storage device used to store source programs and procedures.

source module. The source statements that constitute the input to a language translator for a particular translation.

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*American National Standard Definition

*source program. A computer program written in source language. Contrast with *object program.*

source statement. A statement written in symbols of a programming language.

stacked job processing. A technique that permits multiple job definitions to be grouped (stacked) for presentation to the system, which automatically recognizes the jobs, one after the other.

stand-alone program. A program that can be executed independently of an operating system.

statement. (1)*In computer programming, a meaningful expression or generalized instruction in a source language. (2) See *operation control statement.*

step. (1)*One operation in a computer routine. (2)See *job step.*

*storage. (1) Pertaining to a device into which data can be entered, in which they can be held, and from which they can be retrieved at a later time. (2) Loosely, any device that can store data. (3) Synonymous with memory.

supervisor. The part of a control program that coordinates the use of resources and maintains the flow of CPU operations.

switched line. A communication line in which the connection between the computer and a remote station is established by dialing. Synonymous with dial line.

SYSGEN. System generation.

system control programming. IBM-supplied programming that is fundamental to the operation and maintenance of the system. It serves as an interface with program products and user programs and is available without additional charge.

system generation. The process of tailoring the system control programming to suit a user's requirements and of including the desired program products.

system input device. A device specified as a source of input.

system log device. See *log device.*

system output device. A device assigned to record output data.

teleprocessing. The processing of data that is received from or sent to remote locations by way of telecommunication lines.

temporary file. A disk file that is normally created and deleted in the same job. Contrast with *permanent file, scratch file.*

track. The portion of a moving storage medium, such as a tape or disk, that is accessible to a given reading head position.

unit record devices. Card readers, card punches, and printers.

universal character set. A printer feature that permits the use of a variety of character arrays. Abbreviated UCS.

utility program. A program designed to perform an everyday task, such as copying data from one storage device to another.

variable-length record (1)A record having a length independent of the length of other records with which it is logically or physically associated. Contrast with *fixed-length record.* (2)*Pertaining to a file in which the records are not uniform in length.

volume. (1) That portion of a single unit of storage which is accessible to a single read/write mechansim, such as a disk pack. (2) A recording medium that is mounted and demounted as a unit; for example, a reel of magnetic tape or a disk pack.

volume table of contents. A table on a disk volume that describes each file on the volume. Abbreviated VTOC.

VTOC. Volume table of contents.

work file. (1)In sorting, an intermediate file used for temporary storage of data between phases. (2)A temporary or scratch file generally used for the duration of one job or job step.

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*American National Standard Definition

IBM System/3
Model 8 Introduction
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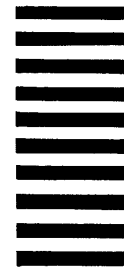
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