IBM

An Introduction to the IBM 8100 Information System

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This edition makes previous editions of this manual and their Technical Newsletters obsolete.

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Preface

This manual contains introductory information about the IBM 8100 Information System. It can help you understand the 8100 Information System, the interrelationships of its components, and the system's value to distributed data processing. The manual briefly discusses system concepts, programming support, hardware units and features, and input/output devices that can be attached to the system.

Who Should Read This Manual

Users, or potential users, of the 8100 Information System, including managers, programmers, and installation planners, should become familiar with the contents of this manual. A general knowledge of data processing concepts, data communications concepts, and event-driven systems is assumed.

How This Manual Is Organized

The information in this manual is divided into two parts of five chapters each. Part 1 is an "Executive Overview" for customer executives who are evaluating distributed data processing and the 8100 Information System as ways of meeting the needs of their enterprise. Part 2 is a "Technical Overview" for managerial and technical personnel who are evaluating the feasibility of an 8100 Information System to meet their distributed data processing system requirements. A Glossary and Index at the back of the manual will help all readers.

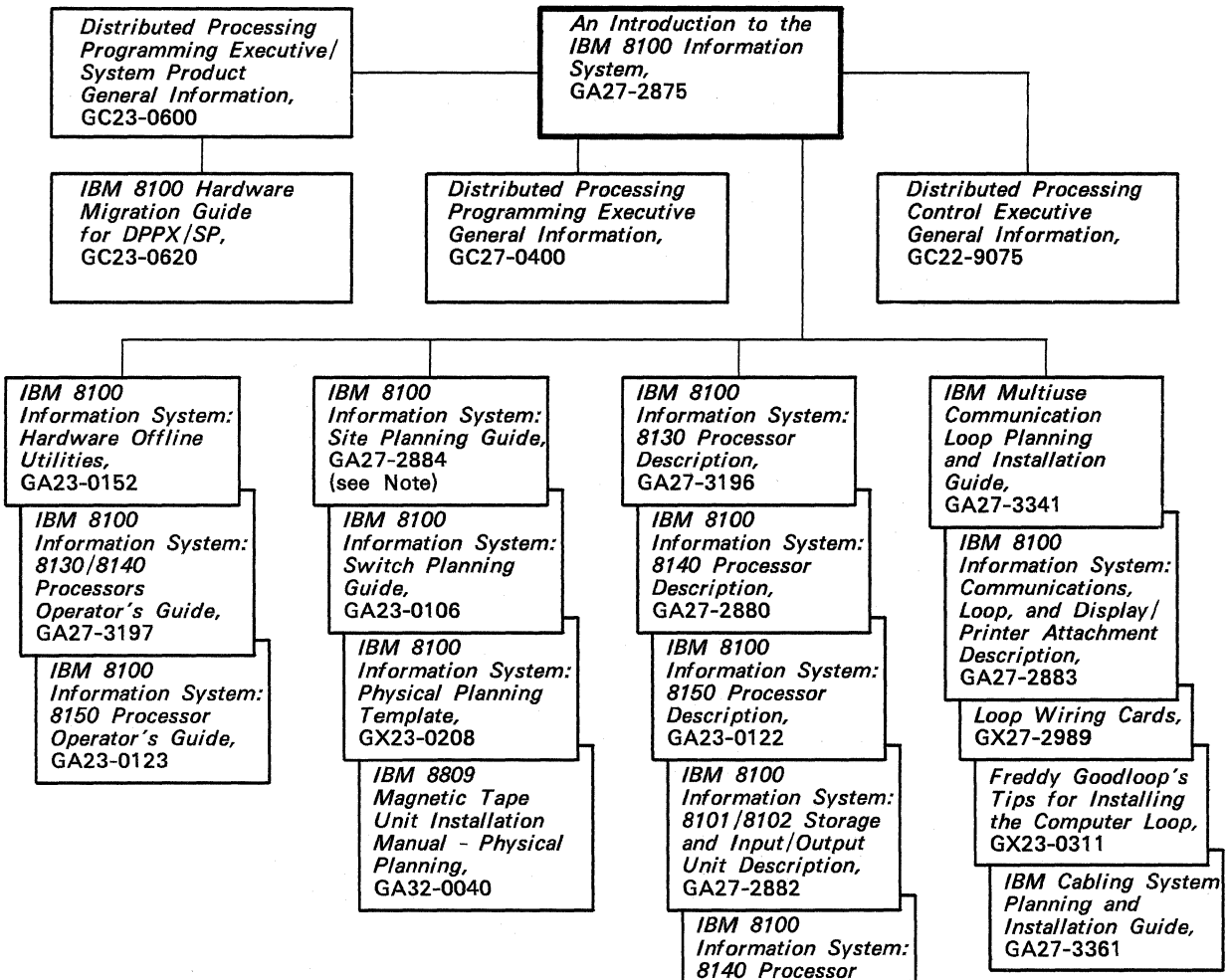
Other 8100 Manuals

This manual describes the 8100 Information System hardware units, their characteristics, features, functions, and capabilities. The Related Publications chart on the next page shows how this manual relates to the rest of the 8100 system library and lists other 8100 hardware manuals. You can order those manuals through your IBM marketing representative.

For details concerning the hardware configurations each licensed program supports, refer to the following manuals:

- *Distributed Processing Programming Executive/System Product General Information*, GC23-0600
- *Distributed Processing Programming Executive General Information*, GC27-0400
- *Distributed Processing Control Executive General Information*, GC22-9075
- *Distributed Office Support Facility General Information*, GC27-0546

Related Publications



Note:

IBM provides a Bill of Forms by which you can order one form number and receive two or more documents. Bill of Forms number GBOF-3983 will provide the following:

- *IBM 8100 Information System Site Planning Guide,*
- *IBM 8100 Information System Physical Planning Template, GX23-0208.*
- *IBM 8809 Magnetic Tape Unit Installation Manual-Physical Planning, GA32-0040.*

Bill of Forms GBOF-1589 will provide the following documents:

- *IBM Multiuse Communications Loop Planning and Installation Guide, GA27-3341*
- *Freddy Goodloop's Tips for Installing the Computer Loop, GX23-0311*

Use Bill of Forms SBOF-1594 to order three-ring binders to store your description manuals.

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Part 1. Executive Overview

This executive overview is for customer executives evaluating distributed data processing in general and the 8100 Information System in particular as ways of meeting the needs of their enterprise. This part contains the following five chapters:

Chapter 1. Introduction to Distributed Data Processing and the 8100 Information System

This chapter compares distributed processing systems concepts to decentralized processing systems and centralized processing systems. It also introduces the 8100 Information System and explains how it covers the spectrum of decentralized-distributed-centralized processing.

Chapter 2. Types of System Relationships Possible with the 8100 Information System

This chapter presents the 8100 Information System building block approach to system growth, from either a centralized or a decentralized system, to a distributed data processing system.

Chapter 3. Hardware and Communications Highlights

This chapter introduces the hardware units of the 8100 Information System and explains the system's communications capabilities.

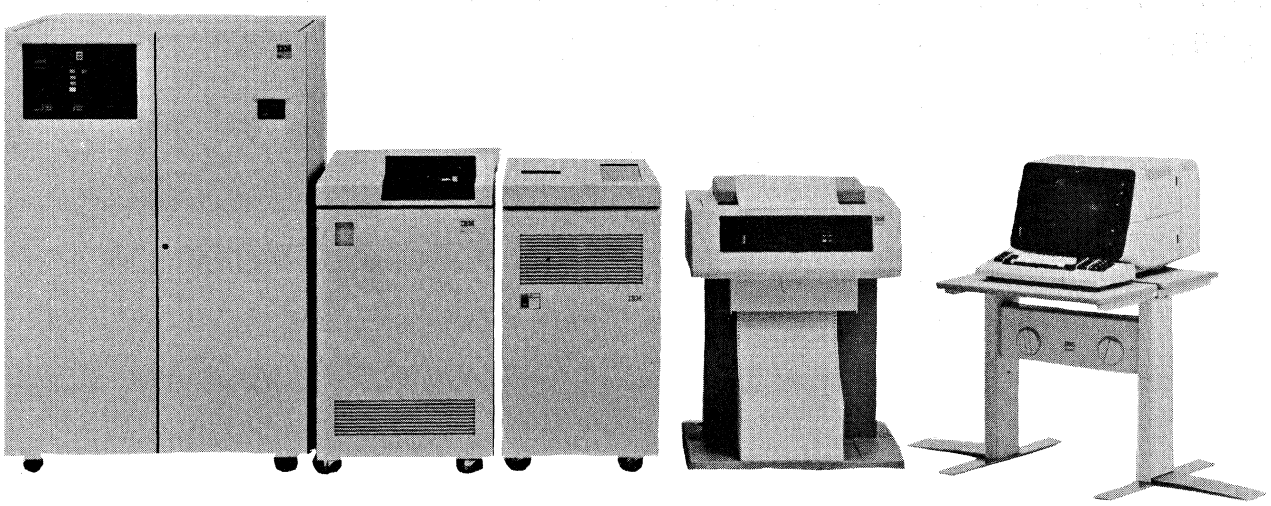
Chapter 4. Programming Highlights

This chapter introduces two IBM operating systems that support the 8100 Information System:

- Distributed Processing Programming Executive/System Product DPPX/SP or Distributed Processing Programming Executive DPPX.
- Distributed Processing Control Executive DPCX.

Chapter 5. Reliability, Availability, and Serviceability

This chapter presents the tools and levels of support that are available to optimize the reliability, availability, and serviceability of the 8100 Information System.



Frontispiece. IBM 8100 Information System

Chapter 1. Introduction to Distributed Data Processing and the 8100 Information System

The IBM 8100 Information System is a data processing system designed to distribute processing among computers in a cooperative network. The 8100 system offers the customer a variety of alternative functions, applications, and prices through its systems approach to distributed data processing. The 8100 system can be installed in a variety of ways and can be used for many business and industrial applications. The system's computers can be connected to host computers, other 8100 systems, or they can run as stand-along processors. See Frontispiece.

The components of the 8100 Information System are the 8130, 8140, and 8150 processors, the 8101 and 8102 Storage and Input/Output Units, two types of support programs, and attached input/output devices. The system can be configured in a number of combinations of components to meet a wide range of customer needs. This multipurpose data processing system can operate stand-alone or as part of a hierarchy of interconnected processors, which can be other 8100 processors, IBM 4300 processors, IBM System/370 processors, and processors for systems supplied by other manufacturers.

The IBM 8100 Information System offers two kinds of programming support:

1. Distributed Processing Programming Executive/System Product (DPPX/SP), a packaged group of licensed programs

   OR

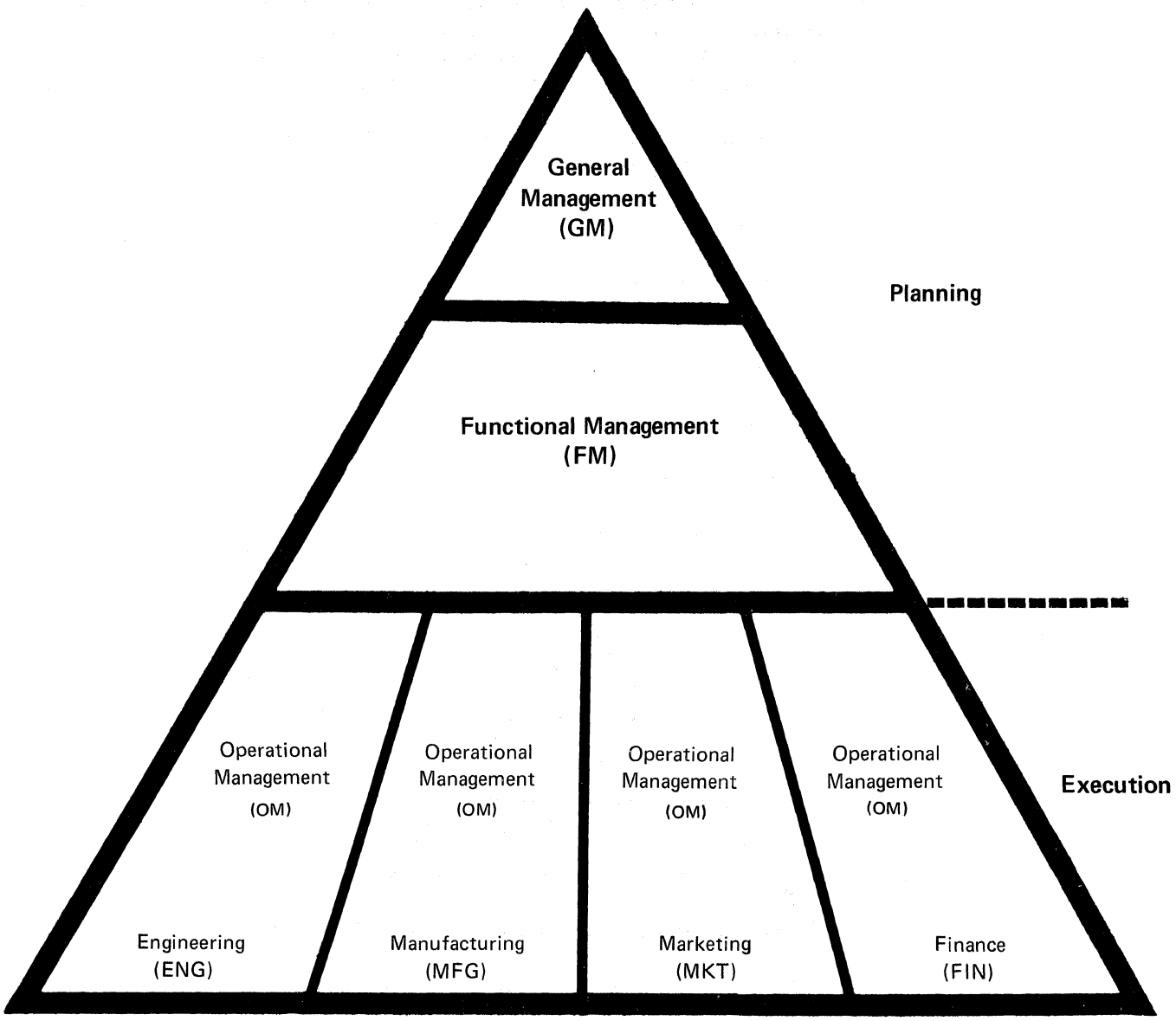
   Distributed Processing Programming Executive (DPPX), a group of individual, licensed programs

2. Distributed Processing Control Executive (DPCX), a licensed program that provides programming functions compatible with the 3790 Communications System. DPCX is the base system for Distributed Office Support Facility (DOSF), a text application program.

Customers can connect input/output devices to the 8100 Information System either directly without modem or through a common carrier communications line (hereafter called a data link). Many devices can also be connected through a communications loop, a single cable to which a user can attach a large number of devices.

IBM's Systems Network Architecture (SNA) and its communications discipline, Synchronous Data Link Control (SDLC), are the basis for the 8100 Information System communications support. They offer an orderly, structured approach to distributed processing. The 8100 system also supports the Binary Synchronous Communications (BSC) and Start-Stop (SS) disciplines to let customers integrate 8100 hardware units into existing communications networks. These older disciplines can migrate to a SNA network as the customer adds newer communications devices and other 8100 systems.

Data Processing Alternatives



The management of a business or organization can set up its data processing capabilities in a variety of ways, ranging from decentralized to centralized.

Decentralized | | Centralized

The capabilities are based on the firm or organization's information needs as the management perceives them and on the data processing equipment and programming support used to satisfy those needs. The following sections discuss some of the advantages and disadvantages of decentralized and centralized data processing.

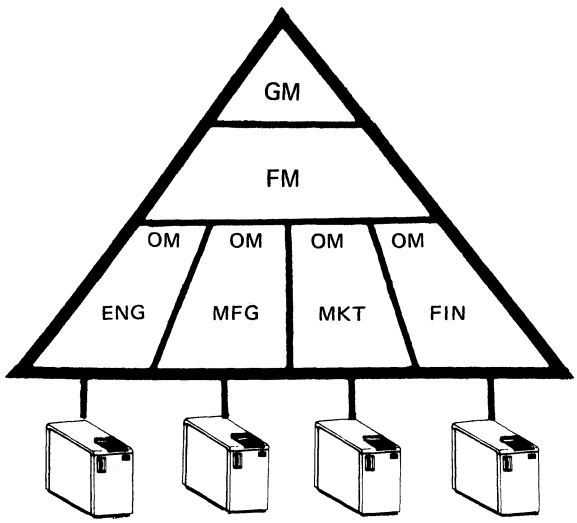
Decentralized Data Processing

At one end of the data processing spectrum for a company is the decentralized approach which means that data is processed at several locations. Each operational department in an organization sets up its own stand-alone data processing system. A decentralized system allows:

- End users to participate in the scheduling and development of application programs
- Administrative or production personnel to use the system easily
- Operational departments to ensure that their own data processing requirements, both present and future, are met

A decentralized system also provides:

- Straight-forward cost justification
- High availability
- Fast application implementation without complicated systems and highly trained application programmers

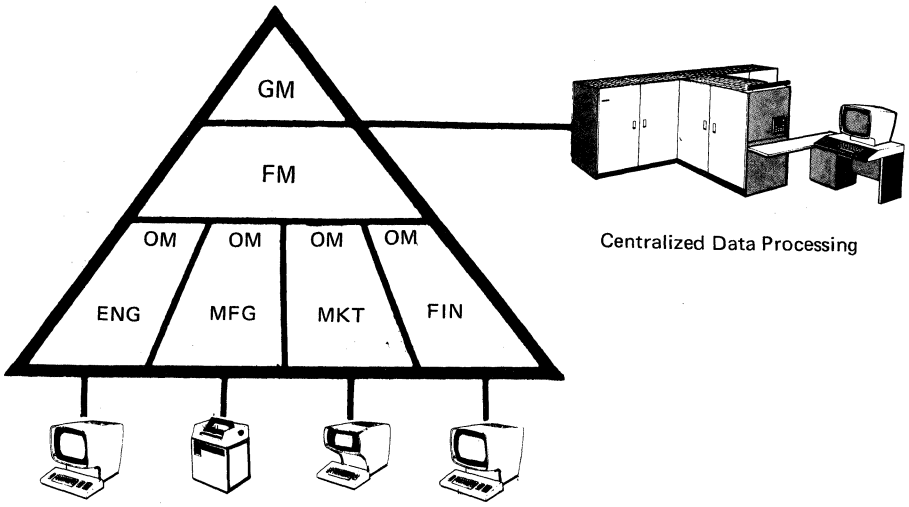


Stand-Alone Decentralized Data Processing

Along with these advantages, stand-alone systems have possible drawbacks: they require management be more diligent and exercise tighter controls so various operational departments do not duplicate their efforts and resources. For example, much of the data created, used, and changed at the operational level is important for the overall control and measurement of the company at the functional and general management levels. Since stand-alone systems are controlled by their respective operational departments, uniform standards and controls are often needed to make sure programs and data are exchanged within a company or organization.

Centralized Data Processing

At the other end of the data processing spectrum is the centralized approach. With this approach, the general management of the enterprise consolidates the data processing function. A central data base not only eliminates redundancy, but also brings together all information into a valuable corporate reservoir. Controls are easier to implement and manage, and integrated applications are developed across the enterprise.

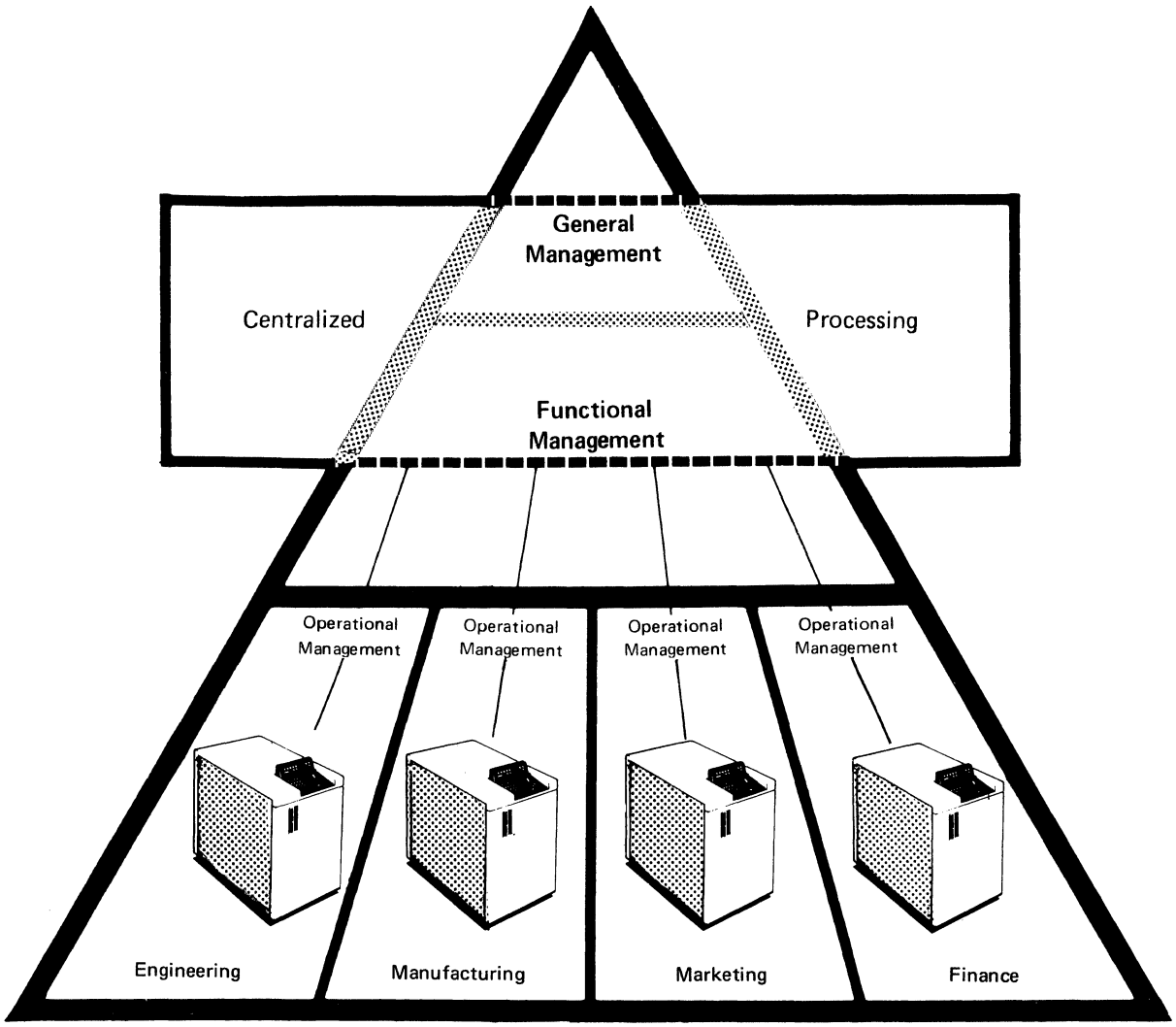


Centralized Data Processing

With centralized data processing, resources can easily be directed to develop and implement applications that serve nonoperational areas such as functional management. However, when management commits resources to develop and implement operational applications, it must consider the needs of all operational departments. The result may be that some operational departments have difficulty satisfying their unique processing requirements.

Additionally, operational level users can communicate their processing and data access needs to the central processors only through terminals, which limits their interaction with the processors and data base that serve the entire enterprise. For these reasons, and because of improvements in cost and performance in decentralized data processing technology, operational departments often find the decentralized approach more attractive than the centralized approach.

In summary, both centralized and decentralized data processing have their advantages and disadvantages, depending on the level and perspective of the management evaluating them.



Distributed Processing

The 8100 Information System Approach to Distributed Data Processing

Advantages

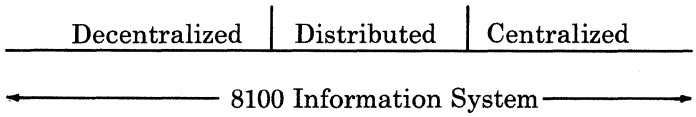
The 8100 Information System's distributed processing has the advantages of both centralized and decentralized processing and adds the flexibility to meet the information requirements of all levels. It offers centralized control of programming standards and procedures, security and integrity, and sensitive data. At the same time, it offers decentralized control of application programs and makes them meet the specific requirements of all operational departments. The system cuts costs by sharing data, programs, procedures, skills, and control.

8100 system distributed data processing is carried out at many locations in a wide variety of ways, each tailored to the application requirements of the users in that location. Programmable storage devices containing the consolidated data base are connected to host or interconnected processors. Functions and data are distributed within a network of processors to provide each organizational level with both data and processing resources while also providing increased productivity and maintaining management control of those resources.

The 8100 Information System covers the entire data-processing spectrum. It may be installed as a decentralized, stand-alone system at the operational level, and later connected to a distributed network.

It may be installed as a data processing system supported by a larger centralized system such as System/370, a host-connected processor.

It may be installed as an addition to an existing 8100 Information System with interconnected processors.



The 8100 Information System has the configuration flexibility and programming support to let an enterprise's data-processing system grow and change as the information needs of the enterprise grow and change. It offers high function at low cost, a choice of primary licensed programs, and a wide selection of storage and I/O options, including direct access storage devices, a magnetic tape unit, communications facilities, printers, and printer/display terminals. The 8100 Information System accommodates multiple user environments by allowing customers to select the most appropriate configurations.

With the 8100 Information System, an enterprise's data processing system can evolve into a distributed data processing system that provides:

- Management control
- Distributed functions
- Distributed data
- Communications alternatives
- Implementation alternatives
- System management

Management Control

With the 8100 Information System as part of a distributed data processing system, general and functional management levels can maintain control of data processing while applications processing is distributed among connected processors.

By using a central processor to which the 8100 Information System is connected, general and functional management retain the advantages of centralized data processing through:

- Economies from the shared use of hardware and data processing skills
- Minimum redundancy in the development of applications throughout the enterprise
- Development and control of data processing standards
- Management of all applications within the business

At the distributed processor locations, operational management gains the support of other systems in the network while retaining the following advantages of decentralized processing:

- Quick implementation of low-risk applications
- High system availability for operational level applications
- Control of applications that are unique to a particular operational function
- Cost justification of a distributed system compared to local applications

Distributed Functions

8100 Information System processors can share processing functions, distributed throughout the data processing system, depending on where they can be most effective.

Applications can be moved from the central processor location to locations where they more logically or economically belong. Applications unique to an end user can be executed in the distributed processor at the end user's location. The ability of the 8100 system to distribute processing functions permits a balanced approach — necessary control at the general and functional management, and enough flexibility for the end user at all levels.

Distributed Data

In a simplified corporate structure, central control is at the top level. Delegation of responsibility and assignment of work flows down through the organization to the operational level while information is fed back to the top. Typically, the greatest amount of information processing takes place at the operational level. That level needs to send only summary data upward.

Without distributed data processing, data base concepts use a central data base containing information frequently accessed by the operational levels via terminals. Yet there is no real need to keep all that information in the central data base if data storage is possible at the operational locations. As application programs are developed by the operational levels to satisfy the information needs of general and functional management, data flow to and from a central data base increases. As a result, communications line costs and response time also increase.

Distributed data processing is a logical extension of these data base concepts. The 8100 Information System can store data at the distributed processor locations and can share the data throughout the system.

Control and information needs of the organization can be satisfied and line costs and response times can be optimized by configuring a system that stores:

- Strategic data at the corporate level
- Tactical information at the operational level
- Uniquely required information only where that need exists
- Commonly used information in a central place, making it accessible to remote users

Communications Alternatives and SNA

The 8100 Information System is a communications-based system. Its communications support comes from IBM's Systems Network Architecture (SNA) and Synchronous Data Link Control (SDLC), the SNA communications discipline. The 8100 Information System also supports the older line disciplines, Binary Synchronous Communications (BSC) and Start-Stop (SS). Therefore, the 8100 Information System can be integrated into an existing communications network, and can migrate to a SNA network as newer communications devices and 8100 systems are added.

The IBM 8100 Information System can be connected to a System/370 host, a 4300 system processor, or to other 8100 system processors. The System/370 host connection can range from the total dependence of full-time linkage to manual dial-up. User applications determine the particular relationship required among processors.

SNA allows logical and physical network and terminal control functions to be separated from customer application programs. This permits application programmers to concentrate on application requirements, and reduces the time and effort needed to execute and maintain user-application programs.

This architecture requires no interdependence between an application program and a terminal. Because SNA terminals operate with the SDLC line discipline, they communicate with application programs through a common set of IBM programs. The functions and speeds of today's terminals can be upgraded in the future without the massive application reprogramming that was needed before SNA was introduced.

Because all SNA devices use a standard line protocol, different types of SNA terminals can share a common communications line. This line sharing reduces or eliminates the cost of redundant lines and networks previously required to support various types of terminals. SNA offers greater potential use of data communications resources across all applications in the system. An aim of SNA is to let any terminal connect with any application and thus eliminate redundant terminals and lines. In many cases, customers can add new applications using existing lines and terminals. This can make many applications financially feasible that could not have been feasible in the past.

A systems approach to distributed processing is one of the important benefits of SNA. A distributed processing system developed under SNA can be flexible enough to meet both current and future requirements. As a business grows and its requirements change, SNA and distributed processing provide a logical framework for expanding a network with host or peer systems, while preserving the value of the investment already made.

General, functional, and operational management recognize that orderly growth is essential in a distributed data processing system. SNA and the 8100 Information System, in a distributed processing configuration, provide the architecture and the systems approach needed to meet the challenge of orderly growth in a logical manner.

Implementation Alternatives

The 8100 Information System offers the option of designing, writing, and testing application programs either centrally at the host processor, remotely at operational areas, or in a combination of locations. An operational area can develop stand-alone application programs to support its unique information needs, while programs for several operational areas can be developed centrally or jointly. As a result, users at the operational level can develop and implement more application programs for their own needs. Regardless of where application programs are developed, central control is maintained.

Although the 8100 Information System is a major adjunct to System/370 host processing and is usually related to a centralized implementation, it can also be installed stand-alone in operational areas, separate from the host processor site. In either case, the central location or the remote operational area can manage and implement application program development. Customers can plan to involve the host in distributed data processing when they install their system or later. The relationship between the central processor and the distributed data processing systems is a factor in a customer selecting the 8100 Information System licensed program that will satisfy the information needs of the enterprise.

System Management

The 8100 Information System allows the distributed processing network to be monitored and managed from a central location. Network problem determination can be carried out from the central site. Programs for all processors in the network can be generated and updated from a central location.

System Reliability, Availability, and Serviceability (RAS)

Reliability, availability, and serviceability (RAS) of the network and its individual processors are critical to the successful operation of any data processing system. Distributed System Network Management tools available for installation at the System/370 host location enhance the 8100 Information System's RAS facilities.

Customer Setup (CSU)

The IBM 8100 Information System is designed so customers can set up, relocate, and test hardware units without tools or special skills. Well-defined customer access areas, quick connectors, verification checkout tests, and carefully tested instructions allow easy setup by customers. Selected IBM input/output devices (described in Chapter 10) are also designed for customer setup. IBM marketing representatives can help customers determine which IBM products are designated "CSU."

For installation of an 8100 Information System to be successful, customers must pay attention to the following stages of the installation:

1. Configuration — The customer selects 8100 component and attachable devices, with appropriate features, to create a customized information system. Configuration information may be obtained from an IBM marketing representative. This information will be needed whenever changes are made to the system, or when 8100 components or devices are relocated.

2. Site Planning/Preparation — Site planning requires the customer to use configuration information to plan the placement of components, cables, and power sources. During site preparation, the customer allocates space for units and installs the appropriate power, cables, and communications facilities.

   The *8100 Site Planning Guide*, GA27-2884, contains site planning and cable order worksheets that customers can use in site planning, preparation, and setting up the 8100 system.

3. Customer Setup (CSU) — The customer uses IBM customer setup instructions to situate and set up the hardware units as planned. Part of CSU includes customers verifying that the 8100 unit works correctly.

4. Program Installation — The customer needs configuration and CSU information to install and customize 8100 system licensed programs.

Licensed Programs

Two programs support the 8100 Information System:

- Distributed Processing Programming Executive/System Product (DPPX/SP)

  OR

  Distributed Processing Programming Executive (DPPX)

- Distributed Processing Control Executive (DPCX)

DPPX/SP is an enhanced version of DPPX, offering additional functions and hardware product support. DPPX/SP supports existing program products that are supported by DPPX.

DPPX is a communications-based operating system designed for 8100 Information System processors and distributed data processing applications. With DPPX, remote sites can develop, compile, and execute application programs either independently or with other 8100 Information Systems. Application program development can also be centralized at a single 8100 Information System.

DPCX continues the system philosophy of the IBM 3790 Communication System but uses the processing capabilities of 8100 system hardware. Application programs written for the 3790 operating system will run without change under DPCX. DPCX offers current 3790 users the added functions and advantages of the 8100 Information System, while retaining host control of application development. DPCX's Distributed Office Support Facility (DOSF) is an IBM licensed program for text processing and paperwork management. It helps users produce and manage letters, reports, and manuals efficiently and economically as documents stored in an 8100/DPCX system.

Chapter 2. Types of System Relationships Possible with the 8100 Information System

To meet the broad range of user requirements, the IBM 8100 Information System is designed for four different kinds of systems:

- Stand-alone systems
- Interconnected processors
- Host-connected processors
- Processors sharing disk files and tape drives

The degree to which the 8100 Information System supports the relationship between parts of these systems depends on programming support, discussed in Chapter 4.

Stand-Alone System

The stand-alone system (Figure 2-1) performs an application or group of applications without depending on another processor. Data or program information may be transferred to other systems by exchange of physical media. The stand-alone system may be located in a data processing center or it may be part of a multiple system. If several locations require the same application, each location probably has its own independent system performing that application. Stand-alone systems may grow to distributed configurations when they are connected to hosts and peers.

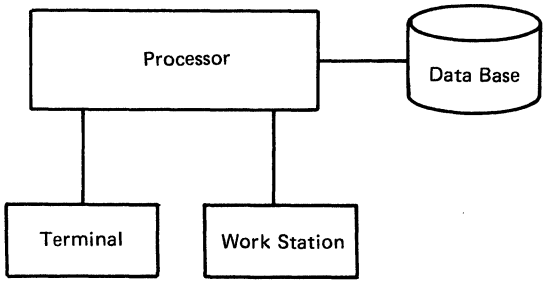


Figure 2-1. Stand-Alone System

Interconnected Processors

Interconnected processors are two or more 8100 Information System processors directly linked as a distributed data processing system.

Interconnected processors (Figure 2-2) are supported by DPPX or DPPX/SP and operate jointly on one application or a group of closely related applications. A program on one processor:

- Activates application tasks that reside on an interconnected processor.
- Reads from or writes to an on-line data file or data base on an interconnected processor with the help of user programming.

Other characteristics of interconnected processors include:

- Interactive use of interprocessor applications
- No subordination of one system to another with regard to communications or applications
- Optional communications link to a host processor for batch data or batch submission

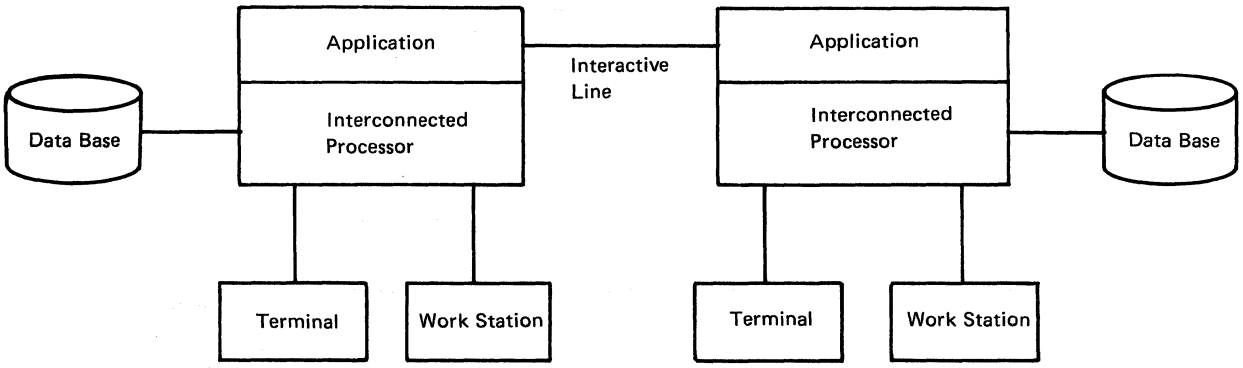


Figure 2-2. Interconnected Processors

Host-Connected Processors

The host is the controlling element in a host-connected distributed data processing system. Depending on application requirements, the IBM System/370 or IBM 4300 can support 8100 Information Systems connected as satellites.

A host-connected system (Figure 2-3) consists of a host processor connected to one or more distributed processors capable of operating jointly on an application or a group of closely related applications. A program on one processor:

- Activates application tasks that reside on another system.
- Reads from or writes to an on-line data file or data base on another system with the help of user programming.
- Transmits programs to another system for execution.

An interconnected processor system may be configured within a host-connected system, and may or may not need the host for support.

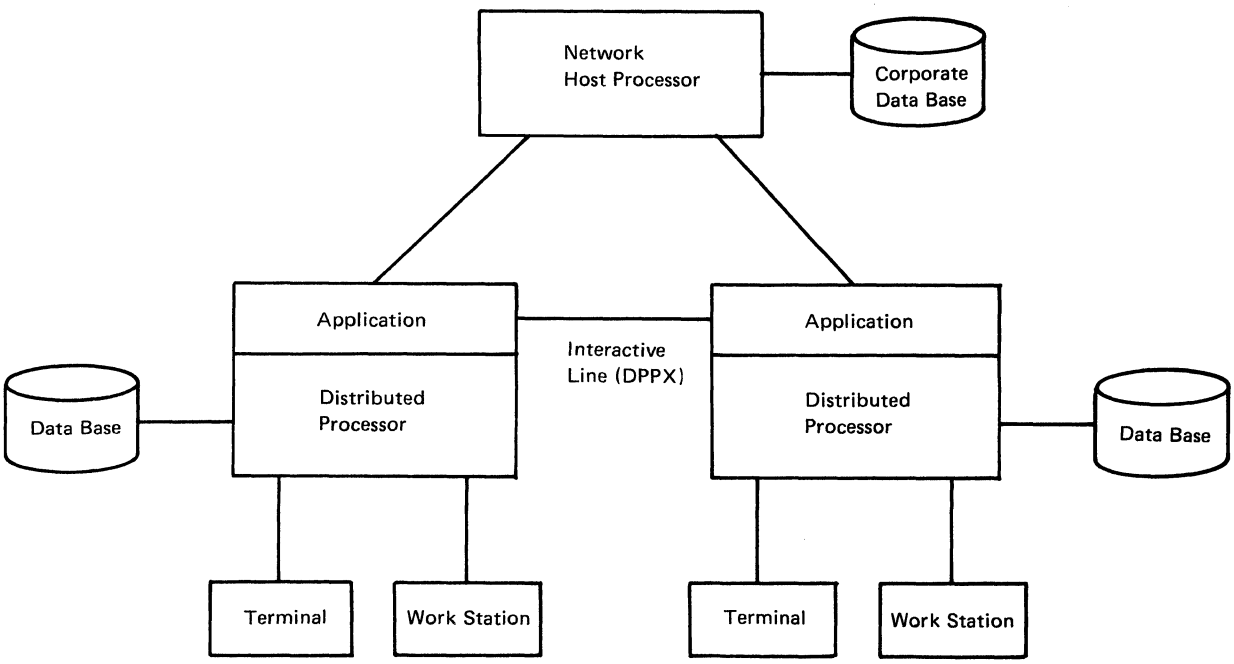


Figure 2-3. Host-Connected Processors

Processors Sharing Disk Files and Tape Drives

The Storage and I/O Unit Switch Feature allows an operator to select which one of two 8100 processors, or which one of two processing and control elements (PCEs) in the 8150 B Model Processor, has access to a data base stored on disk files or tape drives. The switch feature is located on an 8101 or 8102 Storage and I/O Unit attached to the processors.

The data base is connected to the **primary** processor by the 8101 or 8102. If a failure occurs in the primary processor, the operator can use the switch feature to electronically switch access to the data base to the secondary processor. See Figure 2-4.

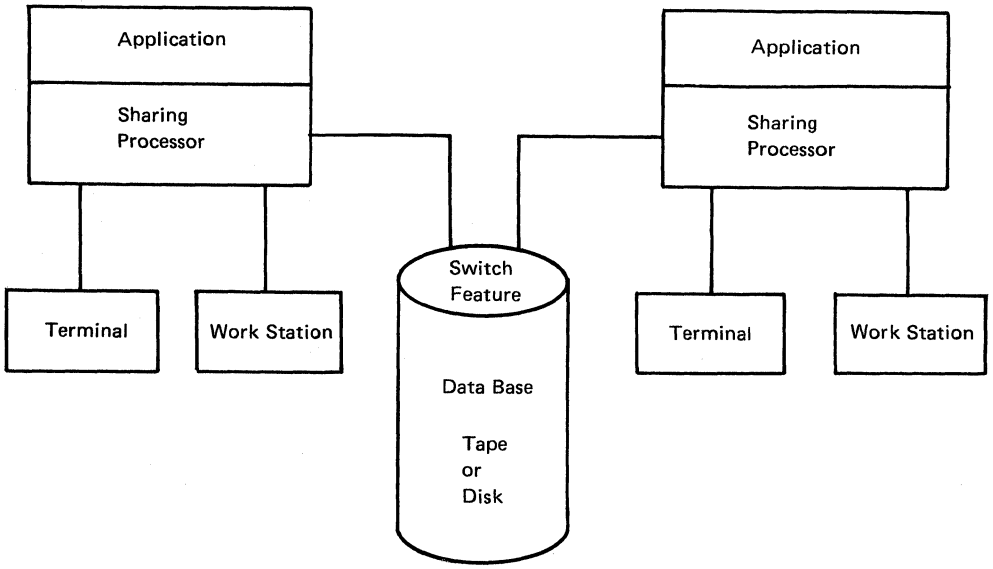


Figure 2-4. Data Base Made Accessible by Storage and I/O Unit Switch Feature

Chapter 3. Hardware and Communications Highlights

8100 System Hardware

With the IBM 8100 Information System, users can select and configure units to meet a variety of application requirements. The most basic system begins with an 8130, 8140, or 8150 Processor. The 8130 and 8140 contain a disk, a diskette drive with removable diskette, and communications and input/output (I/O) facilities. The 8150 has a diskette drive and communications and I/O facilities, but it does not have its own disk storage. Disk storage for this processor is provided by an attached 8101 or 8102 Storage and I/O Unit.

The basic system can be expanded by adding 8101s and 8102s that provide disk storage, 8809 Magnetic Tape Units, and communications and I/O capabilities. Communications and I/O adapters attach multiple printers or display terminals, and a card reader and punch, to the 8100 system, either directly or by data link. These devices can also be attached to loops connected either directly or by data link to the 8100 system.

All IBM 8100 Information System units are designated customer setup units to provide faster availability and easier relocation.

Processors

The 8100 Information System offers three multilevel, interrupt-driven processors, the 8130, 8140, and 8150. There are four 8130 A models, two 8130 B models, twenty 8140 A models, six 8140 B models, three 8140 C models, four 8150 A models, and four 8150 B models.

8130 Processor

The IBM 8130 Processor models provide controls, storage, disk storage, diskette storage, and communications and I/O capabilities for the 8100 Information System.

8140 Processor

The IBM 8140 Processor models provide controls, storage, disk storage, and diskette storage for the 8100 Information System. Additionally, models A31 – A34, A41 – A44, B51, B52, B61, B62, B71, B72, C72, C82, and C92 provide communications and I/O capabilities.

Floating-Point arithmetic is a standard part of models A41 – A44 and it is an optional feature of the 8140 B and C models.

The Expanded Function Operator Panel is available as an optional feature on 8140 models A31 – 34, A41 – A44 (if selected on the A41 – A44, communications capabilities can only be selected via the 8101), and on all the 8140 B models.

8150 Processor

The IBM 8150 Processor models provide controls, storage, diskette storage, and communications and I/O capabilities for the 8100 Information system. The 8150 B models also provide increased availability through two Processing and Control Elements (PCEs) and increased reliability through Error Correction Coding. Disk storage for the 8150 is provided by attaching 8101 and 8102 Storage and I/O Units.

Floating Point is optional.

Processor Functions

The 8130, 8140, and 8150 Processors also provide the following:

- Dynamic address relocation and translation of logical addresses within a logical address space of up to 16M bytes
- Storage protection
- High-speed register storage separate from main storage
- Eight priority levels of program execution
- Capability to define supervisor and application programs on the same priority level
- Sixteen general registers per program
- Priority level assignment of I/O devices through programming (available on 8130 only when the System Expansion feature is installed)
- Sixteen sublevels per priority level for I/O interrupt request identification (available on 8130 only when the System Expansion feature is installed)
- Basic instruction set
- I/O bus with a capacity of up to 930K bytes per second for the 8130 and 1.25 million bytes per second for the 8140 and 8150
- Flexible system configuration with the attachment of 8101 or 8102 Storage and I/O Units
- Remote attachment to System/370 over communications facilities ranging from 600 to 9600 bits per second with BSC, and up to 56,000 bits per second with SDLC
- Wide variety of I/O device attachment features including:

  Directly attached loops
  Loops attached by data link
  Synchronous Data Link Control communications attachments
  Binary Synchronous Communications attachments
  Start-Stop communications attachments

Storage

A listing of processors and internal disk storage by model follows:

8130 Models	Processor Storage	Disk Storage
A21	256K to 1024K bytes	29 million bytes, movable heads
A22	256K to 1024K bytes	23 million bytes, movable and fixed heads
A23	256K to 1024K bytes	64 million bytes, movable heads
A24	256K to 1024K bytes	58 million bytes, movable and fixed heads
B23	1024K to 2048K bytes	64 million bytes, movable heads
B24	1024K to 2048K bytes	58 million bytes, movable and fixed heads

8140 Models	Processor Storage	Disk Storage
A31	256K to 384K bytes	29 million bytes, movable heads
A32	256K to 384K bytes	23 million bytes, movable and fixed heads
A33	256K to 384K bytes	64 million bytes, movable heads
A34	256K to 384K bytes	58 million bytes, movable and fixed heads
A41	320K bytes	29 million bytes, movable heads
A42	320K bytes	23 million bytes, movable and fixed heads
A43	320K bytes	64 million bytes, movable heads
A44	320K bytes	58 million bytes, movable and fixed heads
A51	512K bytes	29 million bytes, movable heads
A52	512K bytes	23 million bytes, movable and fixed heads
A53	512K bytes	64 million bytes, movable heads
A54	512K bytes	58 million bytes, movable and fixed heads
A61	768K bytes	29 million bytes, movable heads
A62	768K bytes	23 million bytes, movable and fixed heads
A63	768K bytes	64 million bytes, movable heads
A64	768K bytes	58 million bytes, movable and fixed heads
A71	1024K bytes	29 million bytes, movable heads
A72	1024K bytes	23 million bytes, movable and fixed heads
A73	1024K bytes	64 million bytes, movable heads
A74	1024K bytes	58 million bytes, movable and fixed heads
B51	512K bytes	58 million bytes, movable and fixed heads
B52	512K bytes	123 million bytes, movable and fixed heads
B61	768K bytes	58 million bytes, movable and fixed heads
B62	768K bytes	123 million bytes, movable and fixed heads
B71	1024K bytes	58 million bytes, movable and fixed heads
B72	1024K bytes	123 million bytes, movable and fixed heads
C72	1024K bytes	123 million bytes, movable and fixed heads
C82	1536K bytes	123 million bytes, movable and fixed heads
C92	2048K bytes	123 million bytes, movable and fixed heads

8150 Models	Processor Storage	Disk Storage
A10	1024K bytes	Disk storage is not available within
A20	2048K bytes	the processor, but is available
A30	3072K bytes	through an attached 8101 or 8102.
A40	4096K bytes	
B20	2048K bytes	
B40	4096K bytes	
B60	6144K bytes	
B80	8192K bytes	

Notes:

1. *In this manual, when referring to the above models as 8130 A and B models, 8140 A, B, and C models, and 8150 A and B models, any listed two-digit suffix number is assumed.*

2. *The capital letter suffix K, as used in this manual when referring to storage capacity, means 2 to the 10th power, or 1024 decimal notation.*

8101 and 8102 Storage and Input/Output Units

The 8130 A Model Processors can attach one or two IBM 8101 or 8102 Storage and Input/Output Units. The 8130 B Model Processors can attach up to three 8101s or 8102s. 8140 Processors can attach up to four 8101s or 8102s and 8150 Processors can attach up to eight 8101s and 8102s. Some features available on 8101s and 8102s are:

Feature	8101 Models						8102 Models	
	A10	A11	A13	A20	A23	A25	A15	A17
Display and Printer Attachment	X	X	X	X	X	X	X	X
Communication and Loop Attachment	X	X	X	X	X	X		
29 Million Byte Disk Storage		X						
64 Million Byte Disk Storage			X		X			
128 Million Byte Disk Storage						X		
129 Million Byte Disk Storage							X	
259 Million Byte Disk Storage								X
8809 Magnetic Tape Unit	X	X	X	X	X	X	X	X
Storage and I/O Unit Switch				X	X	X	X	X
Diskette 2D	X	X	X	X	X			

IBM Diskette 2D Drive

The 8100 Information System has a diskette feature which may be used for:

- Logging
- Dumping
- Data exchange
- Initial program load

The diskette 2D Drive provides up to 1 million bytes of removable diskette storage when using the 2D diskette. It operates at a data rate of 62K bytes per second.

One diskette is provided in a single processor. A maximum of two diskettes can be attached to a single 8100 system, the second being attached to an 8101 Storage and I/O Unit.

8100 System Communications and Attachment Capabilities

The IBM 8100 Information System provides the capabilities for attaching terminals, I/O devices, and additional processors in a distributed system. Attachments can be made through:

- **Data link** — communications using modems and common carrier communication lines. The 8100 system permits data-link attachment to System/370 processors or 4300 processor via SDLC or BSC.

- **Direct connect** — a means of attaching another 8100 system, terminal, or other I/O device to an 8100 system through a selected communications interface and a limited length cable. The direct connect capability does not require modems or other communications equipment to attach at either the 8100 system or the connected device.

  Direct connect maximum speeds and maximum cable distances depend on which one of two interfaces is used. One interface supports a maximum speed of 9,600 bps and a maximum cable length of 12.1 m (40 ft). The other interface supports a maximum speed of 56,000 bps and a maximum cable length of 304.8 m (1000 ft).

- **Loop** — a closed electrical signal path connecting a number of I/O devices to the system. Loops can be attached to the 8100 Information System in two ways: directly and through a data link. Directly attached loops operate at 9600 or 38,400 bps. Data-link-attached loops operate at 2400, 4800, or 9600 bps. For specific device and programming support, refer to the general information manuals for DPPX/SP, DPPX, and DPCX.

  Both directly attached and data-link-attached loops can be used with all processors and with the 8101 Storage and I/O Unit.

  The Loop Adapter Second Lobe feature allows the directly attached loop to divide the attached devices between two different cables through a second lobe for improved device placement, simpler installation planning and control, and greater loop cable length.

- **Display and Printer Attachment** — a capability that allows select displays and printers to be directly attached to specific 8100 system units via a single coaxial cable or a combination of coaxial cable and IBM Cabling System cable. The 8100 units and the devices that the Display Printer Attachment will attach are listed in Chapter 8 under "Display and Printer Attachment." The Display and Printer Attachment supports an inbound (receive) data rate of 91,575 characters per second from devices and an outbound (transmit) rate of 61,050 characters per second.

  Up to four devices can be attached to an 8100 unit's first Display and Printer Attachment adapter in any combination. As many as five more Display and Printer **Additional** Adapters may be added, each allowing up to four additional devices to be attached in any combination.

Communications Examples

Figure 3-1 shows a small system with displays and a printer. Figure 3-2 depicts a much larger system. Figure 3-3 is an example of a complex system having devices connected directly and via loop and Display and Printer Attachment. For a list of many of the devices that can be attached to the 8100 system, see Chapter 10.

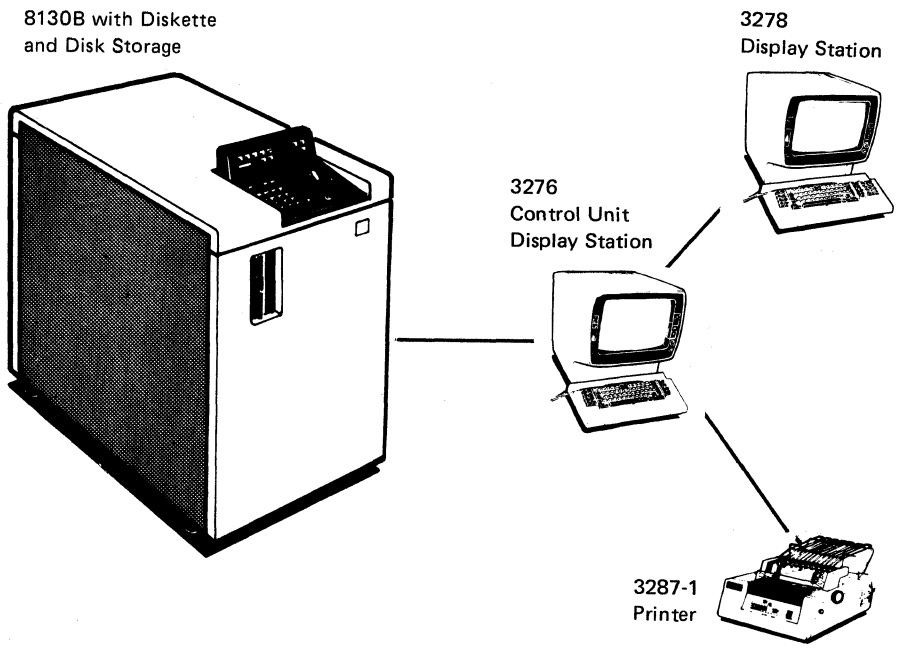


Figure 3-1. Example of a Small IBM 8100 Information System

8100 System Unit Attachment Capabilities

Figure 3-4 shows the attachment capabilities of the IBM 8100 Information System's processors, storage and I/O units, and magnetic tape unit.

Note: "Communication Port Attachment" refers to the set of hardware communications features dedicated to a single data channel for receiving data from or transmitting data to one or more external devices.

Communications Programming Support, Protocols, and Lines

DPPX/SP, DPPX, and DPCX support the synchronous data link control (SDLC) line protocol. DPPX/SP and DPPX also support the binary synchronous communications (BSC) and start-stop (SS) line protocols. SDLC line speeds can be up to 56,000 bits per second with 8130 B model, 8140, and 8150 processors. BSC line speeds can be up to 9,600 bits per second.

The IBM 3631 and 3632 Plant Communications Controllers may be attached by data link and control their own loop transmission facility.

Directly connected facilities for SS, BSC, and SDLC are available.

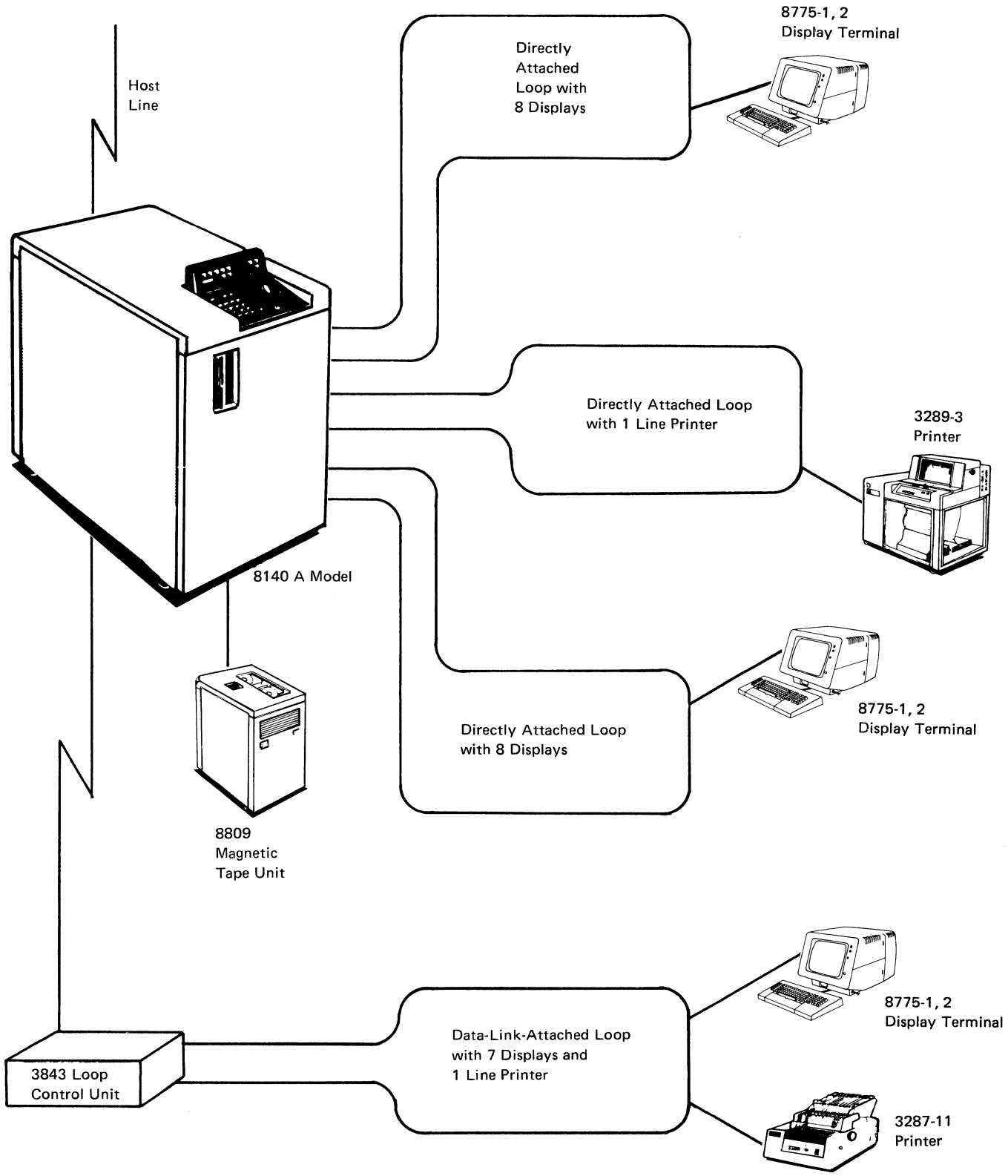


Figure 3-2. Example of a Larger IBM 8100 Information System

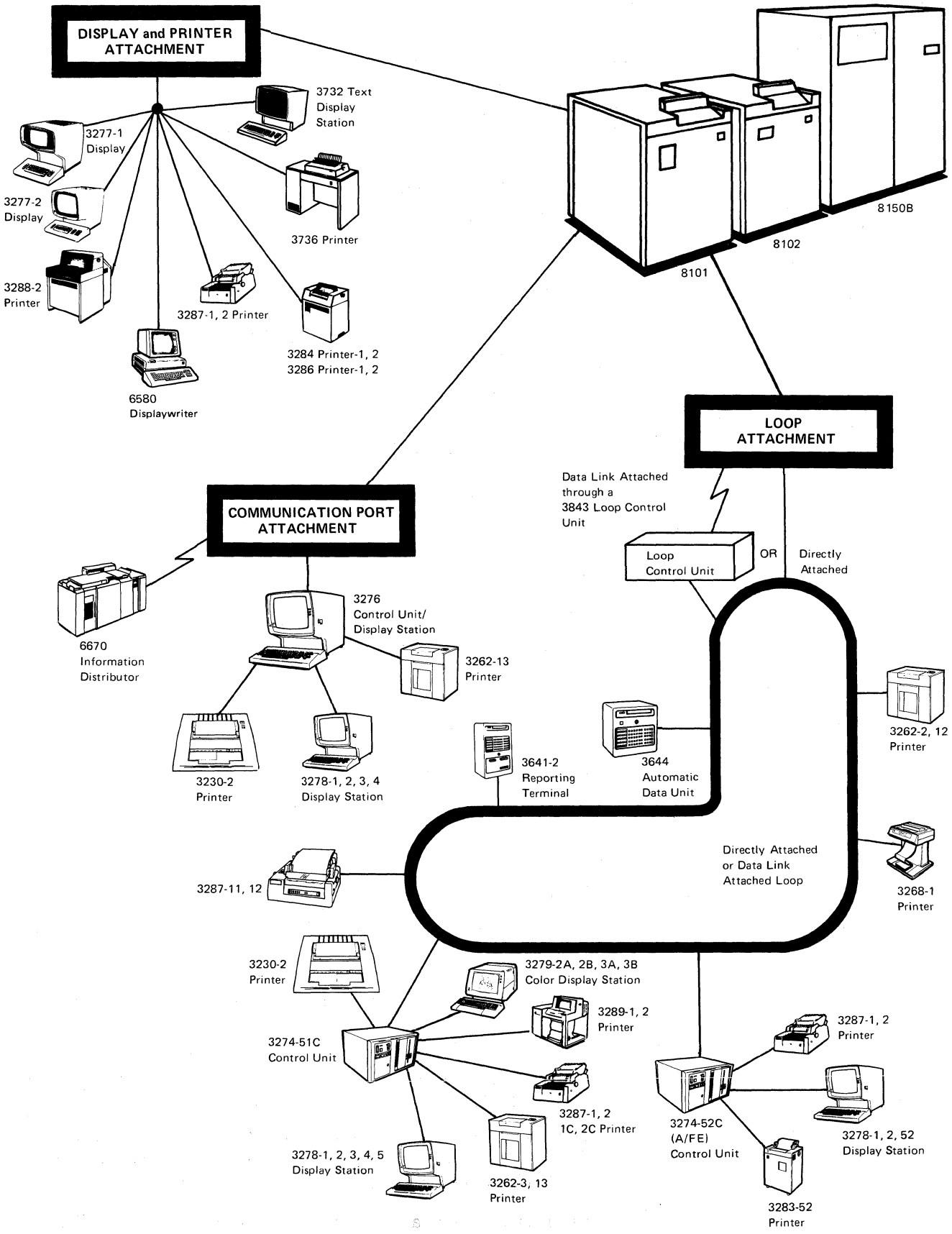


Figure 3-3. Example of a Complex IBM 8100 Information System

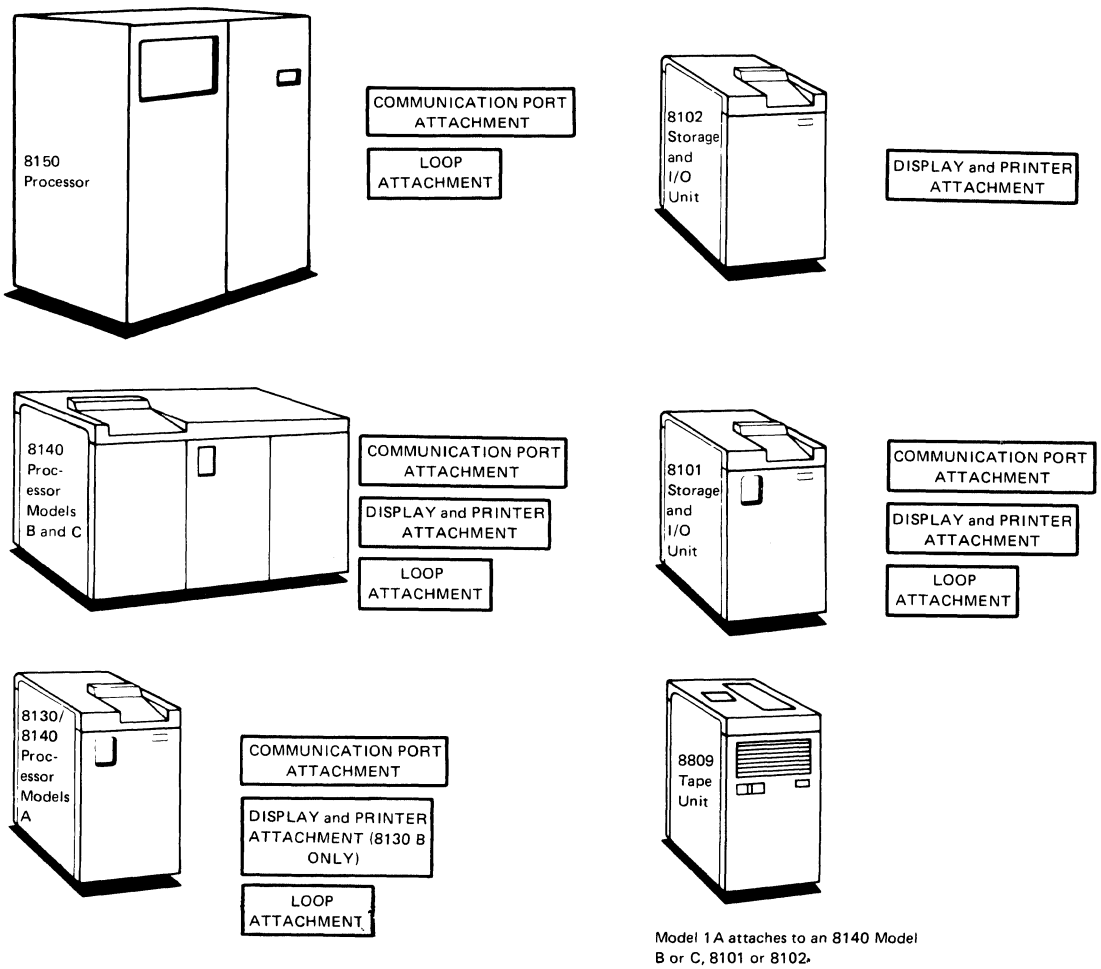


Figure 3-4. Attachment Capabilities of 8100 System Units

The line types supported by the 8100 are:

- Switched (host only)
- Switched with auto-answer from System/370 or 4300 host (SDLC only)
- Nonswitched (leased line)
- Full and half-duplex communications facilities operating in half-duplex data mode

Other communications and I/O attachment features allow the following:

- 8100-to-8100 communications
- BSC device (2780/3780-compatible) attachment to the 8101 Storage and I/O Unit and 8130, 8140, and 8150 processors.
- Start-stop device, IBM 2741 Communications Terminal, IBM 3101 Display Terminal, or teletypewriter equipment (TTY) 33/35 Protocol device attachment via 8101 for 8140 C model and 8150 processors
- TTY device attachment to a 7426 Terminal Interface Unit on a directly attached or data-link-attached loop, or on a communications line.

Related Hardware Manuals

For more information about 8100 System processors, see the following manuals:

- *IBM 8100 Information System: 8130 Processor Description,* GA27-3196
- *IBM 8100 Information System: 8140 Processor Description,* GA27-2880
- *IBM 8100 Information System: 8150 Processor Description,* GA23-0122

For more information about the 8101 and 8102 Storage and I/O Units, see *IBM 8100 Information System: 8101/8102 Storage and Input/Output Unit Description,* GA27-2882.

For more information about the 8100 System's communications capabilities, see *IBM 8100 Information System: Communications, Loop, and Display/Printer Attachment Description,* GA27-2883.

Chapter 4. Programming Highlights

This chapter briefly describes the two operating systems that support IBM 8100 Information System hardware:

- Distributed Processing Programming Executive/System Product (DPPX/SP): a general-purpose, communications-oriented operating system. It is a single software package consisting of enhanced versions of DPPX and its licensed products as well as added licensed products.

  OR

  Distributed Processing Programming Executive (DPPX): an operating system that can be used with a stand-alone system or with a distributed processing system

- Distributed Processing Control Executive (DPCX): a host-supported programming system that provides text processing and data applications.

Brief descriptions of DPPX/SP, DPPX, and DPCX follow. For detailed descriptions, see:

- *Distributed Processing Programming Executive/System Product General Information*, GC23-0600,
- *Distributed Processing Programming Executive General Information*, GC27-0400,
- *Distributed Processing Control Executive General Information*, GC22-9075.

Distributed Processing Programming Executive/System Product (DPPX/SP)

DPPX/SP and its related program products form an interactive operating system for running application programs on IBM 8100 Information System computers.

Customers familiar with DPPX, described later in this chapter, may notice that DPPX/SP includes several program products marketed separately under the DPPX Base operating system. In addition, DPPX/SP includes enhancements and functions that will take advantage of the hardware capabilities of the 8150 Processor and will also enhance productivity of 8130 and 8140 Processors as well as support the 8101 and 8102 storage and I/O units.

DPPX/SP is for new and existing 8100 distributed data processing systems. Additional and enhanced functions, application-to-application communications flexibility, and performance benefits make DPPX/SP

attractive to customers wanting to upgrade their 8100 network management capabilities.

DPPX/SP is designed to distribute information processing among 8100 processors and connected systems in a cooperative network. It has also expanded a user's network management capabilities by increasing the communication between a host or remote operator and multiple applications throughout the network.

DPPX/SP is easier to install than the DPPX Base and associated licensed products. The system is installed, serviced, and customized as a single unit.

DPPX/SP features include the following:

- DPPX/SP, with the addition of the programming languages it supports, lets users write application programs to perform diverse functions. Several languages and tools are available. Users can develop these application programs at both central and distributed sites.

- Users with application programs that run with DPPX Base will be able to run them with DPPX/SP.

- Through distributed processing, DPPX/SP decreases the workload placed on a host computer. It also lets users increase productivity in remote locations by decreasing the time it takes to access information those sites need.

- DPPX/SP allows access to data in both 8100 and host computers, eliminating the need for users to duplicate data.

- DPPX/SP provides on-line panels to help users obtain services. These panels prompt the user to enter information at the terminal. Inexperienced users can take advantage of special help panels and tutorials to become familiar with the on-line panels. Enhancements help programmers construct and design their own panels to decrease the time spent doing repetitive or complex tasks.

- DPPX/SP provides security and data integrity through several features. An authorized user can control who has access to what data and whether the data can be viewed, changed, or printed. DPPX/SP also protects the integrity of data bases. It allows recovery from errors as well as re-creation of a data base in case of damage.

- DPPX/SP supports the full range of 8130, 8140, and 8150 configurations, the BSC Programmed Communications feature, connection to other systems, and the Personal Computer and Displaywriter attachments.

DPPX/SP Highlights

DPPX/SP components and program products give 8100 system users the following advantages:

- Greater usability through
  - Menu-driven system functions
  - Improved system messages
  - Printer sharing enhancements including multiple operators
  - Expansion or contraction of defined catalogs
  - Option for unattended Remote Job Entry
  - Task-oriented documentation
- Increased attachment of devices and subsystems through
  - DPPX/SP Work Station Support
  - PC File Transfer Services

  DPPX/SP supports attachment of IBM 5210 Printer, Series/1, 6580 Displaywriter System, 5150/5160 Personal Computers, 4700 Finance Communication System, 5280 Distributed Data System, and 8100/DPCX systems.
- Enhanced function through
  - Host Transaction Facility
  - Shadow File
  - Multiple Batch Environments
  - Format Management
  - Router
- Better performance through
  - Save/restore IPL
  - DASD Cache
  - Distributed indexed access method enhancements
  - Self-tuning buffers
  - I/O reductions in fetching for dynamic resident routines
  - User library improvements
  - Remote Job Entry: larger maximum RU size
- Improved network and system management support through
  - System trace options and performance enhancements
  - Formatted Dump
  - Error Log Summary and Archive enhancements
  - First Failure Data Capture

DPPX/SP Components

In addition to all the functions included in the DPPX Base, DPPX/SP includes the following components:

Application Support Components

- The Format Management (FM) Component of Distributed Presentation Services (DPS) — provides an ease-of-use aid for application program development and execution. At run time, it allows the application to send and receive data using the previously generated maps.

- Data Base and Transaction Management System (DTMS) — supplements DPPX Base services by (1) managing concurrent processing of user-written transaction programs, (2) controlling access to and protecting the integrity of shared data, and (3) allowing DTMS applications to communicate with System/370 or 4300 Customer Information Control System/Virtual Storage (CICS/VS) and Information Management System/Virtual Storage (IMS/VS) applications.

- Shadow Processing — allows a user to set up and maintain duplicate disks so if one disk becomes damaged, application processing can continue using the other disk

- Interactive Productivity Facility (IPF) — an ease-of-use aid that allows users to respond to prompts instead of entering commands.

Components for Enhanced Network Access

- Remote Job Entry (RJE) — supports job output from host application programs. Host programs may be used from 8100 terminals through DPPX/SP. Output from DPPX/SP application programs may be stored as data sets at the 8100.

- Data-Stream Compatibility (DSC) — allows users at some terminals attached to the 8100 to communicate with selected 3270 applications in a System/370 or 4300 host processor without programming changes at either the host or the 8100.

- Router — lets an operator access different applications in many different domains without logging on and off between each application.

- Host Transaction Facility (HTF) — lets programs in an 8100 work with programs in the host.

Components for Network Management

- Distributed Host Command Facility (DHCF) — helps create a link between an application program in the 8100 and a terminal user attached to the host. DHCF works under Host Command Facility (HCF) in the host.

  Note: HCF is a program product that lets the user of a host-attached display terminal log on to an 8100 system and perform functions that

could be performed by the operator at the 8100. HCF executes in a System/370 or 4300.

- Host Data Transfer (HDT) — provides for data transfer between the host and the 8100. HDT works with the Distributed System Executive (DSX) program product.

  Note: DSX is a program product that allows a user at a host-connected terminal to retrieve data sets from 8100s in a network and store, manage, and distribute them wherever they are needed in the network. DSX executes in a System/370 or 4300.

- Problem Determination Application (PDA) — alerts the host operator of certain errors in the attached 8100.

- Link Problem Determination Aid (LPDA) — monitors activity in data-link networks downstream of an 8100 processor and alerts the operator of an SDLC-connected System/370 or 4300 host when hardware or software errors occur. LPDA executes in an 8100 processor allowing problem determination communication with downstream IBM 3863, 3864, or 3865 modems. LPDA complements Network Problem Determination Application (NPDA) running at the host site.

  Note: NPDA provides for the collection, recording, display, and analysis of problem-related data retrieved from a number of network devices. These include the IBM 3705 Communications Controller, telecommunications lines, 386x modems, and 3270 control units. NPDA runs in the host computer, not in the 8100, and accepts alerts from 8100 (and 3600) systems and routes them to the network operator.

- Programmed Operator Facility (POF) — performs many functions otherwise requiring system operator action. It can intercept messages and codes targeted for the 8100 system operator and apply preprogrammed responses to them.

Components for Specialized Applications

- Sort/Merge — lets users sort and merge data.
- DPPX Parameter Table Generation for the IBM 3644 Automatic Data Unit — helps programmers efficiently customize the 3644 Automatic Data Unit.
- DPPX/SP Work Station Support (DWSS) — allows IBM 6580 Displaywriter and IBM 5150/5160 Personal Computer users to store documents and files in "folders" in the 8100 system. Once a document has been filed, a user can retrieve it, print it, and send it to other local DWSS users.
- PC File Transfer Services — allows users of IBM 3270 Personal Computer and IBM 3270 Personal Computer Attachment to send files to the 8100 system and retrieve them for later use.

For more information about DPPX/SP components, see *DPPX/SP General Information*, GC23-0600.

DPPX/SP Program Products

DPPX/SP supports program products that are supported by DPPX. Many of the program products that work with DPPX/SP are preceded by the name DPPX (for example, DPPX APL). These products work with both DPPX and DPPX/SP. The program numbers are the same.

DPPX/SP supports the following program products which can be ordered separately:

- DPPX COBOL Compiler
- DPPX PL/1 Compiler
- DPPX PL/1 Library
- DPPX FORTRAN Compiler
- DPPX FORTRAN Library
- DPPX APL
- Cross System Product/Application Development for DPPX/SP
- Cross System Product/Application Execution for DPPX/SP
- DPPX Assembler
- DPPX/SP Interactive Map Definition
- DPPX Performance Tool
- Data Capture and Management System (DCMS)
- DPPX Presentation Services for 3640 Terminals
- Distributed Systems Executive
- Host Command Facility

For more information about DPPX/SP program products, see *DPPX/SP General Information*, GC23-0600.

Host Support

DPPX/SP is supported by the VTAM, ACF/VTAM, BTAM, TCAM, and ACF/TCAM host access methods. DPPX/SP supports 8100 Information Systems connected to a System/370 or 4300 host via an SDLC line. Remote Job Entry and Data-Stream Compatibility can also use a BSC line. Host operating system support is via DOS/VS, VSE, OS/VS1, and OS/VS2 (MVS). In addition, DPPX/SP supports several program products such as IMS/VS, CICS/VS, and TSO.

Distributed Processing Programming Executive (DPPX)

DPPX is a versatile, general-usage operating system made up of the DPPX Base program product and its family of licensed program products. DPPX supports:

- All 8100 Information System processors except the 8150, which is supported by DPPX/SP
- The 8101 Storage and I/O Unit
- The 8809 Magnetic Tape Unit

- A wide variety of attachments for terminals, unit record devices, and system-to-system communications

The complete set of program products that comprise the DPPX family is described below. This set includes three System/370 or 4300 program products — Host Command Facility (HCF), Distributed System Executive (DSX), and Network Problem Determination Application (NPDA) — which may be used in networks that include 8100 Information System processors.

DPPX is designed for distributed processing configurations. With the range of programming and device support provided by DPPX, an 8100 Information System processor can communicate with other 8100 processors and with System/370 and 4300 processors, as well as function as a stand-alone system.

In a DPPX distributed system, applications can be off-loaded from a central System/370 or 4300 processor to remote locations and changed for execution in distributed processors. New applications unique to the remote location can execute in the distributed processors. The ability to distribute processing functions permits a balanced approach. Control, including problem determination, is at the central location yet remote locations maintain flexibility.

DPPX provides support services for application development, including high-level languages and interactive application-development tools. It can be used to handle many applications, including business, scientific, and manufacturing control.

DPPX has a comprehensive set of facilities that permit effective management of data processing operations including system installation and customization, system operation, data security, and system growth.

Program Products for DPPX

The program products that can be used with the DPPX Base fall into the following categories:

Languages for Application Development

DPPX COBOL Compiler	DPPX PL/I Compiler
DPPX COBOL Run-Time Library	DPPX PL/I Library
DPPX FORTRAN Compiler	DPPX APL
DPPX FORTRAN Library	DPPX Assembler

Programmers who have used these languages on other systems can easily familiarize themselves with their DPPX versions.

Application Support Programs

- DPPX Distributed Presentation Services (DPS) — helps programmers specify how an application program should format data on display terminals and printers.

- DPPX Data Base and Transaction Management System (DTMS) — supplements DPPX Base services by (1) managing concurrent processing

of user-written transaction programs, (2) controlling access to and protecting the integrity of shared data, and (3) allowing DPPX DTMS applications to communicate with System/370 or 4300 Customer Information Control System/Virtual Storage (CICS/VS) and Information Management System/Virtual Storage (IMS/VS) applications.

- DPPX Development Management System (DMS) — a productivity tool for developing and running application programs without using a programming language. DMS consists of two program products: (1) Development Management System for DPPX, for developing DMS programs, and (2) Development Management System Execution Facility for DPPX, for running DMS programs. The Execution Facility must be installed in an 8100 that is to execute a DMS program.

- DPPX Data Capture and Management System (DCMS) — allows bulk, full-screen entry of large amounts of repetitive data in a batch mode.

- DPPX Interactive Productivity Facility (IPF) — an ease-of-use aid that allows users of DPPX Base services to respond to prompts instead of entering commands.

- DPPX Performance Tool — for collecting and reporting information about DPPX Base and DTMS performance. It can be used to tune the system after installation and when the system changes.

- DPPX Sort/Merge — lets users sort and merge data.

Programs for Enhanced Network Access

- DPPX Remote Job Entry Work Station Facility (RJE) — lets users at an 8100 submit user-defined jobs to a host operating system's job queue for execution. DPPX RJE also controls job output sent back to the 8100 location after execution.

- DPPX Data-Stream Compatibility (DSC) — allows certain keyboard displays, printers, controllers, and processors attached to an 8100 system to communicate with application programs in a System/370 or 4300 host processor as though they were directly attached by data link to the host. The keyboard display, printer, controller, or processor appears to be in direct session with the application at the host processor.

Programs for Network Management

- DPPX Problem Determination Application (PDA) — monitors activity in an 8100 processor and alerts the operator of a System/370 or 4300 host that is connected by SDLC when an error occurs.

- Host Command Facility (HCF) — runs in a System/370 or 4300 host and lets users issue most DPPX commands from a terminal connected to the host. It allows installation, control, problem determination, and service of remote 8100 systems from the host location.

- Distributed Systems Executive (DSX) — runs in a System/370 or 4300 and provides central library support for a distributed system with DPPX.

- DPPX Programmed Operator Facility (POF) — performs many functions otherwise requiring system operator action. It can intercept messages and codes targeted for the 8100 system operator and apply preprogrammed responses to them. It is designed to allow users with reduced skill and effort to operate a remote 8100. DPPX POF executes in an 8100 processor.

Programs for Specialized Applications

- DPPX Presentation Services for 3640 Terminals — helps programmers develop and run transaction programs for certain 3640 terminals.

- DPPX Parameter Table Generation Facility for the IBM 3644 Automatic Data Unit — helps programmers efficiently customize the 3644 Automatic Data Unit.

For more information about DPPX program products, see *DPPX General Information*, GC27-0400.

Host Support

DPPX is supported by the VTAM, ACF/VTAM, BTAM, TCAM, and ACF/TCAM host access methods. DPPX supports 8100 Information Systems connected to a System/370 or 4300 host via an SDLC line. DPPX RJE and DPPX Data Stream Compatibility can also use a BSC line. Host operating system support is via DOS/VS, VSE, OS/VS1, and OS/VS2 (MVS). In addition, DPPX supports several program products such as IMS/VS, CICS/VS, and TSO.

Distributed Processing Control Executive (DPCX)

Distributed Processing Control Executive (DPCX), a licensed program designed to control the 8100 Information System, is a programmable, multi-application, display-oriented operating system, which can execute up to 94 user programs concurrently. It is designed for combined text and data processing applications, and provides the functions for interactive processing at distributed sites and interactive processing between the host and distributed sites. DPCX is the base system for Distributed Office Support Facility (DOSF), a text application program.

Distributed Processing

DPCX and its host support program product, Host Prep, allow users to distribute data and processing functions while retaining control at the host computer. These host-controlled functions include program development, distribution and updating, system design integrity, and network management.

Applications may run independently of the host, accessing local DPCX data bases and doing all processing locally. Conversely, applications may establish SNA sessions with host applications, thus distributing processing and data between DPCX and host applications.

DPCX SNA Host Support

DPCX is supported by the ACF/VTAM, and ACF/TCAM host SNA access methods. DPCX/8100 is connected to the host via an SDLC line. SCP (System Control Program) support is via VSE, OS/VS1, OS/VS2 (SVS), and OS/VS2 (MVS). In addition, DPCX is supported by several program products such as IMS/VS, CICS/VS, VSPC and TSO, DSX, RES/JES1, JES2, JES3, POWER/VS, and POWER/VSE.

The DPCX application programmer can allow DPCX to manage all or some of the SNA protocols in the DPCX application program.

The Host Prep licensed program provides to the host system the functions needed to assemble, format, test, and transmit programs to be assembled.

DPCX Application Programs

An application programmer, using Host Prep programming statements, can:

- Write programs that communicate with a terminal.
- Check the data entered by the operator.
- Read and update application data sets.
- Send data to a common print spool for printing.

A program can also communicate with a host program in a batch or interactive session using SNA protocols.

Instead of programming for the DPCX/8100 system using the Host Prep programming statements, programmers can use Development Management Service (DMS), a licensed program. DMS is a high-productivity, form-driven, prompt-response, interactive component for generating display panels, display printer formats, and data definition sections of the application program.

Once a DPCX application program has been coded, it is tested and prepared by host support programs provided with the Host Prep program at the host.

Thus, all DPCX application programs are written and tested at the host location under control of host data processing personnel. Only after these programs are completed at the host are copies transferred through the network to the various 8100/DPCX installations.

At the 8100 system, each DPCX application program executes on a symbolic machine, consisting of real storage resources (a set of buffers, registers, and condition indicators). A program can also allocate and release virtual storage for program work areas as part of the symbolic machine. Each symbolic machine is protected from access by other programs at the same 8100 system.

DPCX Access to Host Applications

DPCX support allows users access to certain host applications. These functions are:

- Data-Stream Compatibility, which allows local or remote displays and display printers to be supported by existing 3270-based host applications.
- On-line printing to local or remote printers supported by 3270-based host applications.
- An RJE package that includes on-line work station program support for host-based RJE applications, and off-line functions, such as spooled printing and input editing with user exits.

In addition, many field-developed programs (FDPs) and Installed User Programs (IUPs) provide applications for use with DPCX.

Distributed Office Support Facility (DOSF)

The Distributed Office Support Facility (DOSF) is an IBM licensed program for text processing and paperwork management at an IBM 8100 Information System. DOSF adds text processing to any 8100 Information System that has the DPCX operating system. (DPCX Release 4 is required for systems with 8130 B Model and 8150 Processors.)

DOSF can be used by typists, terminal operators, administrators, secretaries, clerks, or staff professionals and managers. It will help them produce and manage letters, reports, and manuals efficiently and economically as documents stored in an 8100/DPCX system.

While other 8100 DPCX jobs are running on a system, users not familiar with data processing can use DOSF to do the following:

- Type, edit, and revise documents using the IBM 3732 Text Display Station and the IBM 8775 Display Terminal with the Interactive Display Text Facility (IDTF) licensed program.
- Print documents using the IBM 3736 Printer, IBM 5210 Printer Model E, and IBM 6670 Information Distributor.

- Format documents automatically.
- Store frequently used text, thus reducing repetitive typing.
- Create individualized documents from stored text and from information in DPCX data sets.
- Create, sort, and select items from structured documents (records processing).
- Perform arithmetic on numbers or columns of numbers in documents.
- Check and correct spelling in documents.
- Send and receive documents to and from the host for distribution or archiving.
- Send documents to the 8100 system for printing and storage from
  - an IBM 5150/5160 Personal Computer connected to an IBM 3278 Display Station or 3279 Color Display Station by the 3270 PC Attachment
  - a loop-attached IBM 5150/5160 Personal Computer
  - a Displaywriter

  The user can also retrieve documents from the 8100 system to update them.
- Transfer files between an IBM Personal Computer and the 8100 system for later retrieval at a Displaywriter, Personal Computer, or DOSF terminal.
- View documents on any 8100/DPCX display.

Users familiar with data processing and 8100/DPCX capabilities can write programs and procedures to:

- Automate various office practices through user-written procedures.
- Incorporate information from the host system and 8100/DPCX files directly into a document.
- Combine data processing and text processing.

For further information about DOSF, refer to the *Distributed Processing Support Facility, General Information*, GC27-0546.

DPCX Installation

DPCX and DOSF can be installed in several ways: A DPCX system is distributed in its entirety, via diskettes from the IBM Programming Information Department (PID), to all customer sites. The DPCX system can then be customized to the user's configuration of the 8100 Information System through an interactive display service. In addition, DPCX may be reconfigured by the customer, if new devices or functions are required, without affecting existing customer data bases or programs.

A simplified installation, using Automated System Service for Installing Stand-Alone Text (ASSIST), is available for users of DOSF only (no data processing). ASSIST provides a preconfigured DOSF application ready for operators to use. A system using ASSIST installation can later be expanded to include data and text processing.

Network Installation Management (NIM) lets customers use one DPCX system to create system configuration records. Customers then use the Distributed Systems Executive (DSX) licensed program to transmit the configuration from a host to the other 8100/DPCX systems in the network.

Compatibility with 3790 Communication System

Application programs written for the 3790 Communication System will run without change or recompilation under DPCX when the same or compatible devices are used. User applications transferred from the 3790 will benefit from the increased performance of the DPCX/8100 Information System. User data sets are transferred via diskettes from 3790 disk storage. The data sets are transferred to diskettes using a 3790 function and transferred from diskettes to the 8100 disk using a DPCX service.

Summary

DPCX provides the user with a multi-application, interactive system for distributed processing that features the following:

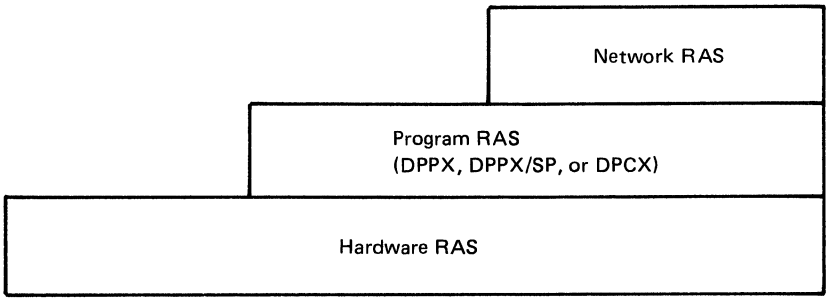
- Central host control with the ability to distribute data and processing.
- Various combinations of interactive and batch communications with locally or remotely attached terminals and a host processor.
- Many system-provided functions and services.
- Customer-configured installation.

For more information about DPCX, refer to *Distributed Processing Control Executive General Information*, GC22-9075.

Chapter 5. Reliability, Availability, and Serviceability (RAS)

In a distributed data processing system, all components are interrelated. The availability of each component, the host processor, the distributed processor, the data links, and the attached devices affect the availability of the entire data processing system. For this reason, a distributed system needs a network control point to monitor network status and manage network problems and changes. This network control point can be located at any network node but it is usually located at a System/370, allowing administration and management tools to be designed for operation with the System/370 or 4300 host system.

The IBM 8100 Information System supports reliability, availability, and serviceability (RAS) in three major areas: hardware, programming, and network. The hardware support is supplemented by the programming support, which in turn is supplemented by the network support.



Hardware RAS

The 8100 Information System provides the hardware level of RAS, which is the base on which the other more complex levels are built. The following hardware RAS facilities are available for 8100 processors:

- Power-on and IPL tests
- 8150 B Model Processor's dual Processing and Control Elements (PCEs)
- Storage and I/O Unit Switch Feature
- Hardware error detection circuitry
  - ECC for main storage
  - Off-line diagnostics
  - Maintenance Analysis Procedures (MAPs)
  - Program Error Check
  - I/O Error Handler
  - Exception Error Handler

System Availability through 8150B Dual Mode Processing

In the 8150 B Model Processor, additional system control facilities provide functions that enhance system availability by allowing users to reconfigure the system around a failing component. An input/output device can be made accessible to either PCE in the processor by connecting it to each PCE's channel by means of system control facilities.

Programming RAS

The programming level of RAS combines the hardware RAS facilities with those of the associated licensed programs. This combination can be used as:

- A stand-alone system
- Part of an interconnected system
- Part of a host-connected system

At this level, RAS tools can be divided into those that are offered by both hardware and licensed programs and those that are offered only by the licensed programs.

Hardware/Licensed Program Tools

- Error logging and display
- System message numbers
- Trace
- On-line problem determination tools

Program Product Tools

- On-line system or application dumps
- Stand-alone dumps
- Service level update management
- Programmed assistance in application of PTFs
- Application program debugging facilities
- Copy
- Entries or exits for user management or recovery procedures
- Vary I/O
- APAR create (DPPX)
- Error log formatter
- User exits

Network RAS

The network level includes a wide range of RAS support. It helps manage the network from a central control point where the major data processing resources are usually concentrated. It requires end users, within the distributed system network, to have only minimum data processing experience.

Network RAS facilities can be used by the network manager or control operator to:

- Monitor the status of a network and identify existing or developing network problems
- Access current information about a problem
- Test the nature and extent of an existing problem and verify when it has been resolved
- Report problems requiring further diagnosis to the proper support personnel

Network RAS facilities include:

- A network problem data display facility that selects, retrieves, and displays formatted error log data from a remote network node. This facility supports the network problem determination activity that defines the failing subsystem or node.
- A link testing facility that allows the user to detect and report network integrity problems. This facility verifies that a program in an initiating processor can communicate with a program in another processor within the network.
- A data set transmission capability that supports central program maintenance. This facility allows data from the host to be transmitted to a network node. It also helps in transmitting operating and error data sets from the node to the host.

RAS Summary

To meet the requirements of network management, the 8100 Information System offers RAS facilities with supporting documentation at the network, programming, and hardware levels. These RAS facilities take a network approach in their concept, requirements, staging, and implementation. They are a flexible means of responding to the RAS requirements of individual distributed system networks.

This is the end of the executive overview. You may continue with:

- Part 2, "Technical Overview".
- *Distributed Processing Programming Executive General Information*, GC27-0400.
- *Distributed Processing Programming Executive/System Product General Information*, GC23-0600.
- *Distributed Processing Control Executive General Information*, GC22-9075.
- *Distributed Office Support Facility General Information*, GC27-0546.

Part 2. Technical Overview

This technical overview is for managers and technical personnel considering the IBM 8100 Information System as their distributed data processing system. This part contains the following five chapters:

Chapter 6. Hardware Unit Capabilities

> This chapter describes the functions and features of the 8130, 8140, 8150, 8101, and 8102 — the 8100 Information System's processors and storage and I/O units.

Chapter 7. Processor Characteristics

> This chapter describes the characteristics of the 8130, 8140, and 8150 Processors.

Chapter 8. Input/Output Functions and Features

> This chapter describes the disk storage, magnetic tape adapter, and operator panels, as they pertain to the 8101, 8102, 8130, 8140, and 8150.

Chapter 9. Communication Capabilities

> This chapter presents the various methods of attaching input/output devices and processors to the 8100 Information System.

Chapter 10. Attachable IBM Devices

> This chapter lists and describes many of the IBM devices that can be attached to, and are supported by, 8100 Information System hardware units.

This part does not define restrictions or limitations placed on the system by DPPX/SP, DPPX, and DPCX. These restrictions and limitations are defined in the documents provided with the licensed programs. Also, this part is not intended to be used to configure an 8100 Information System. However, it may help in selecting features and devices when it is used with configuration information provided by IBM marketing representatives.

Chapter 6. Hardware Unit Capabilities

The IBM 8100 Information System is a communications-oriented, stand-alone system that can be attached to a host System/370 or 4300 system. The many models of the 8100 system's three processors and two storage and input/output units, along with the system's operating systems, permit multiple system configurations that support the attachment of a wide variety of products. The IBM 8100 Information System offers:

- Processor storage capacities up to 8192K bytes
- Dynamic address relocation and translation of logical addresses within a logical address space of up to 16M bytes
- Storage protection
- High-speed register storage separate from main storage
- Eight priority levels of program execution
- Definition of four modes of program execution
- Capability to define supervisor and application programs on the same priority level
- Sixteen fullword general registers per program
- Priority level assignment of I/O devices through programming
- Sixteen sublevels per priority level for I/O interrupt request identification
- Basic instruction set
- Floating-point arithmetic instruction set
- High-speed disk storage
- Tape subsystem compatible with System/370
- A wide variety of I/O device attachment features including:
  - Directly attached display stations and printers
  - Directly attached loops
  - Data-link-attached loops
  - SDLC communications attachments
  - BSC communications attachments
  - SS communications attachments

The hardware units of the 8100 Information System are:

- IBM 8130 Processor (Figure 6-1)
- IBM 8140 Processor A models (Figure 6-2)
- IBM 8140 Processor B models (Figure 6-3)
- IBM 8140 Processor C models (Figure 6-4)
- IBM 8150 Processor (Figure 6-5)
- IBM 8101 Storage and Input/Output Unit (Figure 6-6)
- IBM 8102 Storage and Input/Output Unit (Figure 6-7)

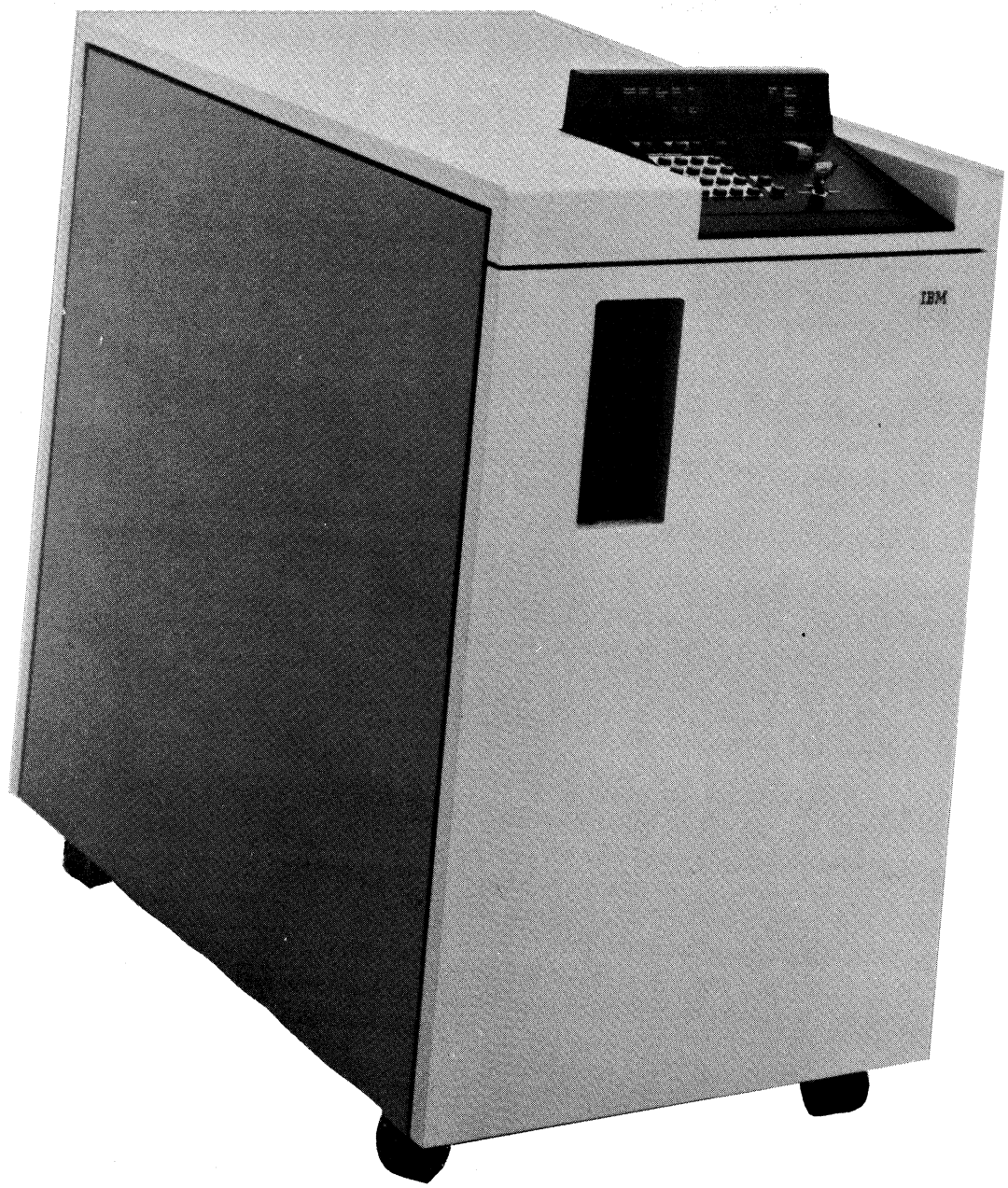


Figure 6-1 (Part 1 of 2). IBM 8130 Processor

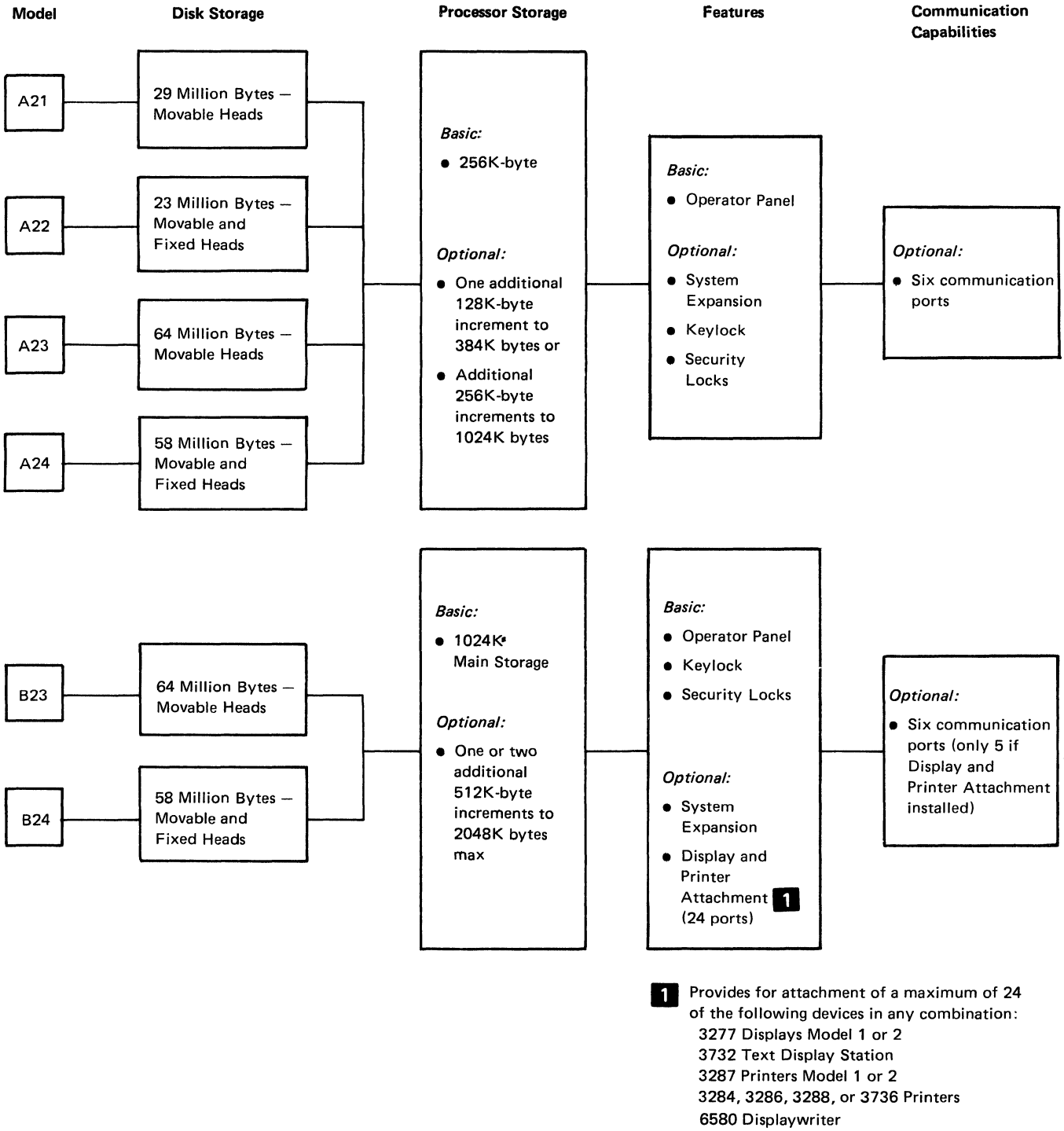


Figure 6-1 (Part 2 of 2). IBM 8130 Processor

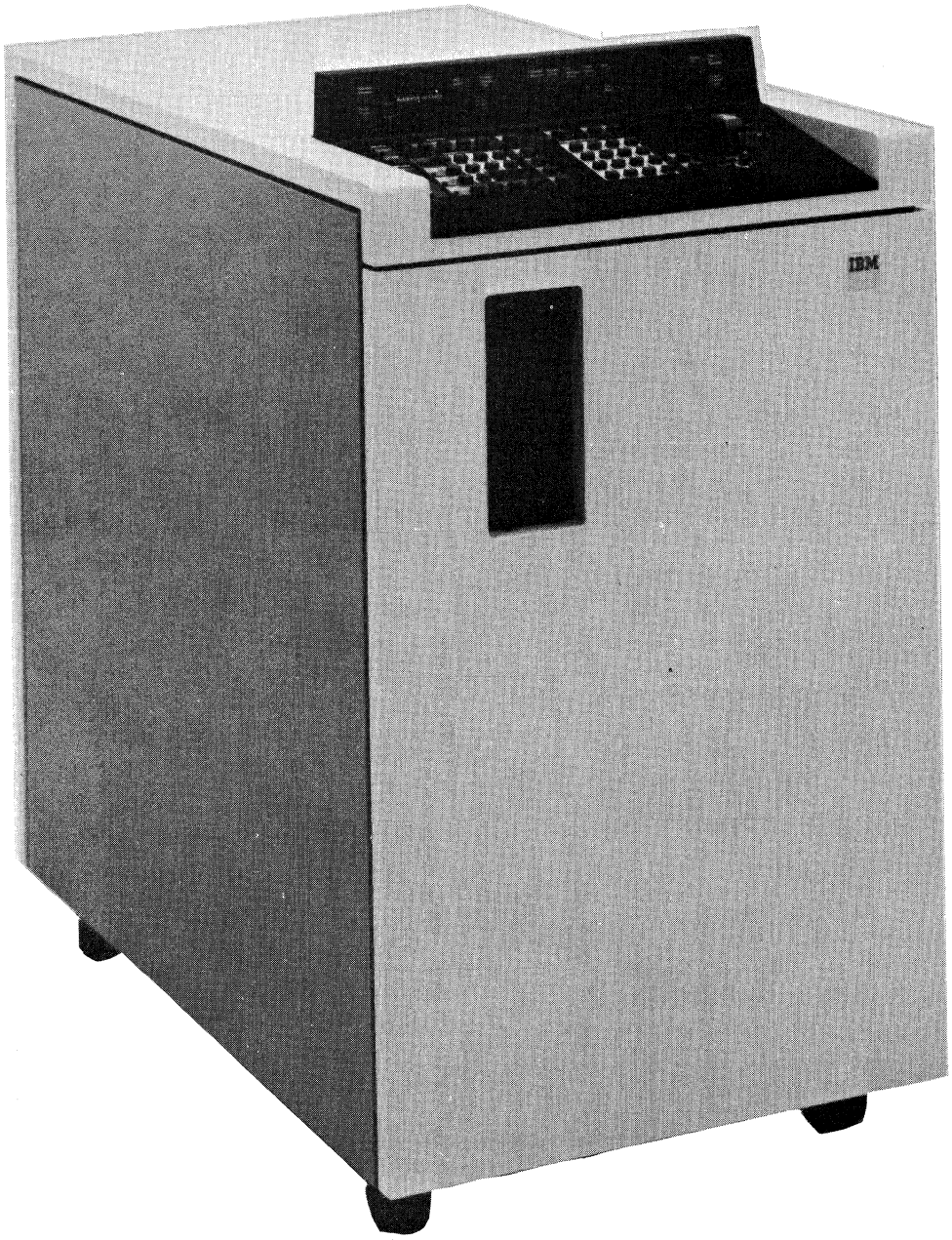


Figure 6-2 (Part 1 of 2). IBM 8140 Processor A Models

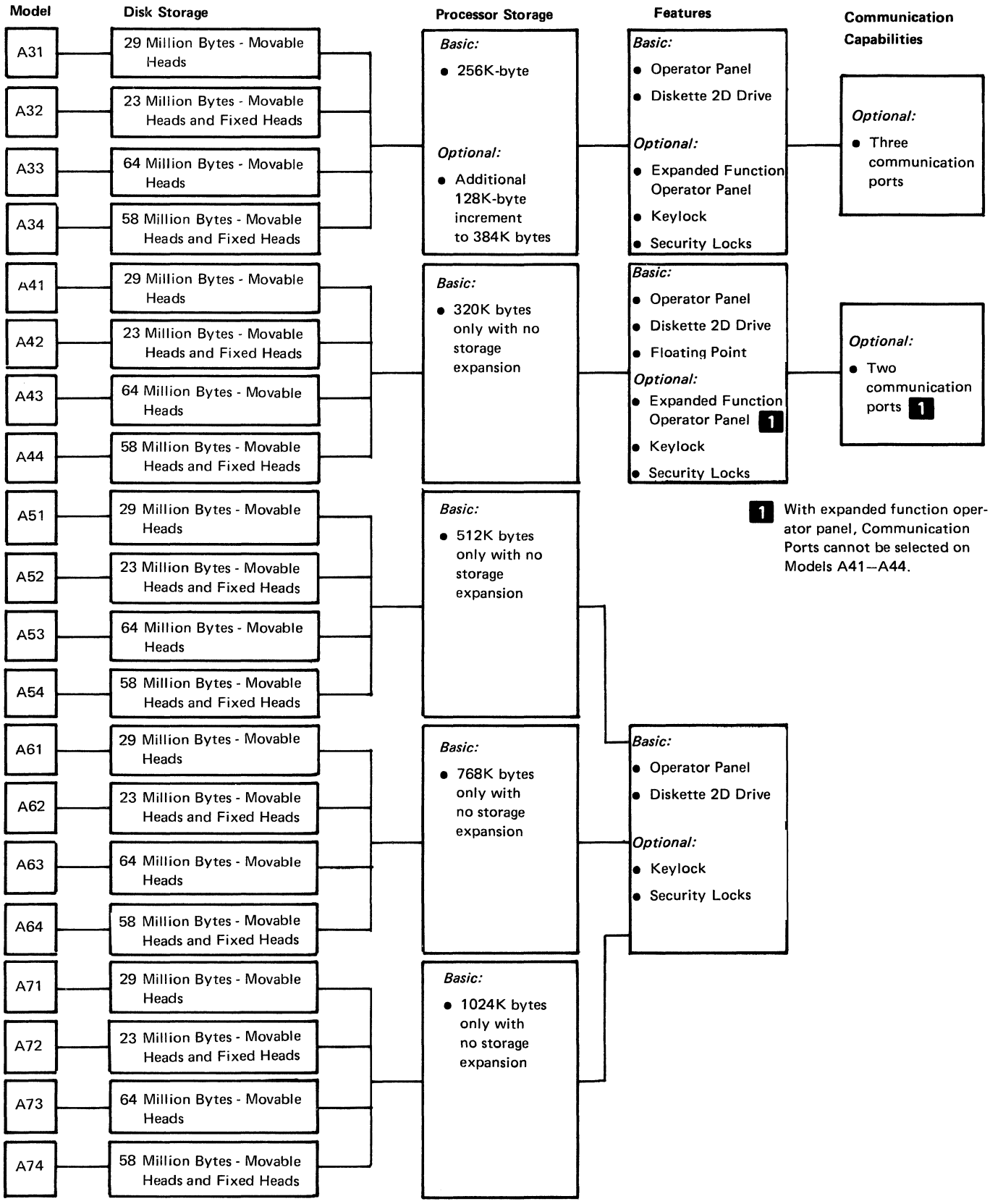


Figure 6-2 (Part 2 of 2). IBM 8140 Processor A Models

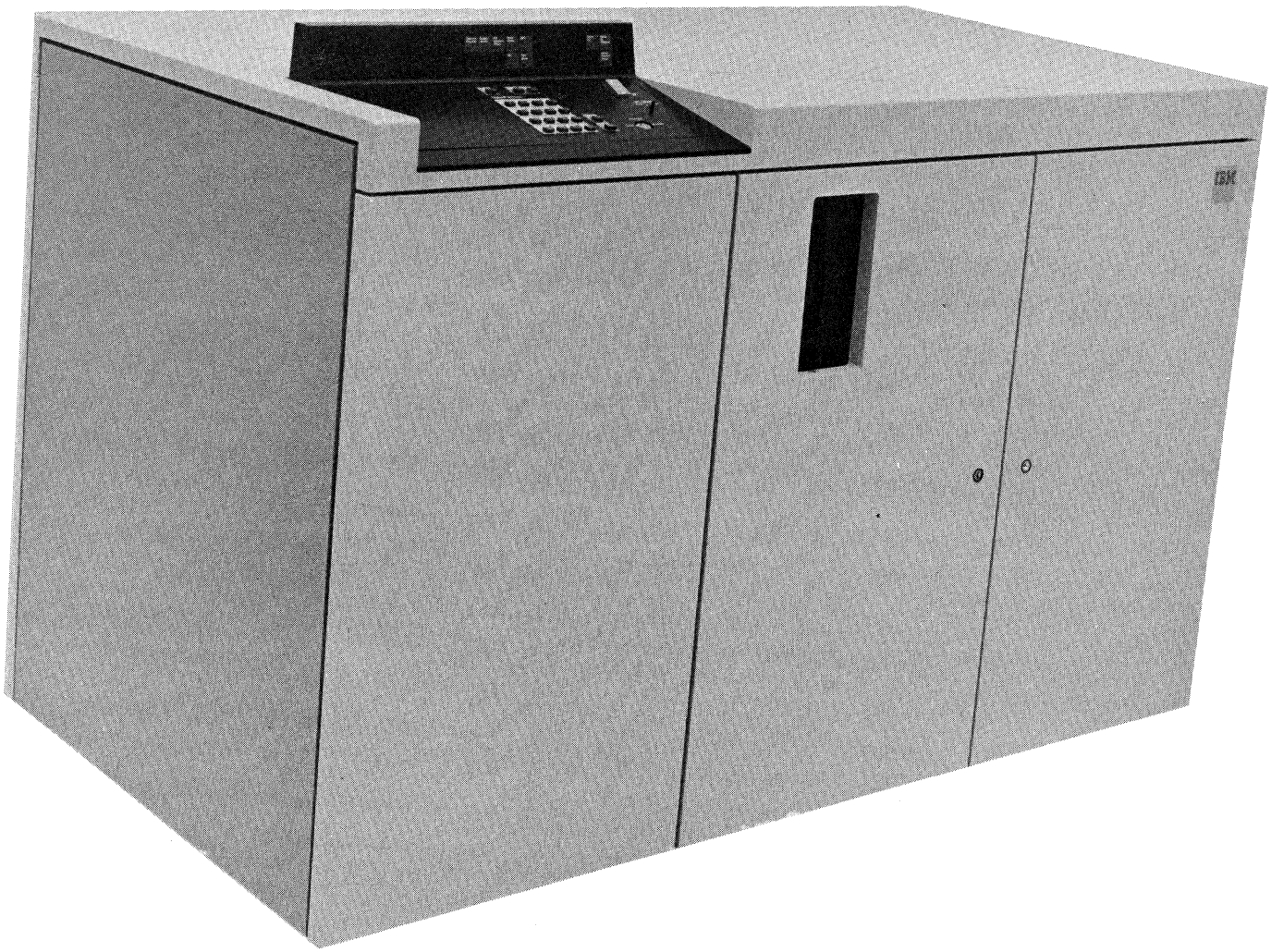
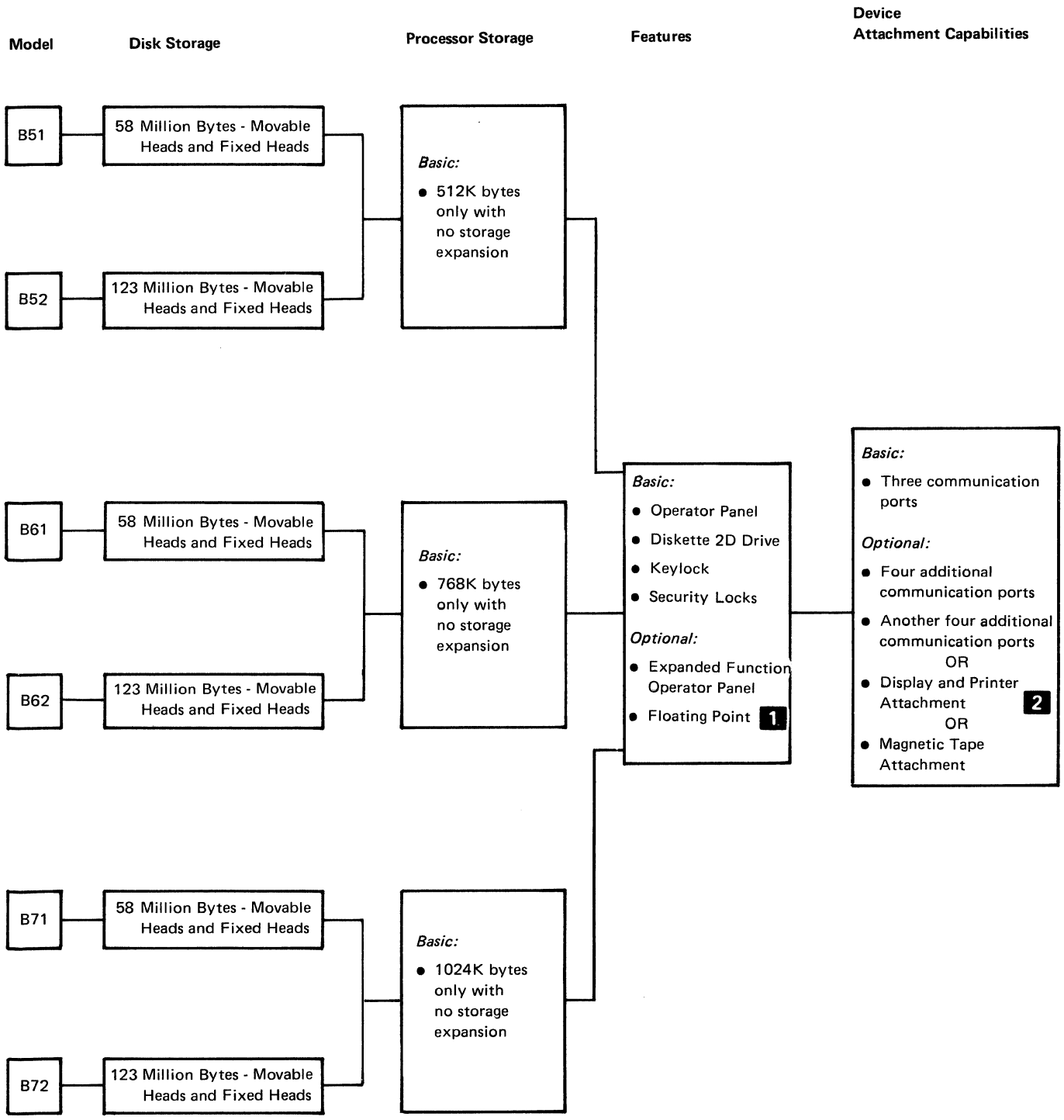


Figure 6-3 (Part 1 of 2). IBM 8140 Processor B Models



1 If the Floating Point feature is selected, then the device attachment capability is one of the following:

- Four additional communication ports
- Display and Printer Attachment
- Magnetic Tape Attachment

2 Provides for attachment of a maximum of 24 of the following devices in any combination:

3277 Displays Model 1 or 2
3732 Text Display Station
3287 Printers Model 1 or 2
3284, 3286, 3288, or 3736 Printers
6580 Displaywriter

Figure 6-3 (Part 2 of 2). IBM 8140 Processor B Models

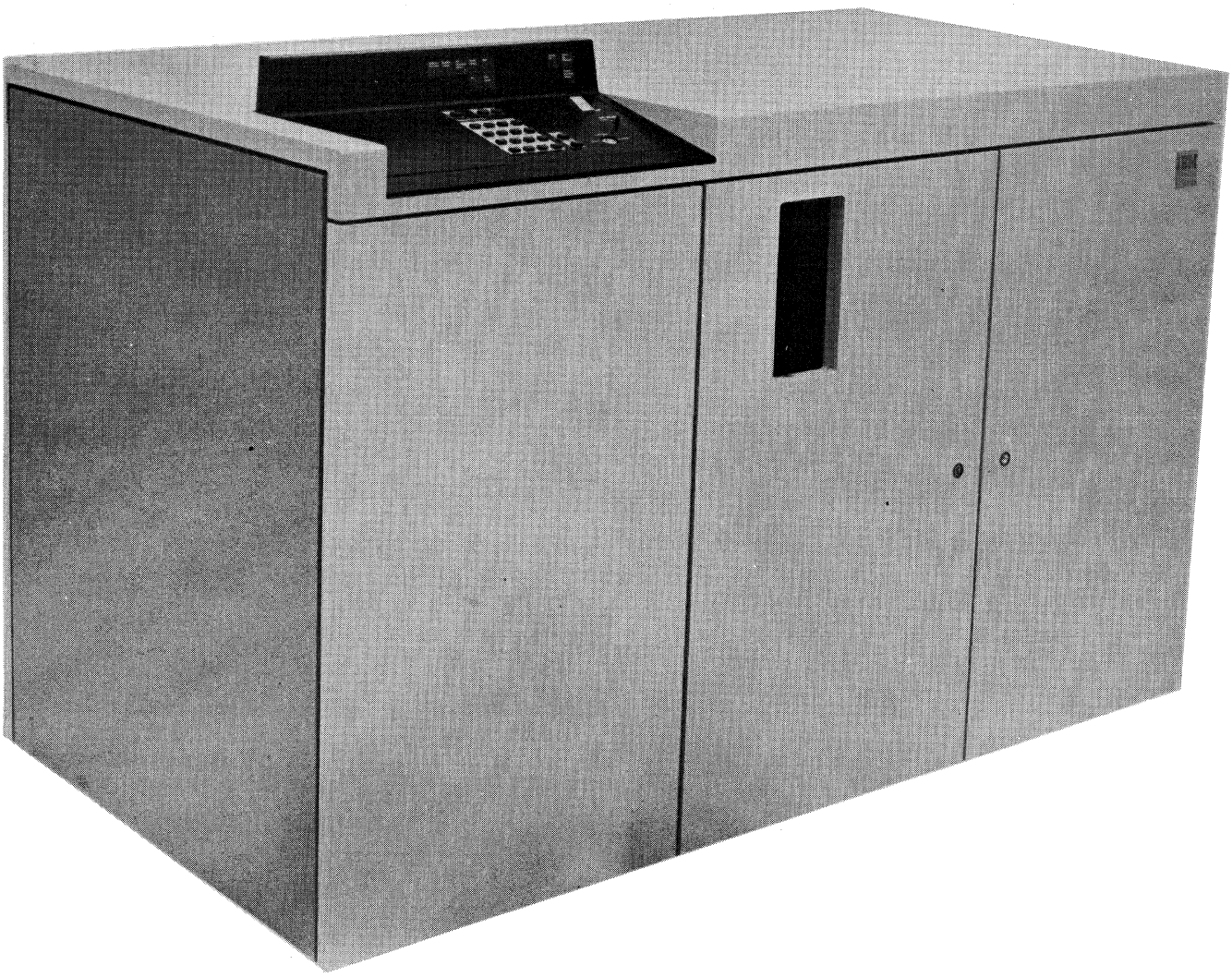


Figure 6-4 (Part 1 of 2). IBM 8140 Processor C Models

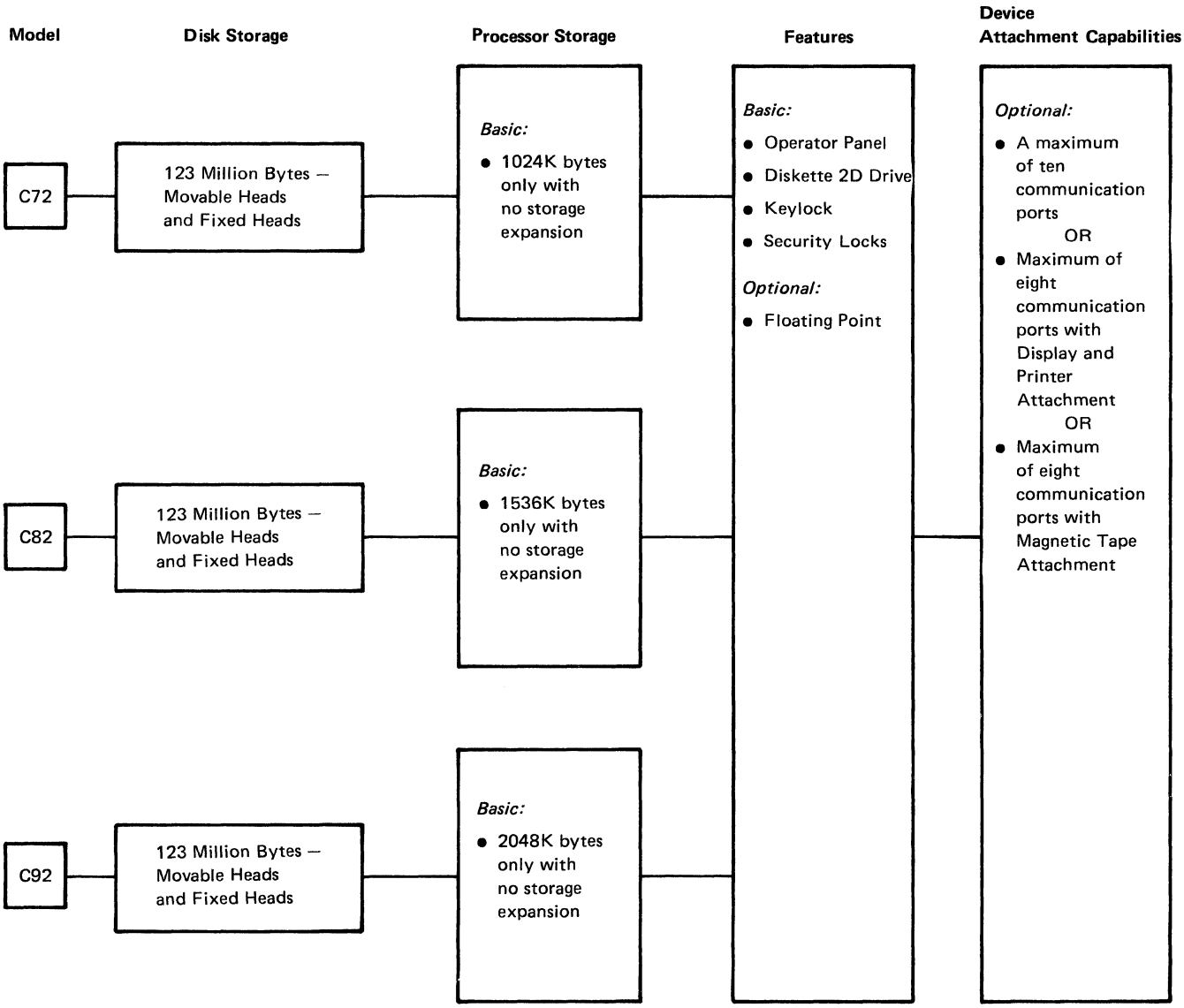


Figure 6-4 (Part 2 of 2). IBM 8140 Processor C Models

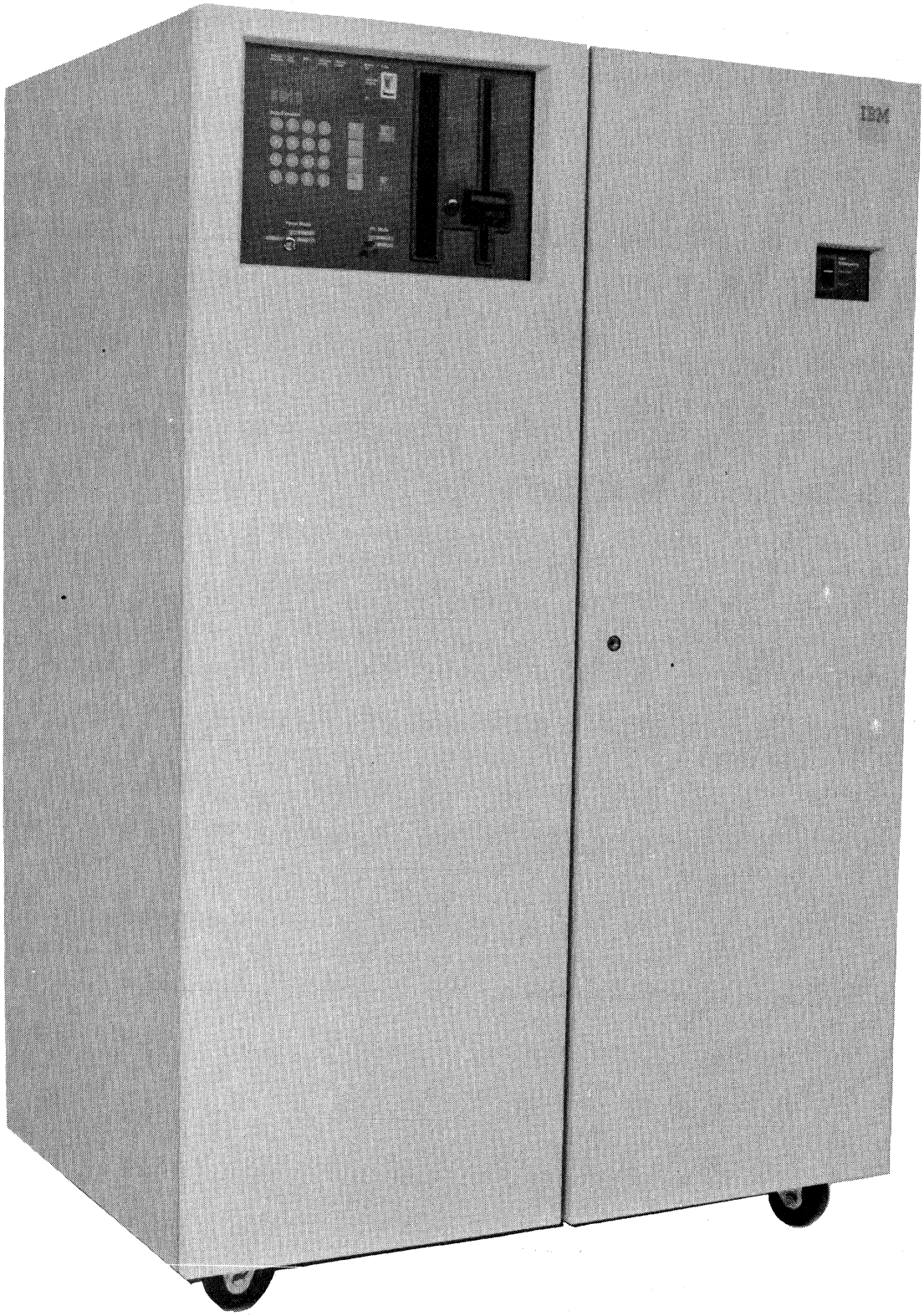


Figure 6-5 (Part 1 of 2). IBM 8150 Processor

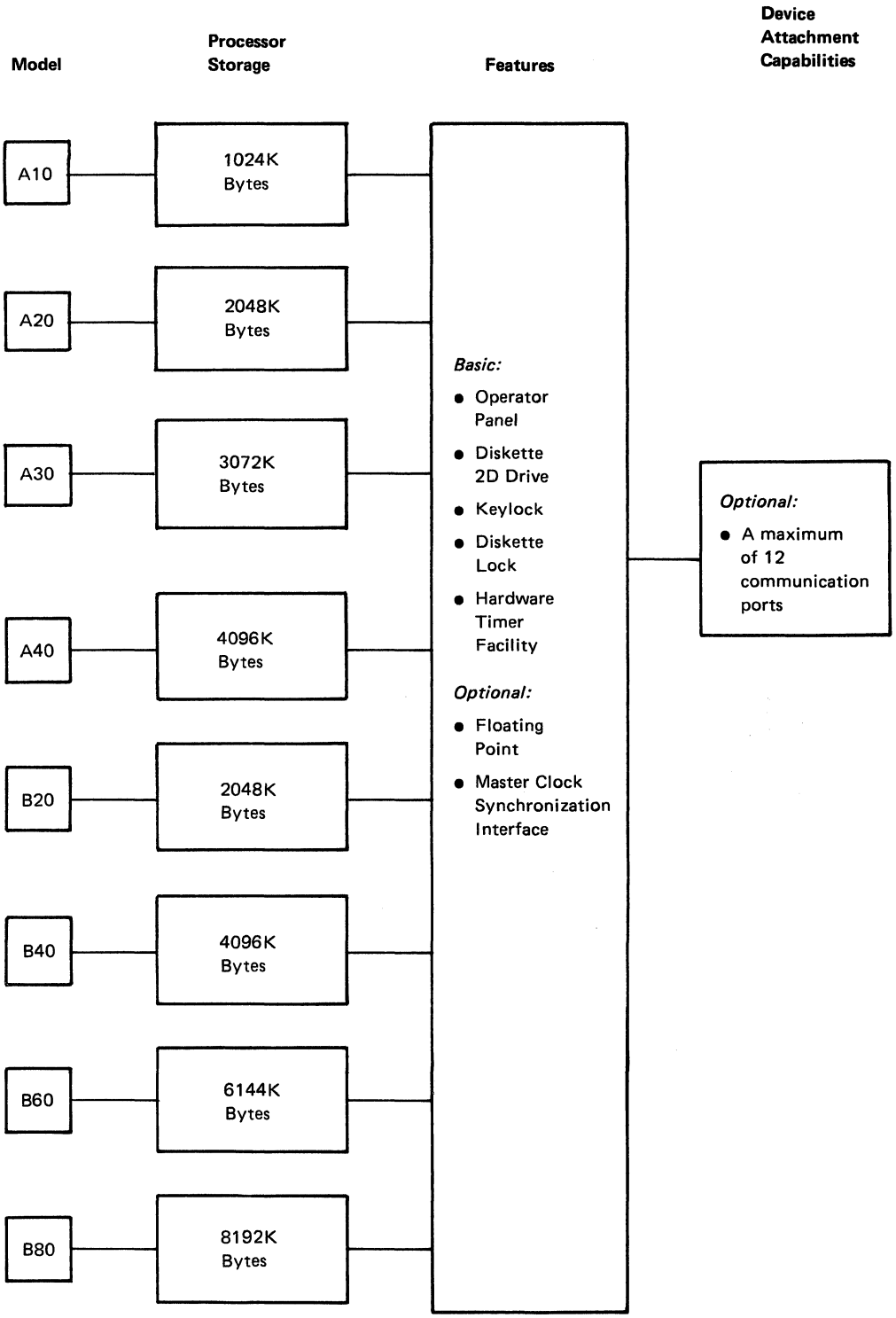


Figure 6-5 (Part 2 of 2). IBM 8150 Processor

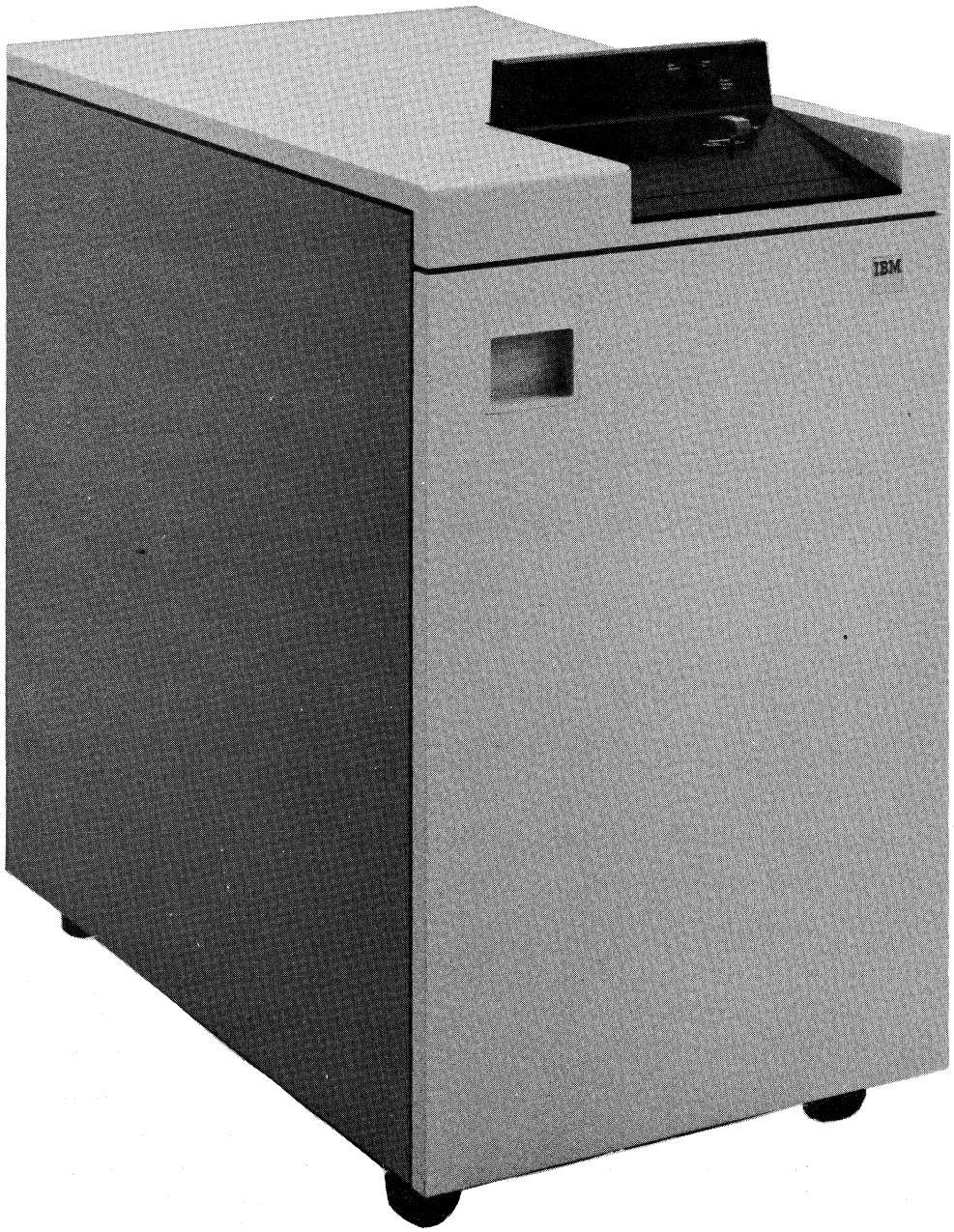


Figure 6-6 (Part 1 of 2). IBM 8101 Storage and Input/Output Unit.

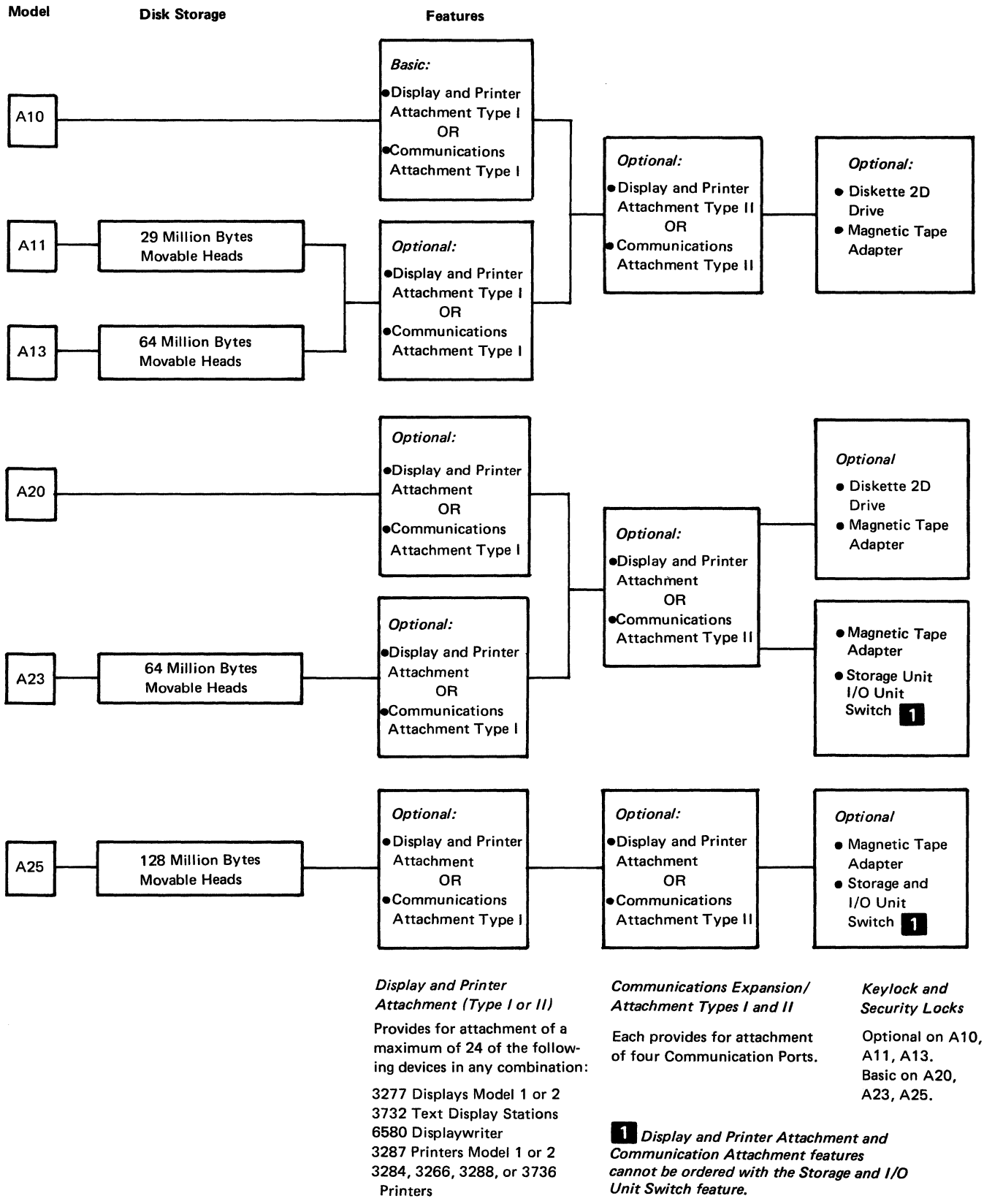


Figure 6-6 (Part 2 of 2). IBM 8101 Storage and Input/Output Unit.

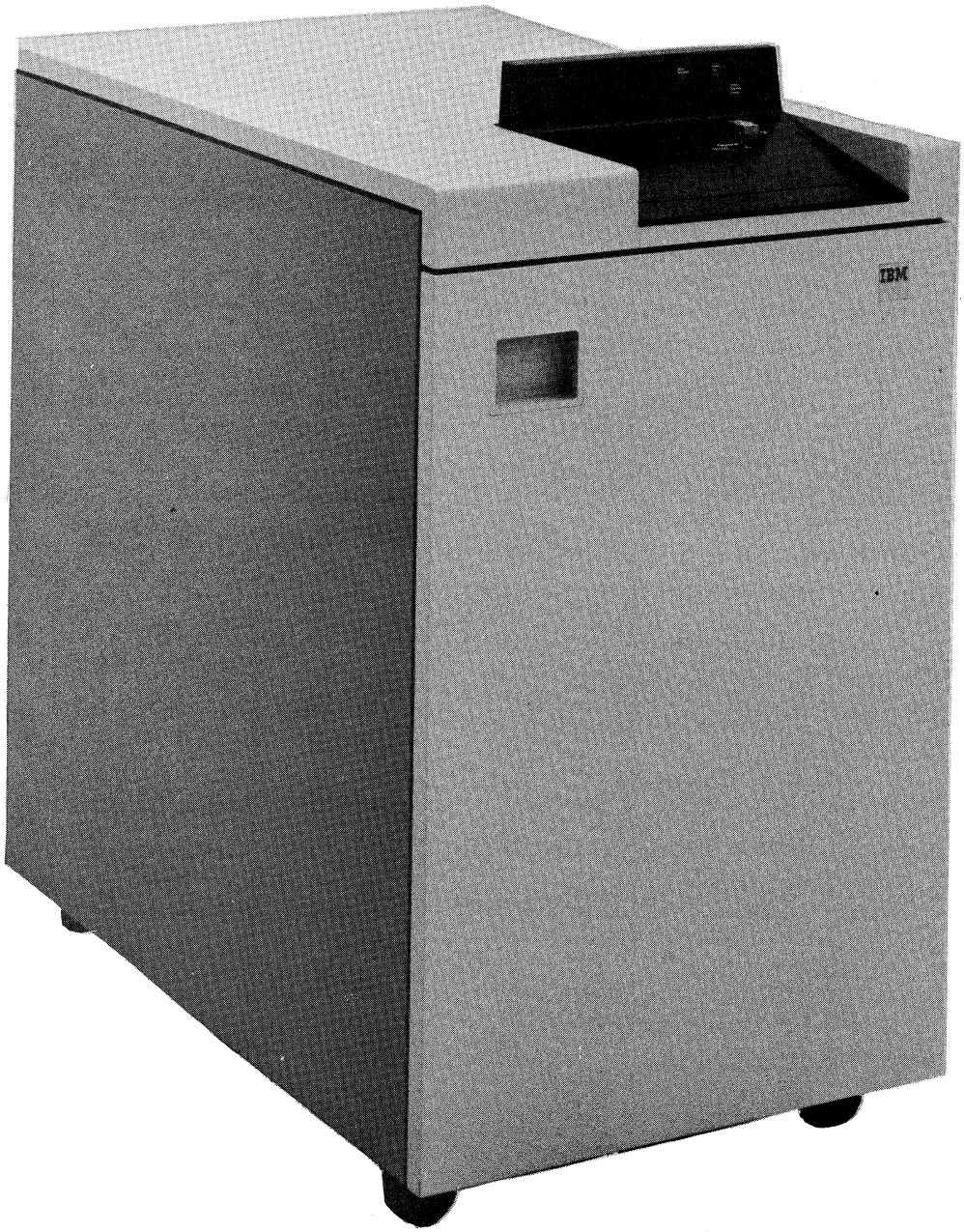
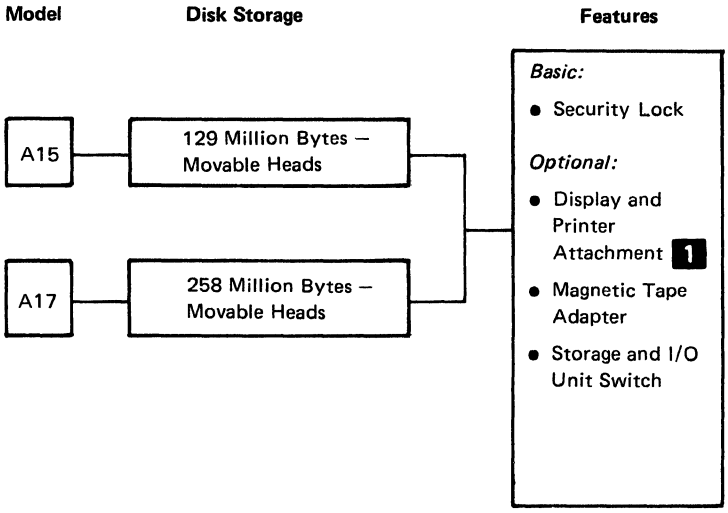


Figure 6-7 (Part 1 of 2). IBM 8102 Storage and Input/Output Unit



1 Provides for attachment of a maximum of 24 of the following devices in any combination:

3277 Displays Model 1 or 2
3287 Printers Model 1 or 2
3284, 3286, or 3288 Printers

Figure 6-7 (Part 2 of 2). IBM 8102 Storage and Input/Output Unit

Processors

The 8100 Information System offers an 8130 Processor available in six models, an 8140 Processor available in 29 models, and an 8150 Processor available in eight models. This choice of models lets the user configure a system to satisfy initial requirements and later reconfigure the system to meet new requirements.

Additionally, 8101 and 8102 Storage and I/O Units can be attached to processors under the following limits:

- An 8130A model with the System Expansion feature allows users to attach one or two 8101s or 8102s.
- An 8130B model with the System Expansion feature allows users to attach up to three 8101s or 8102s.
- 8140 Processors can have up to four 8101s or 8102s.
- 8150 Processors can have up to eight 8101s or 8102s.

Also,

- A maximum of four 8809 Magnetic Tape Units can be attached directly to an 8100 system.

The main differences between 8100 processor models are their operating speeds and message-throughput capabilities. The 8140C and the 8150B are

capable of improved message throughput compared to other 8140 and 8150 models because of their concurrent processing characteristics using Dual Mode operations in two PCEs. Instruction-execution speed and message-throughput performance depend on hardware configuration, the choice of I/O communications capabilities, and application characteristics.

IBM 8130 Processor

The 8130 is a low-cost, general-purpose processor with a wide range of applications available in four A and two B models. It is interrupt-driven with eight hardware-interrupt levels, and it has a maximum of six ports through which various communications capabilities may be attached to I/O devices. The devices that can be attached are described in Chapter 10.

The storage cycle time of the 8130 is 1500 nanoseconds. The 8130 can transfer I/O data at 930K bytes per second.

All 8130 models include the following items:

- Operator panel
- Processor storage of 256K, 384K, 512K, 768K, or 1024K bytes on the A model, depending on feature selection
- Processor storage of 1024K, 1536K, or 2048K bytes on the B model, depending on feature selection
- 4K bytes of read-only storage besides the processor storage for IPL of the A model
- 8K bytes of read-only storage besides the processor storage for IPL of the B model
- IBM diskette 2D drive with up to 1 million bytes of removable diskette storage. The 2D drive can use either the type 1 or 2D diskette.
- Nonremovable disk storage with 23 to 64 million bytes of storage including 128K bytes accessed by fixed heads, depending on the model selected.
- Dynamic address translation and storage access protection that allows addressing of up to 4M bytes of logical storage in the 8130A.
- Dynamic address translation and storage access protection that allows addressing of up to 8M bytes of logical storage in the 8130B.
- Eight priority levels
- Maintenance device port

Floating-point arithmetic is performed on the 8130 by programs such as the DPPX FORTRAN Library floating-point subroutines (an IBM program product).

8130A Optional Features

Note: The number in parentheses is the Feature Specify Code, used for identifying features and designating other information about the feature. For features that have prerequisites and restrictions, see your IBM marketing representative.

- Keylock (4655) — This three-position key-operated switch provides security for the 8100 system. The switch positions are:

  Secure: Disables the power-on and operator panel functions.

  Power Only: Enables power-on but disables operator panel functions.

  Enable: Enables power-on and operator panel functions.

- Security Cover Locks (6555) — Provides locks for the front and rear covers.

- Security Lock, Diskette (6566) — Provides a lock for the diskette cover.

- Processor Storage (1710) — Provides 128K bytes of additional processor storage for Models A21 through A24.

- Processor Storage (1720) — Provides 256K bytes of additional processor storage for Models A21 through A24.

- System Expansion (1530) — Provides programmable priority levels and I/O interrupt request determination. Required for attachment of up to two 8101s or 8102s, or one 8101 or 8102 and one 8809 Model 1B Magnetic Tape Unit directly to the 8130.

- Loop Adapter (4830) — Provides for attachment of a directly attached loop at 9600 or 38,400 bps.

- Loop Adapter Second Lobe (4835) — Provides for attachment of a second lobe to a directly attached loop.

8130B Optional Features

Note: For features that have prerequisites and restrictions, see your IBM marketing representative.

- Processor Storage (1730) — Provides 512K bytes of additional storage. Maximum: two per 8130B.

- System Expansion (1530) — Provides programmable priority levels and I/O interrupt request determination. Required for attachment of up to three 8101s or 8102s, or two 8101s or 8102s and one 8809 Model 1B Magnetic Tape Unit directly to the 8130.

- Loop Adapter (4830) — Provides for attachment of a directly attached loop at 9600 or 38,400 bps.

- Loop Adapter Second Lobe (4835) — Provides for attachment of a second lobe to a directly attached loop.
- Display and Printer Attachment (3220) — Provides for attachment of up to four display/printer terminals.
- Display and Printer Additional (1506) — Provides for attachment of additional display/printer terminals in any combination up to four.

Note: Keylock, Security Cover Lock, and Diskette Security Lock are standard features in the base 8130B.

8130 Processor Hardware Communications Features

- SDLC Communications with Business Machine Clock (1601, 8130A only)
- SDLC Communications without Business Machine Clock (1602)
- BSC/SS Communications with Business Machine Clock (1603, 8130A, 8130B A/FE only)
- BSC Communications without Business Machine Clock (1604, 8130A, 8130B A/FE only)
- Modem, Integrated, Nonswitched (5500, 8130A only)
- Modem, Integrated, Switched (5501, 8130A only)
- Digital Data Service Adapter (DDSA) (5660, 8130A only)
- EIA RS-232-C/CCITT V.24 Interface (3701)
- CCITT V.35 Interface (1550)
- Multispeed Clock (5200)
- Public Switched Network Adapter (PSNA) Manual (2947, 8130A only)
- X.21 Adapter for Nonswitched Networks (5655)
- X.21 Adapter for Switched Networks (5656)

IBM 8140 Processor

The 8140 is a multilevel, interrupt-driven processor designed to complement the distributed data processing capabilities of the 8100 Information System. It offers greater performance than the 8130 and is available in 29 models: 20 A models, 6 B models, and 3 C models.

The storage cycle time for the 8140 is 800 nanoseconds. The 8140 can transfer I/O data at 1.25 million bytes per second. Up to four 8101 or 8102 Storage and I/O Units can be attached to the 8140. Up to four 8809 Magnetic Tape Units can be attached to the 8140 or to an 8101 or 8102.

Processor storage for the 8140 can be 256K, 320K, 384K, 512K, 768K, 1024K, 1536K, or 2048K bytes, depending on the model.

The 8140 include the following items:

- Operator panel
- 4K bytes of read-only storage besides the processor storage for IPL of the A and B models
- 8K bytes of read-only storage besides the processor storage for IPL of the C models
- IBM Diskette 2D drive with up to 1 million bytes of removable diskette storage. The 2D drive can use either the type 1 or 2D diskette.
- Nonremovable disk storage with 23 to 123 million bytes of storage available, depending on model selection
- Dynamic address translation and storage access protection to address 4M bytes of logical storage in the 8140A and B
- Dynamic address translation and storage access protection to address 16M bytes of logical storage in the 8140C
- Eight priority levels
- Concurrent (Dual Mode) processing with two PCEs (8140 C model)
- Maintenance device port

Floating-point arithmetic is provided on Models A42 – A44 and is available as an optional feature on all B and C models.

8140 Features

Note: The number in parentheses is the Feature Specify Code, used for identifying features and designating other information about the feature. For features that have prerequisites and restrictions, see your IBM marketing representative.

- Storage Increment 128K (1490) — Provides 128K bytes of additional storage. Processor storage in Models A31 – A34 can be increased from 256K to 384K bytes.
- Expanded Function Operator Panel (4545) — Provides programmer and operator access to data in storage, program stop and restart capability, and current operating indicators.

- Keylock (4655) — Provides a three-position key-operated switch (optional on the 8140 A models and provided on the 8140 B and C models). The switch positions are:

  Secure: Disables power-on and operator panel functions.

  Power Only: Enables power-on but disables operator panel function.

  Enable: Enables power and operator panel functions.

- Security Cover Locks (6555) — Provides locks for the front and rear covers (optional on the 8140A and provided on the 8140B and C).

- Security Lock, Diskette (6566) — Provides a lock for the diskette cover (optional on the 8140A and provided on the 8140B and C).

- Loop Adapter (4830) — Provides for direct attachment of a single-lobe loop at 9600 or 38,400 bps. One or two loop adapters can operate at 38,400 bps on an 8140.

- Loop Adapter Second Lobe (4835) — Provides for attachment of a second lobe to a directly attached loop at 9600 or 38,400 bps. Prerequisite: 4830.

8140A and B Hardware Communications Features

- SDLC Communications with Business Machine Clock (1601)
- SDLC Communications without Business Machine Clock (1602)
- BSC/SS Communications with Business Machine Clock (1603)
- BSC Communications without Business Machine Clock (1604)
- Modem, Integrated, Nonswitched (5500)
- Digital Data Service Adapter (DDSA) (5660)
- EIA RS-232-C/CCITT V.24 Interface (3701)
- CCITT V.35 Interface (1550)
- Multispeed Clock (5200)
- Public Switched Network Adapter (PSNA) Manual
- X.21 Adapter for Switched Networks (5656) (8140 B model only)
- X.21 Adapter for Nonswitched Networks (5655)

8140B Features

Note: For features that have prerequisites and restrictions, see your IBM marketing representative.

- Feature Expansion Prerequisite (3901) — Required for first Communications Attachment (1701) ports 5 through 8, Display and Printer Attachment without Communications Attachment (1701), or Magnetic Tape Attachment (4901) without Communications Attachment (1701).

- Communications Attachment (1701) — Provides for the expansion of communications capabilities to include ports 5 through 8 or 9 through 12. Additional special features for line control, communications interface, and modems are required to complete each communications port selected.

- Magnetic Tape Attachment (4901) — Provides for attachment of up to four 8809 Magnetic Tape Units, consisting of one 8809 Model 1A plus two Model 2's and one Model 3.

- Display and Printer Attachment (3220) — Provides for attachment of the 3277 Display Station, 3287 Printer, and 3284, 3286, or 3288 Printer, 3732 Text Display, 3736 Printer, and 6580 Displaywriter in any combination up to four. Can be expanded to a maximum of 24 devices with five Display and Printer, Additional feature (1506).

- Display and Printer, Additional (1506) — Provides for attachment of additional 3277 Display Stations, 3284, 3286, 3287, or 3288 Printers, 3732 Text Display, 3736 Printer, and 6580 Displaywriter in any combination up to four.

- Floating-Point Feature (3750) — Provides 30 floating-point instructions and 32 floating-point registers. The instructions provide for loading, adding, subtracting, comparing, multiplying, dividing, storing, and controlling the sign of short (4-byte) and long (8-byte) operands.

8140C Communications Ports Features

Communications Ports Features are presented in sets which occupy predefined communications ports: one of five sets can occupy ports 1 through 4, one of four sets can occupy ports 5 through 8, and one set can occupy ports 9 and 10. A maximum of 10 ports can be occupied.

Note: For features that have prerequisites and restrictions, see your IBM marketing representative.

One of the following features may occupy ports 1 through 4. One feature may be selected:

- Communications Ports Feature 1610 — Provides for loop attachment in ports 1 and 2, with the speed independently selectable by switch at 9600 bps or 38,400 bps. Port 2 can be a two-lobe loop (4835). Ports 3 and 4

provide an SDLC/EIA interface without clock to an external modem with clock up to 9600 bps.

- Communications Ports Feature 1611 — Provides for loop attachment in ports 1, 2, and 3, with the speed independently selectable by switch at 9600 bps or 38,400 bps (only two of the three loops can be set at 38,400 bps). Port 2 can be a two-lobe loop (4835). Port 4 provides an SDLC/EIA interface without clock to an external modem with clock up to 9600 bps.

- Communications Ports Feature 1612 — Provides for loop attachment in ports 1, 2, and 3, with the speed independently selectable by switch at 9600 bps or 38,400 bps. Port 2 can be a two-lobe loop (4835). Port 4 provides an X.21 switched interface without clock up to 48,000 bps.

- Communications Ports Feature 1613 — Provides for loop attachment in ports 1, 2, and 3, with the speed independently selectable by switch at 9600 bps or 38,400 bps. Port 2 can be a two-lobe loop (4835). Port 4 provides an X.21 nonswitched interface without clock up to 48,000 bps.

- Communications Ports Feature 1614 — Provides for loop attachment in ports 1, 2, and 3, with the speed independently selectable by switch at 9600 bps or 38,400 bps. Port 2 can be a two-lobe loop (4835). Port 4 provides a V.35 interface without clock to an external modem with clock up to 56,000 bps, or a direct-connect interface with clock (multispeed clock feature) or without clock at 56,000 bps.

One of the following Communications Ports Features may occupy ports 5 through 8. One feature may be selected:

- Communications Ports Feature 1620 — Provides for loop attachment in port 7, operating at 9600 bps. Port 7 can be a two-lobe loop (4835). Ports 5, 6, and 8 provide an SDLC/EIA interface without clock to an external modem with clock up to 9600 bps.

- Communications Ports Feature 1621 — Provides an SDLC/EIA interface in ports 5 through 8. Ports 6, 7 and 8 provide an SDLC/EIA interface without clock to an external modem with clock up to 9600 bps. Additionally, port 5 provides a direct-connect interface with clock (multispeed clock feature) or without clock at 4800 bps.

- Communications Ports Feature 1622 — Provides one SDLC interface in port 7 without clock to an external modem with clock up to 9600 bps. Provides BSC Programmed Communications interfaces in ports 5, 6, and 8 from 1200 to 9600 bps without clock or 600 and 1200 bps with clock to an external modem. Additionally, port 5 provides a direct-connect interface (up to 40 feet) with selectable clock options and speeds up to 9600 bps.

- Communications Ports Feature 1623 — Provides two BSC Programmed Communications interfaces in ports 5 and 6 from 1200 to 9600 bps without clock or 600 to 1200 bps with clock to an external modem. Prerequisite: 3901 (Feature Expansion).

The following feature occupies ports 9 and 10:

- Communications Ports Feature 1630 — Provides an SDLC/EIA interface without clock to an external modem with clock to 9600 bps in ports 9 and 10.

8140C Features

Note: For features that have prerequisites and restrictions, see your IBM marketing representative.

- Feature Expansion (3901) — Required for Display and Printer Attachment (3220) or Magnetic Tape Attachment (4901) without one of the Communications Ports Features for ports 5 through 8 (1620, 1621, 1622, or 1623).

- Magnetic Tape Attachment (4901) — Provides for attachment of up to four 8809 Magnetic Tape Units, consisting of one 8809 Model 1A plus two Model 2s and one Model 3.

- Display and Printer Attachment (3220) — Provides for attachment of 3277 Display Station, 3284, 3286, 3287, or 3288 Printers, 3732 Text Display, 3736 Printer, and 6580 Displaywriter in any combination up tc a maximum of four. Can be expanded to a maximum 24 devices with five Display and Printer, Additional features (1506).

- Display and Printer Additional (1506) — Provides for attachment of additional 3277 Display Stations, 3284, 3286, 3287, or 3288 Printers, 3732 Text Display, the 3736 Printer, and 6580 Displaywriter in any combination up to four.

- Floating—Point Feature (3750) - Provides 30 Floating-Point Instructions and 32 floating-point registers. The instructions provide for loading, adding, subtracting, comparing, multiplying, dividing, storing, and controlling the sign of short (4-byte) and long (8-byte) operands.

IBM 8150 Processor

The 8150 is a multilevel, interrupt-driven processor designed to provide higher performance and availability for the 8100 Information System. The 8150 is available in four A models and four B models. Model A processors have one processing and control element (PCE) and one input/output bus; model B processors have two PCEs and two I/O buses.

Storage for the 8150 can be up to a maximum of 8192K bytes. Up to eight 8101 or 8102 Storage and I/O Units can be attached to the 8150. One 8101 or 8102 is required. Up to four 8809 Magnetic Tape Units can be attached to an 8150 or to an attached 8101 or 8102.

The 8150 includes the following items:

- Concurrent (Dual Mode) processing with two PCEs (B model only)

- I/O devices attached to each PCE (B model only)

- Processor storage
- Diskette storage
- System control
- Dynamic address translation, storage access protection, and separation protection for 16M bytes of logical storage.
- IBM Diskette 2D drive with up to 1 million bytes of removable diskette storage. The 2D drive can use either the type 1 or 2D diskette.
- Operator panel
- Eight priority levels
- 8K bytes of read-only storage
- Maintenance device port
- Main storage error detection and error correction
- Hardware timer facility that includes remote power-on capability and battery-backed timer.

8150 Features

Note: For features that have prerequisites and restrictions, see your IBM marketing representative.

- Communications Ports Feature 1711 – Provides for directly attached loops with single lobes in ports 1 and 2, with choice of speed by switch at 9600 or 38,400 bps.
- Communications Ports Feature 1712 – Provides for directly attached loops with single lobes in ports 3 and 4, with choice of speed by switch at 9600 or 38,400 bps.
- Communications Ports Feature 1716 – Provides for directly attached loops with single lobes in ports 11 and 12 with clock speed selectable by switch at 9600 or 38,400 bps for the 8150B. The switch must only be set in the 9600 bps position for the 8150A.
- Communications Ports Feature 1721 – Provides for directly attached loops with double lobes in ports 1 and 2, with speed selectable by switch at 9600 or 38,400 bps.
- Communications Ports Feature 1726 – Provides for directly attached loops with double lobes in ports 11 and 12, with clock speed selectable by switch at 9600 or 38,400 bps for the 8150B. The switch must only be set in the 9600-bps position for the 8150A.

- Communications Ports Feature 1732 – Provides for two SDLC EIA RS-232-C/CCITT V.24/V.28 interfaces in ports 3 and 4. Both interfaces are unclocked and attach to external modems with clock up to 9600 bps.

- Communications Ports Feature 1733 – Provides for two SDLC EIA RS-232-C/CCITT V.24/V.28 interfaces in ports 5 and 6. Port 6 is unclocked and attaches to an external modem with clock up to 9600 bps. Port 5 provides the same interfaces as port 6; or direct connect without clock up to 9600 bps; or with clock at 4800 bps or 9600 bps up to 40 feet.

- Communications Ports Feature 1734 – Provides for two SDLC EIA RS-232-C/CCITT V.24/V.28 interfaces in ports 7 and 8. Port 7 is unclocked and attaches to an external modem with clock up to 9600 bps. Port 8 provides the same interface as port 7 or direct connect without clock up to 9600 bps, or with clock at 4800 bps, or 9600 bps up to 40 feet.

- Communications Ports Feature 1735 – Provides for two SDLC EIA RS-232-C/CCITT V.24/V.28 interfaces in ports 9 and 10. Both interfaces are unclocked and attach to external modems with clock up to 9600 bps.

- Communications Ports Feature 1742 – Provides for two SDLC/CCITT V.35 interfaces in ports 3 and 4. Port 3 is unclocked and attaches to an external modem with clock up to 56,000 bps. Port 4 provides the same interface as port 3 or direct connect with or without clock at 56,000 bps up to 1000 feet or up to a total cable length of 61 m (200 ft) to an IBM 3705 or 150 m (492 ft) to an IBM 3725.

- Communications Ports Feature 1745 – Provides for two SDLC/CCITT V.35 interfaces in ports 9 and 10. In the 8150A, neither interface has a clock and both attach to an external modem with clock having speeds up to 9600 bps. In the 8150B, the port 10 interface does not have a clock and attaches to an external modem with clock up to 56,000 bps. The port 9 interface is identical and has direct connect capability with or without clock at 56,000 bps up to 1000 feet or up to a total cable length of 61m (200 ft) to an IBM 3705 or 150 m (492 ft) to an IBM 3275.

- Communications Ports Feature 1752 – Provides one SDLC/CCITT X.21 switched interface with auto answer and auto call in port 3 and one SDLC/CCITT X.21 nonswitched interface point-to-point or multipoint in port 4, without clock up to 48,000 bps via a Data-Circuit Terminating Equipment (DCE) which complies with CCITT Recommendation X.21 as explained in IBM SRL GA27-3287.

- Communications Ports Feature 1755 – Provides one SDLC/CCITT X.21 switched interface with auto answer and auto call in port 10 and one SDLC/CCITT X.21 nonswitched interface (point-to-point or multipoint) in port 9, without clock having speeds up to 9600 bps in the 8150A and 48,000 bps in the 8150B via a DCE which complies with CCITT Recommendation X.21 as explained in IBM SRL GA27-3287.

- Communications Ports Feature 1763 – Provides two BSC EIA RS-232-C/CCITT V.24/V.28 interfaces in ports 5 and 6. Port 6 provides an BSC Programmed Communications Feature from 1200 to 9600 bps without clock or 600 and 1200 bps with clock to external DCE

point-to-point nonswitched 2- or 4-wire or multipoint nonswitched 4-wire. Port 5 provides the same interface as port 6 or direct connect up to 40 feet.

- Communications Ports Feature 1764 – Provides two BSC EIA RS-232-C/CCITT V.24/V.28 interfaces in ports 7 and 8. Port 7 provides a BSC Programmed Communications Feature from 1200 to 9600 bps without clock or 600 and 1200 bps with clock to external DCE point-to-point nonswitched 2- or 4-wire or multipoint nonswitched 4-wire. Port 8 provides the same interface as port 7 or direct connect up to 40 feet.
- Floating Point (3750)
- Feature Expansion, Prerequisite for ports 7-12 (3901)
- Multi-Speed Clock Feature (5200)
- Master Clock Synchronization (MCS) Interface (5210) – Provides a Start-Stop EIA RS-232-C/CCITT V.24/V.28 serial interface for attaching a customer-supplied external digital clock.

8150 Communications Specify Codes

- E/ME/A Modem Cabling Germany (2712)
- E/ME/A Cabling U.K. (2724)
- Direct Connect with clock at 56,000 bps, port 4, with Feature Code 1742 (9682)
- Direct Connect without clock, port 4, with Feature Code 1742 (9683)
- Modem Connect, port 4, with Feature Code 1742 (9684)
- Direct Connect with clock at 4800 bps, port 5, with Feature Code 1733 (9686)
- Direct Connect with clock at 9600 bps, port 5, with Feature Code 1733 (9687)
- Direct Connect without clock, port 5, with Feature Code 1733 (9688)
- Modem Connect, port 5, with Feature Code 1733 (9689)
- Direct Connect BSC, port 5, with Feature Code 1763 (9690)
- Direct Connect BSC, port 8, with Feature Code 1746 (9680)
- Direct Connect with clock at 56,000 bps, 8150B port 9, with Feature Code 1745 (9692)
- Direct Connect without clock, port 9, with Feature Code 1745 (9693)

- Modem Connect, port 9, with Feature Code 1745 (9694)
- Direct Connect with clock at 4800 bps, port 8, with Feature Code 1734 (9696)
- Direct Connect with clock at 9600 bps, port 8, with Feature Code 1734 (9697)
- Direct Connect without clock, port 8, with Feature Code 1734 (9698)
- Modem Connect, port 8, with Feature Code 1734 (9699)
- Port 3 Link Problem Determination Aid (LPDA) (9803)
- Port 4 LPDA (9804)
- Port 5 LPDA (9805)
- Port 6 LPDA (9806)
- Port 7 LPDA (9607)
- Port 8 LPDA (9808)
- Port 9 LPDA (8801)
- Port 10 LPDA (8802)

8150 Accessory

- Mercury Battery – Provides power to the timer facility while utility power is off or while the 8150 emergency power switch is in the power-off position.

IBM 8101 and 8102 Storage and Input/Output Units

The IBM 8101 Storage and Input/Output Unit provides disk storage, diskette storage, communications, device attachment capabilities, and storage and I/0 switching for the 8100 Information System.

The IBM 8102 Storage and Input/Output Unit provides disk storage, storage and I/O unit switching, and Display and Printer Attachment capabilities for the 8100 Information system.

The 8101s and 8102s attach to the 8100 Information System via any 8100 processor. The 8150 Processor must have an 8101 or 8102 attached to it but there is no such requirement for 8130 or 8140 processors.

There are six 8101 models and two 8102 models. They extend the data-handling capability of the 8100 Information System by allowing customers to attach a wide variety of I/O devices -- displays, printers, controllers, and data collection units -- to the system. The devices may be

attached directly to the 8101 or 8102 or through attached loops or via communications facilities to the 8101. The 8101 has a maximum of eight ports through which communications capabilities may be attached to I/O devices. Devices (described in Chapter 10) may be attached to the loop facilities described in this chapter.

8101 Models A10, A11, and A13 Features

Note: For features that have prerequisites and restrictions, see your IBM marketing representative.

- Display and Printer Attachment Type I (1501-A11 and A13 or 9941-A10) or Type II (1502) — Provides for the attachment of feature codes 1505 and 1506.

- Display and Printer Adapter (1505) — Provides attachment capability in any combination up to a maximum of four of the following devices:

  3277 Display Station, Models 1, 2
  3732 Text Display Station
  6580 Displaywriter System
  3787 Printer, Models 1, 2
  3284 Printer
  3286 Printer
  3288 Line Printer
  3736 Printer

- Communications Attachment Type I (1503-A11 and A13 or 9943-A10) or Type II (1504) — Provides for attachment of loops and communications facilities up to a maximum of four.

- Diskette Drive and Magnetic Tape Attachment (1507) (part of the base 8101 Model A10) — Provides the capability to attach features 4520 and 4521.

8101 Models A20, A23, and A25 Features

Note: For features that have prerequisites and restrictions, see your IBM marketing representative.

- Feature Expansion Prerequisite (3901) — Required for first Communications Attachment Type I (1701 or 1702) ports 1 through 4 or Display and Printer Attachment (3220) without Communications Attachment Type I (1701).

- BSC Programmed Communications Feature (1605) — Provides control for BSC and direct-connect interfaces. User-parameter selection of speeds up to 9600 bps and clocking options are supported.

- Diskette Drive and Magnetic Tape Attachment (1507) (part of the base 8101 Model A20) — Provides the capability to attach features 4520 and 4521.

- Communications Attachment Type I or Type II (1701) — Provides for attachment of four loops and/or communications ports. Type I (1701) provides for ports 1 through 4; Type II (1701) provides for ports 5 through 8. Additional special features for line control, communications interface, and modems are required to complete each communications port selected.

- Communications Attachment Type I (1702) — Provides the capability for attaching four loops and/or communications ports for ports 1 through 4. Additional special features for line control, communications interface, and modems are required to complete each communications port selected.

- Display and Printer Attachment (3220) — Provides for the attachment of the IBM 3277 Display Station, the IBM 3732 Text Display Station, the IBM 3287 Printer, the 3284, 3286, 3288, 3736 Printers, and the 6580 Displaywriter in any combination up to four. This feature can be expanded to a maximum of 24 devices with Display and Printer Attachment (1506).

- Storage and I/O Unit Switch Feature (4525) — Provides the 8101 with the capability of switching processor access between one of two 8130s, 8140s, or 8150s or between the two PCEs of the 8150B.

8101 Additional Features

Note: For features that have prerequisites and restrictions, see your IBM marketing representative.

- Display and Printer, Additional (1506) — Provides for attachment of additional IBM 3277 Display Stations, IBM 3732 Text Display Stations, IBM 3287 Printers, the 3284, 3286, 3288, 3736 Printers, and 6580 Displaywriters in any combination up to four.

- Diskette 2D Drive (4520) — Provides 1 million bytes of removable diskette storage. (Not available on Model A25.)

- Magnetic Tape Attachment (4521) — Provides for attachment of up to four 8809 Magnetic Tape Units.

- Loop Adapter (4830) — Provides for direct attachment of a single-lobe loop at 9600 or 38,400 bps.

- Loop Adapter Second Lobe (4835) — Provides for attachment of a second lobe to a directly attached loop at 9600 or 38,400 bps.

- Security Cover Locks (6555) (Optional feature for Models A10, A11, A13; basic feature of Models A20, A23, A25.) — Provides locks for the front and rear covers.

- Security Lock, Diskette (6566) (Optional feature for Models A10, A11, A13; basic feature of Models A20, A23, A25.) — Provides a lock for the diskette cover.

8101 Hardware Communications Features

- SDLC Communications with Business Machine Clock (1601)
- SDLC Communications without Business Machine Clock (1602)
- BSC/SS Communications with Business Machine Clock (1603)
- BSC Communications without Business Machine Clock (1604)
- Modem, Integrated, Nonswitched (5500)
- Modem, Integrated, Switched (5501)
- Digital Data Service Adapter (DDSA) (5660)
- EIA RS-232-C/CCITT V.24/V.28 Interface (3701)
- CCITT V.35 Interface (1550)
- Multispeed clock (5200)
- Public Switched Network Adapter (PSNA) Manual
- X.21 Adapter for Nonswitched Networks (5655)
- X.21 Adapter for Switched Networks (5656)

8102 Model A15 and A17 Features

Note: For features that have prerequisites and restrictions, see your IBM marketing representative.

- Display and Printer Attachment (3220) — Provides for attachment of IBM 3277 Display Station and the IBM 3284, 3286, 3287, and 3288 Printers in any combination up to four. This feature can be expanded to a maximum 24 devices with Display and Printer Attachment (1506).
- Display and Printer Additional (1506) — Provides for attachment of additional IBM 3277 Display Stations and IBM 3284, 3286, 3287, and 3288 Printers in any combination up to four.
- Magnetic Tape Attachment (4521) — Provides for attachment of up to four 8809 Magnetic Tape Units.
- Storage and I/O Unit Switch Feature (4525) Provides the 8102 with the capability of switching processor access between one of two 8130s, 8140s, or 8150s or between the two PCEs of an 8150B.

Related Hardware Manuals

For more information about the 8130 Processor, see *IBM 8100 Information System: 8130 Processor Description*, GA27-3196.

For more information about the 8140 Processor, see *IBM 8100 Information System: 8140 Processor Description*, GA27-2880.

For more information about the 8150 Processor, see *IBM 8100 Information System: 8150 Processor Description*, GA23-0122.

For more information about the 8101 and 8102 Storage and I/O Units, see *IBM 8100 Information System: 8101/8102 Storage and Input/Output Unit Description*, GA27-2882.

Chapter 7. Processor Characteristics

This chapter describes the functional characteristics and features of the IBM 8100 Information System processors. The chapter includes details of the register storage organization, storage control, PCE control, I/O operations, general registers, floating-point registers, and other resources of the 8130, 8140, and 8150 processors.

For a detailed explanation of the characteristics of the 8100 System's processors, see *IBM 8100 Information System: Principles of Operation*, GA23-0031.

Processing and Control Element (PCE)

The Processing and Control Element (PCE) is the part of the processor that contains the sequencing and processing controls for instruction execution, interrupt control, dynamic address transformation, and other control and processing functions. All 8100 processors have one PCE except for the 8140C and 8150B processors.

8140 C models have two PCEs (PCE 0 and PCE 1), and an Interrupt Control Element (ICE) to provide communication and control between the two PCEs. PCE 0 in the 8140 C models performs the same functions as the PCE in models of processors with a single PCE. PCE 1 is restricted since it does not directly attach channel logic circuitry, the System Control Facility (SCF), or the SCF signal bus.

The 8140C can operate with a single PCE in Single Mode (SM). Its normal mode of operation, with both PCEs operating, is called Dual Mode (DM).

8150 B models also have two PCEs (PCE 0 and PCE 1), an ICE, up to 8M bytes of shared storage, a duplex SCF, and two I/O channels. One I/O channel is attached to each PCE.

The 8150B can operate with a single PCE (Single Mode). Its normal mode of operation is Dual Mode, with both PCEs executing instructions.

The 8150B contains a number of duplex elements. When one element fails, the 8150B may be run with the other element in a reduced configuration. Possible 8150B configurations include:

1. Dual Mode with both PCEs and full main storage
2. Reduced Dual Mode with both PCEs and half the main storage
3. Single Mode with PCE 0 and full main storage
4. Single Mode with PCE 1 and full main storage
5. Reduced Single Mode with PCE 0 and half the main storage
6. Reduced Single Mode with PCE 1 and half the main storage

Data Units

The basic unit of information is the 8-bit byte with parity. Bytes may be handled separately or grouped into fields. A halfword is two consecutive bytes; a word is four consecutive bytes; a doubleword is eight consecutive bytes. Register operands may be a byte, a halfword, or a word long. Variable-length operands of MOVE (halfwords, storage) or COMPARE LOGICAL (halfwords, storage) instructions may be 256 halfwords (512 bytes) long. Variable-length operands of MOVE (bytes, storage) or COMPARE LOGICAL (bytes, storage) instructions may be 256 bytes long. Floating-point operands are a word or a doubleword long and are located in a floating-point register or in main storage.

Data Types

General instructions perform operations with three types of data:

- Signed fixed-point numbers
- Unsigned fixed-point numbers
- Unstructured logical quantities

Additional general instructions control instruction sequencing. Floating-point instructions operate on floating-point data. PCE control information is manipulated with a set of PCE control instructions.

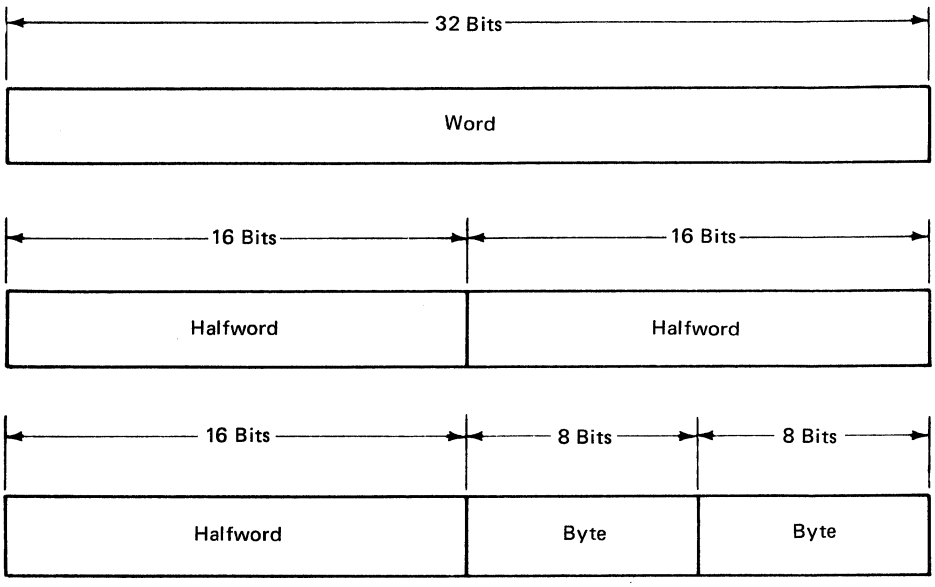
Processor Resources

This section describes the processor resources that are available to a program.

General Registers

General registers are 32 bits long and organized in register sets. A register set consists of eight general registers. Each program is assigned two sets of general registers -- the primary register set and the secondary register set. These registers can be used for addressing, indexing, accumulating, and storing temporary operands. In the 8140C and the 8150B, each PCE contains its own separate register storage.

Operands in general registers may be a byte, a halfword, or a word in length. One general register may hold multiple operands, each of which may be processed independently. The three possible allocations of operands in a general register are as follows:



Floating-Point Registers (8140 and 8150)

Eight sets of floating-point registers are provided for floating-point operations. A floating-point register is 64 bits long, with four floating-point registers in each set. One set of floating-point registers can be assigned to a program. Floating-point operands may be either short format (32 bits) or long format (64 bits). When floating-point operands are 32 bits long, the rightmost 32 bits in a floating-point register are unused.

Processor (Main) Storage

Main storage provides the 8100 Information System processor with high-speed, directly accessible data storage. Data and programs must be loaded into main storage from input devices before they can be processed. Main storage is available in a variety of sizes, ranging from a minimum of 256K bytes on an 8130A to a maximum of 8192K bytes on an 8150B. Main storage availability for the individual processor models is described in Chapter 6, "Unit Configurations".

For the 8140C and the 8150B, main storage is shared by both PCEs. Memory contention interlock logic is provided to decide which PCE will be given the access to main storage when simultaneous access requests are made. Memory contention is reduced in the 8150B by interleaving main storage between even and odd storage banks.

Byte locations in storage are numbered consecutively left to right, starting with 0; each number is considered to be the address of the corresponding byte. A group of bytes in storage is addressed by the leftmost byte of the

group. The number of bytes in the group is either implied or explicitly stated for the operation being performed.

Integral Boundaries

Certain units of data must be located in main storage on an integral boundary. An integral boundary means that a unit of data is located at a storage address that is a multiple of its size. For example, a halfword is on an integral boundary when it is located at a storage address that is a multiple of 2, and a word of data is on an integral boundary when it is located at a storage address that is a multiple of 4.

Floating-point storage operands may be a word or a doubleword. Both operand lengths are required to be on a word boundary.

Instructions must appear on halfword integral boundaries. Halfword and word storage operands must appear on integral boundaries. The low-order bits of addresses designating instructions or data operands that are required to be on integral boundaries are ignored and are assumed to be zero.

Addressing Main Storage

Storage addresses are linear from address 0 to the maximum byte address of the installed storage. If the maximum byte address of the installed storage is exceeded while referencing main storage, a program exception condition is detected by the PCE, and the operation is suppressed.

The PCE accesses main storage using real addresses. A real address is considered to be the byte address of a physical main storage location. A real address is only associated with one main storage location.

An address used by a program or by the channel during an I/O operation is a logical address. Logical addresses are not used to access main storage directly; a logical address identifies a byte location within a logical address space. Storage addressing is not permitted to wrap from the maximum address to address 0. Programs and channel I/O operations are assigned a logical address space by the supervisor program. The PCE automatically relocates the logical addresses issued by a program or during a channel I/O operation into the PCE address space. Logical addresses are relocated by the dynamic address relocation mechanism. The relocated address may be used to access main storage, or it may require translation by the dynamic address translation mechanism before main storage can be accessed. Dynamic address relocation and dynamic address translation are described later in this chapter under "Storage Control".

Instruction Set

An instruction is one or two halfwords long. Each instruction is in one of eight basic formats. The halfword instruction formats are: register-register (RR), register-immediate (RI), register-storage (RS), jump (J), and floating-point register-register (FF). The word instruction formats are: register-register long (RR-Long), register-storage long (RS-Long), and floating-point register-storage (FS). The format names express, in general terms, the specification of operands.

Operands

Operands can be grouped into three classes: operands located in registers, immediate operands, and operands in main storage. Operands may be either explicitly or implicitly designated.

Register operands may be located in either general registers or floating-point registers, with the type of register identified by the operation code of the instruction that processes the operand. The register containing the operand is specified in a four-bit field in the instruction, called the R field in the general instruction set, and a two-bit field, called the F field in the floating-point instruction set. Some general instructions specify the register implicitly. The location of the register operand is implied by the operation code.

Immediate operands are contained within the instruction. The field containing the immediate operand is called the I field.

Operands in main storage may have either an implied length or a length specified by the contents of a general register. The addresses of operands in main storage are specified using the contents of a general register, or the value of the instruction address, as part of the address. The address used to refer to main storage is contained in a general register designated by the R field in the instruction or is calculated from a base and displacement, designated by the B field and the D field, respectively, in the instruction. This addressing format permits the following flexibility in program design:

- Complete address specification using an abbreviated notation
- Address manipulation using instructions that use general registers for operands
- Change of addresses through programming without altering the instruction stream
- Operation independent of the location of data areas by directly using addresses received from other programs

For describing instruction execution, operands are designated as first and second operands and, in some cases, as third operands. Usually, two operands participate in instruction execution, and the result replaces the first operand. An exception is found in store-type instructions, where the result replaces the second operand. Except for storing the final result, and for instructions that include address modification as part of the operation,

the contents of all registers or storage locations participating in the addressing or execution part of an operation are normally unchanged.

Instruction Summary

This section provides an overview of the capabilities of the 8100 Information System instruction set. These descriptions are grouped by the types of operations performed by the PCE when the instructions are executed.

Arithmetic Operations: Arithmetic operations are provided for addition, subtraction, multiplication, division, and comparison of fixed-point binary numbers. Positive numbers are represented in true binary notation. Negative numbers are represented in 2's-complement notation. Byte and halfword formats are provided for fixed-point numbers. Addition, subtraction, and comparison can also be performed on numbers represented in multiple bytes or halfwords.

Arithmetic operations are provided in the register-register instruction format. Addition and subtraction are also provided in the register-immediate format. For operands located in the high-order halfword of any general register, addition, subtraction, and comparison are also provided.

Logical Operations: Instructions are provided for AND, OR, and exclusive OR operations on byte and halfword operands. These operations are provided in the register-register instruction format. Logical operations on byte operands are also provided in the register-immediate instruction format. Included in this last group is a logical test operation that uses the immediate field as a mask. The mask is used to select one or more bits of a byte operand for testing.

Shift and Rotate Operations: Instructions are provided that shift (left) or rotate (left) the bits within a byte or halfword operand. An immediate field specifies a maximum shift or rotate of 7 bit positions for a byte operand and 15 bit positions for a halfword operand. All bits of the operand participate in the operation. The byte operand may be located in either register set.

Variable-Length Field Operations: Move and logical comparison operations are provided that operate on variable-length fields in main storage. Depending on the instruction, the operand fields may contain a maximum of either 256 bytes or halfwords. The instructions require the specification of three registers. Two of the registers contain the storage address of the operand fields; the third provides an eight-bit count.

Load and Store Operations: Load and store operations are provided to transfer data between main storage and general registers. For the register-register format instructions, the storage address is specified by the contents of a general register. The register-storage format instructions permit the specification of the storage-operand address with a base address and a displacement. The base address can be designated as the contents of a general register or as the value of the instruction address. For both instruction formats, the operand size may be a byte or halfword; word operands may also be designated with the register-storage format.

The capability is provided to load or store a group of eight halfword operands, collectively called a quadrant. Either general register set may be specified, and the operands may be designated as either the high-order or low-order halfword of the eight registers.

Certain operations in the register-register instruction format provide additional function to post-increment or pre-decrement the storage address. For the transfer of a quadrant, the storage address is incremented by 16.

Load Register Operations: Operations in the register-register instruction format transfer a byte or halfword from one general register location to another. The byte or halfword may be located in any operand position of any general register. In addition, an operation in the register-immediate instruction format allows a byte of immediate data to be loaded into a register.

An operation loads a storage address. This operation adds the displacement field to a base address and places the result in a general register.

Branching Operations: The normal sequential execution of instructions may be changed using branching operations to perform subroutine linkage and decision making. These operations permit the introduction of a new instruction address. The new address either is contained in a general register or is calculated from a base address and a displacement. The contents of a general register or the value of the instruction address may be used as the base address.

Subroutine linkage is provided by instructions that introduce a new instruction address and preserve the next-sequential-instruction address. Decision making has conditional branching operations. These operations inspect condition indicators that reflect the results of arithmetic, logical, and I/O operations.

Other specialized branching operations are provided for counting and testing, bit testing, and n-way branching, where n is a value up to 256.

Input/Output Operations: Three I/O instructions transfer a byte or a halfword of data between the processor and an I/O device. The INPUT/OUTPUT (byte) and the INPUT/OUTPUT (byte, immediate) instructions transfer one byte of data during their execution. The INPUT/OUTPUT (halfword) instruction transfers two bytes during its execution. These I/O instructions transfer data to or from a general register in the processor; they do not transfer data to or from main storage.

Channel I/O operations transfer data between main storage and a device. I/O instructions are used to prepare the devices for the channel I/O sequence and to initiate the operation.

I/O instructions can only be executed by programs executing in the I/O, supervisor, and master modes. A program exception is detected by the processor when a program executing in application mode attempts to execute an I/O instruction.

I/O instructions and channel I/O operations are described later in this chapter under "I/O Operations".

PCE-Control Operations: PCE-control instructions permit a program to inspect and change PCE-control information that reflects operational status of the PCE. The execution of most PCE-control instructions is limited to programs executing in supervisor or master mode. A program exception is detected by the PCE when programs executing in application or I/O mode try to execute these instructions.

Floating Point Operations: For the 8140C and the 8150B models, the Floating Point feature is available with only PCE 0.

Data Integrity and Security

Data integrity and security is maintained through the following processor facilities:

- Error checking is done on data and control paths to and from register storage, main storage, and I/O devices.
- Application programs may not execute supervisor privileged instructions.
- Logical address space isolation is provided by the dynamic address relocation mechanism.
- Access protection is provided for each 2K-byte block of PCE address space by the dynamic address translation mechanism.
- Separation protection is provided on the 8150 for each 2K-byte block of PCE address space by the dynamic address translation mechanism.
- Execution of I/O instructions is limited to programs executing in I/O, supervisor, or master mode.

Program Definition

A program is defined to the PCE in terms of its logical address space and its operational status. For the 8140C and the 8150B models, program execution can take place concurrently in each PCE. A pair of control vectors is associated with the definition of each program. The address control vector (ACV) defines the size and location of the program's logical address space. The ACV also contains a translation control bit that determines if the logical address must be translated by the dynamic address translation mechanism. The program status vector (PSV) records the status of the program's execution and provides information with which the PCE controls program execution. Two PSV/ACV pairs are provided for each priority level: a primary PSV/ACV pair and a secondary PSV/ACV pair. The PCE uses control information, called the program activation vector, to determine

which PSV/ACV pair should be given control on each priority level. PSV/ACV pairs are stored in fixed locations in register storage. Each priority level is assigned a unique location for its primary and secondary PSV/ACV pair. The register storage location of the PSV/ACV pair that describes a program determines the priority level of that program's execution.

PCEs that implement floating-point operations provide an additional control vector for program control on each priority level. This control information is called the floating-point status vector (FSV). The FSV contains control information relative to the execution of floating-point instructions. The FSV for a specific priority level is activated by the PCE when a program is dispatched on that level. One FSV is provided for each priority level; it is shared by the programs defined by the primary and secondary PSV/ACV pairs for that priority level.

A program is dispatched when its PSV/ACV pair is activated by the PCE. The priority level to be given control and the determination of which PSV/ACV pair is to be activated determine the fixed register storage location from which the PSV/ACV pair is activated. Program execution does not modify the active ACV. The PSV, however, provides the instruction address and condition indicators that record the program execution. When control is given to a new priority level or to the opposite PSV/ACV pair on the current level, the PCE stores the current PSV in its fixed location in register storage before activating the new PSV/ACV pair. Saving the PSV information permits the interrupted program's execution to be resumed later. Since the ACV is not modified during program execution, it is not stored when control is exchanged with a new PSV/ACV pair.

Address Control Vector

The address control vector (ACV) describes a logical address space assigned to a program or channel I/O operation. An ACV is paired with each PSV and channel pointer to define their logical address spaces when they are activated. ACVs are stored in fixed locations in register storage.

The ACV also defines what types of addresses are used by the program or channel I/O operation to access main storage. The addresses used by the program or channel I/O operation are called logical addresses. All logical addresses are relocated into the PCE address space by the dynamic address relocation mechanism. The ACV defines whether the relocated addresses are to be used to access main storage or whether the relocated addresses must be translated by the dynamic address translation mechanism to access main storage. The dynamic address relocation mechanism and the dynamic address translation mechanism are described later in this chapter under "Storage Control". Channel I/O operations and channel pointers are described later in this chapter under "I/O Operations".

Program Status Vector

The program status vector (PSV) contains information required for proper program execution. The PSV includes the instruction address, the program mode, condition indicators, register set numbers, and other control fields.

The instruction address contains the logical address of the next instruction to be executed. The instruction address controls instruction sequencing in the execution of the program.

The program mode defines the instruction execution privilege assigned for the program. Four program modes are defined: master mode, supervisor mode, I/O mode, and application mode. The program modes can be summarized as follows:

- Master Mode: All instructions are valid. In addition, all store and execute references to main storage are allowed because the access codes in the translation-table entries are ignored (except for the block-invalid bit). An access exception is recognized, regardless of the program mode, when an attempt is made to use an invalid table entry for translation. Access codes are described in this chapter under "Storage Access Protection".

- Supervisor Mode: All instructions are valid.

- I/O Mode: Only those instructions are valid that cannot be used to affect system integrity. Supervisor-privileged instructions are not valid in I/O mode; they include those instructions that change the system control fields in the PSV and in control vectors, those that change system control fields in the floating-point status vector, those that change or inspect the contents of the translation table and translation lock table, and those with the capability to change or inspect the contents of any register set.

- Application Mode: Only those instructions are valid that do not affect system integrity and that do not pertain to I/O functions. Supervisor-privileged instructions and I/O-privilege instructions are not valid in application mode.

Four condition indicators reflect the results of arithmetic, logical, and I/O operations. These operations can indicate the existence of one or more of five possible conditions by setting the appropriate values in the condition indicators. The specific meaning of any condition depends on the operation that sets the indicators. All operations that set the condition indicators place new values in all four indicators. Once set, the condition indicators remain unchanged until modified by an instruction that causes new conditions to be indicated.

The register set numbers record the primary and secondary register set assignment for each program. Each program is assigned two sets of eight 32-bit general registers. These registers can be used for temporary operand storage, address specification, and as accumulators.

Floating-Point Status Vector (8140 and 8150)

The floating-point status vector (FSV) contains information used to control floating-point operations. The floating-point register set assignment, the precision of floating-point operations, and control information for processing floating-point program exceptions are contained in the FSV. The FSV also records floating-point exceptions or equipment checks detected during floating-point operations.

The register set assignment contains the number of the floating-point register set assigned to the program associated with this FSV. Each program can be assigned one set of four 64-bit floating-point registers.

The precision of floating-point operations is controlled with a 1-bit field in the FSV. When short-precision is specified, floating-point operands are 32 bits long. When long-precision is specified, floating-point operands are 64 bits long. For operations on short-precision operands, the low-order 32 bits of floating-point register operands are ignored.

Certain floating-point exceptions can be masked to be detected or to be ignored. The exception mask field permits the following exceptions to be masked: Significance, Exponent Overflow, and Exponent Underflow. When the mask bit is 0, an exception condition results in a program exception interruption sequence. When the mask bit is 1, no program interruption occurs when an exception condition is detected.

The equipment check bit is set when a data or control error is detected during floating-point operations. The remaining field in the FSV records program exception conditions associated with the floating-point operations.

Register Storage Organization

Register storage is organized into 64 principal register sets and 64 adjunct register sets. A register set contains eight registers. In the 8140C and 8150B, each PCE contains its own separate register storage.

Eight sets of floating-point registers are provided for PCEs that implement floating-point operations. Floating-point registers are physically separate from adjunct and principal register storage. One floating-point register set contains four floating-point registers.

Principal Register Sets

The registers in the principal register sets are 32 bits long. The principal register sets are divided into four categories and contain the following:

- Four sets are provided as save areas for primary and secondary program status vectors (PSVs).
- Eight sets are provided for channel pointers.
- Forty-eight sets are assignable to programs as general registers.
- Four sets are reserved (see Figure 7-1).

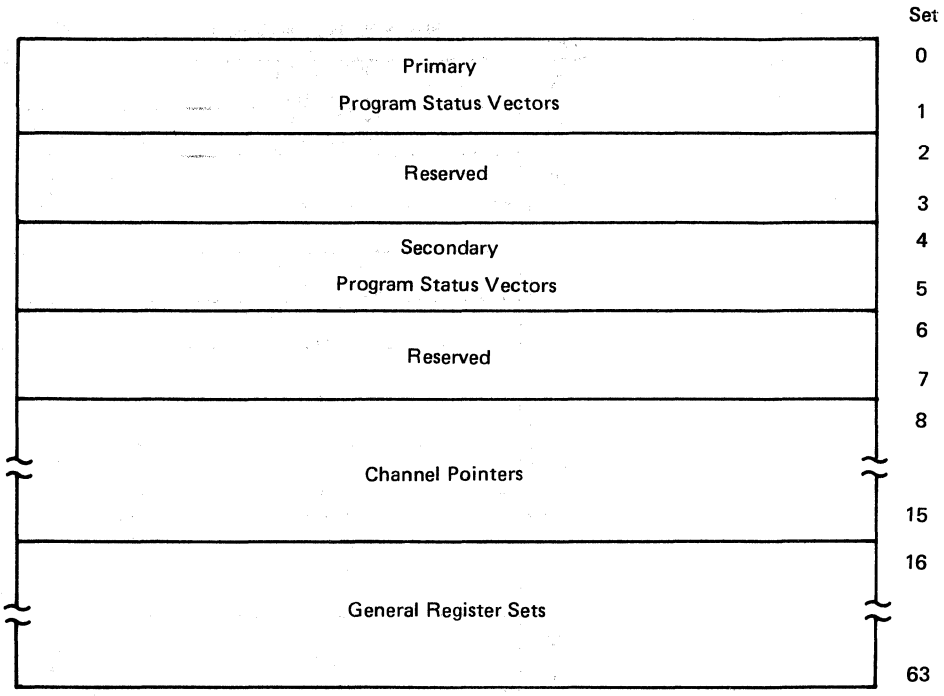


Figure 7-1. Principal Register Sets

The PSV save areas are used for saving active PSVs and introducing new PSVs.

The channel pointers contain the logical addresses of the next data transfer, to or from main storage, during channel I/O operations. Channel pointers and channel I/O operations are described later in this chapter under "I/O Operations".

The remaining register sets contain general register sets that are assignable to programs. Figure 7-1 shows the organization of the principal register sets.

Adjunct Register Sets

The adjunct registers are 16 bits long. Adjunct register sets 0–1, 4–5, and 8–15 contain the ACVs. In the 8150, sets 0–1 also contain Exception Block Index (EBI) for primary mode PSVs levels 1–7 and EBI registers for secondary mode PSVs levels 0–7. An ACV is paired with each PSV and channel pointer to define the logical address space assigned to a PSV and to a channel pointer. Adjunct register sets 2–3, 6–7, 18–19, 22–23, and 32–63 are reserved, and, except for the 8130B and 8150, sets 16–17, 20–21, and 24–31 are also reserved.

16–17 contain protection keys for primary mode PSVs levels 0–7.

20–21 contain protection keys for secondary mode PSVs levels 0–7.

24–27 contain protection keys for channel pointers 32–63.

28–31 contain protection keys for channel pointers 0–31.

Figure 7-2 shows the relationship between principal and adjunct register sets.

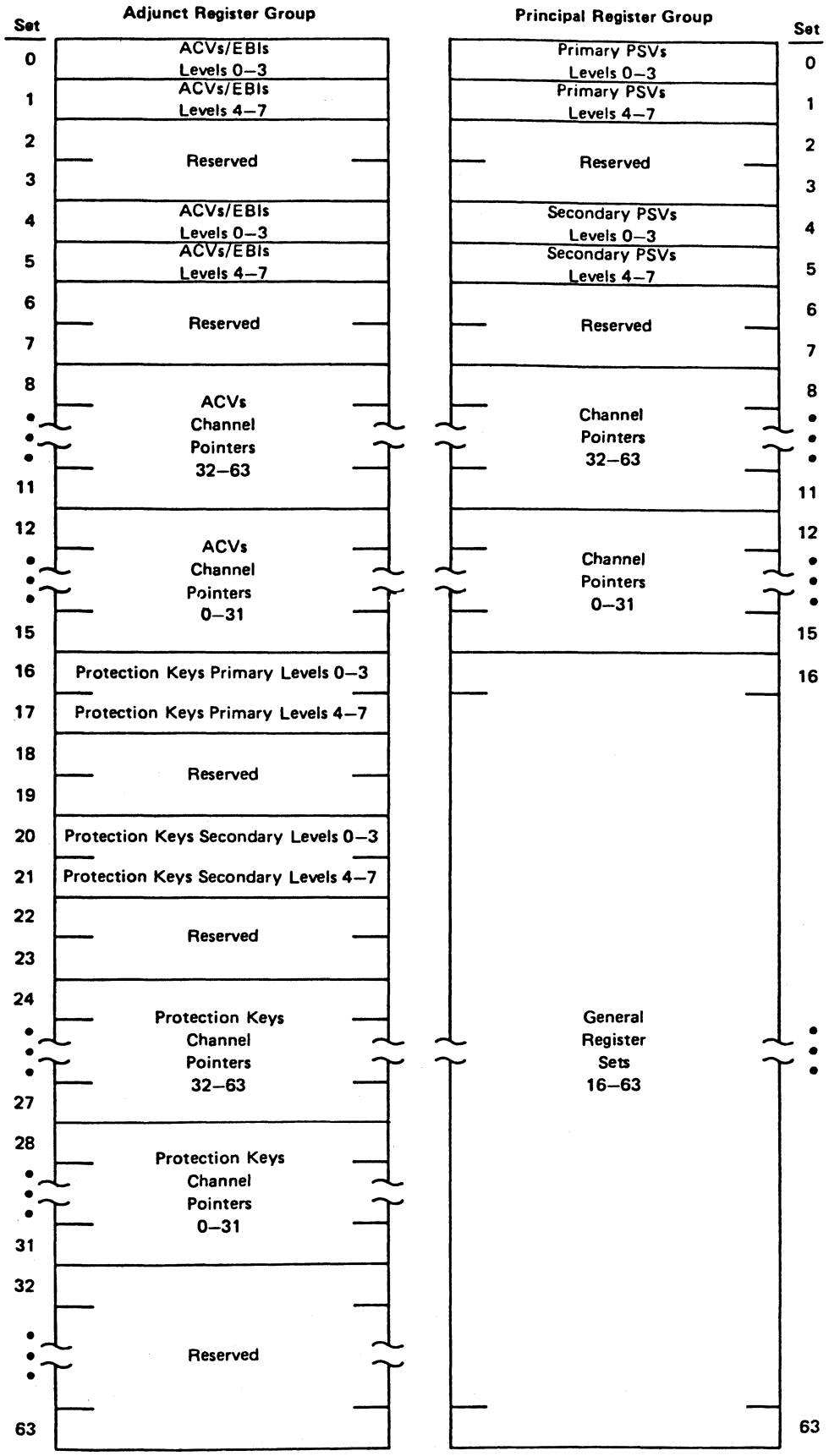


Figure 7-2. Relationship of Principal and Adjunct Register Sets

Exception Block Index (EBI) Registers

EBI registers are provided in the 8130B and the 8150. When an access or separation exception is detected, the corresponding translation-table index, or EBI, is stored in the EBI register associated with the active PSV.

Floating-Point Register Sets (8140 and 8150)

A floating-point register is 64 bits long. Floating-point operands may be 32 or 64 bits long, depending on the setting of the precision bit in the FSV. The FSV identifies which of the eight sets of floating-point registers is assigned to a program. The contents of floating-point registers can be inspected and modified using floating-point instructions; instructions that access the principal and adjunct registers cannot access floating-point registers.

Storage Control

This section describes how programs, using logical addresses, access main storage. Program addresses, or logical addresses, are not used to directly access main storage. The PCE relocates all logical addresses into the PCE address space with the dynamic address relocation mechanism. The relocated address may be translated with the dynamic address translation mechanism before main storage is accessed. Both the dynamic address relocation mechanism and the dynamic address translation mechanism are described in this section.

The dynamic address relocation mechanism provides storage protection as logical address space isolation. The limits of each logical address space are defined by an ACV. The dynamic address relocation mechanism ensures that the limits of each logical address space are not exceeded by storage access requests from the program or channel I/O operation with which the logical address space is associated. If an attempt is made to access a storage location associated with a logical address greater than the limit of the logical address space, a program exception occurs.

The dynamic address translation mechanism translates relocated addresses into main storage addresses (real addresses) using a translation table. The translation is performed on a 2K-byte block basis whereby contiguous blocks within a relocated logical address space are remapped to 2K-byte blocks of main storage that are not required to be contiguous.

The dynamic address translation mechanism provides protection within a logical address space against improper storage access. An access control field in each entry of the translation table defines how the corresponding main storage block can be accessed. Additionally, the 8150 provides separation protection by means of protection keys and translation locks. This capability allows multiple programs and/or channel I/O operations to share the same logical address space in such a way that individual blocks within the logical address space may be shared between users or uniquely assigned.

Dynamic address translation may be made either active or inactive by a supervisory program transparent to application programs. When active, address translation, storage access protection, and separation protection (if available) all apply. When dynamic address translation is inactive, none of the dynamic address translation functions apply, and relocated addresses are used directly to access main storage.

Logical Addresses

The 8100 programs and data areas used during channel I/O operations (CHIO) are defined within a logical address space. The size of the program or the length of the CHIO data area determines the extent of the logical address space. The address of a byte location in a logical address space is a logical address. Within a logical address space, logical addresses are contiguous from 0 to the address that expresses the maximum extent of the logical address space. An ACV is associated with each program and CHIO operation. The address-limit field of the ACV defines the size of the logical address space to the PCE.

Dynamic Address Relocation

All logical addresses are relocated in the PCE address space by the dynamic address relocation mechanism. The address-base field of the ACV defines where, in the PCE address space, the logical address space is relocated. Logical addresses are converted into relocated addresses by the dynamic address relocation mechanism to identify a byte location in the PCE address space.

PCE Address Space

The PCE address space consists of the total range of addresses available to the PCE. The PCE address space contains all the logical address spaces as they have been relocated by the dynamic address relocation mechanism. Each logical address space is relocated in the PCE address space on a boundary that is an integral multiple of its size. A supervisory program must determine which set of addresses in the PCE address space is allocated for each logical address space. During this allocation process, the address-base and address-limit field values for the ACV associated with the program or CHIO operation are defined.

Figure 7-3 provides an overview of the relationship between logical address space and the PCE address space.

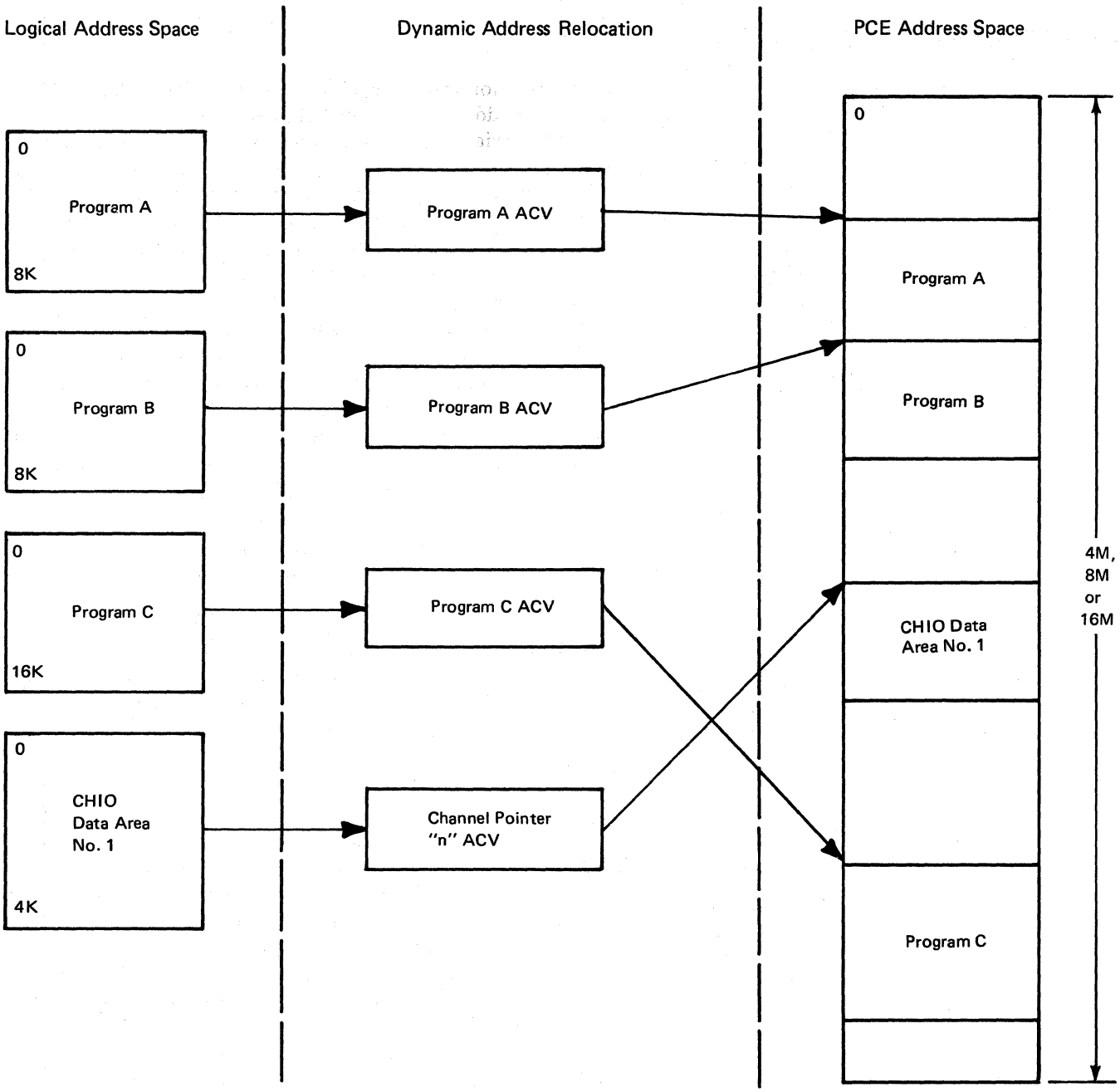


Figure 7-3. Relocating Logical Address Spaces in the PCE Address Space

Dynamic Address Translation

The dynamic address translation (DAT) mechanism translates relocated addresses into main storage addresses. The PCE address space is represented by up to 8192 entries in the translation table provided by the DAT mechanism. The translation table is a high-speed storage array that is physically separate from main storage. Each entry in the translation table corresponds to a block of 2048-byte addresses in the PCE address space. Each logical address space is relocated into a portion of the PCE address space represented by a corresponding set of contiguous translation-table entries. The address-base field in the ACV identifies the first translation-table entry of the set that is allocated to the program or CHIO operation. When a logical address is converted to a relocated address with DAT active, the relocated address serves as an index into the translation table to select the translation-table entry associated with that logical address. The translation-table entry provides the PCE with the real address for the main storage access. Main storage allocation is facilitated because each translation-table entry is associated with a separate 2048-byte block of main storage. The translation-table entries associated with a logical address space are contiguous; the 2048-byte blocks of main storage with which the translation-table entries are associated are not required to be contiguous.

For 8140C and the 8150B models, the first four entries are unique to each PCE. When one PCE modifies one of its unique entries, the corresponding entry in the second PCE is not affected. The remaining 8188 entries are treated as common entries.

Figure 7-4 is an overview of the correspondence between a logical address space, the PCE address space represented by the translation table, and main storage. In this example, Program A is defined in a 16K-byte logical address space. Program A logical address space is relocated into the PCE address space using the contents of the ACV associated with Program A PSV. Program A is relocated into eight translation-table entries that represent Program A address space in the PCE address space. The relocated addresses are not used to access main storage with DAT active. Rather, they access the translation-table entries associated with Program A in the PCE address space. The DAT mechanism translates the relocated addresses into real addresses for the main storage access. Each of the translation-table entries is associated with a 2K-byte block of main storage in which a portion of Program A has been stored.

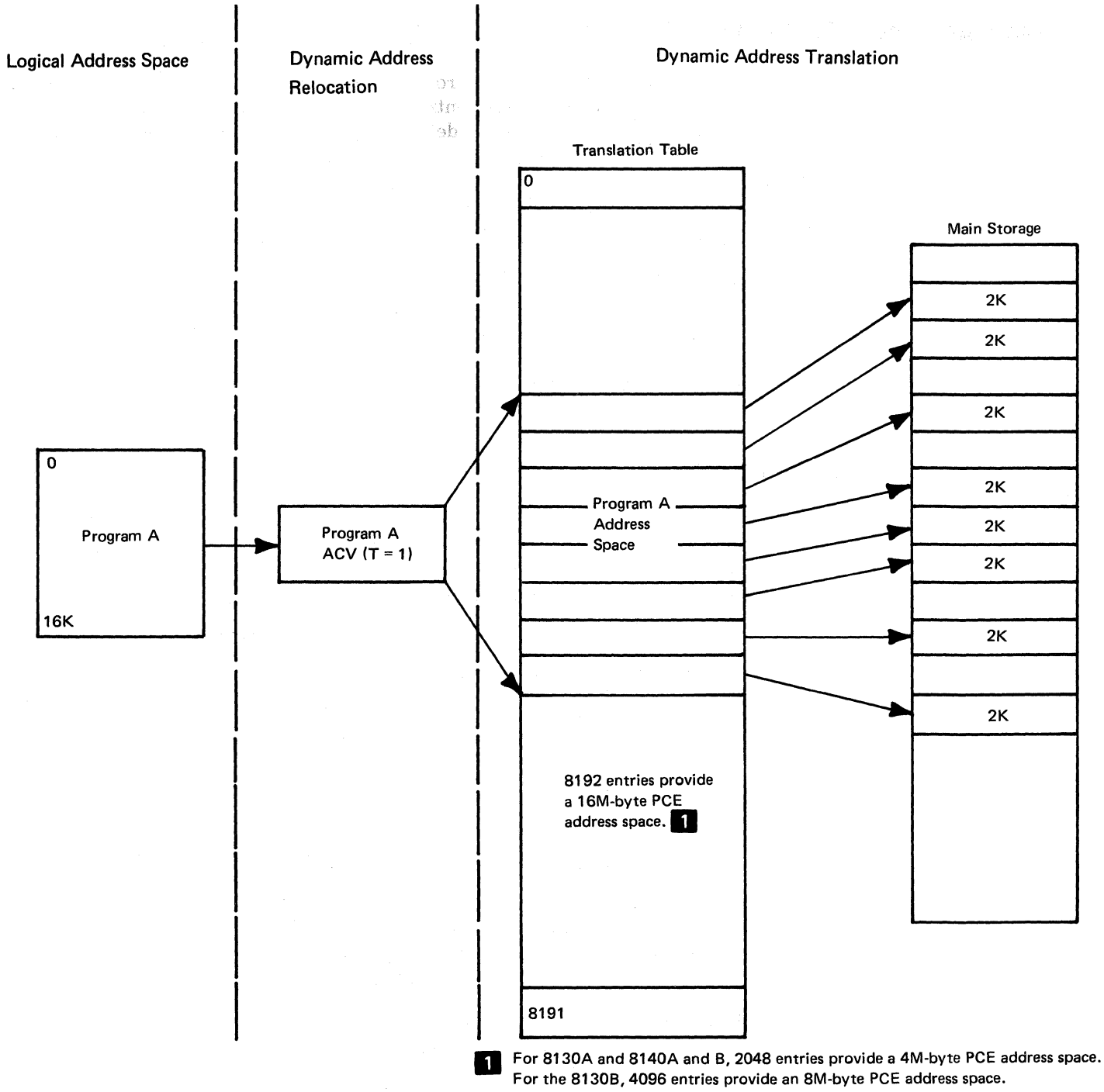


Figure 7-4. Using Translated Addresses to Access Main Storage

Storage Access Protection

Storage access protection is provided for each 2K-byte block of the PCE address space by an access control field in each translation-table entry. The access protection can be defined for each program that accesses that block of storage. The types of access protection are:

- Block Invalid: no access is permitted.
- Store Protection: store access is not permitted.
- Execution Protection: instruction-fetch access is not permitted.
- Channel Store Protection: channel I/O operations for store access are not permitted.

This mechanism is available only when dynamic address translation is active.

Separation Protection (8150 Only)

In the 8150, storage management is further aided by the separation protection mechanism. This mechanism allows a supervisory program to provide logical separation of programs within the logical address space provided by a single ACV. This mechanism is available only when dynamic address translation is active.

An 8-bit translation lock, located in the translation lock table, is logically associated with each entry in the translation table (representing a 2K-byte block of storage). The translation lock accommodates 255 unique values in addition to a master lock value of 0. An 8-bit protection key, located in adjunct registers, is associated with each PSV/ACV and CHP/ACV pair. There are 255 unique protection keys in addition to a master protection key value of 0. During the dynamic translation process, the protection key associated with the active ACV is compared with the translation lock associated with the applicable translation-table entry. A match occurs if either: (1) the protection key is identical to the translation lock, (2) the protection key is the master key (all 0's), or (3) the translation lock is the master lock (all 0's). If a match is not found, the storage access is disallowed and a program exception (separation exception) occurs. If a match occurs, the access-control field of the translation-table entry is inspected for storage access protection. If storage access is permitted, the dynamic address translation process continues. Two special supervisor-privileged instructions are provided for managing the protection keys and translation locks.

PCE Control

For the 8140C and the 8150B, each PCE contains its own priority levels. 8100 processors provide for program execution on eight levels of processing priority. These priority levels are numbered 0 – 7 for each PCE. Level 0 is defined as the highest priority level, level 1 is the next highest priority level, and so on, to level 7, which is defined as the lowest priority level.

Dispatching Priority Level

The PCE gives control to programs in response to requests for program execution. The PCE contains dispatching logic to automatically determine the highest priority request for program execution and to give control to the program on that level. Requests for program execution are received from three sources: those created by an executing program, signals from I/O devices, and requests generated by the PCE because of detecting system-check conditions. The PCE contains special control vectors to record and maintain these requests for program execution.

Requests for program execution on a specific priority level are called interrupt requests. Programmed and I/O interrupt requests can be received for levels 0 – 7; error interrupt requests are only associated with level 0. When a request for program execution is received for a priority level that is of higher priority than the current level, the PCE's dispatching logic initiates an interrupt sequence. An interrupt sequence consists of storing the current PSV in its fixed location in register storage, updating certain control vectors, and activating the new PSV/ACV pair for the priority level being dispatched.

Enabling and Disabling Priority Levels

An interrupt request for a higher priority level than is currently active may or may not result in an interrupt sequence. Priority levels can be enabled or disabled for interrupt requests. When a priority level is enabled, the level can be given control in response to an interrupt request. When a priority level is disabled, all interrupt requests for that level remain pending until that level is enabled. Two masks control the enabling and disabling of priority levels: the common mask and the master mask. The common mask permits each level to be enabled or disabled, individually. The master mask permits the collective disabling of all levels other than the current level and level 0.

Dual PSVs per Priority Level

Two PSV/ACV pairs are defined for each priority level within a PCE; one is designated the primary PSV/ACV pair, and the other is designated the secondary pair. The primary and secondary PSV/ACV pairs are distinguished physically by the fixed locations in register storage where they are stored; their formats are identical. Dual PSV/ACV pairs for each level allow a supervisor program and an application program to be defined on the same priority level. An instruction is provided that permits control

to be exchanged between two programs on the same priority level within a PCE. When the instruction is executed, the current PSV is stored in its fixed location in register storage, and the opposite PSV/ACV pair is activated on the current priority level.

The primary and secondary PSVs differ in the processing of program exceptions. When a program exception is detected with the secondary PSV active, the secondary PSV is stored in its fixed location in register storage, and the primary PSV/ACV pair is activated for the current level. When a program exception is detected with the primary PSV active, the primary PSV is stored, and an error interrupt request is generated for priority level 0. Thus, the supervisor program for each priority level within a PCE can be written to process program exception conditions detected during execution of the application program on that priority level.

Program Environment

The priority level structure and the unique set of fixed register locations for each PSV and ACV permit the definition of a distinct environment for each program. When a new PSV and ACV are introduced, the state of the associated program is defined. The program environment includes the definition of the program's logical address space, general register sets, and the program status and control information used during program execution. The supervisor program establishes the program environment when it initializes the PSV and ACV in its fixed save area prior to giving the program control. The allocation of general register sets from the group of principal register sets and the dynamic address relocation facility allow the supervisor to define a distinct execution environment for the program. This environment is preserved automatically when the program's execution is interrupted and subsequently resumed. This capability permits fast response to requests for program execution. It also allows a single copy of a program to be associated with more than one priority level.

I/O Operations

I/O operations provide for information transfer between an I/O device and a general register or main storage. Programmed I/O (PIO) operations transfer a fixed amount of data to or from a general register; channel I/O (CHIO) operations transfer variable-length blocks of data to or from main storage.

Channel logic is associated with each PCE for the 8150B and with only PCE 0 for the 8140C.

Programmed I/O

An I/O instruction transfers a byte or halfword of data between an I/O device and a general register specified by the instruction. Two I/O instructions are provided for the transfer of a byte of data; a third I/O instruction transfers a halfword of data.

The I/O device is selected with an 8-bit address specified in the instruction. Each device is assigned a unique address. The addresses are called programmed I/O (PIO) addresses.

The I/O instruction also specifies the programmed I/O (PIO) command. A PIO command is an 8-bit code that identifies the operation that the device is to perform. In general, PIO commands are for specific devices. Four PIO commands are implemented by all devices:

- Reset Device
- Reset Basic Status Register under Mask
- Set Basic Status Register under Mask
- Read Basic Status Register

When an I/O instruction is executed, the PIO address and command are sent to the device across the channel data bus. The device whose address matches the address specified in the I/O instruction is selected for the data transfer operation. The command specifies the direction of data transfer and the operation to be performed by the selected devices. The PIO operation is completed when the data has been transferred to or from the selected device.

Channel I/O

Channel I/O (CHIO) operations provide for the transfer of variable-length blocks of data between some I/O devices and main storage. Certain control information can also be placed into register storage. Data is transferred to or from a logical address space assigned for the CHIO operation. The logical address space is assigned to a CHIO operation by the supervisor program. Logical address spaces are defined by an ACV that is paired with the channel pointer to be used during the CHIO operation. The channel pointer contains the logical address of the data to be transferred. The address may be placed in the channel pointer either by the program before the CHIO operation is initiated, or as part of the operation. There are 64 channel pointers defined in fixed locations in principal register sets; each channel pointer is paired with an ACV in a corresponding fixed location in an adjunct register set.

A channel control vector (CHCV) initiates a CHIO operation. The CHCV specifies the channel pointer to be used and the CHIO command to be executed. CHIO commands are executed by the channel and the I/O devices, and specify such operations as reading and writing.

Ordinarily, the program initiates a CHIO operation with a PIO instruction. However, depending on the device and type of operation, the CHIO operation can be initiated by the device asynchronous to program execution. The capability of a device to execute CHIO operations independently from program execution depends on the function of the device and is not described here.

CHIO Sequence

The program initiates a CHIO operation by issuing a PIO command to the I/O device. The device recognizes the command as a start-CHIO operation. The term *start CHIO* is the generic name for a class of device-specific commands. It is used here to denote any PIO command that causes the device to initiate and execute a CHIO operation.

The start-CHIO command may be an immediate-type command, where the accompanying data is ignored. Conversely, the command may specify a write operation, where the data provides control information, such as the CHCV, which the device uses in executing the CHIO operation.

Control information may also be supplied to the device by one or more PIO instructions which are executed before issuing the start-CHIO command. Alternatively, the CHIO operation may consist of writing control information to the device followed by the reading or writing of data. In this case, the distinction between control information and data is made at the I/O device; the channel treats the entire operation as a data transfer.

When the CHIO operation is initiated at the device, the device is set up to issue service requests to the channel, and the channel and device assume subsequent control of the operation. The device requests service from the channel whenever it is ready to send or receive a burst of information. When the channel grants service to the device, the device becomes logically connected to the channel and responds by transferring the CHCV to the channel. The channel decodes the CHCV, including the command code, fetches the storage address from the channel pointer designated in the CHCV, and initiates the reading or writing of the burst of information. The device maintains the data count of the burst, while the channel maintains and updates the storage address as information is transferred to or from main storage. At the end of each burst data transfer, the channel stores the updated channel pointer in its fixed location in register storage.

The CHIO operation may consist of one or more burst transfers. The number of bursts and the amount of information transferred during each burst depend on the device and the type of operation. The CHIO operation is ended when the last burst of the operation has been executed.

CHIO Request Priority

A variety of devices carry out CHIO operations, each requiring a different priority of service response from the channel. Unbuffered high-speed devices require an immediate response from the channel; buffered devices can permit some delay in response to a request for a CHIO burst transfer. Three levels of priority are defined for requests for CHIO burst transfers:

- Channel Request High
- Channel Request Medium
- Channel Request Low

Devices are physically attached to one of these request priorities at time of manufacture.

Programmable Priority Level Assignments

Except for the 8130, I/O devices are assigned to a specific priority level through programming. A unique PIO command permits the supervisor program to define the priority level with which a device is to be associated. The 8130 provides this facility through the System Expansion feature. Without this feature, I/O devices attached to the 8130 are permanently assigned to fixed priority levels. Specifically, the assignment of an I/O device to a priority level determines the priority level on which I/O interrupt requests are reported by that device. Multiple devices can be assigned to a single priority level.

One or more devices can present interrupt requests for a specific priority level. The 8140 and 8150 provide 16 sublevels for each priority level to identify the devices that are presenting interrupt requests for a priority level. This capability is also provided by the 8130 when the System Expansion feature is installed. The sublevel assignment provides a unique user-defined identification for each device assigned to a specific priority level. Only one device can be assigned to each sublevel; up to 16 devices can be assigned to a specific priority level.

The sublevel assignment for each device is made during execution of the PIO command that assigns the device to a specific priority level. A special PIO command is defined to read the sublevel assignments for the device or devices that are presenting interrupt requests for a specific priority level. The program can then process the requests in a user-defined order. The priority of each sublevel is thus determined by the order in which it is processed, rather than through a hardware-defined priority structure.

With multiple devices on a specific priority level, the programmable sublevel facility decreases program overhead by removing the need to "poll" each device for status when an interrupt request is received. Program design flexibility is enhanced through the ability to assign each device to a priority level and define its sublevel identification through programming.

Interrupt Control Element (ICE)

The 8140C and 8150B contain an Interrupt Control Element (ICE) that improves overall operating system performance when the processors are using dual mode. ICE appears as a PIO byte adapter that attaches to both PCEs, and can be accessed by programming from either PCE. It operates by interacting with both PCEs to interlock simultaneous PCE accesses while still maintaining sequential PIO command execution.

The ICE provides interruption capability between the PCEs. The operating system uses most of the PCE functions, such as controlling PCE information transfer with locks and master mask interlocks. Additional PCE functions are used during initialization, bringup, or error recovery.

Chapter 8. Input/Output Functions and Features

This chapter describes the input/output features and functions for the IBM 8100 Information System. Chapter 6, "Hardware Unit Capabilities," defines which option or feature may be selected for each unit in the system.

Direct Access Storage

Two types of direct access storage provide high-speed, high-capacity on-line storage for the 8100 Information System:

1. Processor disk drives containing nonremovable disks with disk storage capacities ranging from 23 and 123 million bytes, depending on processor model. With the addition of 8101 or 8102 Storage and I/O Units, the disk storage capacities are increased up to 128M bytes of storage for each 8101 and 259M bytes of storage for each 8102. Two 8101s or 8102s may be attached to an 8130A, three to an 8130B, four to an 8140, and eight to an 8150. The disk storage for an 8150 must be provided by an 8101 or 8102.

   Some processor models use disk drives with fixed heads for immediate access to predefined areas of the disk. Refer to Figures 6-1 through 6-5 for the specific disk storage features available in each model.

2. IBM Diskette 2D drive, which uses removable media (diskette) with a maximum storage capacity of 1 million bytes. This disk storage device reads or writes on IBM diskettes, type 1 or 2D. See Figure 8-1 for data transfer times. Two types of diskettes are available for use with the diskette 2D drive:

   - Type 1: Data on one side only. Maximum storage is 256K bytes.
   - Type 2D: Data on two sides. High-density recording. Maximum storage is 1 million bytes.

   The total amount of usable storage on any diskette depends on diskette type and the format selected for the diskette.

For more information about the 8100 System's direct access storage, see *IBM 8100 Information System: Direct Access Storage Device Description*, GA23-0053.

	Feature or Option	Track-to-Track Access 1	Seek Time 2	Average Rotational Delay 3	Data Rate (BPS)
Nonremovable Media (Disk)	Movable Heads	9 ms	27 ms	9.6 ms	1,043K
	Fixed Heads		0	9.6 ms	1,043K
Removable Media (Diskette)	Diskette 2D Drive Movable Heads	40 ms	225 ms	83.4 ms	62K (with Type 2D Diskette)

1 Track-to-Track Access = Time required to move the disk head to an adjacent track. This includes head load and settle time if applicable.

2 Seek Time = Time required to move the disk heads one-third way across the disk surface. This includes head load and settle time if applicable.

3 Average Rotational Delay = Time required to read half a track.

Figure 8-1. Average Data Transfer Time

Magnetic Tape Attachment

Up to four 8809 Magnetic Tape Units may be attached to an 8100 system. The first 8809 must be either a Model 1A or 1B, depending on which Magnetic Tape feature was selected for the 8101, 8102 or 8140 (B and C models). Figure 8-2 illustrates some examples of the following configurations:

(A) 8809 – 1A attached to an 8140 (B and C models). In this configuration, the 8140B and 8140C require a Magnetic Tape Attachment feature (4901).

(B) 8809 – 1A attached to either an 8130, 8140, or 8150 through an 8101 or 8102. In this configuration, the 8101 or 8102 requires a Magnetic Tape Attachment feature (4521).

(C) 8809 – 1B attached to either an 8130, 8140, or 8150.

For more information about the 8809 Magnetic Tape Unit, see *IBM 8809 Magnetic Tape Unit Installation Manual – Physical Planning*, GA32-0040.

Display and Printer Attachment

A Display and Printer Attachment allows certain displays and printers to be directly attached to specific 8100 system units via a single coaxial cable or a combination of coaxial cable and IBM Cabling System cable. With coaxial cable, the maximum cable length for each device attachment is 606m (2,000 ft). The maximum cable length using the combination of coaxial cable and IBM Cabling System Cable varies depending on how much of each type cable is used.

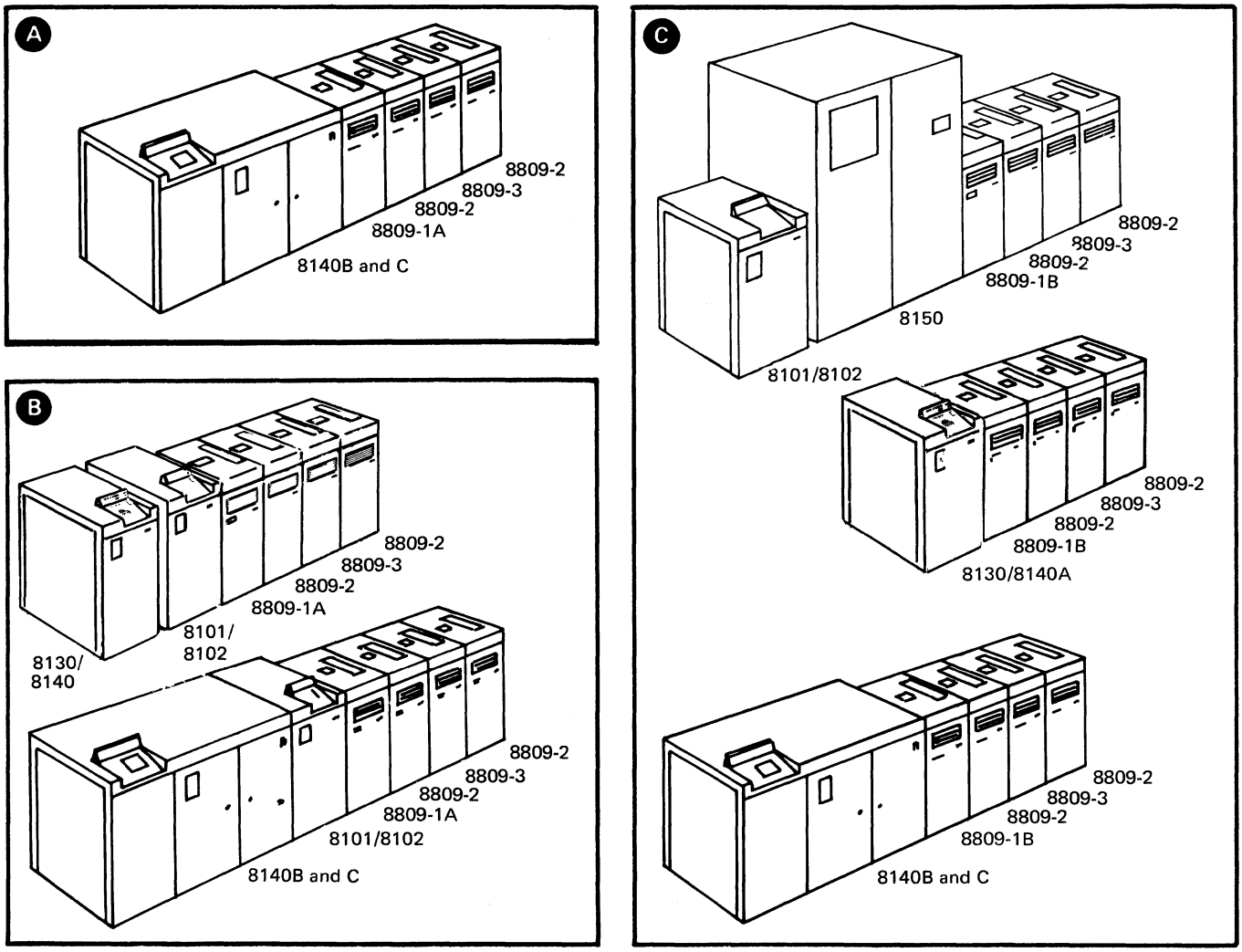


Figure 8-2. Examples of Magnetic Tape Attachment Configurations

The 8100 system units that can accommodate the Display and Printer Attachment feature are the 8101 and 8102 storage and I/O units, and the 8130B, 8140B, and 8140C processors. The IBM displays and printers that may be attached with this feature are:

- 3277 Display Station Models 1 and 2
- 3732 Text Display Station (not 8102)
- 6580 Displaywriter (not 8102)
- 3284 Printer Models 1 and 2
- 3286 Printer Models 1 and 2
- 3287 Printer Models 1 and 2
- 3288 Line Printer Model 2
- 3736 Printer (not 8102)

Four I/O devices can be attached to the first Display and Printer Attachment feature in an 8100 unit. The second and subsequent features, known as Display and Printer Additional features, can also take four I/O devices each. A maximum of six Display and Printer Attachment features can be selected for each 8100 unit for a maximum attachment of 24 I/O devices. Refer to "8101 and 8102 Storage and Input/Output Units" in Chapter 6 for additional details.

Note: Refer to Chapter 10 for more-detailed descriptions of the attachable I/O devices.

Operator Panels

Four types of operator panels are available for the 8100 Information System:

- 8130/8140 operator panel (Figure 8-3)
- 8140 expanded function operator panel (Figure 8-4) (not available on 8140C)
- 8150 operator panel (Figure 8-5)
- 8101 and 8102 operator panel (Figure 8-6)

These panels are mounted on the top front of each unit.

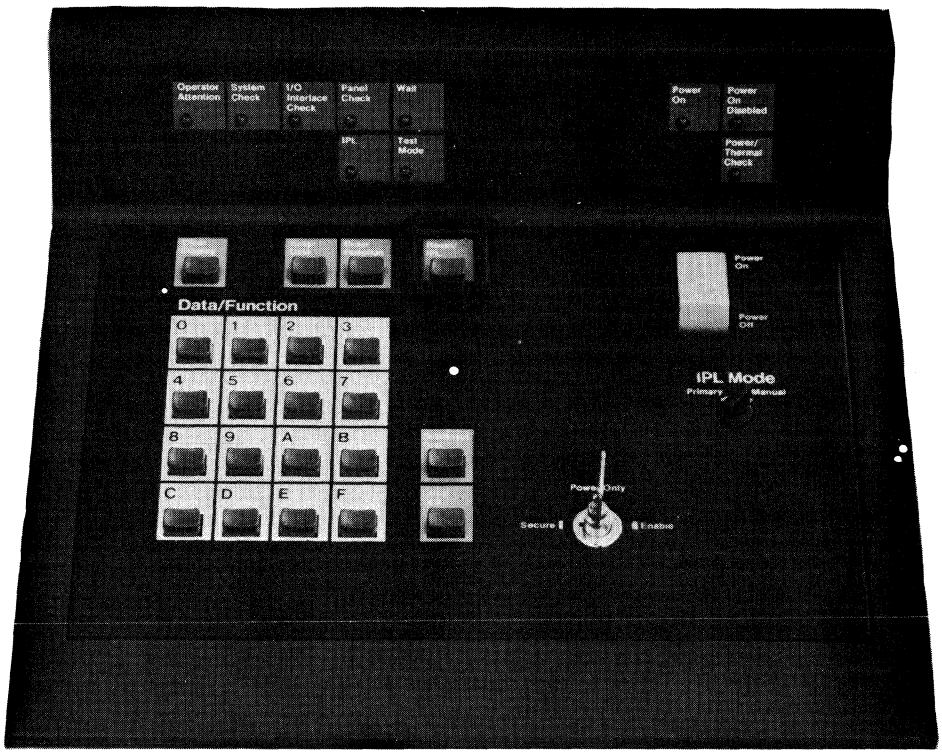


Figure 8-3. 8130/8140 Operator Panel with Features

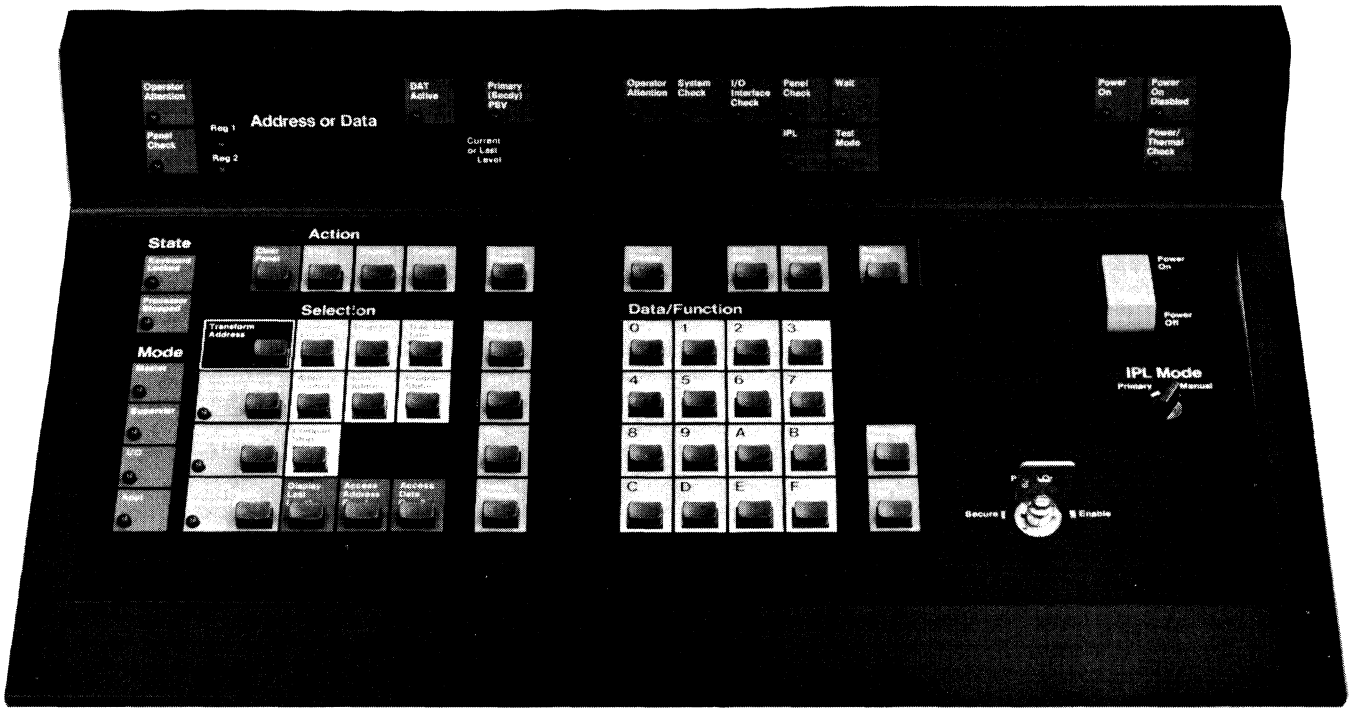


Figure 8-4. 8140 Expanded Function Operator Panel with Features Model A and B Only

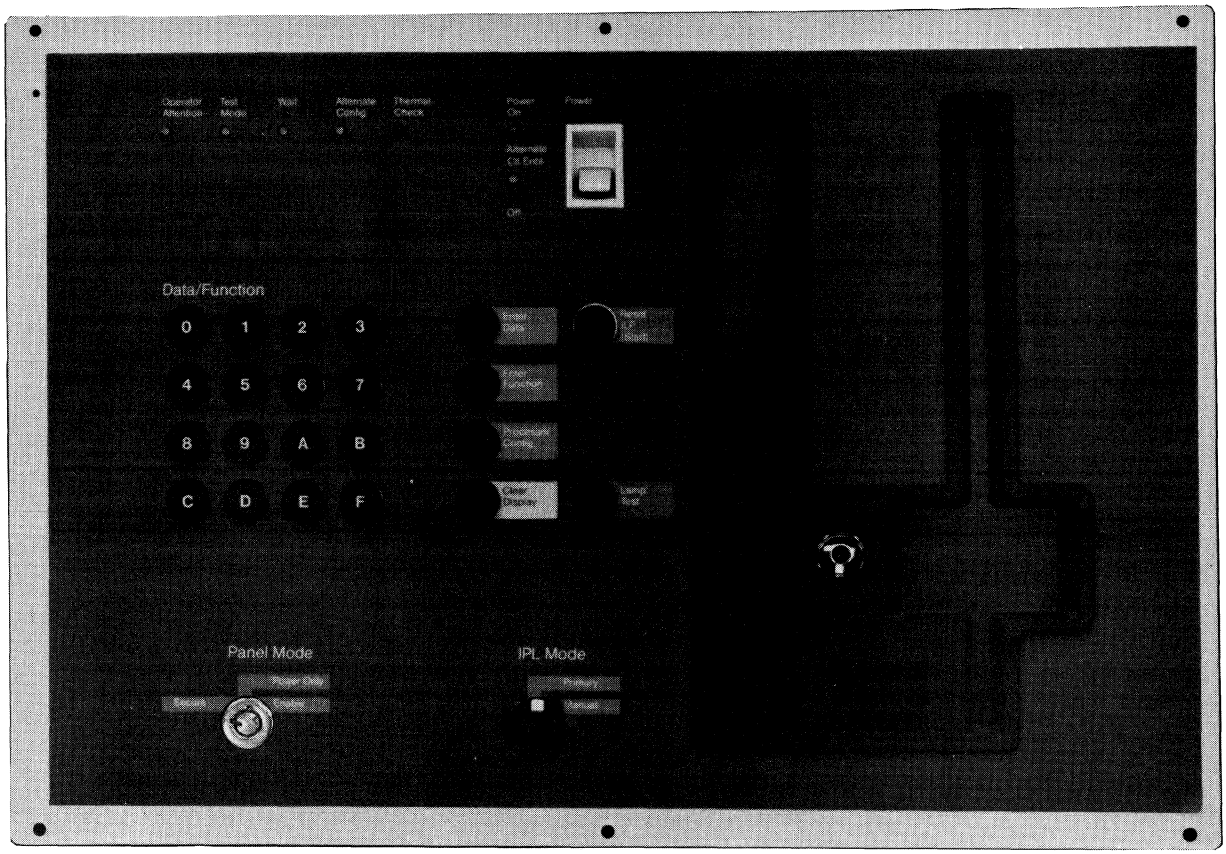


Figure 8-5. 8150 Operator Panel

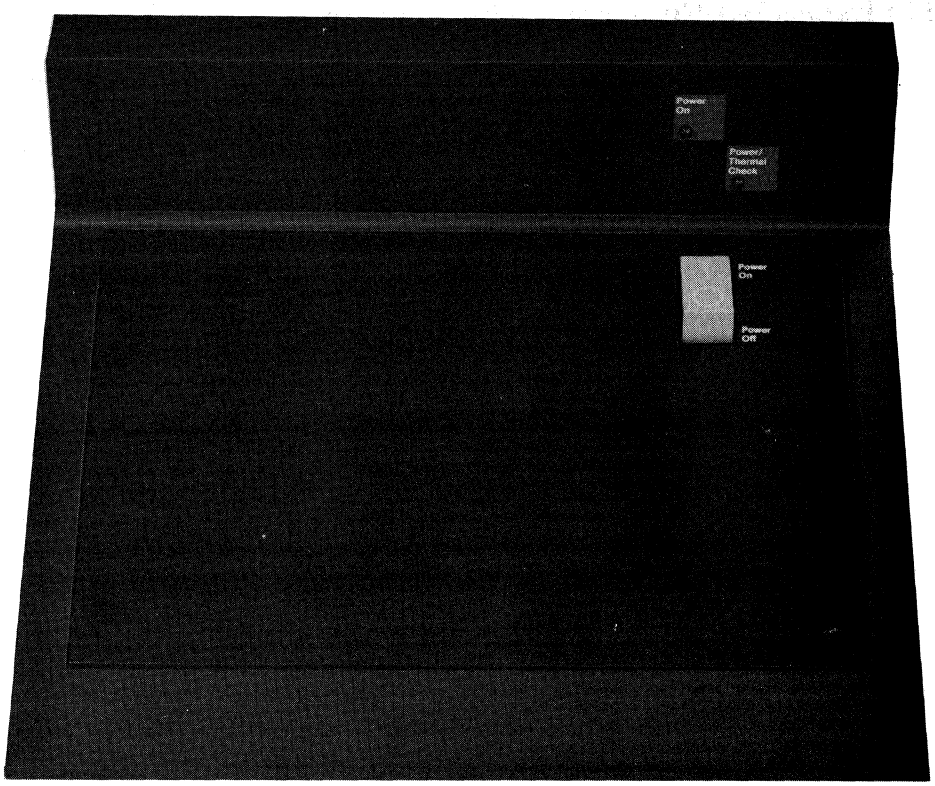


Figure 8-6. 8101 and 8102 Storage and Input/Output Units Operator Panel

8130/8140/8150 Operator Panel

This operator panel provides the means for:

- Entering data, functions, IPL parameters
- System reset/IPL
- Displaying system/diagnostic information in the basic panel display register
- Indicating power-system status
- Power on/off
- Power-control and panel-input security if the keylock feature is installed

8140 Expanded Function Operator Panel

The expanded function operator panel (EFP) feature is provided in addition to the 8140 operator panel as a program diagnostic aid. The EFP feature has all the functions of the 8140 operator panel plus the following functions:

- Read/Write Capability
  - Main storage
  - General registers
  - Translation table
  - Processor control information
  - Instruction address
  - Program status
- Additional functions
  - Translate logical address
  - Stop on address compare
  - Activate program
  - Instruction step
  - Start
  - Stop on system check
  - Stop
- Indicators
  - Panel register 1
  - Panel register 2
  - Current or last priority level with primary/secondary program status vector indications
  - Last priority level with primary/secondary program status vector indications
  - Program mode
  - Translation active
  - Processor state
  - Operator attention
  - Panel check
  - Data or Address Display

The EFP feature is not available on the 8140C.

For more information about the 8140 EFP panel, see *IBM 8100 Information System: 8140 Processor Expanded Function Operator Panel Feature Description*, GA27-2879.

Chapter 9. Communications Capabilities

The IBM 8100 Information System supports a wide variety of line protocols, line speeds, and communications facilities to meet requirements of price and performance in data communications. The 8100 system supports synchronous data link control (SDLC) and binary synchronous communications (BSC) protocols over both conventional analog and digital transmission facilities. Start-stop (SS) is also supported over the conventional analog facility. The alternatives for data communication between remote processors and for data communication between processors and remote devices are shown in Figure 9-1. For a detailed description of the 8100 System's communications capabilities, see *IBM 8100 Information System: Communications, Loop, and Display/Printer Attachment Description*, GA27-2883.

Each communications attachment feature controls one loop or data link or one "direct connection" to an I/O unit that is a limited distance from the 8100 system.

Note: The SDLC communications attachment feature which supports the SDLC protocol can be used with a loop adapter to control a directly attached loop instead of a data link. Refer to "Loop Attachments" later in this chapter.

Data Link Attachments

Synchronous Data Link Control (SDLC)

The SDLC communications attachment feature can connect to analog networks, digital networks, or direct connections. Analog network speeds range from 600 to 56,000 bps, digital network speeds range from 2400 to 56,000 bps, and direct connection speeds range from 600 to 56,000 bps.

The maximum distance for direct connection through an EIA RS-232-C interface is 12.2 m (40 ft). The maximum distance for direct connection through a V.35 interface is 304.8 m (1000 ft). The maximum V.35 direct connection to a host is 61 m (200 ft) via a 3705 Communications Controller or 150 m (492 ft) via a 3725 Communication Controller.

Note: The 8100 Information System communicates with data-link-attached loops through an SDLC communications attachment feature. Refer to "Loop Attachments" later in this chapter.

The 8100 Information System can use the SDLC communications attachment feature to communicate with a System/370 or 4300 host through the 3704/3705/3725 communications controllers or Integrated Communications Adapter with line speeds up to 56,000 bits per second or with other 8100 Information Systems.

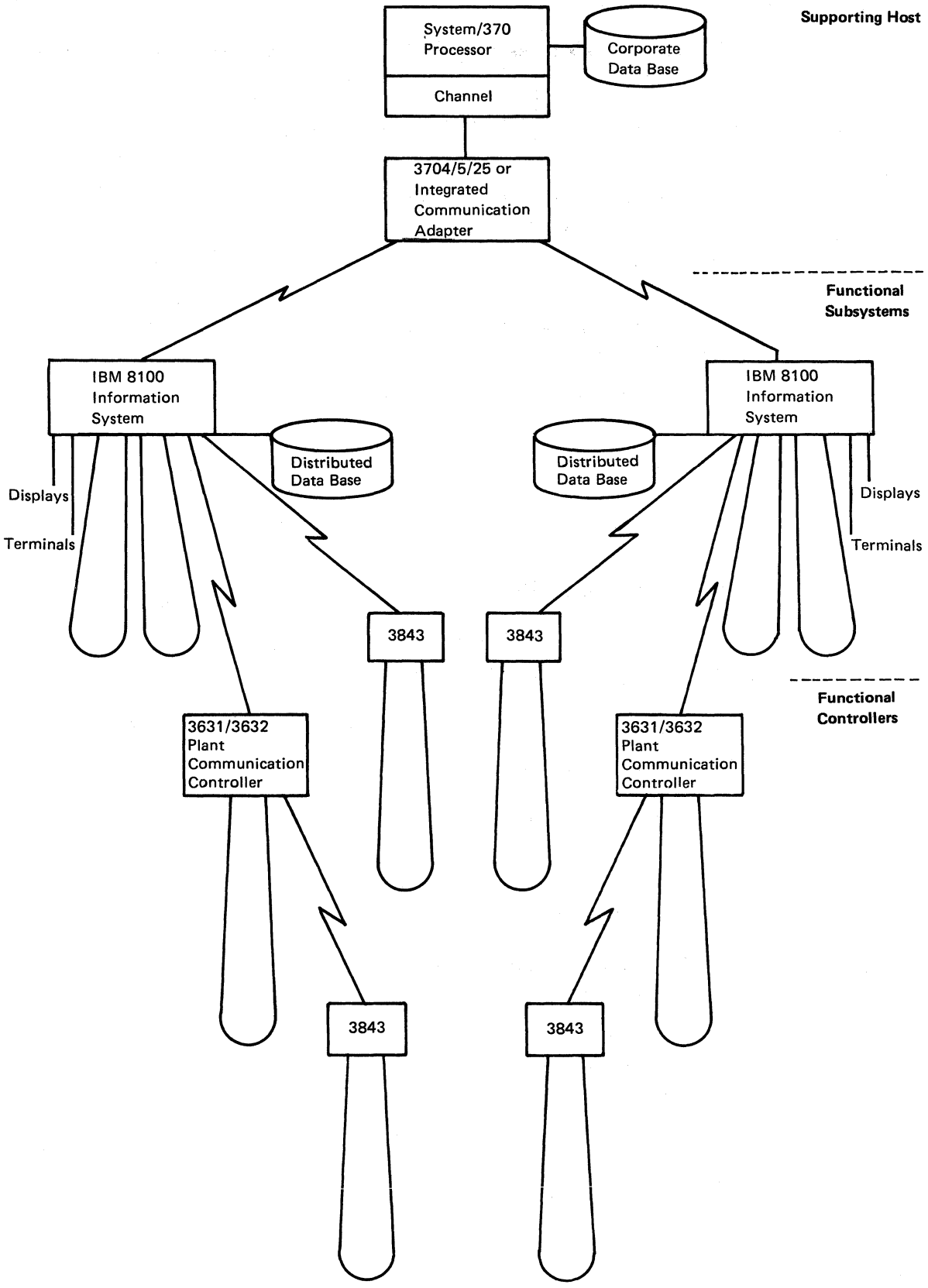


Figure 9-1. Distributed Systems Network

SDLC supports six types of ports (Figure 9-2). The EIA/CCITT port itself supports both analog and digital networks, as follows:

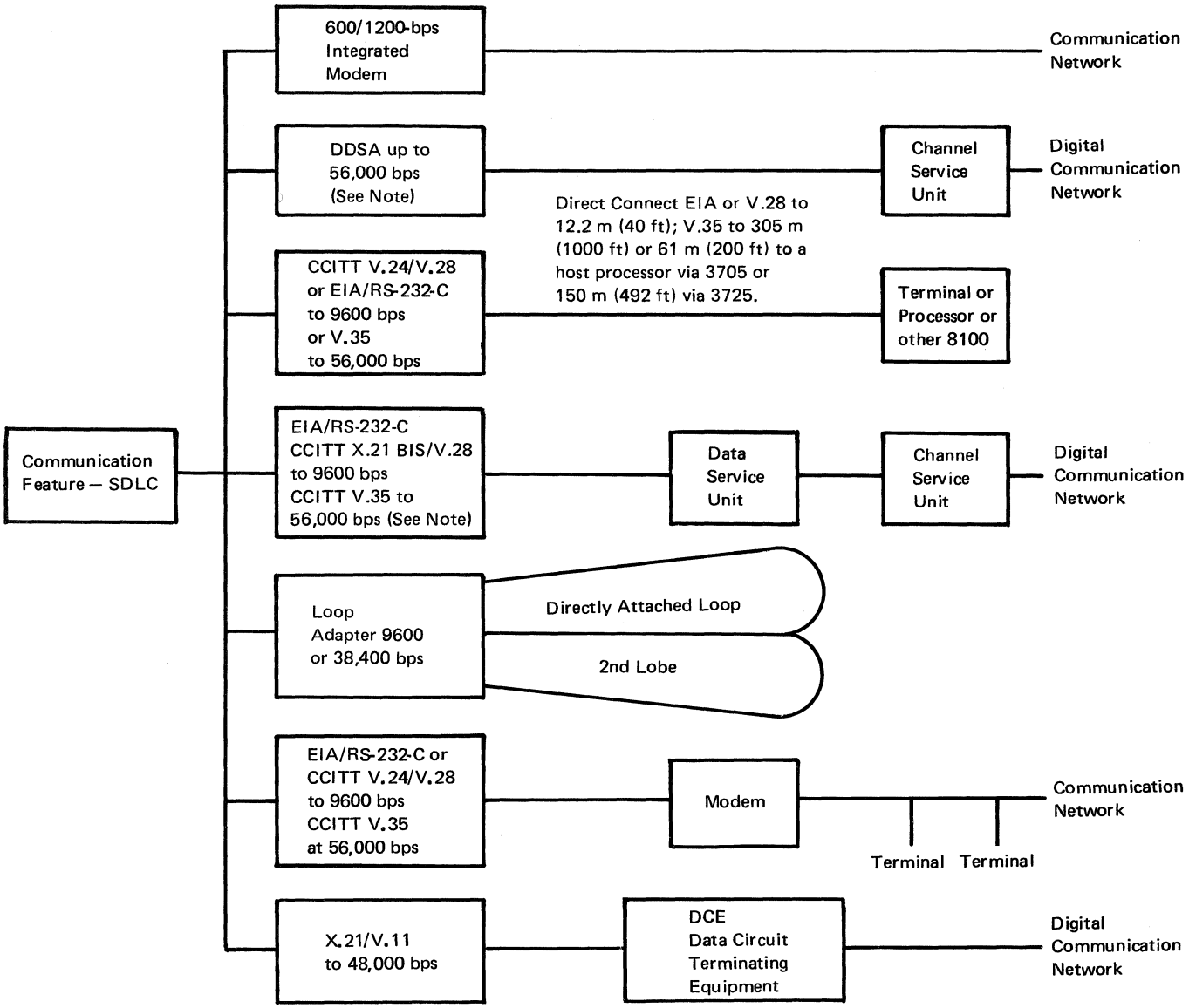
- EIA RS-232-C/CCITT V.24/V.28, CCITT X.21 bis/V.28
  - Digital network
  - Analog network
  - Direct connect
- Loop adapter (1 or 2 lobes)
- 1200-bps integrated modem (available on 8130B, 8140C or on 8150 only via attached 8101)
- Digital Data Service Adapter (DDSA) (available on 8130B, 8140C or on 8150 only via attached 8101)
- CCITT V.35 direct connect, external modem, or digital network
- X.21 Adapter for Switched/Nonswitched Networks

Binary Synchronous Communications (BSC)

The BSC Communications Feature can connect to analog networks and digital networks, or by direct connection. Analog network speeds range from 600 to 9600 bps, digital network speeds range from 2400 to 9600 bps, and direct connection speeds range from 600 to 9600 bps. See Figure 9-3.

BSC supports three types of ports:

- EIA RS-232-C/CCITT V.24/V.28
  - Digital network
  - Analog network
  - Direct connect
- 1200-bps integrated modem (available on 8130B, 8140C or on 8150 only via attached 8101)
- Digital Data Service Adapter (DDSA) (available on 8130B, 8140C or on 8150 only via attached 8101)



Note: *The 56,000-bps data link is from an 8130B, 8140, or 8150 to System/370, 4300 or to another 8130B, 8140, or 8150.*

Figure 9-2. Synchronous Data Link Control (SDLC) Communications

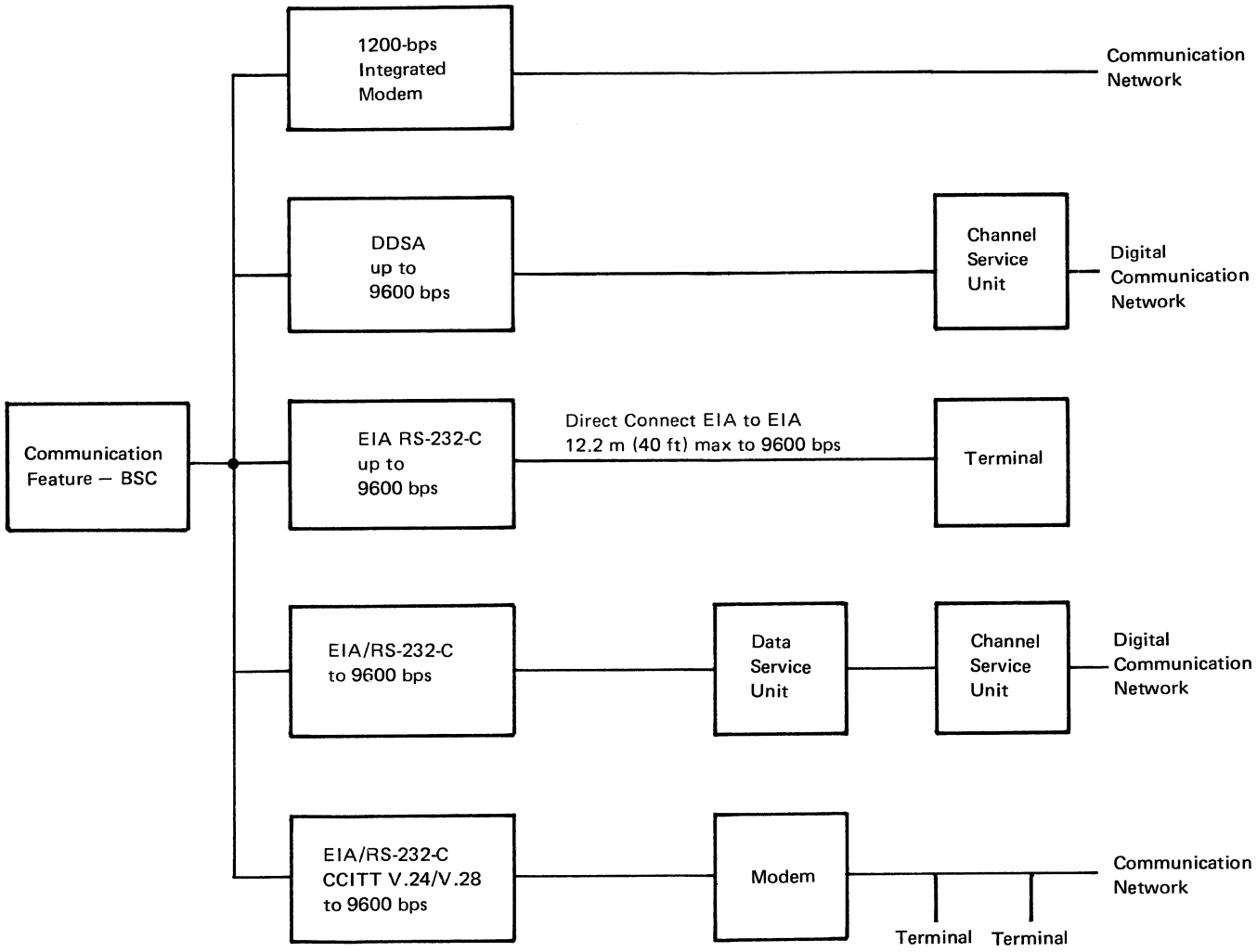


Figure 9-3. Binary Synchronous Communications

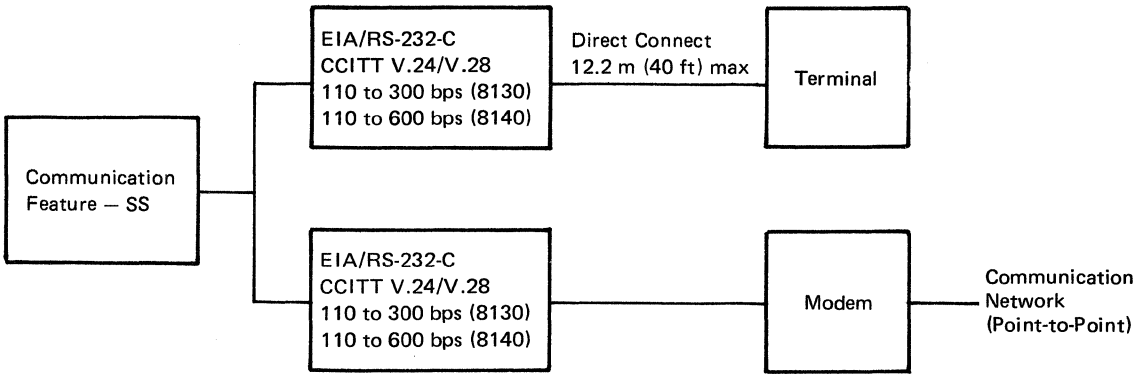
Start-Stop (SS)

The SS communications attachment feature can connect to analog networks or by direct connection. This feature is available for the 8140C or 8150 only via an attached 8101. Analog network speeds and direct connection speeds range from 110 to 300 bps for the 8130, and from 110 to 600 bps for the 8140. See Figure 9-4.

SS direct connection is through an EIA RS-232-C interface. Maximum distance is 12.2 meters (40 ft).

The 8100 Information System can use the SS communications adapter to communicate with the 2741 Communications Terminal and devices like those using the teletypewriter equipment (TTY) 33/35 line protocol.

SS supports one type of port (EIA RS-232-C/CCITT V.24/V.28) and two types of networks - analog network and direct connect.



Note: *All speeds given are maximum speeds.*

Figure 9-4. Start-Stop Communications

Loop Attachments

A loop consists of cable and accessories that allow multiple I/O units to be connected to a common cabling system. Cabling for the loop — both indoor and outdoor — is a shielded, twisted pair cable. The accessories include various types of connection boxes for connecting I/O units to the loop.

Customers can choose between two sets of components for wiring loops:

- Multiuse Communication Loop components
- IBM Cabling System components

In both cases, the loop components are cables and the accessories that attach devices to the cable and that route the signal path to the attached devices. The cabling system components are recommended for loops being installed in new or remodeled buildings.

The loop can be directly attached or data-link-attached to an 8100 Information System. A directly attached loop operates at 9600 or 38,400 bps; a data-link-attached loop operates at 2400, 4800, or 9600 bps.

Note: The loop speed selected depends on the capabilities of the attached devices and system requirements.

Input/output units that can be attached to a directly attached loop can also be attached to a data-link-attached loop. All devices attached to a given loop must operate at the same loop speed. To simplify single terminal loop operation, IBM makes a Single Device Attachment Cable Assembly.

Both directly attached and data-link-attached loops can be used with all processors and with the 8101 Storage and I/O Unit.

Besides being capable of attaching a wide variety of I/O units, the loop is designed for quick problem determination and error recovery. For example:

- For loops wired with Multiuse Communication Loop components, a wrap capability in two of the connection boxes - the loop station connector (LSC) and loop wiring concentrator (LWC) - lets users create an alternate signal path to bypass a failure on the loop. This bypass capability in the LWC allows users to remove a faulty I/O unit or cable from the loop while allowing the remainder of the loop to operate normally.

- With loops wired with IBM Cabling System components, the user can isolate faults by methodically unplugging cables terminated with snap-in snap-out connectors from an LWC to isolate the exact connection box, cable, or device that is faulty.

The loop configuration permits users to relocate devices on the loop without recabling or reprogramming.

Directly Attached Loop

For a directly attached loop, a controlling unit requires an SDLC communications feature and a loop adapter feature. In addition, a directly attached loop can have a second lobe if the second lobe feature is installed for that loop. A lobe is a portion of a loop that has a driver at one end of the lobe and a receiver at the other end of the lobe, neither of which is in an I/O unit.

Multiple lobes are recommended for increased I/O device availability during cabling alterations or failures, simpler installation planning and control, and greater loop cabling distance. A malfunction on one lobe can be bypassed, keeping other lobes operational. For details, refer to the *IBM Multiuse Communication Loop Planning and Installation Guide*, GA27-3341.

Data-Link-Attached Loop

A data-link-attached loop requires an SDLC communications feature with a modem at both the 8100 system and the remote site, as well as a 3843 Loop Control Unit, to interface the data link to the data-link-attached loop. The 3843 requires a modem and runs at the speed of the attached modem, up to 9600 bps. The second lobe feature is not available on a data-link-attached loop.

Chapter 10. Attachable IBM Devices

This chapter lists and then briefly describes IBM devices that may be attached to the IBM 8100 Information System. For further information on which IBM-licensed program supports each device, refer to the DPPX/SP, DPPX, or DPCX *General Information* manuals.

Note: The devices are listed in a format to show the way printers, display stations, and other types of devices are attached to the 8100 Information System. For example, the 3278 Display Station is indented below the 3274 Control Unit because the 3278 attaches to the 8100 system through the 3274.

IBM 2741 Communication Terminal

IBM 3101 Display Terminal Models 10, 12, 13, 20, 23

IBM 3104 Display Terminal Models B1, B2

IBM 3262 Printer Models 2, 12

IBM 3268 Printer Model 1

IBM 3274 Control Unit Models 41C, 51C, 61C

- IBM 3178 Display Station
- IBM 3179 Color Display Station
- IBM 3180 Display Station Model 1
- IBM 3262 Printer Models 3, 13
- IBM 3268 Printer Model 1,2
- IBM 3270 Personal Computer
- IBM 3278 Display Station Models 1—5
- IBM 3278 Display Station, PC Attachment
- IBM 3279 Color Display Station Models 2A, 2B, 3A, 3B, 2X, 3X
- IBM 3279 Color Display Station, PC Attachment
- IBM 3287 Printer Models 1, 1C, 2, 2C
- IBM 3289 Line Printer Models 1, 2
- IBM 3290 Information Panel Display Station
- IBM 5210 Printer Models G1, G2
- IBM 6580 Displaywriter w/3270 attached work station

IBM 3274 Control Unit Model 52C

- IBM 3178 Display Station
- IBM 3268 Printer Model 2
- IBM 3278 Display Station Models 1, 2, 52
- IBM 3283 Printer Model 52
- IBM 3287 Printer Models 1, 2

IBM 3276 Control Unit Display Station Models 1—4, 11—14

- IBM 3178 Display Station
- IBM 3179 Color Display Station
- IBM 3180 Display Station Model 1
- IBM 3262 Printer Model 13
- IBM 3268 Printer Model 2
- IBM 3270 Personal Computer
- IBM 3278 Display Station Models 1—5
- IBM 3278 Display Station, PC Attachment
- IBM 3279 Color Display Station Models 2A, 3A, 2X, 3X, (2B, 3B base color only)
- IBM 3279 Color Display Station, PC Attachment
- IBM 3287 Printer Models 1, 1C, 2, 2C
- IBM 3289 Line Printer Models 1, 2
- IBM 5210 Printer Models G1, G2
- IBM 6580 Displaywriter w/3270 attached work station

IBM 3277 Display Station Models 1, 2

IBM 3284 Printer Models 1, 2

IBM 3286 Printer Models 1, 2

IBM 3287 Printer Models 1, 2, 11, 12

IBM 3288 Line Printer Model 2

IBM 3289 Line Printer Model 3

- IBM 3782 Card Attachment Unit Model 1
  - IBM 3521 Card Punch
- IBM 3782 Card Attachment Unit Model 2
  - IBM 2502 Card Reader Model A1
- IBM 3501 Card Reader

IBM 3600 Finance Communication System

- IBM 3601 Models 1, 2A, 2B, 3A, 3B
- IBM 3602 Models 1A, 1B

IBM 3630 Plant Communication System

- IBM 3631 Plant Communication Controller Models 1A, 1B
- IBM 3632 Plant Communication Controller Models 1A, 1B

IBM Plant Communication Devices

- IBM 3641 Reporting Terminal Models 1, 2
- IBM 3642 Encoder Printer Models 1, 2
- IBM 3643 Keyboard Display Models 2, 3, 4
- IBM 3644 Automatic Data Unit (ADU) Model 1
- IBM 3645 Printer

IBM 3646 Scanner Control Unit
IBM Magnetic Hand Scanner, PN 4123495
IBM Magnetic Slot Reader, PN 4123500
IBM Dual Entry Magnetic Slot Reader, PN 4123520
IBM 3647 Time and Attendance Terminal

IBM 3650 Programmable Store System

IBM 3651 Store Controller Models 25, 75

IBM 3680 Programmable Store System

IBM 3684 Point of Sale Control Unit Models 1, 2

IBM 3732 Text Display Station

IBM 3736 Printer

IBM 3750 Switching System

IBM 3767 Communication Terminal Models 1, 2, 3

IBM 3776 Communication Terminal

IBM 3842 Loop Control Unit

IBM 3843 Loop Control Unit, 2400, 4800, 9600 bps (External Modem)

IBM 3863 Modem

IBM 3864 Modem

IBM 3865 Modem

IBM 3872 Modem

IBM 3874 Modem

IBM 3875 Modem

IBM 3976 Modem Models 1, 3

IBM 4701 Finance Communication Controller Models 1, 2

IBM 3262 Line Printer Models 3,13
IBM 3278 Display Station Model 2
IBM 3279 Color Display Station Models 2A, 2B, 2X
IBM 3287 Printer Models 1, 2

IBM Series/1

IBM 4952 Processor
IBM 4954 Processor
IBM 4955 Processor
IBM 4959 Processor

IBM 5150 Personal Computer

IBM 5160 Personal Computer

IBM 5210 Printer Models E1, E2

IBM 5285 Programmable Data Station

IBM 5288 Programmable Data Station

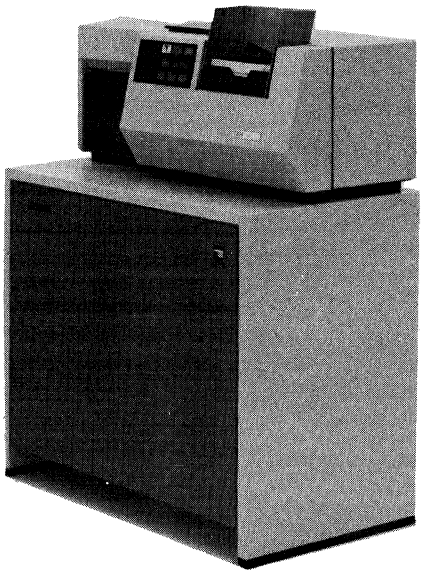
IBM 6580 Displaywriter System

IBM 6670 Information Distributor

IBM 8775 Display Terminal Models 1, 2, 11, 12

IBM 8809 Magnetic Tape Unit Models 1A, 1B, 2, 3

IBM 2502 Card Reader with IBM 3782 Card Attachment Unit



The IBM 2502 Card Reader reads 80-column cards at speeds up to 150 cards per minute (Model A1). Two special features permit the 2502 to electronically read either 51- or 80-column cards interchangeably or 66- or 80-column cards interchangeably. The operator can easily change the machine to read either standard 80-column cards or the shorter-length cards. Both shorter cards cannot be read by the same machine, however.

The 2502 attaches to the 3289-3 Line Printer via the 3782 Model 2 Card Attachment Unit. Only one card reader can be attached to the 3289 Model 3 Line Printer.

IBM 2741 Communication Terminal

The IBM 2741 Communication Terminal is a modified SELECTRIC ® typewriter that can operate as a remote conversational terminal. The 2741 can be used for on-line scientific computation, on-line computer programming, or text handling, depending on the program used by the 8100 system with which it is associated.

The 2741 is available in E/ME/A countries only. It attaches to the 8100 Information System through a start-stop communications capability.

IBM 3101 Display Terminal

The IBM 3101 Display Terminal is a table-top CRT keyboard display terminal capable of displaying 24 lines of 80 characters each. The 87-character keyboard has alphabetic, numeric, special character, and function keys.

The 3101 can be attached to the 8100 system through a start-stop interface for direct connection or data-link attachment.

An output device such as a 3102 Printer can be attached to the 3101.

The 3101 is designated as a customer setup device.

IBM 3104 Display Terminal

The IBM 3104 Display Terminal consists of a display unit and its attached keyboard. The 3104 is available in two models: B1 and B2. Model B1 uses a 75-key data entry type keyboard, a 76-key data entry type keyboard, or a 76-key Japanese Katakana data entry type keyboard. Model B2 uses an 87-key typewriter type keyboard on an 88-key Japanese Katakana typewriter type keyboard. Both models offer a maximum screen capacity of 1920 characters.

The 3104 communicates with the 8100 system using synchronous data link control (SDLC) over either a directly attached or data-link-attached loop.

The 3104 is designated as a customer setup device.

IBM 3178 Display Station

The IBM 3178 Display Station displays up to 1920 characters on its screen and has either a 75-key data-entry keyboard or an 87-key typewriter keyboard.

Models C1 and C2 attach to the 8100 system via a 3274 Control Unit or a 3276 Control Unit Display Station.

The 3178 is designated as a customer setup device.

IBM 3179 Color Display Station

The 3179 Color Display Station is a 14-inch cathode-ray tube that displays up to 1,920 characters.

In base color operation, data fields can be displayed in four colors. In extended color operation, data can be displayed in seven colors.

The 3179 attaches to the 8100 system via the 3274 Control Unit or the 3276 Control Unit Display Station. It is designated a customer setup device.

IBM 3180 Display Station Model 1

The 3180 Display Station Model 1 lets users choose multiple screen formats and reconfigure the keys on the keyboard.

Users can select four screen formats on the monochrome display, with either 1,920, 2,560, 3,440, or 3,564 alphanumeric characters. The display screen tilts, rotates, and elevates.

The keyboard has 122 removable keys (124 keys for Japanese Katakana) that the user can move about on the keyboard to meet individual needs.

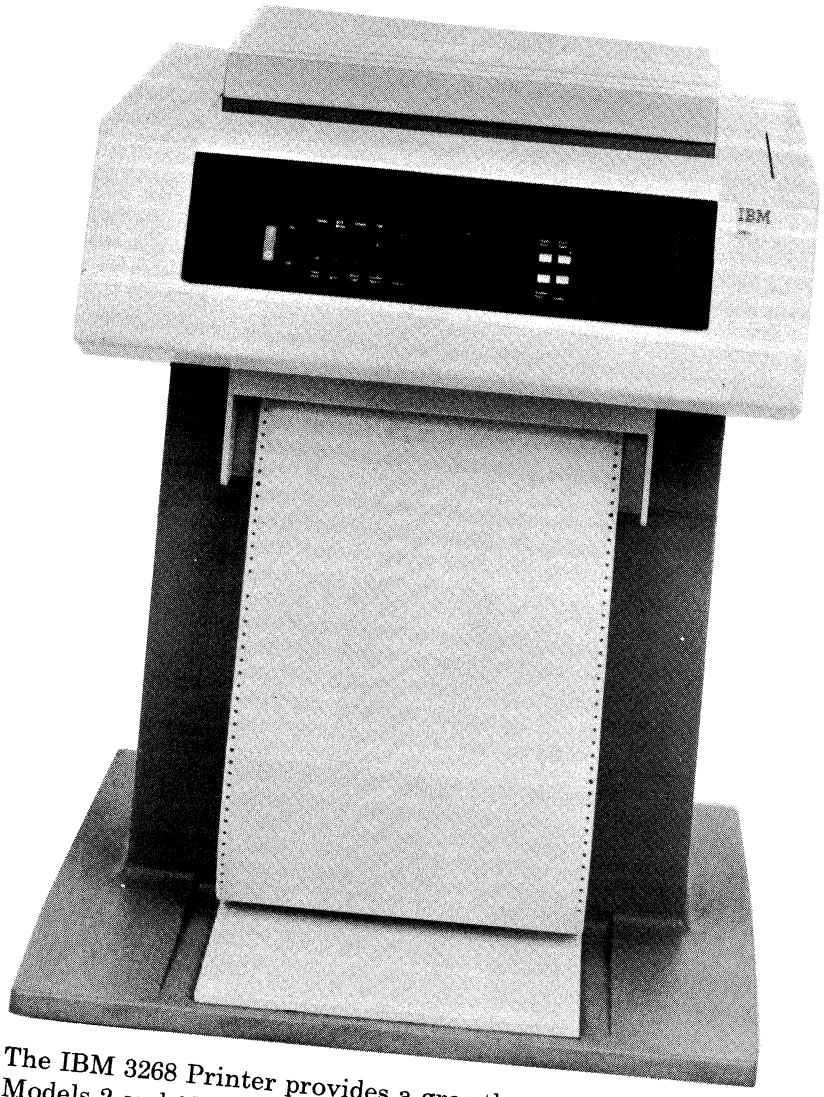
The 3180 attaches to the 8100 system via the 3274 Control Unit and the 3276 Control Unit Display Station. It is designated a customer setup device.

IBM 3262 Line Printer

The IBM 3262 Line Printer is a medium-speed line printer featuring operator-interchangeable print bands. It is available in four models: 2, 12, 3, and 13. Models 2 and 12 can attach to the 8100 system through a directly attached loop or through a data-link-attached loop. Model 3 is attached through the 3274-51C Control Unit. Model 13 is attached either through the 3274-51C or through the 3276 Control Unit Display Station.

The 3262 is designated as a customer setup device.

IBM 3268 Printer



The IBM 3268 Printer provides a growth path for users of the 3262 Printer Models 2 and 12; it prints faster (340 characters per second) and has a broader range of standard functions.

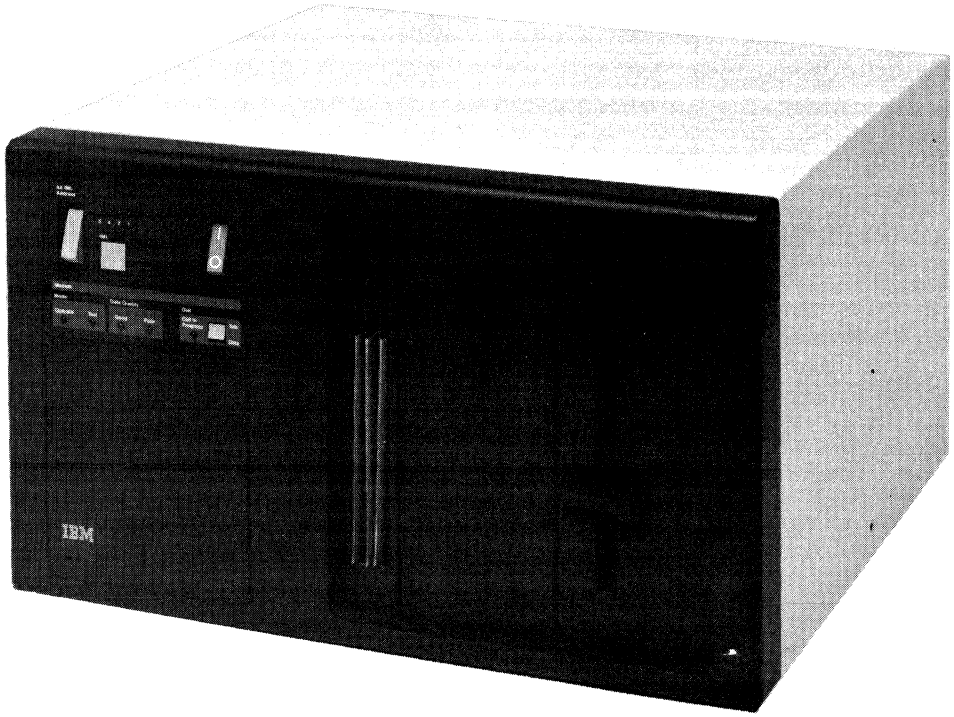
The 3268 Model 1 attaches to the IBM 8100 Information System through directly attached or data-link-attached loops. The 3268 Model 2 attaches to the IBM 3270 Information Display System through a 3274 Control Unit or a 3276 Control Unit Display Station.

IBM 3270 Personal Computer

The IBM 3270 Personal Computer allows users to display as many as seven sessions or "windows" at once to view, interrelate, and analyze data. Up to four 3270 host sessions, two notepad sessions, and one personal computer session can be displayed at one time. A notepad session allows users to jot down on-line notes while working in one of the other sessions. The user operates in one session at a time, moving from one session to another by simply pressing a key.

The 3270 PC attaches to the 8100 Information System via the 3274 Control Unit and 3276 Control Unit Display Station.

IBM 3274 Control Unit



The IBM 3274 Control Unit is a cluster control unit that comes in four models: 41C, 51C, 52C, and 61C. The maximum numbers of terminals that can be attached to each model are as follows:

Model	Terminals (Max)
41C	32
51C	8
52C	8
61C	16

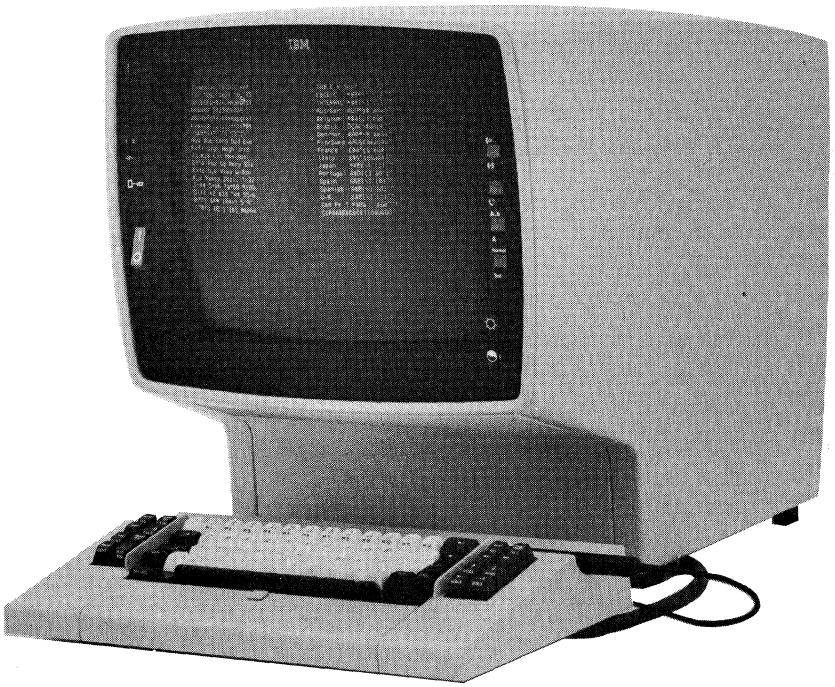
Model 52C provides the capability of handling Kanji/Chinese as well as EBCDIC characters.

The 3274 uses SDLC to attach to the 8100 system in any of the following ways:

- Through a directly attached loop at data rates of 9600 bps or 38,400 bps (except Model 41C).
- Through a data-link attached loop at data rates of 9600 bps, 4800 bps, or 2400 bps (except Model 41C).
- Through data-link and direct-connect communications attachment at data rates up to 56,000 bps.

The 3274 is designated as a customer setup device.

IBM 3276 Control Unit Display Station

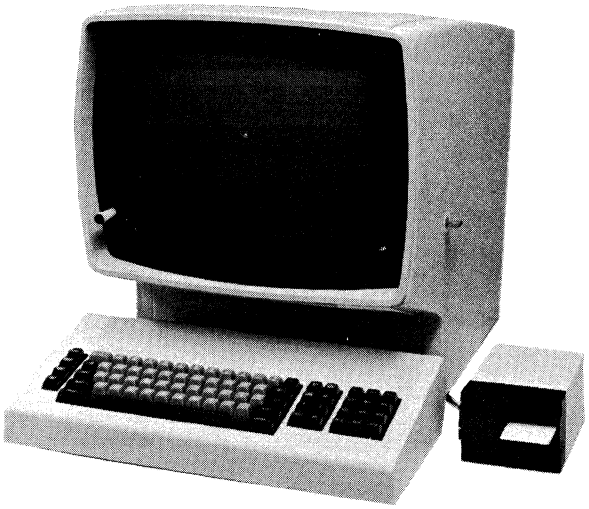


The IBM 3276 Control Unit Display Station is a cluster control unit able to control up to seven display stations and printers (as well as the display station that is part of the 3276) for remote-data half-duplex communications, or for attachment to the data-link-attached loop or directly attached loop.

The 3276 can have display sizes of up to 3440 characters per screen, depending on which model is selected.

The 3276 is designated as a customer setup device.

IBM 3277 Display Station Models 1 and 2

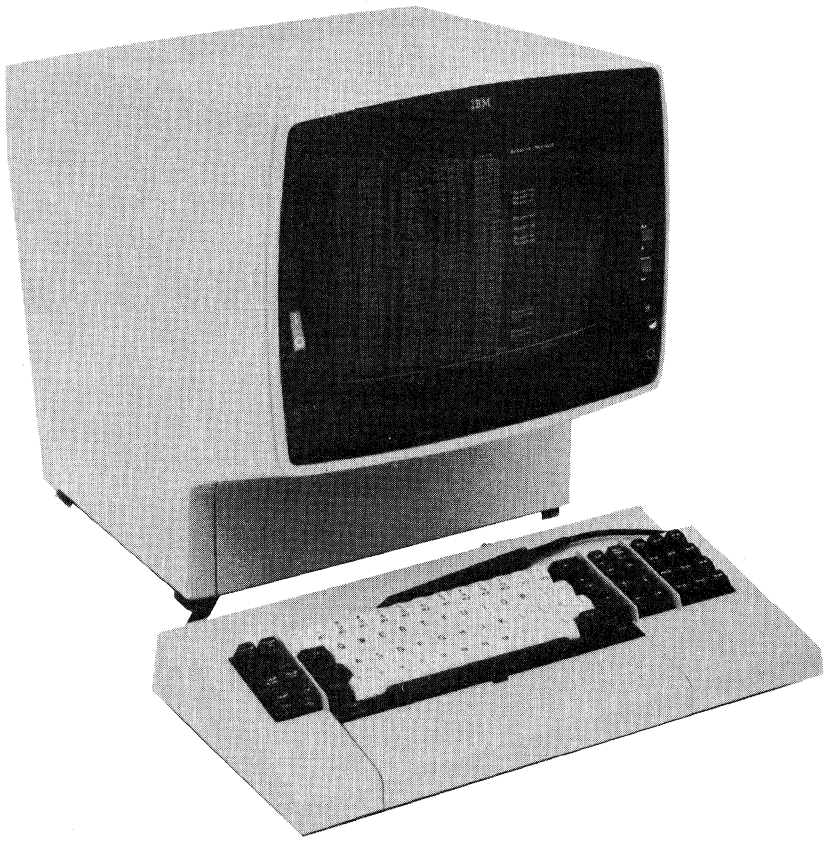


IBM 3277 Display Station displays alphameric data and enters data into and retrieves data from the 8100 system. The 3277 permits an operator to use the keyboard or light pen, or both, to display and manipulate data on the CRT screen.

The 3277 is available in two models: Model 1 displays up to 480 characters in 12 lines of up to 40 characters per line; Model 2 displays up to 1920 characters in 24 lines of up to 80 characters per line. The character set includes 36 alphameric and 27 special characters. A choice of keyboards, a selector light pen, and a set of program function keys provide input flexibility. Output flexibility is enhanced because information on the screen can be directed to another display or to a 3284, 3286, 3287, or 3288 Printer.

The 3277 is attached to the 8100 Information System via the Display and Printer Attachment feature in the 8101, 8102, 8130 B models, and 8140 B and C models.

IBM 3278 Display Station



The IBM 3278 Display Station is available with display sizes of up to 3564 characters per screen.

The 3278 (Models 1 – 4) attaches to the 8100 Information System through the 3276 Control Unit Display Station. Models 1 through 5 attach through the 3274 Control Unit Models 41C, 51C, and 61C. When attached through the 3274 Control Unit, with the appropriate features, the 3278 can optionally provide the capability for extended character and field highlighting (reverse video, underscore, and blink).

The 3278 Model 52 attaches through the 3274 Model 52C and provides for the use of Kanji/Chinese characters. The keyboard for the 3278 Model 52 is a 254-key Kanji keyboard. 3278 Models 1 and 2 may also be attached to the 8100 system via the 3274 Model 52C.

The 3278 is designated as a customer setup device.

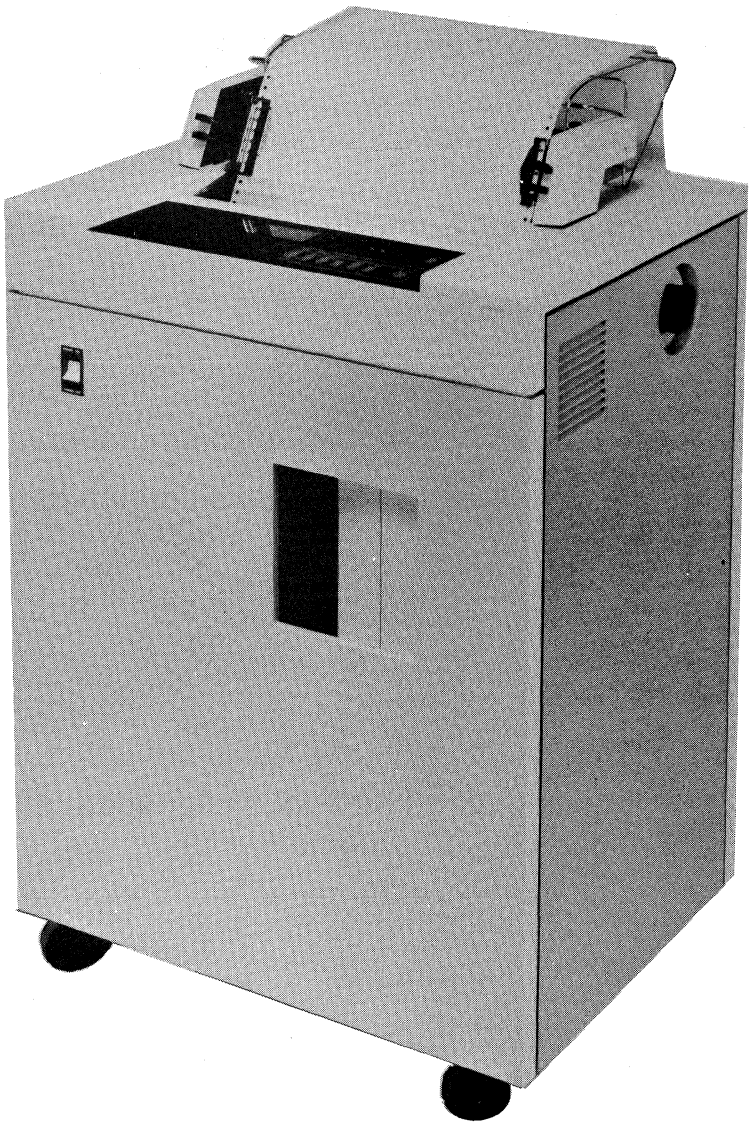
IBM 3279 Color Display Station

The IBM 3279 Color Display Station is high-quality color display. The 3279 is available in four models: two basic color and two extended color models. All models will operate in the base color mode, and Models 2B and 3B also provide APL/TEXT when attached to a 3276 Control Unit Display Station via the appropriate terminal adapters. The 3279 cannot be attached to 3276 Models 1 – 4 in the 8100 system. When attached to 3276 Models 11 – 14, 3279 Models 2B and 3B operate in base color mode, and also display the APL/Text character set.

When attached through the 3274 Control Unit Models 41C, 51C, and 61C, the 3279 can operate in the extended color mode. When attached in this way, the 3279 also offers APL/Text, extended highlighting (reverse video, underscore, and blink), and optional programmed symbols (six sets of programmed symbols allow symbols and shapes to be displayed).

The 3279 is designated as a customer setup device.

IBM 3283 Printer

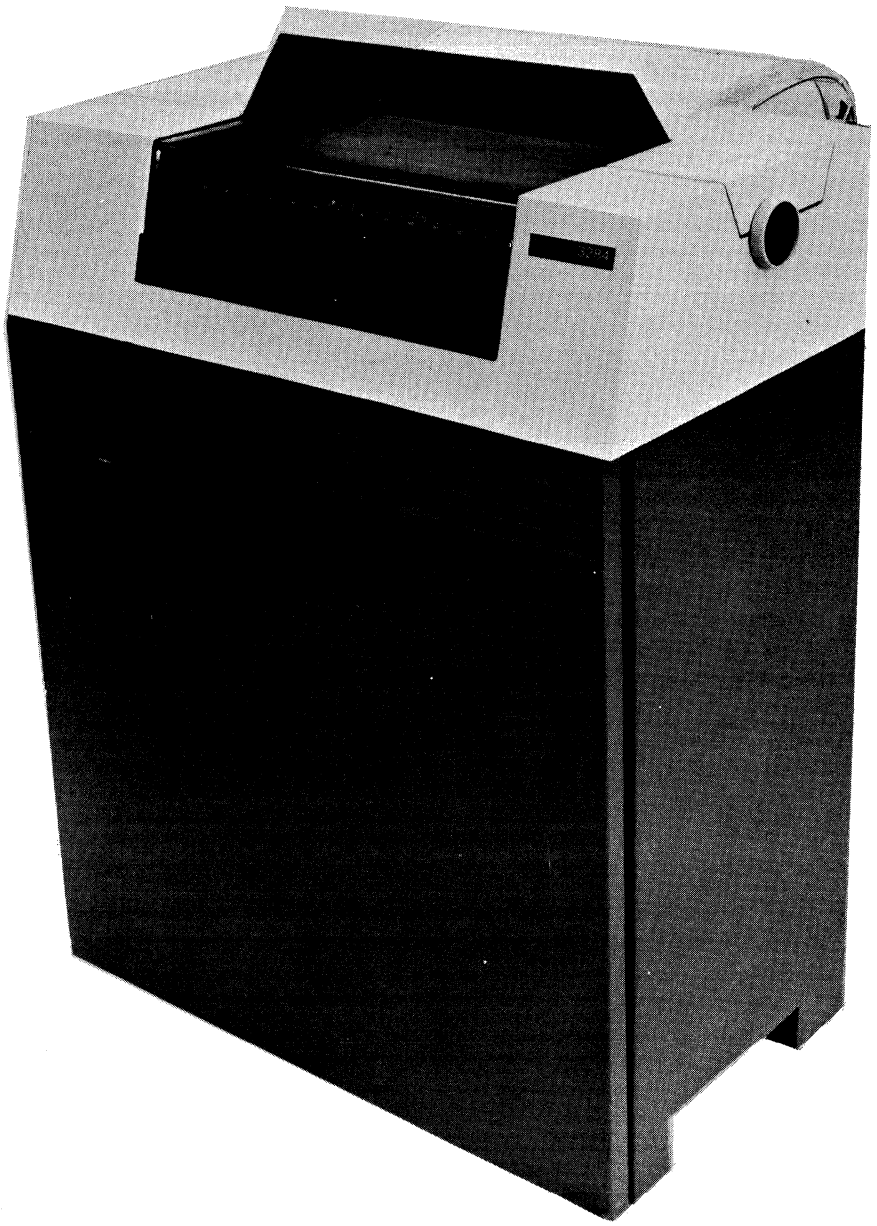


The 3283 Model 52, available in WT – A/FE countries only, is a single copy, ink-jet, terminal printer using the Variable Width Forms Tractor. It provides both Kanji/Chinese and EBCDIC character printing capabilities. Character spacing is 6 to the inch for Kanji/Chinese and 12 to the inch for EBCDIC. Line spacing is 4 and 6 to the inch. The print span is 335.1 mm (13.2 in.) maximum. Up to 79 Kanji/Chinese characters, 158 EBCDIC characters, or a mixture of them by field, can be printed on a line.

The 3283 can print 7658 Kanji (Japanese) or 11,560 Chinese characters. Printing speed is 77 EBCDIC characters/second or 38.5 Kanji characters/second.

The 3283 attaches to the 8100 Information System via the 3274-52C Control Unit.

IBM 3284 Printer

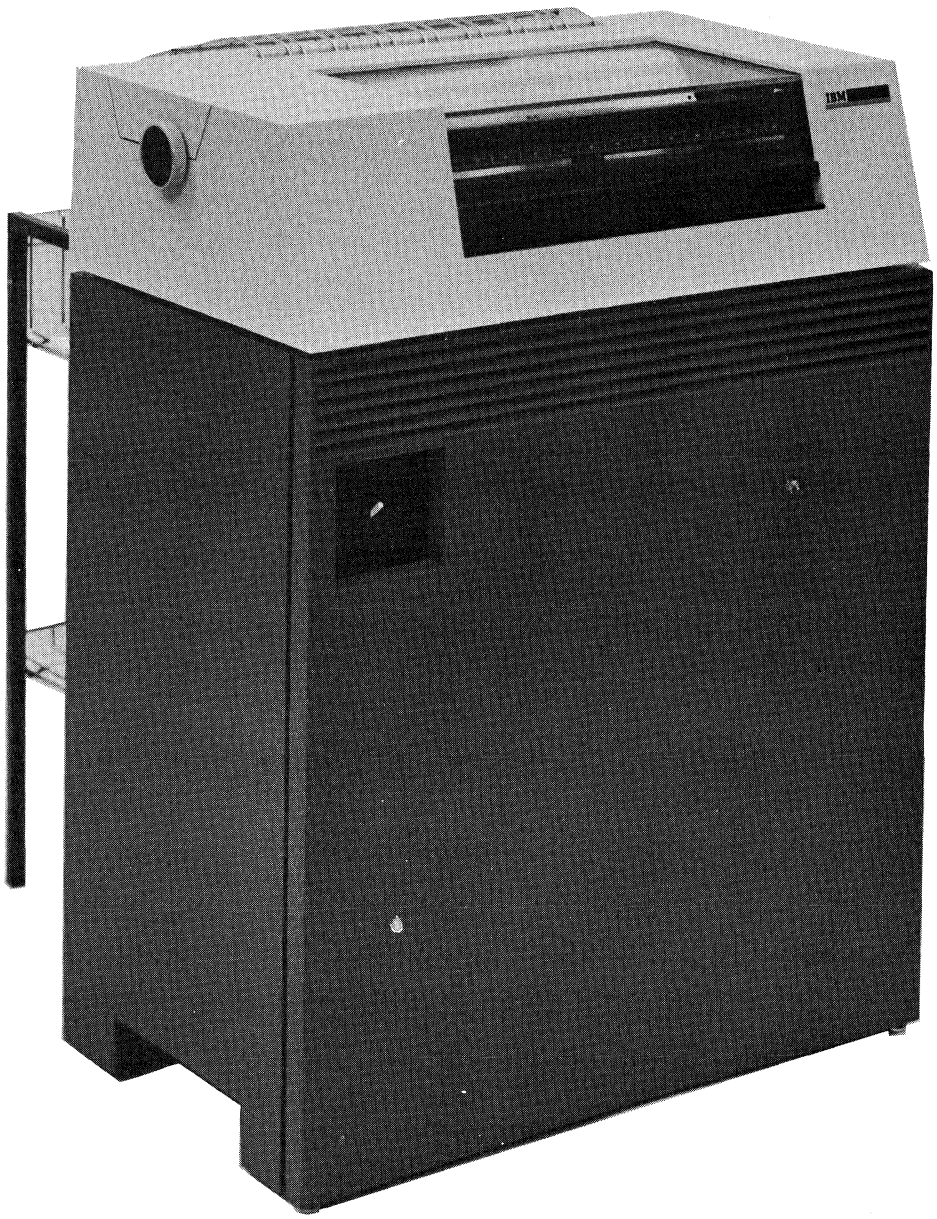


The IBM 3284 Printer is available in two models:

- Model 1 – 480-character buffer capacity with a 40-cps printout rate
- Model 2 – 1,920-character buffer capacity with a 40-cps printout rate

The 3284 attaches to the 8100 Information System via the Display and Printer Attachment in the 8101, 8102, 8130 B models, and 8140 B and C models.

IBM 3286 Printer



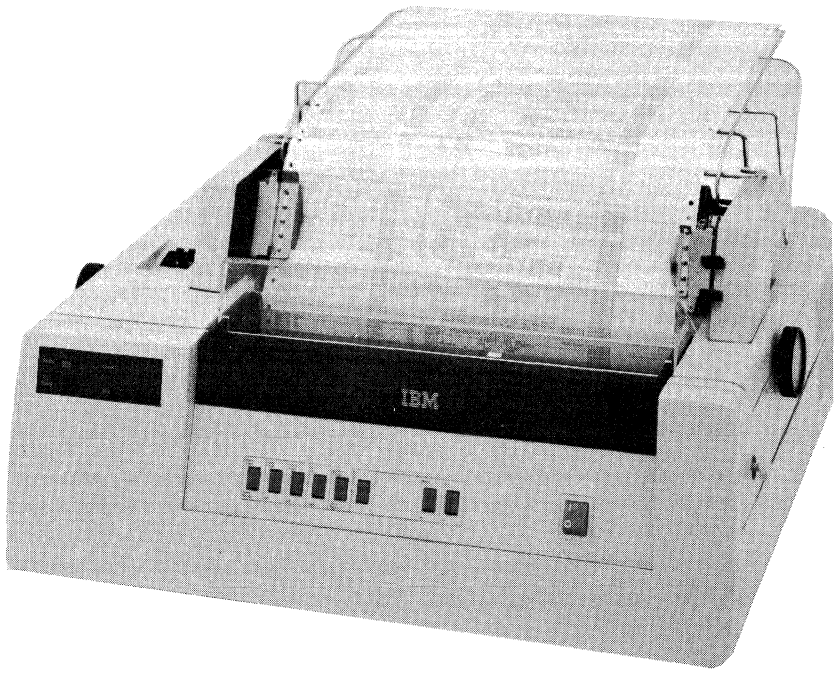
There are two IBM 3286 Printer models:

- Model 1 – 480-character buffer capacity with a 66-cps printout rate
- Model 2 – 1,920-character buffer capacity with a 66-cps printout rate

The 3286 attaches to the 8100 Information System via the Display and Printer Attachment feature in the 8101, 8102, 8130 B models, and 8140 B and C models.

IBM no longer manufactures this printer.

IBM 3287 Printer



The IBM 3287 Printer is a table-top printer with bidirectional printing capability. It is available in six models:

- Models 1, 1C (Color), and 11 – 80-cps maximum print rate
- Models 2, 2C (Color), and 12 – 120-cps maximum print rate

Note: Print speeds depend on the operational and system characteristics and may be affected by such factors as application programs, loop speed, print line length, multiple device operational loads, and communications transmission speed.

The 3287 Models 1 and 2 attach to the 3274-51C or 52C or through the 3276 Control Unit Display Station. Attachment can be up to 1500 meters (4920 feet) maximum cable length from either the 3274-51C, 3274-52C, or the 3276.

The 3287 Models 1 and 2 can also attach to the 8100 Information System via the Display and Printer Attachment in the 8101, 8102, 8130 B models, and 8140 B and C models.

The 3287 Models 11 and 12 attach to a loop. These models can operate on 38,400-bps and on 9600-bps directly attached loops, and on data-link-attached loops that operate at 9600 bps, 4800 bps, or 2400 bps.

3287 Models 1C and 2C attach to the 8100 system through the 3274 Model 51C Control Unit or through the 3276 Control Unit Display Station. Models 1C and 2C give the user the option of printing in combinations of four colors: red, green, blue, and black.

The Programmed Symbols feature is available on 3287 Models 1C and 2C as well as on the monochrome 3287 Models 1 and 2 when attached through a 3274 Control Unit. This feature provides a graphics capability for symbols and shapes.

The 3287 is designated as a customer setup device.

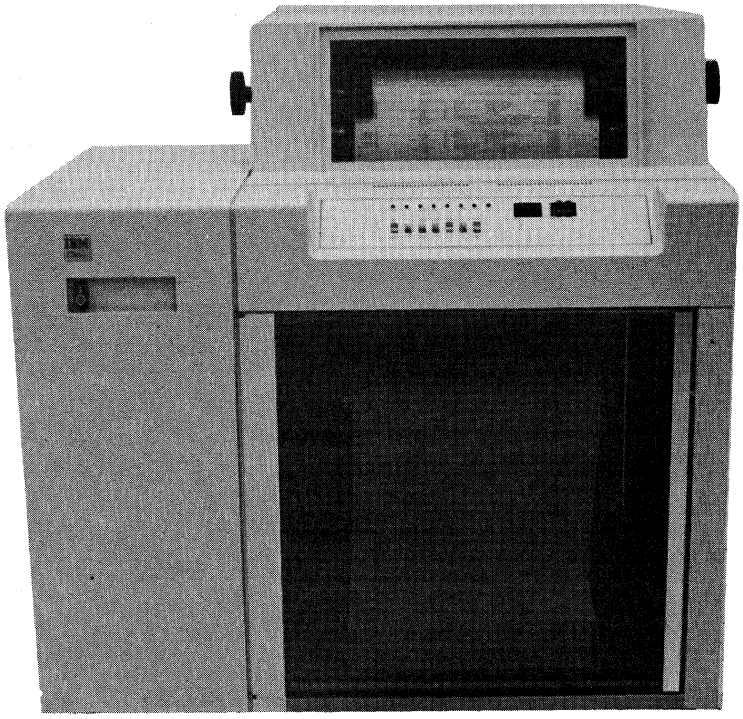
IBM 3288 Line Printer

The IBM 3288 Line Printer Model 2 has a 1920-character buffer capacity and a print rate of 120 lines per minute.

The 3288 attaches to the 8100 Information System via the Display and Printer Attachment feature in the 8101, 8102, 8130 B models, and 8140 B and C models.

IBM no longer manufactures this printer.

IBM 3289 Line Printer Models 1 and 2



The IBM 3289 Models 1 and 2 are floor-standing line printers with integrated forms stand/stacker that print up to 400 lines per minute.

Note: Print speeds depend on the operational and system characteristics and may be affected by such factors as application programs, loop speed, print line length, multiple device operational loads, and communications transmission speed.

The 3289 Models 1 and 2 attach to the 8100 Information System through the 3274 Control Unit or the 3276 Control Unit Display Station. Attachment can be up to 1500 meters (4920 feet) maximum cable length.

The 3289 Models 1 and 2 are designated as a customer setup device.

IBM 3289 Line Printer Model 3

The IBM 3289 Line Printer Model 3 is a floor-standing line printer with integrated forms stand/stacker that prints up to 400 lines a minute.

Note: Print speeds depend on the operational and system characteristics and may be affected by such factors as application programs, loop speed, print line length, multiple device operational loads, and communications transmission speed.

The 3289-3 attaches to a directly attached loop (9600 bps) or to a data-link-attached loop (9600 bps, 4800 bps, or 2400 bps) and can have the following devices attached to it:

- 3782 Model 1 Card Attachment Unit, which attaches the 3521 Card Punch
- 3782 Model 2 Card Attachment Unit, which attaches the 2502 Model A1 Card Reader
- 3501 Card Reader

Note: The 3289-3 Line Printer can only have one card reader attached to it.

When the 3289-3 is attached to the 8100 Information System via a directly attached loop, it transmits and receives data at a maximum speed of 9600 bps.

When the 3289-3 is attached to an 8100 system data-link-attached loop, it transmits and receives data at speeds up to 9600 bps. The speed, matched to the loop when the printer is installed, is switch-selectable by the operator.

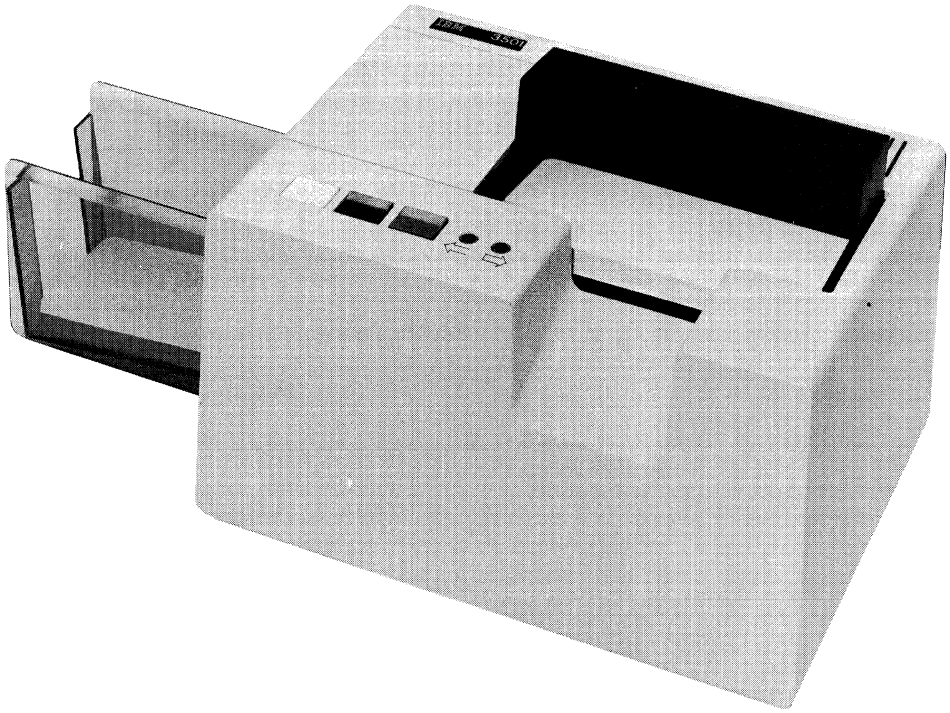
IBM 3290 Information Panel Display Station

The IBM 3290 Information Panel Display Station uses a flat plasma panel to provide a large-capacity display of alphanumeric data and graphics. The image is orange on a black background and is uniform at every point of the viewing area.

The 3290 lets users configure the screen in large-screen or multiple-screen formats. The screen displays up to 9,920 characters (62 lines of 160 characters). The 3290 allows an alternate display of up to 5,300 characters (50 lines of 106 characters). Variable character spacing and multiple partitioning to up to 16 sections are also provided.

The 3290 attaches to the 8100 system via the 3274 Control Unit. It is designated a customer set up device.

IBM 3501 Card Reader

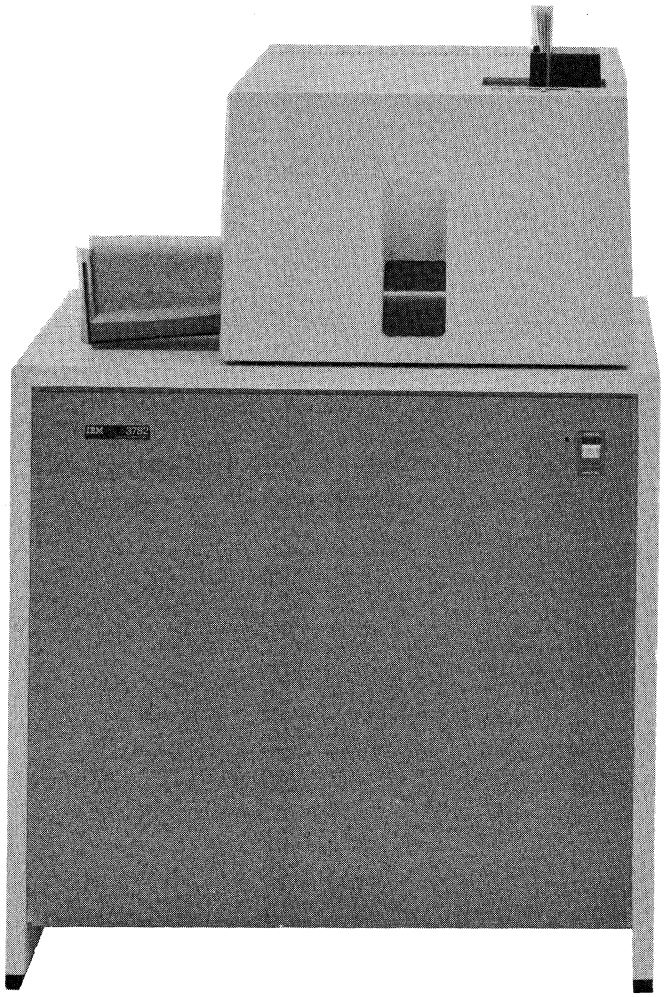


The IBM 3501 Card Reader reads 80-column cards at 50 cards per minute (maximum). This compact unit is suitable for desk-top use.

The 3501 attaches to the 8100 Information System via the 3289 Model 3 Line Printer.

No special features are available for the 3501, and it cannot be installed if a 2502 Card Reader is already attached.

IBM 3521 Card Punch with IBM 3782 Card Attachment Unit



The IBM 3521 Card Punch punches 80-column cards at 50 cards per minute (maximum). Special features permit card reading or card punching with checking and card printing. The 3521 speed is reduced to 25 cards per minute during printing of Katakana.

The 3521 attaches to the 3289 Model 3 Line Printer via the 3782 Model 1 Card Attachment Unit.

Note: The 3289-3 Line Printer can only have one card reader attached, whether it is a 3501, a 2502, or the card read/punch checking feature of the 3521.

The following features are available on the 3521:

- Card read feature – adds a read station for reading 80 column cards.
- Card print feature – prints (interprets) cards above the 12 row as they are punched or read. The EBCDIC 64-character set is standard but the Katakana 127-character set is also available.

IBM 3600 Finance Communication System (A/FE and E/ME/A Only)

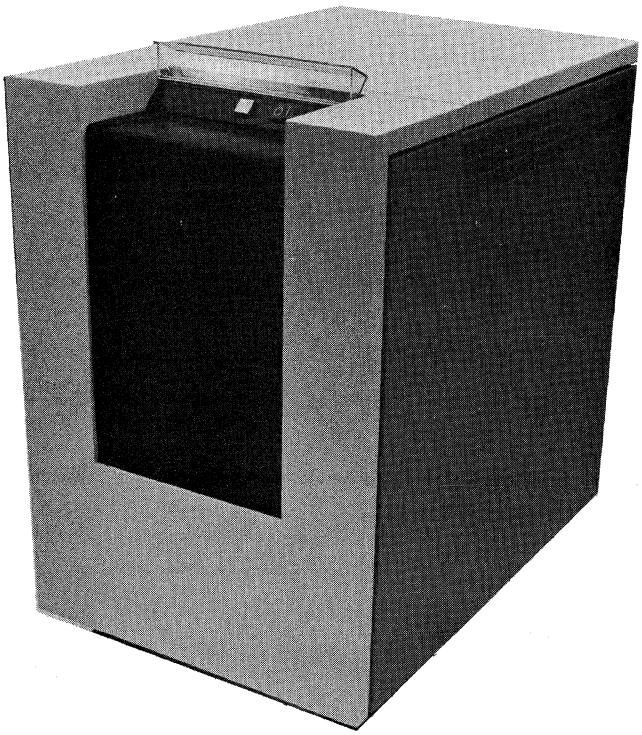
IBM 3602 Controller

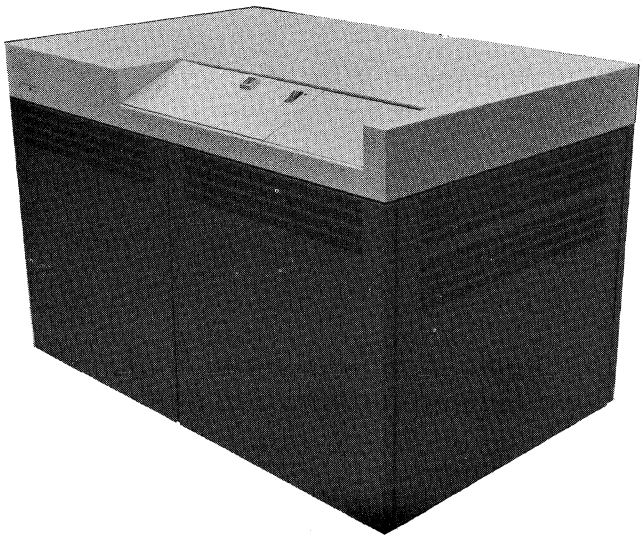
The IBM 3600 Finance Communication System is supported by the 8100 Information System in World Trade countries only.

The 3600 system is designed specifically for the finance community, including commercial banks, savings and loan associations, credit unions, finance companies, and other institutions offering financial services.

For more information, refer to the 3600 System Library.

IBM 3631/3632 Plant Communication Controllers





The IBM 3631 and 3632 Plant Communication Controllers are programmable controllers that coordinate the communications traffic among the IBM 3640 Plant Communication Terminals and the host. Control and application storage can be extended in 16K-byte increments. For host communications, any one of three SDLC communications adapters and an external modem to the 8100 system can be used. Each controller can support up to two directly attached or data-link-attached loops for 3640 terminal attachment.

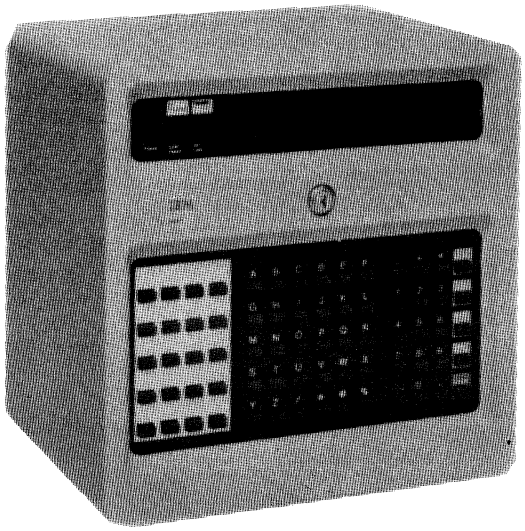
The 3631 Model 1A incorporates an IBM Diskette 1 Drive (one-sided 256K-byte diskette). The 3631 Model 1B and both models of the 3632 incorporate an IBM Diskette 2 Drive (one- or two-sided 512K-byte diskette). Diskette space unused by control and application code is available for customer data.

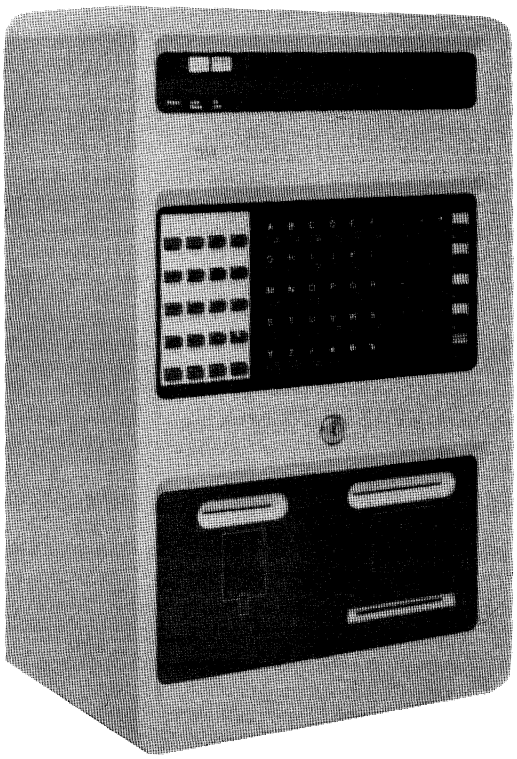
The 3632 controller has either a 5 million byte disk or 9.2 million byte disk.

Key 3631 and 3632 functions include line control, message assembly, data conversion, data and message editing, error control, message buffering and queuing, message logging, and statistics recording.

The 3631/3632 controllers are attached to the 8100 Information System through a 2400-bps or 9600-bps SDLC data-link communications facility.

IBM 3641 Reporting Terminal



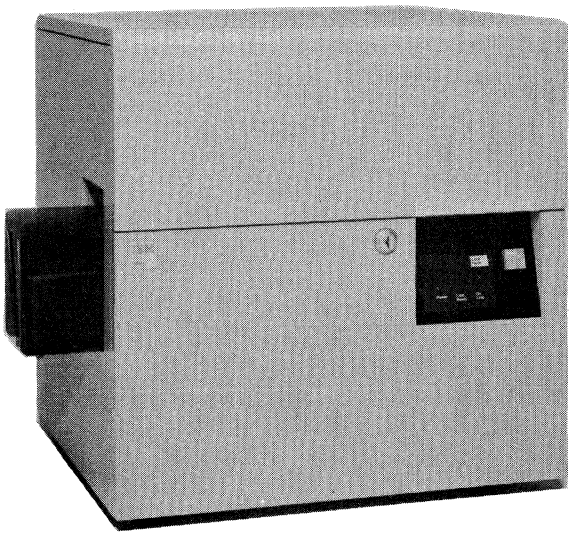


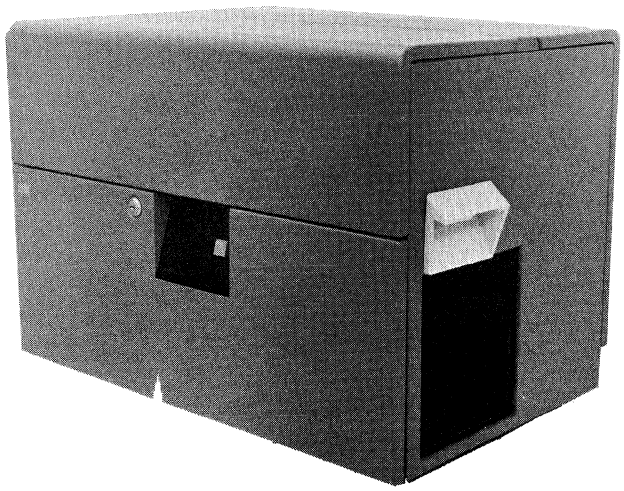
The IBM 3641 Reporting Terminal is an input/output device that can be used for data collection and response in a wide range of industrial work zones or offices. Input data may be entered from a keyboard and, optionally, from a Magnetic Hand Scanner or Magnetic Slot Reader, 80-column Punched Card Reader, 10-column Numeric Punched Hole Badge Reader, or a customer device connected to a Digital Input/Digital Output Adapter. Output may be directed to 22-position alphanumeric display, or optionally to a customer device connected to the Digital Input/Digital Output Adapter. The application program formats an input area on the display where keyed data appears.

The 3641 attaches to the 8100 Information System via a directly attached or a data-link-attached loop,or through the 3631/3632 Plant Communication Controller. Its maximum communications line speed is 9600 bps.

The 3641 is designated as a customer setup device.

IBM 3642 Encoder Printer





The IBM 3642 Encoder Printer is a work station output device that prints and magnetically encodes data on magnetic stripe documents. Output for the 3642 is prepared by user-written application programs.

The 3642 can be used in a wide range of industrial work zones and office areas to produce working documents where they are needed. In this way, human- and machine-readable documents can be more easily kept current and synchronized with data in the information system.

There are two 3642 models:

- Model 1 provides magnetic stripe encoding and ten lines of printing on hand-fed documents.
- Model 2 provides the capabilities of the Model 1, and, in addition, can automatically feed and burst continuous forms. The Model 2 may be used unattended.

Both models have a 400-form output stacker. The Model 2 has a 400-form input hopper. This hopper is not used when documents are hand-fed on the Model 2. The Model 2 automatically bursts continuous forms into single forms.

The 3642 attaches to the 8100 Information System via a directly attached or data-link-attached loop, or through the 3631/3632 Plant Communication Controller. The 3642 maximum communications line speed is 9600 bps.

The 3642 is designated as a customer setup device.

IBM 3643 Keyboard Display

The IBM 3643 Keyboard Display is an interactive input/output terminal that brings display capability to a wide range of industrialized work zones or offices. It can be used for many applications, including activity reporting, receiving and inspection, and stores or warehouse control. The terminal, which consists of three models, can be used interactively with the system by the operator, accept operator-entered data, present messages from the system, and provide guidance messages for the operator. The definition of function keys can be selected to reflect plant floor operations. The keyboard includes lights for indicating terminal status and message waiting conditions. The display uses an IBM gas panel display technology that provides a constant, flicker-free image.

Three models of the 3643 are available:

- Model 2, a 240-character display consisting of six lines of 40 characters each, using a 7 x 9 dot matrix to form each character.
- Model 3, a 480-character display consisting of 12 lines of 40 characters each, using a 7 x 9 dot matrix to form each character.
- Model 4, a 1024-character display consisting of 16 lines of 64 characters each, using a 5 x 7 dot matrix to form each character.

Each model has the option of an alphanumeric or expanded alphanumeric keyboard.

A Magnetic Reader Attachment feature is also available for connecting either a Magnetic Hand Scanner or a Magnetic Slot Reader.

For flexibility in meeting varying customer applications, both keyboards have a combination of engraved and nonengraved keytops. Both preprinted and blank labels are supplied to tailor the keyboard to the user's application. Overlays are provided to protect customer-inscribed blank labels.

The 3643 attaches to the 8100 system via a directly attached or a data-link-attached loop, or through the 3631/3632 Plant Communication Controller.

The 3643 is designated as a customer setup device.

IBM 3644 Automatic Data Unit

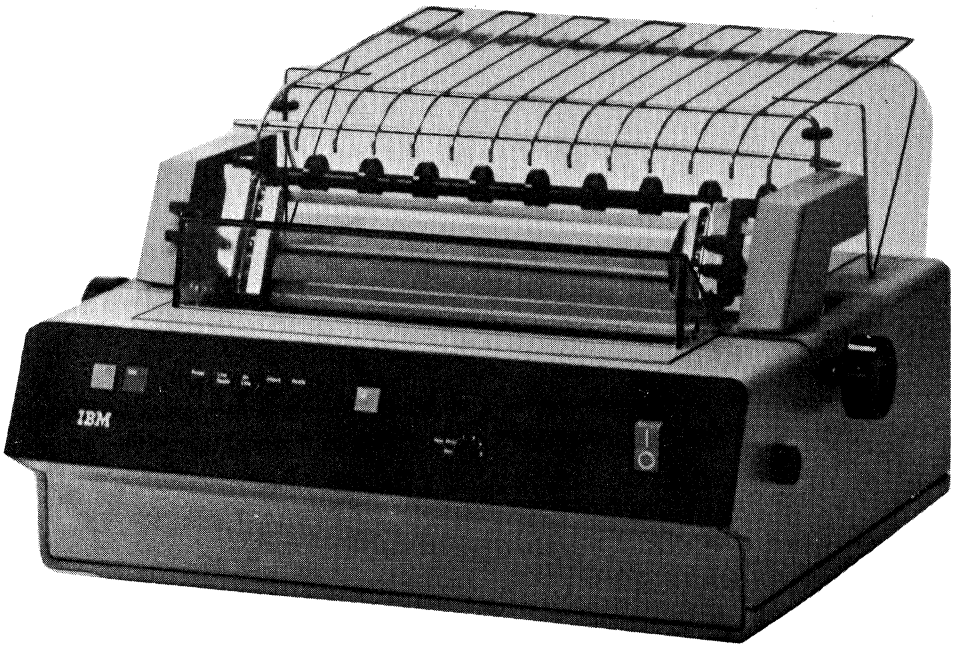
The IBM 3644 Automatic Data Unit Model 1 is a terminal that attaches to the 8100 Information System via the multiuse communications loop to provide system connection to a variety of distributed sensors, actuators, and production and laboratory equipment. The 3644 can collect data from the attached devices on a cyclic or interrupt-driven basis. It can send the data to the 8100 system directly or examine the data when specific conditions exist. It can also generate and send responses to the attached devices without interacting with the 8100 system.

Optional Feature

A Manual I/O feature is available which provides a 22-position display and a 35-position alphanumeric/function keyboard that allows inquiry into data and status contained in the 3644 internal storage facility when online. Manual control of the 3644 and inquiry and modification of 3644 data and status are possible when offline.

The 3644 attaches to the 8100 Information System via a directly attached or a data-link-attached loop, or through the 3631/3632 Plant Communication Controllers. The 3644 maximum communications line speed is 9600 bps.

IBM 3645 Printer



The IBM 3645 Printer terminal is a serial matrix table top printer. It is capable of printing bidirectionally at 120 characters per second (cps) using a 94-character set. It has 132 print positions per line with character spacing of 10 per inch.

The printer accepts up to six-part continuous forms when used with the Variable Width Forms Tractor. It provides quality printing on single sheets or on an original and up to three carbon copies of continuous forms. Cut forms with as many as four parts can be used with the standard friction feed. Maximum forms width is 381 mm (15.0 in.). Card stock forms are not recommended.

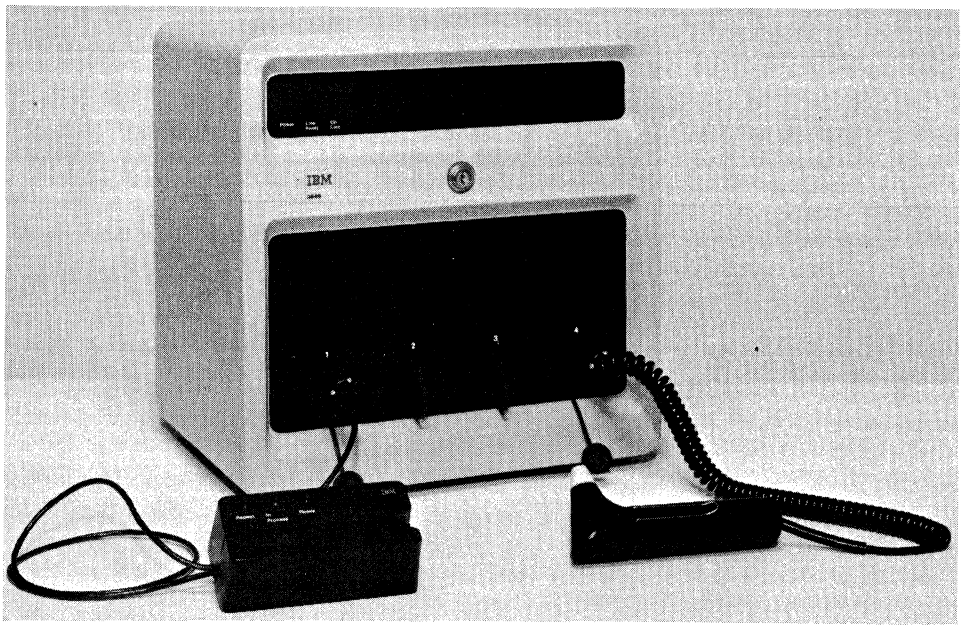
Features include:

- Standard Character Print
- Large Character Print
- Variable Width Forms Tractor
- Separator Bar Tractor

The 3645 attaches to the 8100 Information System via a directly attached or a data-link-attached loop, or through the 3631/3632 Plant Communication Controller. Its maximum communications speed is 9600 bps.

The 3645 is designated as a customer setup device.

IBM 3646 Scanner Control Unit with Magnetic Hand Scanner and Magnetic Slot Reader



The IBM 3646 Scanner Control Unit, Model 1, is a dedicated magnetic attachment device. Two attachment ports are standard with an option of two additional ports.

One IBM Magnetic Hand Scanner or IBM Magnetic Slot Reader may be attached to each port. Each attachment port has its own subaddress and operates independently. The Magnetic Hand Scanner and the Magnetic Slot Reader are used to read data encoded on a variety of magnetic striped adhesive labels, tags, plastic cards, or badges.

The Scanner Control Unit can be used at quality control stations, assembly areas, shipping and receiving docks, piecework control stations, etc. Operator feedback is provided by three lights and a buzzer on the slot reader and hand scanner.

The 3646 attaches to the 8100 Information System via a directly attached or data-link-attached loop, or through the 3631/3632 Plant Communication Controller. The 3646 maximum communications line speed is 9600 bps.

The 3646 is designated as a customer setup device.

IBM 3647 Time and Attendance Terminal

The IBM 3647 Time and Attendance Terminal is designed for attendance reporting, labor reporting, and other data entry applications. The basic 3647 has a magnetic scanner adapter and a four-digit display which can be used for time of day. The 3647 provides:

- Time-of-Day Clock – the initial time is set under program control and can be set for a 12- or 24-hour clock, with time displayed in hours and minutes or hours and hundredths of hours.
- Input Buffer – an input buffer mode of operation can be selected to store multiple input messages. This provides a high walkby rate and allows input when the controller, loop, or data link is inoperative. A no-buffer mode of operation can also be selected to permit interactive processing on each input message.
- Invalid Document Code – an invalid code option can be selected which allows input messages to be checked for the presence of a non-numeric character. Input without this character is rejected by the 3647.
- Time Stamping – a time stamping option can be selected which sends the displayed time of day with each input message transmitted to the controller.

The 3647 attaches to the 8100 system via a directly attached or a data-link-attached loop, or through the 3631/3632 Plant Communication Controller. It is designated as a customer setup device.

IBM 3650/3680 Programmable Store System

The IBM 3650 and 3680 Programmable Store Systems are supported by the 8100 Information System.

Both the 3650 and 3680 are store-level systems that provide facilities for point-of-sale transactions, data entry and inquiry, report printing, and related administrative support procedures. The systems are designed for the retail merchandiser with departmental, area sales, or checkout lane operations.

For more information, refer to the 3650 or 3680 System Library.

IBM 3732 Text Display Station

The IBM 3732 Text Display Station consists of a display and keyboard that provide text entry and editing. The 3732 displays all the text characters that can be entered at the keyboard. Additional graphic characters are displayed to denote certain text control functions.

The cathode-ray tube display has an antiglare screen with a diagonal dimension of 381 mm (15 inches). This display provides 24 lines of 80 characters each, for a total of 1920 characters.

The 3732 attaches to the 8100 Information System through the Display and Printer Attachment feature of the 8101, 8130 B model and 8140 B and C models.

IBM 3736 Printer

The IBM 3736 Printer is a bidirectional, impact printer that has a printing speed of up to 55 characters per second. It can print on cut sheets and continuous stationery, having a maximum width of 381 millimeters (15 inches).

The 3736 can take single sheets, forms, envelopes, and labels if they are manually loaded, or it can take continuous paper that has these single items mounted on the paper. It can print up to five carbon copies.

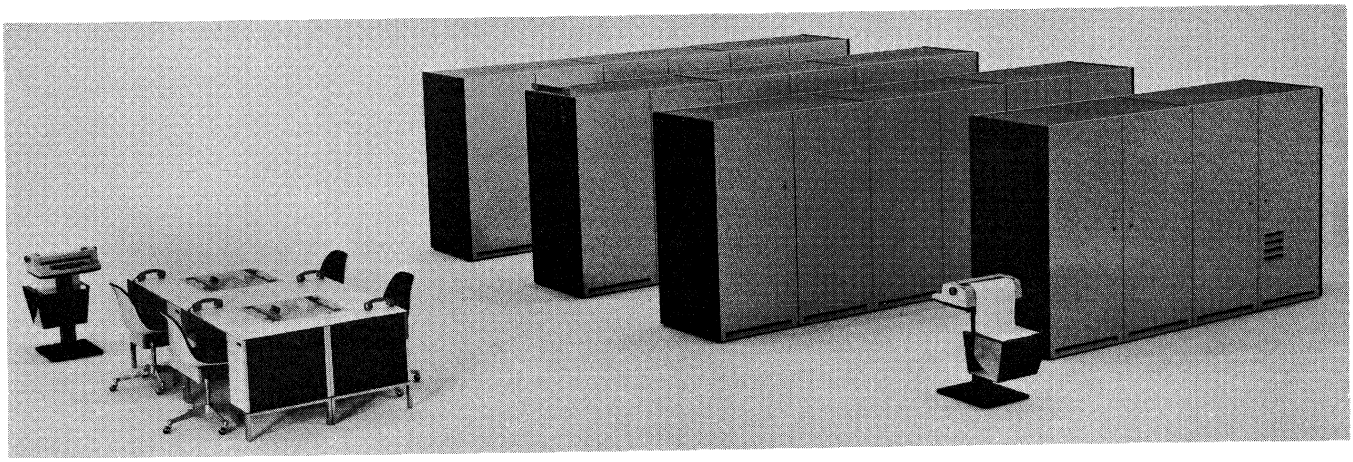
Interchangeable print wheels with pitch settings of 10 or 12 characters per 25.4 millimeters (10 or 12 characters per inch) provide various type styles.

A variable-width forms tractor feature, a paper stacker/tray, and a paper carrier are available.

The 3736 attaches to the 8100 Information System through the Display and Printer Attachment feature of the 8101, 8130 B model and 8140 B and C models.

IBM no longer manufactures this printer.

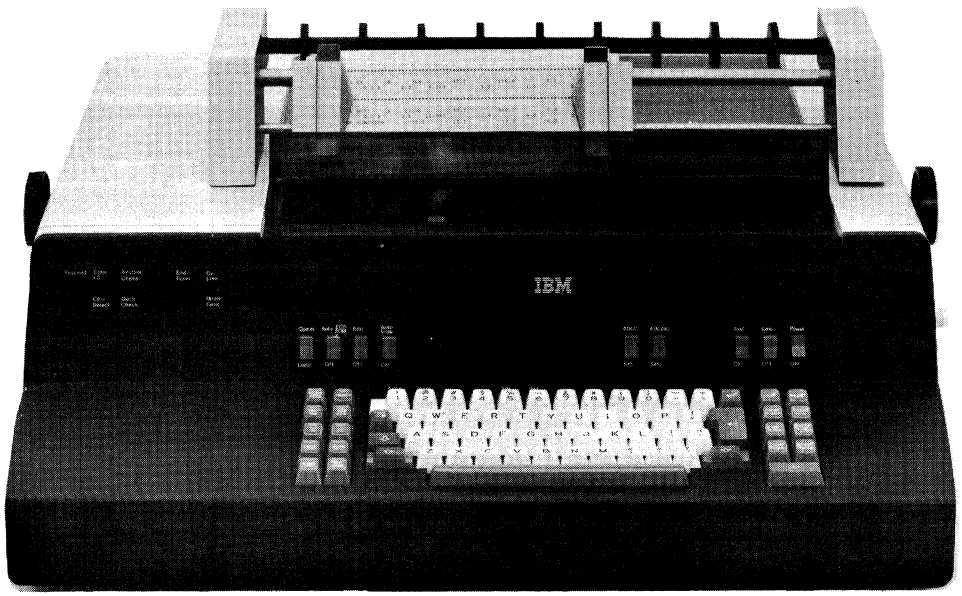
IBM 3750 Switching System (A/FE and E/ME/A Only)



The IBM 3750 is a voice and data communications system designed for use on customer premises with connection to the public switched and/or leased telephone network. It attaches to the 8100 Information System through a binary synchronous communications attachment facility.

For more information, refer to the 3750 System Library.

IBM 3767 Communication Terminal



The 3767 Communication Terminal is a compact, movable, desk top buffered terminal that can also be used for normal secretarial typing. Printing on the 3767 is bidirectional for increased throughput.

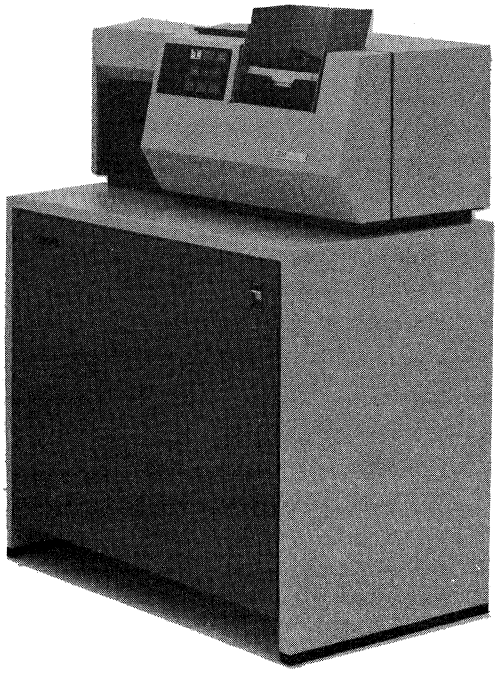
The 3767, offered in three models with print speeds up to 120 cps, has the following optional features:

- Buffer expansion
- Security keylock
- Magnetic strip reader
- Alternate character set
- Calculate-scientific

The 3767 is attached to the 8100 Information System via an SDLC data-link communications facility.

The 3767 is designated as a customer setup device.

IBM 3782 Card Attachment Unit with IBM 2502 Card Reader



The IBM 3782 Card Attachment Unit provides facilities for attaching the IBM 2502 Card Reader or the IBM 3521 Card Punch to the IBM 3289 Model 3 Line Printer. The 3782 Model 1 attaches the 3521 Card Punch. The 3782 attaches the 2502-A1 Card Reader.

IBM 3843 Loop Control Unit

The IBM 3843 Loop Control Unit is used to connect the loop to a data link. The 3843, which requires an external modem, is capable of line speeds of 2400, 4800, and 9600 bps when attached through the appropriate modem.

The 3843 is designated as a customer setup device.

IBM 3863 Modem 1200/2400 bps

IBM 3864 Modem 2400/4800 bps

IBM 3865 Modem 4800/9600 bps

The IBM 3863, 3864, and 3865 are a family of synchronous modems with half-speed capability that provide teleprocessing products with the modulation/demodulation function required for transmitting data over common-carrier nonswitched voice-grade lines, equivalent privately owned nonswitched lines, or public switched telephone networks.

Transmission may be full duplex, half duplex, or half speed. Speeds range from 1200 bps to 9600 bps. The 3863 transmits data at 2400-bps and 1200-bps half speed. The 3864 transmits data at 4800-bps and 2400-bps half speed. The 3865 transmits data at 9600-bps and 4800-bps half speed. The three modems can be used with SDLC and BSC.

These microprocessor-based modems enhance communications network management and network problem determination by providing diagnostic functions supported by the Network Problem Determination Application (NPDA) program product which provide:

- Probable cause of network errors
- Alert messages on error threshold
- Formatted modem test results

The 3863 and 3864 are available in two models:

- Model 1 – Operates in half-duplex or duplex mode over four-wire nonswitched duplex facilities on point-to-point, multipoint control, or multipoint tributary configurations.
- Model 2 – Operates in half-duplex mode over two-wire switched telecommunications networks on a point-to-point configuration.

The 3865 is available in two models:

- Model 1 – Operates in half-duplex or duplex mode over four-wire nonswitched duplex facilities on point-to-point configuration.
- Model 2 – Operates in half-duplex mode over four-wire nonswitched duplex facilities on multipoint control or multipoint tributary configurations.

The 3863, 3864, and 3865 are designated as customer setup devices.

IBM 3872 Modem 1200/2400 bps

IBM 3874 Modem 2400/4800 bps

IBM 3875 Modem 3600/7200 bps

The IBM 3872, 3874, and 3875 Modems are a family of synchronous modems with half-speed capability that provide teleprocessing products with the modulation/demodulation function required for transmitting data over common-carrier nonswitched voice-grade lines, equivalent privately owned nonswitched lines, or public switched telephone networks.

These three modems can accommodate configurations which include point-to-point, multipoint, and switched network operation. The operator panel controls and indicators allow the operator to quickly localize problems by carrying out local and end-to-end testing.

Transmission may be full duplex, half duplex, or half speed. Speeds range from 2400 bps to 7200 bps. The 3872 transmits data at 2400-bps and 1200-bps half speed. The 3874 transmits data at 4800-bps and 2400-bps half speed. The 3875 transmits data at 7200-bps and 3600-bps half speed. The three modems can be used with SDLC and BSC.

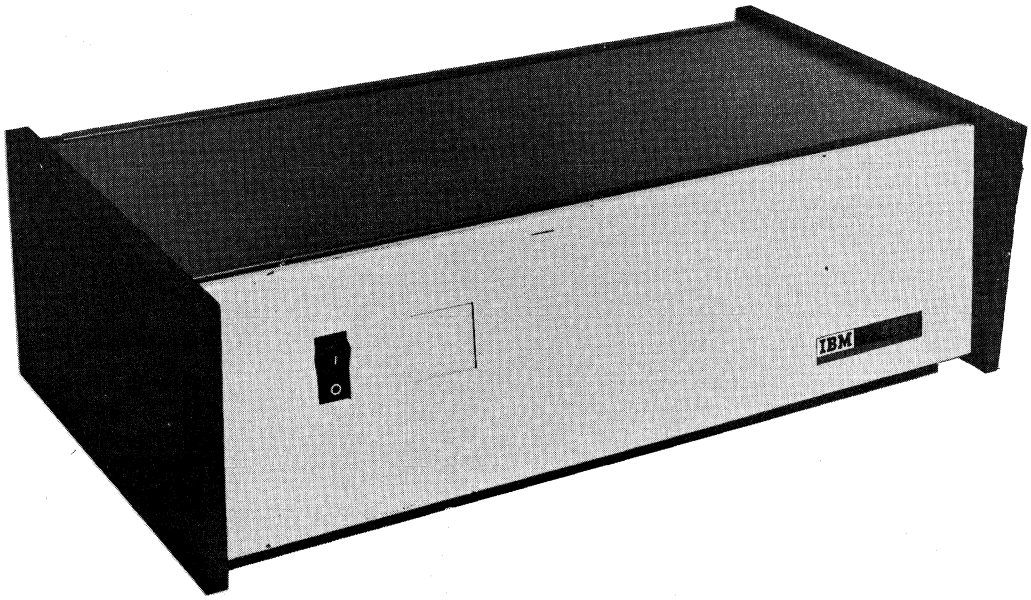
Optional features include:

- Alternate voice, which provides signaling capability and a socket on the operator panel to plug in a handset for voice communication.

- Fan-out, which allows up to three IBM devices to be attached at one location. It also allows up to three IBM communications controllers or integrated communications adapters at a central site to share the same modem for backup purposes.

IBM no longer manufactures the 3874 and 3875 modems.

IBM 3976 Modem Model 1 (A/FE and E/ME/A Only)



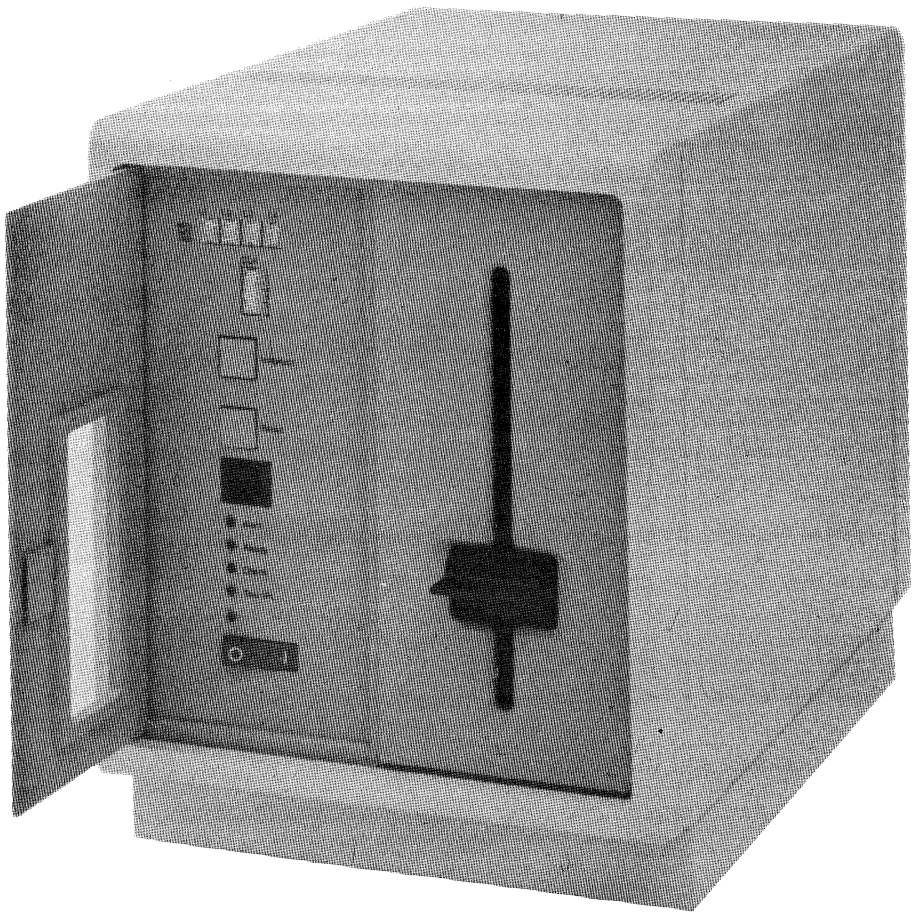
IBM 3976 Modem Model 3 (A/FE and E/ME/A Only)

The IBM 3976 Modem is designed for use in World Trade countries. It is a frequency modulation modem, providing serial transmission of binary information.

The 3976 Model 1 operates in duplex or half-duplex mode over a two-wire, nonswitched, telephone line. Its transmission speed is up to 200 bps.

The 3976 Model 3 operates in half-duplex mode over a two-wire, switched, telephone line or in continuous carrier mode over a four-wire, nonswitched telephone line. Its transmission speed may be 600 or 1200 bps.

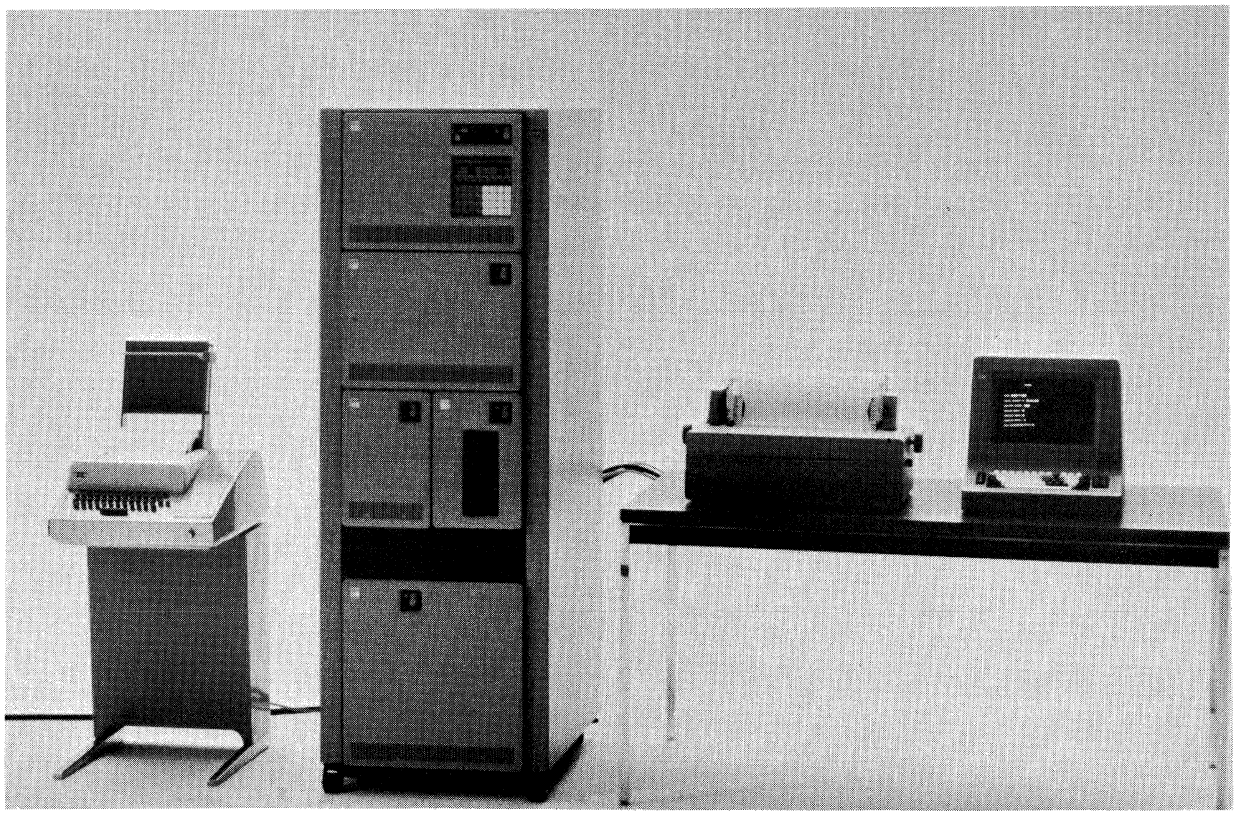
IBM 4701 Communication Controller



The IBM 4701 Communication Controller Models 1 and 2 are programmable controllers for attaching 4700 and 3600 Finance Communication System terminals to various hosts, including the 8100 Information System. The 4701 is connected to the 8100 Information System by remote attachment or direct connection by use of SDLC through 8100 data-link features. This attachment is supported by DPPX/DSC capability.

The 4701 is designated as a customer setup device, thereby offering the customer early availability and terminal relocation flexibility.

IBM Series/1



IBM Series/1 is a family of general-purpose computers and input/output devices. It is modular in design, and all Series/1 units except the printer and the display station fit into a standard 19-inch rack. The system offers both communications and sensor-based capabilities. The Series/1 units are connected to the 8100 Information System by remote attachment or direct connection by use of SDLC through 8100 data-link features.

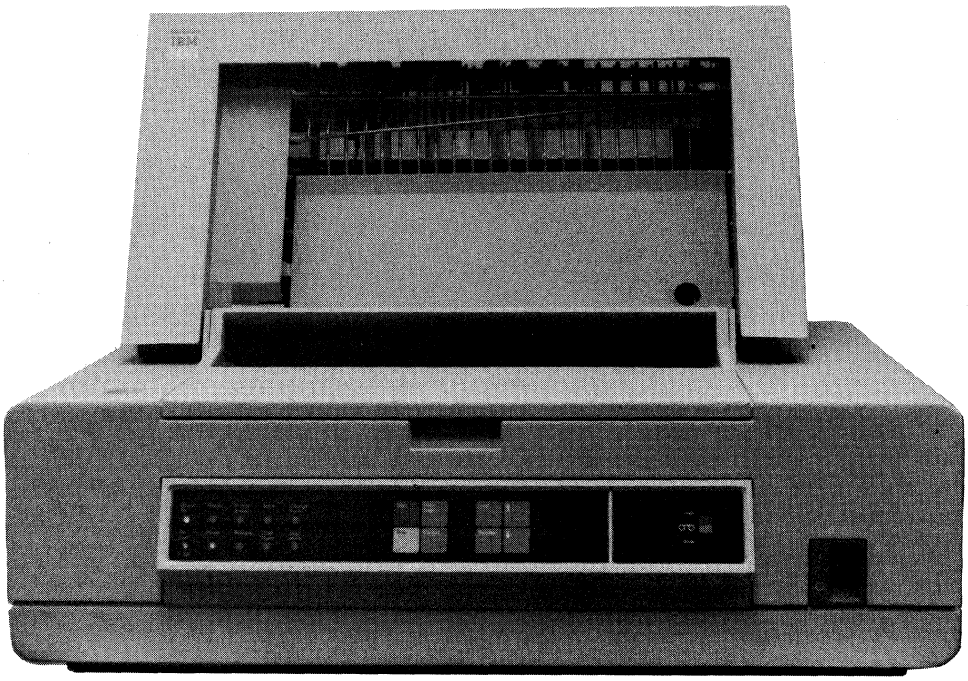
IBM 5150 and 5160 Personal Computers

The IBM 5150 Personal Computer and the IBM 5160 Personal Computer XT are small computers that offer a variety of options for tailoring a system to the user's needs.

The Personal Computers include a system unit (containing the processor) and may include optional disk or diskette drives, displays, adapters, printers, and memory expansion.

The two Personal Computers attach to the 8100 system via data link and directly attached or data-link-attached loop.

IBM 5210 Printer

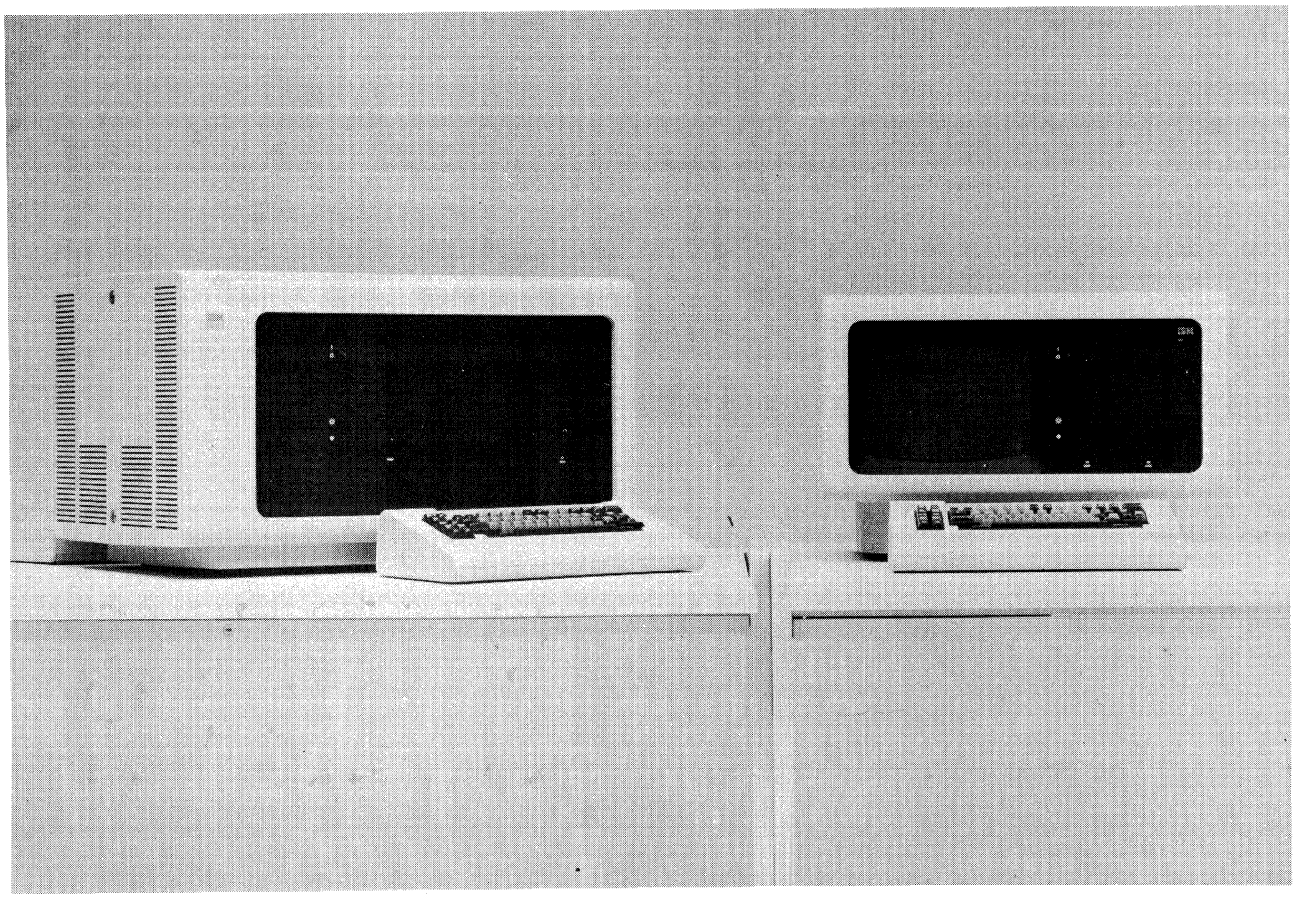


The IBM 5210 Printer is a correspondence-quality, bidirectional, desk-top, printwheel printer. It provides flexibility in paper handling, type styles, and print speed. The printer attaches to the 8100 system via a directly attached loop (5210 Models E1 and E2) or a 3274 Control Unit (5210 Models G1 or G2).

Models E1 and G1 have a rated burst print speed of up to 40 cps using a 10-pitch, 96-character printwheel.

Models E2 and G2 have a rated burst print speed of up to 60 cps using a 10-pitch, 96-character printwheel.

IBM 5280 Distributed Data System

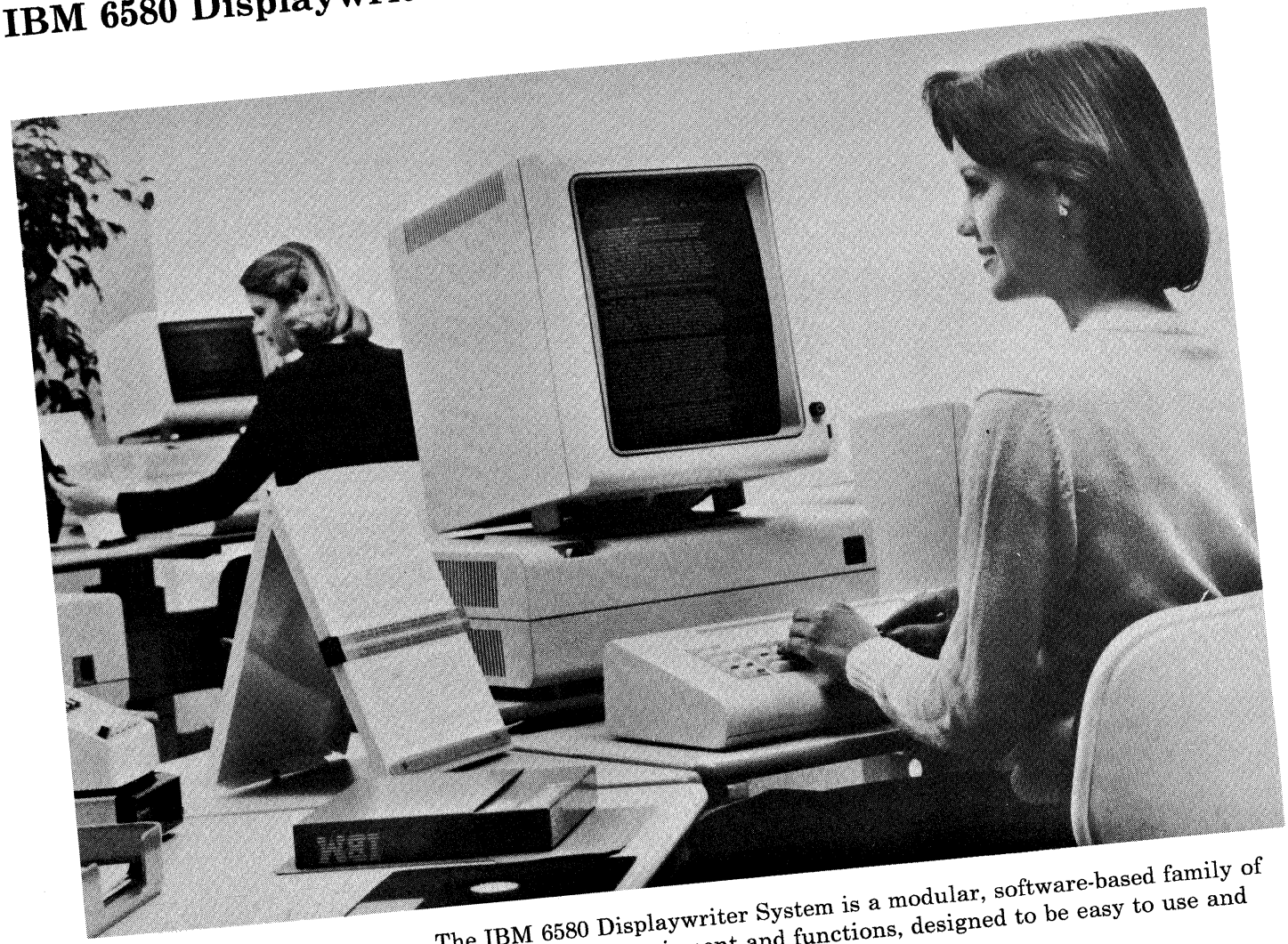


The IBM 5280 Distributed Data System is a diskette-based system consisting of table-top programmable data stations, floor-standing programmable data stations, table-top auxiliary data stations, a floor-standing programmable control unit, and printers.

The 5280 attaches through a nonswitched line to an SDLC adapter in the 8100 system. The 5280, via its 3270 Emulation feature, appears as a 3274 Control Unit with a 3278 Display Station and a 3287 Model 1 or 2 Printer. The 5280 can function as a 3270 terminal on the 8100 to which it is connected.

The 5280 system is designated as a customer setup device.

IBM 6580 Displaywriter System

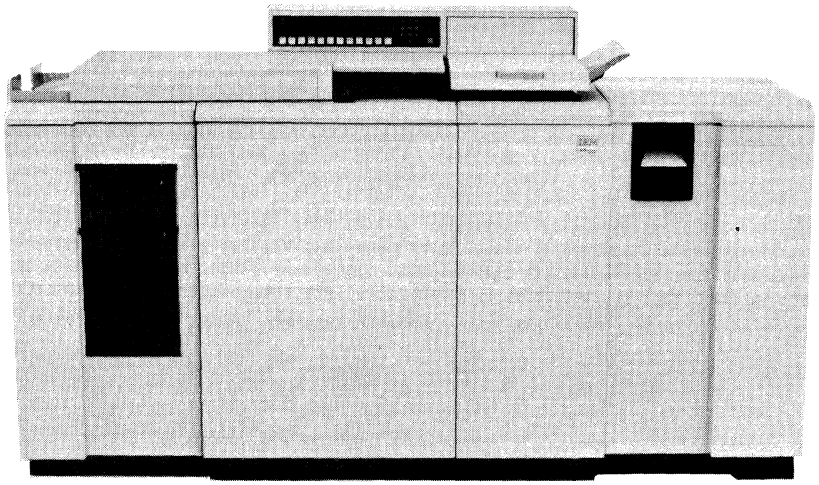


The IBM 6580 Displaywriter System is a modular, software-based family of word-processing equipment and functions, designed to be easy to use and cost-efficient.

The building-block Displaywriter System can be custom-ordered from more than 20 separate components, features, and options. It consists of display and electronics modules, a typewriter-like keyboard, a typewriter-quality printer, and a unit that records and reads diskettes.

The Displaywriter can be connected to the 8100 Information System in several ways: by data link, via the 3274 Control Unit and 3276 Control Unit Display Station (with 3270 attached work stations for use with both controllers), and via the Display and Printer Attachment feature.

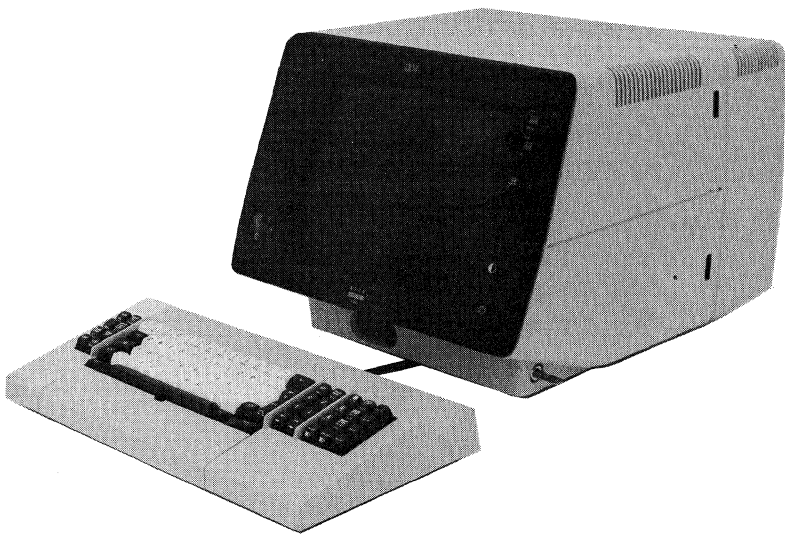
IBM 6670 Information Distributor



The IBM 6670 Information Distributor is a printer with communications capability. The printer consists of a laser head printer, a magnetic card unit, a communications facility, and a processor. It also serves as a convenience copier.

The 6670 attaches to the 8100 Information System through the SDLC/EIA interface either by direct connection or through a data link. The line speed can be up to 7200 bps.

IBM 8775 Display Terminal



The IBM 8775 Display Terminal consists of a display unit, its attached keyboard, and, optionally, a selector light pen and magnetic slot reader. The 8775 offers such functions as:

- Scrolling
- Multiple partitions
- Highlighting
- Field validation
- APL
- Programmed symbols

The 8775 is available in four models: 1, 2, 11, and 12.

Models 1 and 11 offer a screen capacity of 960, 1920, or 2560 display characters in a 9 x 16 dot character matrix.

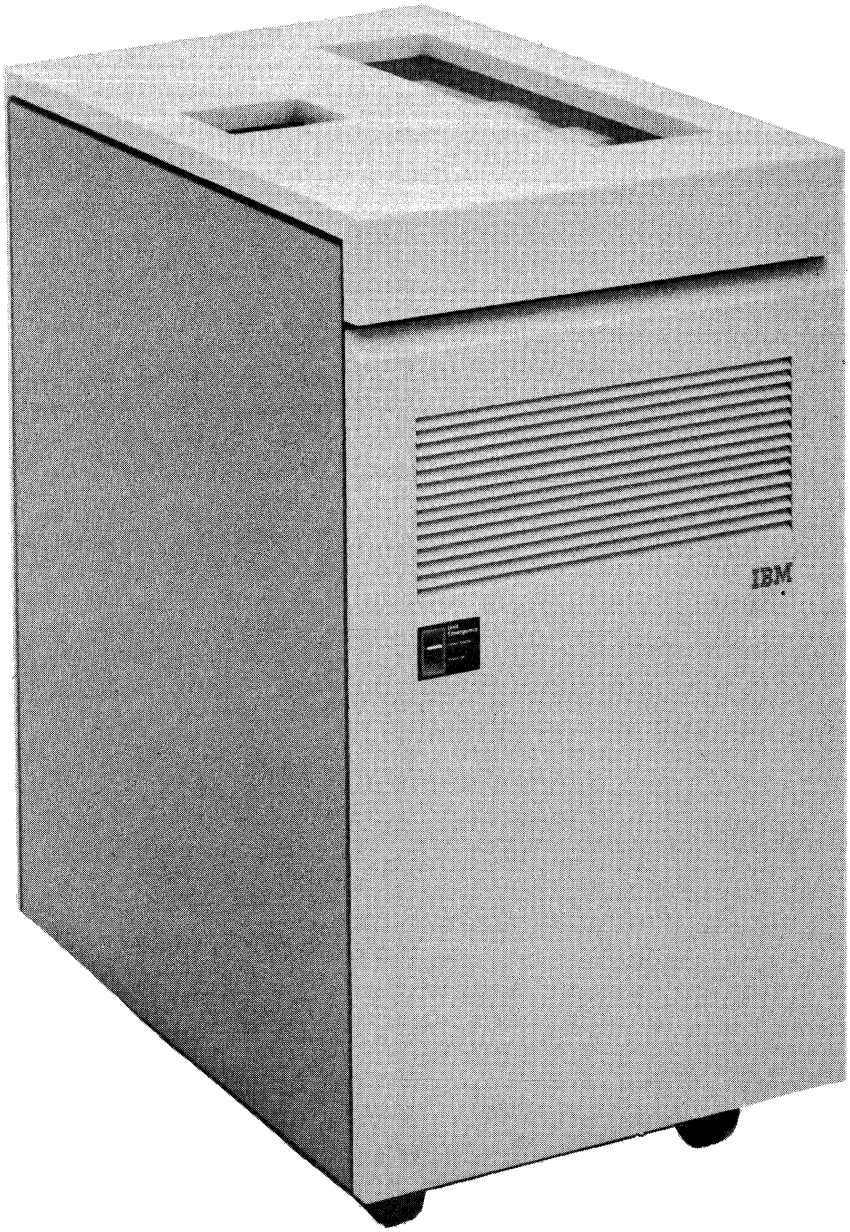
Models 2 and 12 offer a screen capacity of 960, 1920, or 2560 display characters in a 9 x 16 dot character matrix, and 3440 characters in a 9 x 12 dot character matrix.

Models 1 and 2 attach to the 8100 either through a directly attached loop or through a data-link-attached loop. Models 11 and 12 attach to the 8100 over data link communications features. The logical structure formats, protocols, and operational sequence used for transmitting data between the 8775 and 8100 are defined by the System Network Architecture (SNA).

For more detailed information about the 8775, refer to *An Introduction to the IBM 8775 Display Terminal*, GA33-3040.

The 8775 is designated as a customer setup device.

IBM 8809 Magnetic Tape Unit



The IBM 8809 Magnetic Tape Unit attaches to the 8100 Information System through a processor or an 8101 or 8102 Storage and I/O Unit. It provides high-speed save/restore capabilities for DASD and satisfies DB/DC journaling, tape interchange, and processing requirements for the 8100 system.

The 8809 is a 9-track, reel-to-reel, magnetic tape unit that uses the industry standard tape density and format for phase-encoded (PE) 1600 bytes per inch operation. It operates in either 0.3175 meter per second (12.5 ips) start-stop mode, which provides a 20K bytes per second instantaneous data rate for journaling and processing, or 2.54 meters per second (100 ips) streaming mode, which provides a 160K bytes per second instantaneous data rate for

save/restore. The 8809 accepts half-inch tape reel sizes of 6.25, 7.0, 8.5, and 10.5 inches. However, the 10.5-inch large hub or padded hub for 1200 feet of tape cannot be used on 8809.

The 8809 can also operate with either a 0.6-inch interblock gap (IBG) or a 1.2-inch IBG. The speed and IBG settings are under program control of the 8100 system. Tapes written in either mode are identical, and both gap sizes can be read on other IBM 2400 or 3400 1600-bpi PE tape drives.

Mode can be changed by a command issued from the 8100 system and can be made at any point on the tape.

In start-stop mode, the 8809 operates the same as current tape products, for example, starting and stopping within the IBG.

In the streaming mode, the 8809 takes advantage of the fact that large amounts of data are generally transmitted in load/dump applications. Therefore, the 8809 maintains tape velocity through the gap, anticipating the next command. If the next command occurs during the gap crossing and is functionally consistent with the current tape direction and mode setting, the operation continues without loss of time because of start-stop or repositioning. If commands from the 8100 system are discontinued or arrive after the gap crossing (command overrun), the 8809 automatically repositions the tape for the next command.

The 8809 is available in four models (up to four 8809 units may be attached):

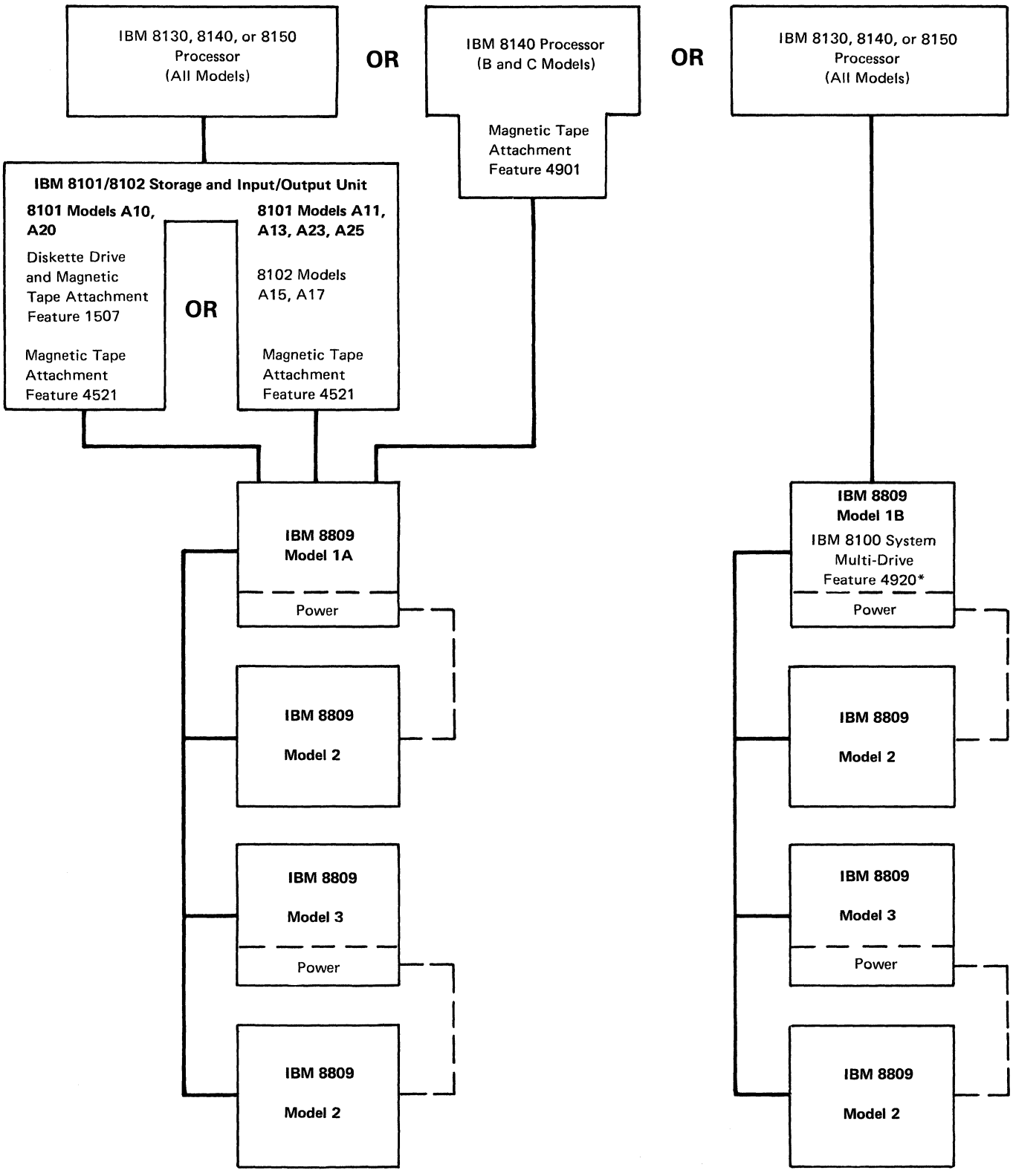
- Model 1A or 1B – The first 8809 in a string of up to four 8809 units. The 1B has power for itself and for the second 8809 unit. The Model 1A attaches to an 8140 Processor (B and C models) or to an 8101 or 8102 Storage and I/O Unit. The Model 1B attaches to an 8130, 8140, or 8150.
- Model 2 – The second and fourth drive in a string of 8809 units. It does not contain power (it receives power from the Model 1 or Model 3).
- Model 3 – The third drive in a string of 8809 units. It has its own power, and supplies power to the fourth tape drive, which is the second Model 2.

The 8809 has the following characteristics:

	Start-Stop	**Streaming**
• Tape Speed (±5%)	0.3175 m/s (12.5 ips)	2.54 m/s (100 ips)
• Data Rate, nominal	20K bytes/sec bytes/sec	160K
• Write access time, nominal	40 ms	295 ms
• Read access time, nominal	44 ms	295 ms

- Half-tape, reel-to-reel, nine-track
- Record density: 1600 bytes per inch
- Rewind Speed: 200 ips
- Rewind time (2400 feet): 2.6 minutes
- Reel capacity: 30 MB (2K blocks)

IBM 8809 Magnetic Tape Unit Typical Configurations



*Required if additional drives (Models 2 and 3) are attached.

This is the end of the technical overview. You may continue with:

- *Distributed Processing Programming Executive General Information*, GC27-0440
- *Distributed Processing Programming Executive/System Product General Information*, GC23-0600
- *Distributed Processing Control Executive General Information*, GC22-9075
- *Distributed Office Support Facility General Information*, GC27-0546

Glossary

This glossary includes terms and definitions from the *IBM Vocabulary for Data Processing, Telecommunications, and Office Systems*, GC20-1699.

A

ACV. Address control vector.

adapter. In 8100, hardware that is generally required to transfer data and commands between the processor and an I/O device.

address control vector (ACV). In 8100, the formatted information used to control dynamic address relocation (DAR) and the activation of dynamic address translation (DAT).

address limit. In 8100, the field of an address control vector (ACV) that designates the maximum logical address in a logical address space. It is used to check the validity of a logical address during dynamic address relocation (DAR).

adjunct register. In 8100, a 32-bit register used as storage for an address control vector (ACV), an Exception Block Index (EBI) register, or a protection key; only the low-order 16 bit positions are available to the program.

adjunct register set. In 8100, a set of eight adjunct registers located consecutively in the adjunct register group.

A/FE. IBM World Trade Americas/Far East Corporation.

application program. (1) A program written for or by a user that applies to a particular application. (2) In data communications, a program used to connect and communicate with terminals in a network, enabling users to perform application-oriented activities.

assembler. A computer program for (1) translating programs expressed in an assembly language into a machine language and (2) linking subroutines.

B

binary synchronous communications (BSC). Communications using binary synchronous transmission, that is, data transmission in which synchronization of characters is controlled by timing signals generated at the sending and receiving stations.

bpi. Bits per inch.

BPI. Bytes per inch.

BSC. Binary synchronous communications.

C

CCITT. Consultative Committee on International Telephone and Telegraph

CCITT V.35 feature. In 8100, a feature that allows devices using the V.35 interface to be attached to the system.

channel control vector (CHCV). In 8100, the formatted information that specifies the controlling parameters, such as the channel I/O command, used during a channel I/O operation.

channel I/O (CHIO) operation. In 8100, the transfer of data between main storage and an I/O device. The operation consists of one or more channel I/O burst operations.

channel pointer (CHP). In 8100, the principal register, containing the logical address used during a channel I/O (CHIO) operation.

channel request. In 8100, a signal from an adapter indicating that the adapter is requesting permission to start a channel I/O (CHIO) operation.

channel request priority. In 8100, logic in the system control facility (SCF) that establishes the priority of I/O adapter channel requests according to one of three priority chains, and to the setting of four switches on the secondary control facility (SSCF) to which an adapter is attached.

CHCV. Channel control vector.

CHIO. Channel I/O operation.

communications facility. Anything used or available for use in furnishing data communications service.

communications ports. A set of hardware communications features that are dedicated to a single data channel (data-link or directly attached loop) for the purpose of receiving data from or transmitting data to one or more external devices. A port is physically identified to a two-digit number at the time a FAC is ordered for an 8100 unit.

condition indicators. In 8100, the four bits in a program status vector (PSV) that reflect the result of a previous arithmetic, logical or I/O operation.

configuration. The collection of programs and devices that make up a particular data processing system.

control unit. A device that controls input/output operations at one or more devices.

controller. A device that directs the transmission of data over the data links of a network; its operation may be controlled by a program executed in a processor to which the controller is connected or it may be controlled by a program executed in the device.

CSU. Customer setup.

D

DAT. Dynamic address translation.

data base. A collection of data fundamental to a system or enterprise.

data circuit terminating equipment (DCE). The equipment installed at the user's premises that provides all the functions required to establish, maintain, and terminate a connection, and the signal conversion and coding between the data terminal equipment (DTE) and the line.

data link. The physical connection and the connection protocols between units that exchange data over a communications line.

data-link-attached loop. In 8100, a data communications transmission loop used to attach I/O devices to the system by a data link facility rather than directly by cables. Contrast with *directly attached loop.*

Data-phone* Digital Service. A service leased from Bell Telephone to allow the use of their digital data service communications facility.

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) (SC1) In data communications, a combination of data transmission signaling equipment and a telephone set in one functional unit. (3) In DPCX, a collection of related records in a prescribed arrangement and described by control information to which DPCX has access.

data terminal equipment (DTE). The part of a data station that serves as a data source, data sink, or both, and provides for the data communication control function according to protocols.

data transmission interface. (SC1) A shared boundary defined by common physical interconnection characteristics, signal characteristics, and functional characteristics of the interchange circuits.

digital data service adapter feature. In 8100, a feature that allows the system to be connected to a Data-phone* digital service network.

direct access. (ISO) The facility to obtain data from a storage device, or to enter data into a storage device, in such a way that the process depends only on the location of that data and not on a reference to data previously accessed.

direct connect. In 8100, the attachment of another 8100 system, terminal, or other I/O device through a selected communications interface and a limited-length cable. No modem is required.

directly attached loop. In 8100, a loop that connects to the loop adapter by cables, rather than through a data-link facility, and allows attachment of a variety of I/O devices. Contrast with *data-link-attached loop.*

disk storage. In 8100, a fixed-disk file that, through different combinations of head options, can have variable byte capacities.

diskette drive. In 8100, a generic term for *diskette 2D drive.*

**Trademark of American Telephone &Telegraph Co.*

diskette 1. A generic term for any diskette that is the medium for recording single density information on one physical side. See *IBM Diskette 1.*

diskette 2. A generic term for any diskette that is the medium for recording single density information on both physical sides. See *IBM Diskette 2.*

diskette 2D. A generic term for any diskette that is the medium for recording double density information on both physical sides. See *IBM diskette 2D.*

diskette 2D drive. In 8100, a diskette drive that can read and write double density information on both sides of an IBM diskette 2D or equivalent, and single density information on one side of an IBM diskette 1 or equivalent.

Display and Printer Attachment feature. In 8100, hardware and control logic that allows the connection of selected I/O devices to system units by coaxial cable.

distributed data processing. Data processing in which some or all of the processing, storage, control, input, and output functions are situated in different places and connected by transmission lines.

Distributed Office Support Facility (DOSF). An IBM program product for text processing and paperwork management in the 8100 system. It runs under the Distributed Processing Control Executive (DPCX) operating system.

Distributed Processing Control Executive (DPCX). An operating system for the 8100 system.

Distributed Processing Programming Executive (DPPX). A comprehensive collection of program products that make up an operating system for 8100 system hardware. DPPX includes the DPPX Base and other licensed programs that provide programming languages, application support, and host network access.

Distributed Processing Programming Executive/System Product (DPPX/SP). A program product that schedules and supervises the execution of programs written for the 8100 system. Along with associated program products, DPPX/SP forms an interactive operating system for running application programs on 8100 computers.

distributed system. A data processing system in which processing, storage, and control functions, in addition to input and output operations, are distributed among remote locations.

DOSF. Distributed Office Support Facility.

DPCX. Distributed Processing Control Executive.

DPPX. Distributed Processing Programming Executive.

DPPX/SP. Distributed Processing Programming Executive/System Product.

dual program status vectors. In 8100, the association of two program status vectors (PSVs) with each priority level, used to facilitate the definition of both an application program and a supervisory program on a single priority level.

duplex. (1) In data communication, pertaining to a simultaneous two-way independent transmission in both directions. (2) contrast with *half duplex.*

dynamic address relocation. In 8100, the mapping of logical storage addresses to relocated storage addresses.

dynamic address translation (DAT). In 8100, the mapping of relocated storage addresses to real storage addresses.

E

error correction coding (ECC). Main storage hardware that corrects all single-bit errors, some double-bit errors, and, depending on processor model, detects multiple bit errors.

EBI. Exception Block Index

EIA. Electronic Industries Association

EIA/CCITT V.24 feature. In 8100, a feature that allows devices using the EIA/CCITT V.24 interface to be attached to the system.

E/ME/A. IBM World Trade Europe/Middle East/Africa Corporation.

Exception Block Index. In 8100, 15 registers, each associated with a PSV/ACV pair and used during dynamic address translation. The EBI is used to store the block (translation block) index of the address in error when an access or separation exception occurs during a main storage operation.

expanded function operator panel. In 8100, a panel that permits the user to alter, display, and control various areas of the processor unit and storage.

external modem. A modem that is separate from the unit with which it operates. Contrast with *integrated modem.*

F

FAC. See *Features for Attaching Communications.*

feature. A specific design addition to an IBM product, quoted by the IBM sales manual, that can be ordered separately.

Features for Attaching Communications (FAC). A term that designates a type of communications capability available on the 8100 system. Each type of communications capability (including directly attached loops) is identified by a two-digit FAC number.

floating-point register. In 8100, a 64-bit register used for floating point operations.

floating-point register set. In 8100, a set of four floating-point registers located consecutively in the floating-point register group.

floating-point status vector (FSV). In 8100, the formatted information used to allocate floating-point registers, to control exception masking, to control precision, and to hold and indicate floating-point check and program-exception conditions related to floating-point operations.

FSV. Floating-point status vector.

G

general register. In 8100, a 32-bit register, in the primary or secondary register set, generally used for storage-address modification and generation, fixed-point (binary) arithmetic, and logical (boolean) operations.

H

half duplex*. (1) In data communication, pertaining to an alternate, one way at a time, independent transmission. (2) Contrast with *duplex.*

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hardware. Physical equipment used in data processing, as opposed to computer programs, procedures, rules, and associated documentation. Contrast with *software.*

host (or host computer). The central or controlling processing unit in a configuration with more than one processing unit. For the 8100 system, a host is either a 4300 system or System/370.

I

IBM diskette 1. A flexible diskette that is the medium used to record single density information on one physical side. Synonymous with *diskette 1.*

IBM diskette 2. A flexible diskette that is the medium used to record single density information on both physical sides. Synonymous with *diskette 2.*

IBM diskette 2D. A flexible diskette that is the medium used to record double density information on both physical sides. Synonymous with *diskette 2D.*

ICE. Interrupt Control Element.

initial program load (IPL). (1) The initialization procedure that causes an operating system to commence operation. (2) The process by which a configuration image is loaded into storage at the beginning of a work day or after a system malfunction.

input/output (I/O). (1) Pertaining to a device whose parts can be performing an input process and an output process at the same time. (2) Pertaining to either input or output, or both.

I/O. Input/Output.

instruction address. In 8100, the logical address that is used to fetch an instruction.

integrated modem. A modem that is an integral part of the device with which it operates. Contrast with *external modem*

interface*. A shared boundary. An interface might be a hardware component to link two devices or it might be a portion of storage or registers accessed by two or more computer programs.

interrupt request. In 8100, a request for processing on a particular priority level. It may be generated by the active program, the processing and control element, or an I/O device.

IO. Input/Output (byte) instruction.

I/O. Input/output.

I/O interrupt request vector (IOIRV). In 8100, the formatted information used to generate an interrupt request generated by an I/O device.

IOH. Input/Output (halfword) instruction.

IOI. Input/Output (byte, immediate) instruction.

IOIRV. I/O interrupt request vector.

IPL. Initial program load.

K

Kanji. The Japanese pictographic script.

keylock feature. In 8100, a processor feature that prevents unauthorized system access by means of a three-position, key-operated switch.

L

licensed program. Any separately priced program that bears an IBM copyright and is offered to customers under the terms and conditions of the Agreement for IBM Licensed Programs.

line discipline. A set of rules for the orderly transfer of data from one location to another using communications facilities. In 8100, the line disciplines used are synchronous data link control (SDLC), binary synchronous communications (BSC), and start-stop (SS).

link protocol. The set of rules by which a logical data link is established, maintained, and terminated, and by which data is transferred across the link. It includes the format by which it is interpreted in order to transmit data across the link.

lobe. In 8100, one of two segments of a directly attached loop.

logical address. In 8100, the storage address that is either supplied to or by a program during the fetching and execution of an instruction, or is used in a channel pointer during a channel I/O (CHIO) operation. Contrast with *relocated address.*

logical address space. In 8100, the set of logical addresses numbered sequentially from zero to one less than the address limit. See also *address limit.*

loop. A closed electrical signal path connecting multiple I/O devices to the system. In the 8100 system, an arrangement consisting of 8100 Information System control units and displays connected directly or by data links to the processor.

loop adapter. In 8100, circuitry that allows devices using a directly attached loop to communicate with the system.

loop station connector (LSC). In 8100, loop hardware used to attach an I/O unit or a controller to a loop.

loop wiring concentrator (LWC). In 8100, loop hardware that provides for the attachment of a cluster of I/O units to a loop without having a large number of drops on the loop cable.

LSC. Loop station connector.

LWC. Loop wiring concentrator.

M

magnetic disk. A flat, circular plate with a magnetizable surface layer on which data can be stored by magnetic recording.

magnetic tape. A tape with a magnetic surface layer on which data can be stored by magnetic recording.

main storage. Program-addressable or channel-I/O-addressable storage from which instructions and other data can be loaded directly into registers for subsequent execution or processing.

modem* (modulator-demodulator). (1) A device that modulates and demodulates signals transmitted over data communications facilities. (2) In 8100, a modem is required at each end of a data link in an analog network. After data has been serialized by a control device, a modem converts (modulates) the binary signals to audio-frequency signals for transmission over communications lines and reconverts (demodulates) the signals at the other end.

multipoint connection. A connection established between three or more data stations. The connection may include switching facilities.

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multispeed clock. In the 8100 system, a speed-variable feature that allows up to 16 telecommunications lines to be connected to the system.

N

network. (1) The assembly of equipment through which connections are made between terminal installations. (2) In data communications, a configuration in which two or more terminal installations are connected. (3) The interconnection of electrical components.

node. In 8100, a junction point in a network, represented by a physical unit.

nonswitched line. A communication line permanently connecting a local data station to a remote data station. Contrast with *switched line.*

O

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

operator panel (OP). In 8100, a display control panel that enables the user to input information, display system status, control powering and IPL, control panel access, and override normal IPL parameters.

P

PCE. Processing and Control Element.

peer. In network architecture, any functional unit that is in the same layer as another entity.

PIO. Programmed I/O. See *programmed I/O operations.*

point-to-point connection. A connection established between two data stations for data transmission. The connection may include switched facilities.

port. (1) A functional unit of a node through which data can enter or leave a data network. (2) In DPPX, the shared boundary between I/O layers. See *communications ports.*

principal register. In 8100, a 32-bit register used as a general register, as storage for half of a program status vector (PSV), or for storage of a channel pointer.

principal register group. In 8100, all principal registers available to the processor.

principal register set. In 8100, a set of eight principal registers located consecutively in the principal register group.

priority level. In 8100, a number ranging from 0 to 7, that designates a relative precedence among interrupt requests, such that processing on one level may be temporarily suspended when an interrupt request is generated for a level of higher priority (lower number).

processing and control element (PCE). In the 8100 Information System, the part of the processor that contains the sequencing and processing controls for instruction execution, interruption control, dynamic address translation, and other control and processing functions.

processor. In a computer, a functional unit that interprets and executes instructions.

processor storage. See *main storage.*

program. (1) A series of actions designed to achieve a certain result. (2) Loosely, a routine. (3) (ISO) To design, write and test computer programs. (4) Loosely, to write a routine.

program mode (PM). In 8100, the field in a program status vector (PSV) that controls which instructions may be executed by the associated program.

program product. A type of licensed program.

program status vector (PSV). In 8100, the formatted information used to control the order in which instructions are executed, to allocate general registers, and to hold and indicate the status of the central processing unit in relation to a particular program.

programmed I/O (PIO) operation. The transfer of data between the processor and an I/O device as part of the execution of an I/O instruction. The I/O instruction designates the address of the I/O device, the command to be performed, and the processor register location into of from which the data is transferred.

protection key. One of 80 8-bit registers associated with a PSV/ACV and CHP/ACV pair and used with the 8-bit translation lock to access addresses within that 2K-byte block. See *translation lock.*

protocol. In SNA, the meanings of, and the sequencing rules for, requests and responses used for managing the network, transferring data, and synchronizing the states of network components.

PSV. Program status vector.

R

RAS. Reliability, Availability, Serviceability

real address. In 8100, the address of a physical main storage location.

register. A storage device, having a specified storage capacity such as a bit, a byte, or a computer word, and usually intended for a special purpose.

relocated address. In 8100, the address in the PCE address space that is derived during dynamic address relocation (DAR) by concatenating the high-order bits of the address base with the low-order bits of the logical address.

remote job entry (RJE). Submission of a job through an input unit that has access to a computer through a data link.

RJE. Remote job entry.

S

SDLC. Synchronous data link control.

SDLC communications feature. In 8100, this feature allows system connection to a variety of devices that use synchronous data link control (SDLC) facilities. It also provides for attachment of loop facilities through the loop adapter.

SNA. Systems Network Architecture.

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

SS. See *Start-stop transmission.*

stand-alone. Pertaining to operations that are independent of another device, program, or system.

stand-alone data processing system. A data processing system that is not served by communications facilities.

start-stop (SS) transmission. Asynchronous transmission such that a group of signals representing a character is preceded by a start element and is followed by a stop element.

storage. (1) The action of placing data into a storage device. (2) The retention of data in a storage device. (3) A storage device.

subroutine. (1) A sequenced set of statements that may be used in one or more computer programs and at one or more points in a computer program. (2) * A routine that can be part of another routine.

subsystem support program. A generic name for any program that is part of the Subsystem Support Services. A subsystem support program is executed in the host system.

switched line. A communication line in which the connection between a local data station and a remote data station is established through an exchange by dialing a telephone set. Contrast with *nonswitched line.*

synchronous data link control (SDLC). A discipline for managing synchronous, transparent, serial-by-bit information transfer over a communications channel. Transmission exchanges may be duplex or half-duplex over switched or nonswitched data links. The communications channel configuration may be point-to-point, multipoint, or loop.

system. In data processing, a collection of people, machines, and methods organized to accomplish a set of specific functions.

systems network architecture (SNA). The total description of the logical structure, formats, protocols, and operational sequences for transmitting information units through the communications system. Communications system functions are separated into three discrete areas: the application layer, the function management layer, and the transmission subsystem layer. The structure of SNA allows the ultimate origins and destinations of information—that is, the end user—to be independent of, and unaffected by, the specific communications system services and facilities used for information exchange.

T

translation lock. An 8-bit lock associated with each 2K-byte block of logical storage.

translation control bit. In 8100, the bit in an address control vector (ACV) used to activate dynamic address translation (DAT).

translation table. In 8100, the table that correlates relocated addresses with real addresses during dynamic address translation (DAT).

translation-table entry. In 8100, an entry in the translation table that contains access control information and the block address associated with a 2048-byte block of physical main storage.

U

user. A person requiring the services of a computer system.

W

work station. (1) A configuration of input/output equipment at which an operator works. (2) A station at which a person can send data to or receive data from a computer for the purpose of performing a job.

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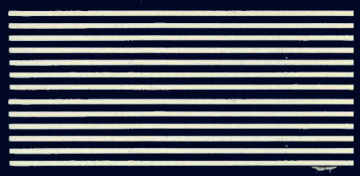

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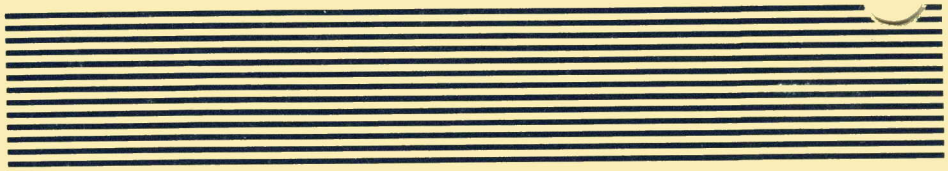

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