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IBM 1130 System Summary

The System Summary presents a brief introduction to the IBM 1130 Computing System, including system concepts, components, and programming systems. Intended as a general, overall picture of the 1130, the manual helps the reader gain a basic understanding of the system and its use.

Sixth Edition

This is a revision of and makes obsolete the previous edition (A26-5917-4). The new material added concerns the IBM 1131 Central Processing Unit, the IBM 1133 Multiplex Control Enclosure, the IBM 1442 Card Punch, the IBM 2501 Card Reader, the IBM 1403 Printer, the IBM 2310 Disk Storage, the IBM 1231 Optical Mark Reader, and the IBM Synchronous Communications Adapter.

Specifications contained herein are subject to change from time to time. Any such change will be reported in subsequent revisions or Technical Newsletters.

The illustrations in this manual have a code number in the lower corner. This is a publishing control number and is not related to the subject matter.

Copies of this and other IBM publications can be obtained through IBM Branch Offices.

This manual was prepared by the IBM Systems Development Division, Product Publications, Dept. 455, Bldg. 014, San Jose, California 95114. Send comments concerning the contents of this manual to this address.

CONTENTS

The IBM 1130 Computing System provides the capacity and versatility to accomplish the engineering and scientific computations that formerly were possible only with large computer systems. The 1130 fulfills the "general purpose" requirements of these areas with computing power well above previous systems in the same cost range. The 1130 Computing System can also handle supporting commercial data processing applications.

The design of the 1130 System is oriented to the operator. Only a minimum of training and experience with computing systems is necessary to make the 1130 usable by engineering and research personnel for solving problems in individual projects. In addition, IBM relieves the user of detailed programming and provides for the statement of problems in familiar language.

The compact, easily operated 1130 System features the IBM 1131 Central Processing Unit (CPU) with core storage capacity ranging from 4,096 to 32,768 sixteen-bit words. The core storage cycle time is 2.2 or 3.6 microseconds to access a full word of storage.

The Single Disk Storage feature of the Model 2 and Model 3 provides an additional 512,000 words of on-line storage in a removable disk cartridge. In addition to the Single Disk Storage, the 1130 System features the IBM 2310 Disk Storage, Model B1 or B2. The 2310 Model B1 contains one disk storage drive and the 2310 Model B2 contains two disk storage drives in a single stand-alone unit. One or two 2310 Disk Storage units may be attached to the 1130 System.

Each of the disk storage drives in the 1130 System uses the interchangeable IBM 2315 Disk Cartridge. This cartridge interchangeability provides virtually unlimited off-line storage capacity.

The basic 1130 System consists of the CPU with its integral console printer and keyboard, and either punched card or paper tape input/output.

The wide range of input/output configurations and storage capacities provide the user with the ability to tailor the 1130 System to fit his present needs and to expand the system as his needs increase.

The following features are available for the 1130 System:

- Core storage capacity is designated by a letter following the 1131 model number; A = 4k, B = 8k, C = 16k, and D = 32k.
- Core storage access cycle time of either 2.2 or 3.6 microseconds.
- Paper tape input/output with the IBM 1134 Paper Tape Reader and the IBM 1055 Paper Tape Punch.
- Punched card input/output with the 1442 Card Read Punch Model 6 or 7 or the high-speed IBM 2501 Card Reader Model A1 or A2 and the IBM 1442 Card Punch Model 5.
- Printed output with the IBM 1132 Printer or high-speed printed output with the IBM 1403 Printer, Model 6 or 7.
- Document reading with the IBM 1231 Optical Mark Page Reader.
- On-line high-speed storage with the Single Disk Storage Drive and the IBM 2310 Disk Storage.
- Graphic documentation with the IBM 1627 Plotter.
- Communication with external devices with the Storage Access Channel.
- Communication with remote systems or devices with the Synchronous Communications Adapter.

The following sections of this manual present summary descriptions of the components of the IBM 1130 Computing System and the associated programs and programming systems. The publication, IBM 1130 Computing System Bibliography (Form A26-5916) contains a list of publications that present more detailed operating and programming information on each part of the system.

IBM 1131 CENTRAL PROCESSING UNIT, MODELS 1, 2, AND 3

IBM 1131 CPU Model 1

The 1131 Model 1 (Figure 1) provides the user with either 4,096 or 8,192 sixteen-bit words of 3.6 microsecond core storage. A versatile, extensive console presents to the operator displays that show the data in the various registers, counters and other storage areas of the machine. Switches provide for control of the operation and entry of data. Data can also be entered from the console keyboard. The console printer provides printed output of data in core storage.

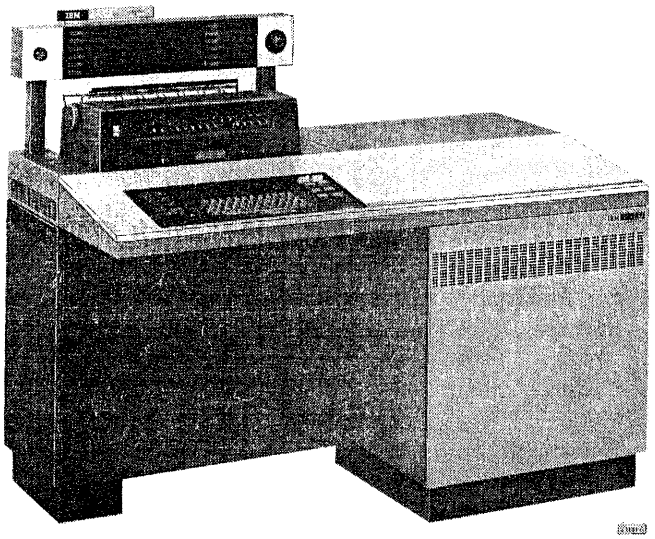

Figure 1. IBM 1131 Central Processing Unit

IBM 1131 CPU Model 2

Model 2 of the 1131 CPU has all of the features of the Model 1 plus 16k or 32k words of core storage and a Single Disk Storage Drive. Single Disk Storage is an auxiliary storage device for the 1130 System. Housed in the CPU enclosure, Single Disk Storage consists of a single disk drive and a removable disk cartridge. Capacity of the removable IBM 2315 Disk Cartridge is 512,000 sixteen-bit words. The data transfer rate is 36,000 words per second, or 27.8 microseconds (μsec) per word. The removable disk cartridge provides for data and program routines to be put on-line and called into core storage as needed.

(Note: The 2315 Disk Cartridge is also used with the IBM 2310 Disk Storage. Refer to IBM 2310 Disk Storage section of this manual.)

IBM 1131 CPU Model 3

Model 3 of the 1131 CPU provides all the features of the Model 2 with 2.2 microsecond core storage cycle time. Either 8,192 or 16,384, or 32,768 words of core storage are available.

Core Storage

The core storage of the Model 3 (2.2 μsec) is located in a special enclosure attached directly to the 1131 CPU (Figure 2). When the Model 2 has greater than 8,192 words, the core storage is also located in this enclosure.

The core storage words are individually addressable or may be coupled and operated upon as double (32-bit) words. Data is recorded and processed in fixed-point binary form. The largest positive number is $2^{31}-1$; the largest negative number is -2^{31}.

Instructions

The 1131 instruction set consists of 29 discrete instructions. A single word or double word instruction format is used to give the CPU added flexibility. Instructions fall into five categories: load and store, arithmetic and logic, shift, branch, and input/output. Three index registers and indirect addressing facilities are available for programming use.

Storage Access Channel

The Storage Access Channel (SAC) provides a means for external devices or systems to communicate directly with the 1131 CPU core storage. Communication with core storage from an external device is on either a cycle-steal or an interrupt basis, and is initiated by the external device when it is ready to communicate. The IBM 1133 Multiplex Control Enclosure attaches to the SAC and provides the

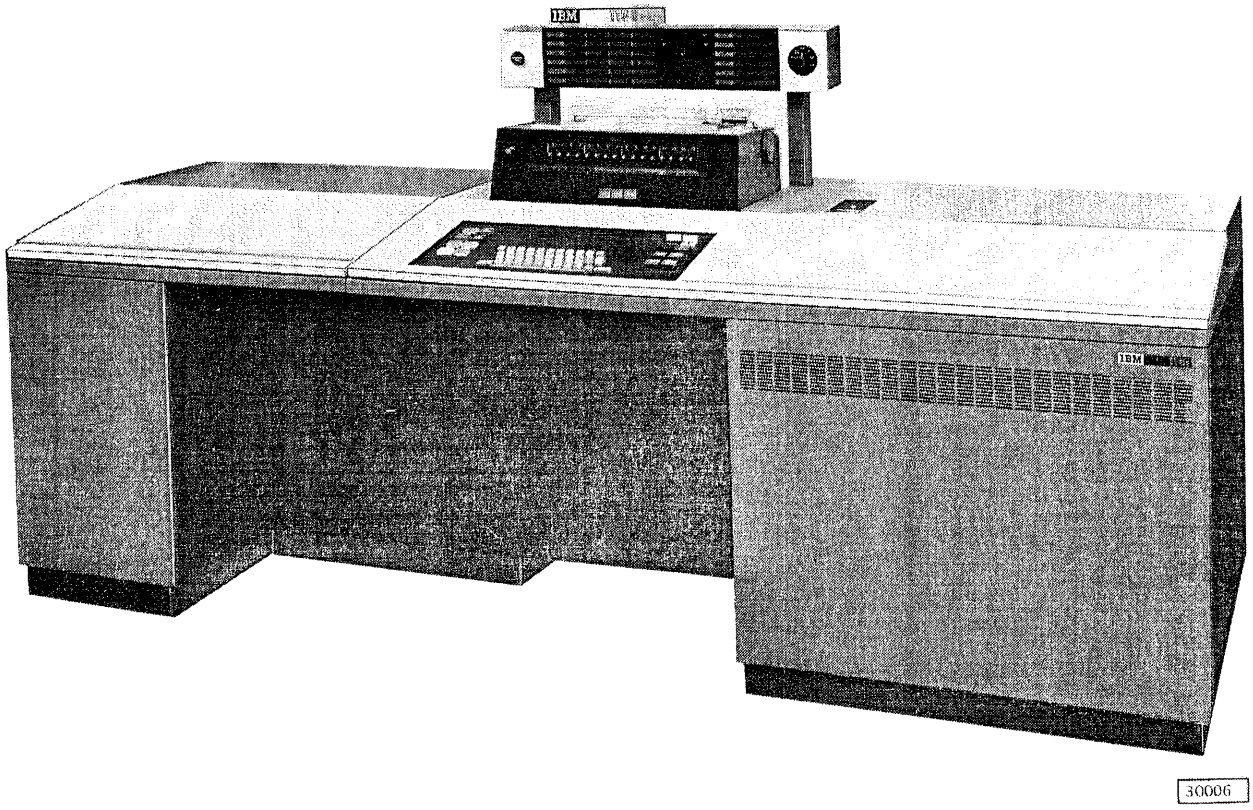

Figure 2. IBM 1131 Central Processing Unit, with Core Storage Enclosure for Models 2C, 2D, 3B, 3C and 3D

optional Storage Access Channel II to provide a similar facility to systems which have the 1133 attached.

Interrupt

The interrupt operation of the 1130 System allows each input/output device to operate at a maximum speed consistent with the programmed operation and makes the CPU available except during the actual transmission of data.

To request service, a device signals the CPU on one or more of the six interrupt levels. Each level has an established priority. If a higher priority device is not being serviced, the device requesting service will interrupt the program long enough to execute the requested service.

The number of interrupt levels for any given system depends upon the configuration of the system.

Cycle Steal

High-speed data channels that transmit data to and from the CPU on a cycle-steal basis are used to operate the 2501 Card Reader, 1403 Printer, and all disk storage drives.

Cycle stealing should not be confused with interrupt. A device using the cycle-steal method does not interrupt the program to transfer data; it steals one cycle from the instruction being executed and transfers a character directly into or out of core storage without control of the CPU.

This type of operation requires less CPU time than would otherwise be required to service the above devices.

IBM 1133 MULTIPLEX CONTROL ENCLOSURE

The 1133 Multiplex Control Enclosure (Figure 3) provides a communication path between external units or systems and the 1131 CPU. Units of the 1130 System that require the 1133 are:

1. The IBM 1403 Printer Model 6 or Model 7
2. The IBM 2310 Disk Storage Model B1 or Model B2

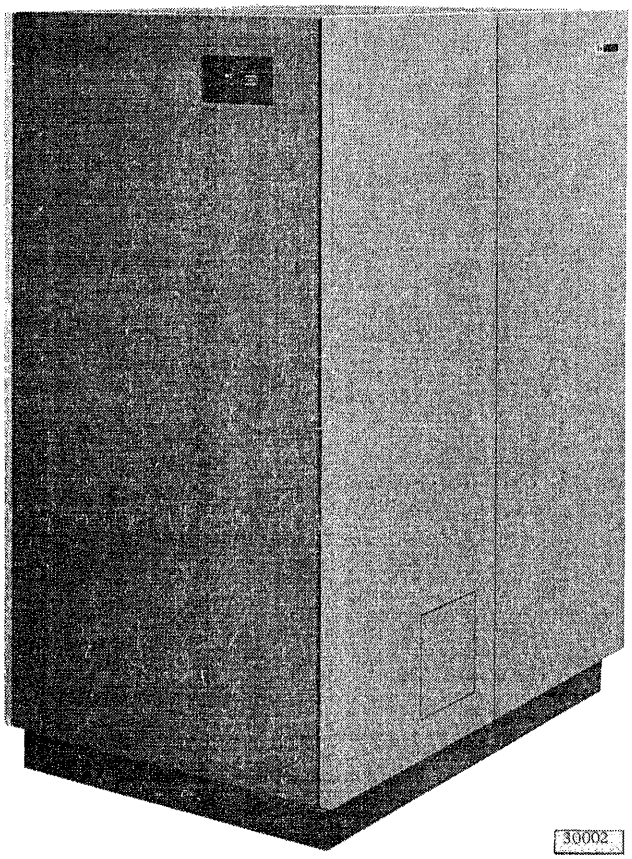

Figure 3. IBM 1133 Multiplex Control Enclosure

IBM 1442 CARD READ PUNCH

The IBM 1442 Card Read Punch Model 6 and Model 7 (Figure 4) provides serial reading and punching of cards for the 1130 System.

The rated speeds of the two models attached to the 1130 System are:

Model 6:
- Read - 300 cards per minute
- Punch - 80 columns per second

Model 7:
- Read - 400 cards per minute
- Punch - 160 columns per second

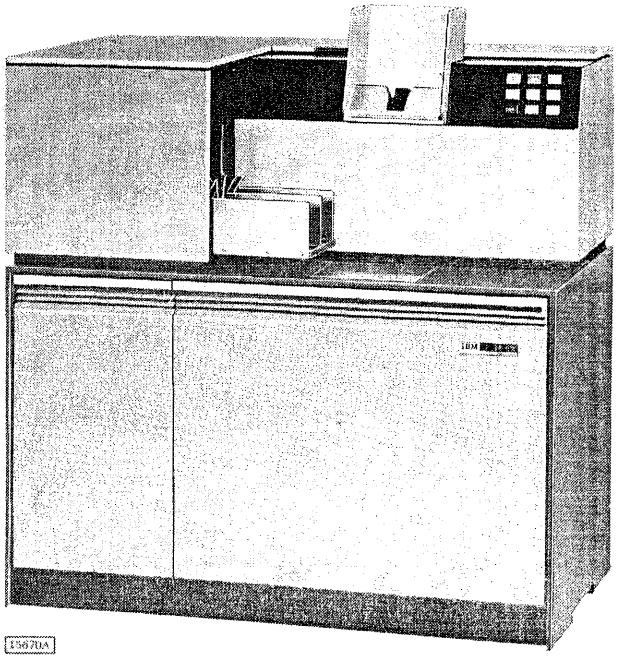

Figure 4. IBM 1442 Card Read Punch

IBM 1442 CARD PUNCH

The IBM 1442 Card Punch Model 5 provides serial punching of cards at 160 columns per second for the 1130 System. The Model 5 may be attached to an 1130 System in place of a 1442 Model 6 or Model 7.

The 1442 Model 5 Card Punch and the 2501 Card Reader provide a separate card path for the overlap of card reading and punching.

IBM 2501 CARD READER

The IBM 2501 Card Reader (Figure 5) provides the 1130 System with high-speed card input.

The IBM 2501 Model A1 reads punched cards at a maximum rate of 600 cards per minute (cpm); the Model A2 reads at a maximum rate of 1,000 cpm.

The IBM 1442 Model 5 Card Punch is the companion unit to the 2501 Card Reader. However, the 1442 Model 6 or 7 may be attached in place of the

Model 5. In such a configuration the 2501 will be considered the primary card input unit.

Figure 5. IBM 2501 Card Reader

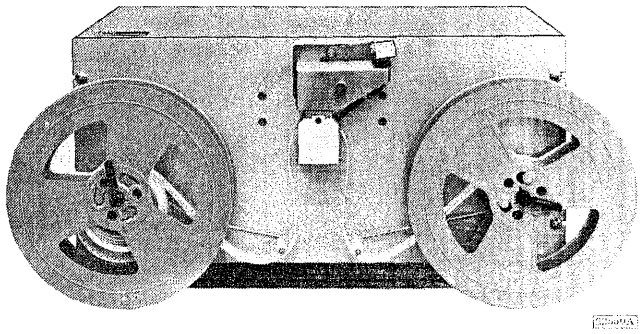

Figure 6. IBM 1134 Paper Tape Reader

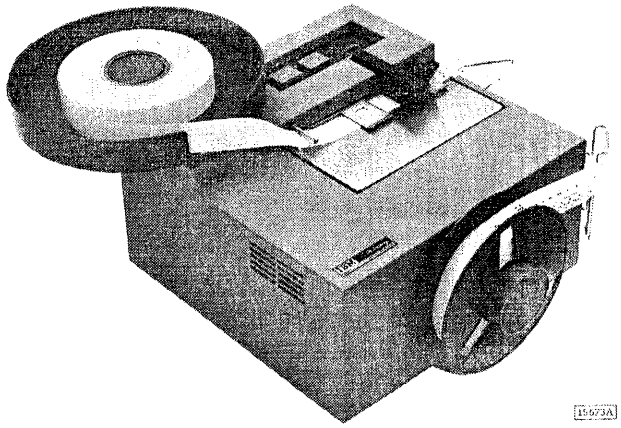

Figure 7. IBM 1055 Paper Tape Punch

IBM 1134 PAPER TAPE READER

The IBM 1134 Paper Tape Reader (Figure 6) is a compact, self-contained device capable of reading perforated tape at speeds up to 60 characters per second. The 1134 dynamically senses the presence of holes in the tape, thus ensuring positive identification of characters. Tape motion and tape reading are controlled by the operating program.

Each punched character is read into one addressed core storage location. Translation of the character code placed in core storage is accomplished through the programming.

IBM 1055 PAPER TAPE PUNCH

The 1055 Paper Tape Punch (Figure 7) punches one-inch, eight-channel paper tape at the rate of 14.8 characters per second. Data is punched as an image of the data in core storage on a character-to-character basis.

IBM 1132 PRINTER

The 1132 Printer (Figure 8) operates as an on-line output unit. The printer is equipped with a tape-controlled carriage for transporting continuous paper forms. Alphameric data is printed at the rate of 80 lines per minute, whereas consecutive all-numeric lines of data are printed at the rate of 110 lines per minute. The print line is 120 characters in length. All printing and carriage operations are under control of the central processing unit program.

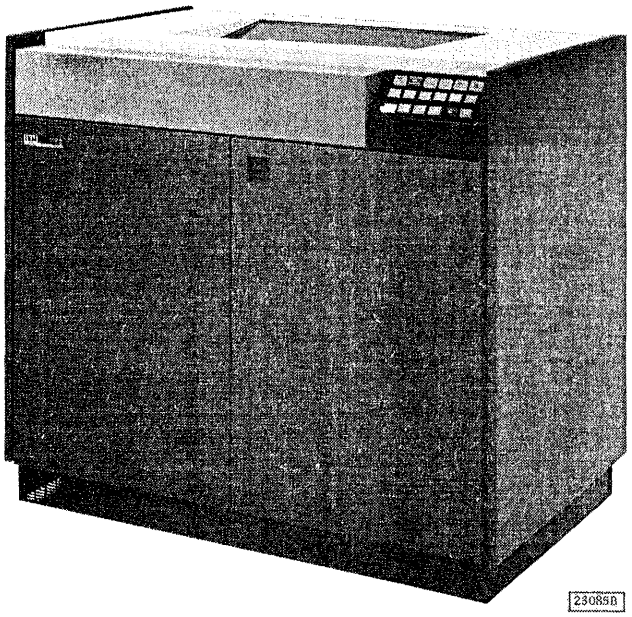

Figure 8. IBM 1132 Printer

IBM 1403 PRINTER

The IBM 1403 Printer (Figure 9) provides high-speed on-line printing capabilities for the IBM 1130 Computing System. Two Models are available for attachment to the 1130 System through the facilities of the 1133.

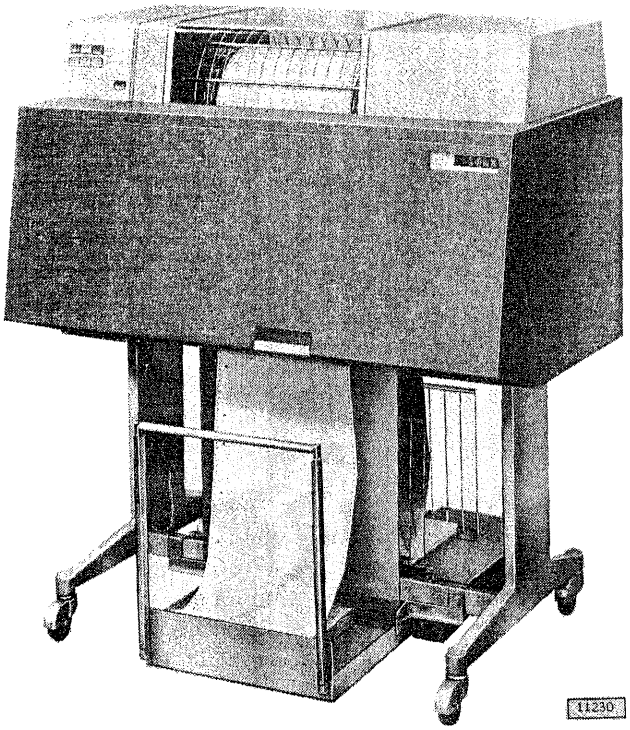

Figure 9. IBM 1403 Printer

The IBM 1403 Printer Model 6 has 120 print positions and prints a maximum rated speed of 340 lines per minute (lpm). The type HN chain is standard and has a 48-character printing set.

The IBM 1403 Printer Model 7 is identical to the Model 6 with the exception of speed. The Model 7 has a maximum rated speed of 600 lines per minute.

Two special features are available for either the Model 6 or the Model 7:

1. Auxiliary Ribbon Feeding Feature, Number 1370.
2. Interchangeable Chain Cartridge Adapter, Number 4740.

IBM 2310 DISK STORAGE

The IBM 2310 Disk Storage Model B1 or Model B2 (Figure 10) provides the 1130 System with random-access storage up to a maximum of 2,048,000 sixteen-bit words on line in addition to the Single Disk Storage Drive in the CPU. One or two 2310s (containing up to two disk storage drives each) can be attached to the 1130 System through the Channel Multiplexer in the 1133. The 2310 Model B1 consists of a housing that contains a single disk storage drive and space for an additional disk storage drive. The 2310 B2 contains two disk storage drives.

The disk storage recording medium is an oxide-coated disk in an interchangeable 2315 Disk Cartridge.

The 2310 Disk Storage is divided into 200 cylinders of two tracks each, one track on the upper surface and one track on the lower surface. Each track is divided into four sectors (321 words each) for ease of block handling. The disk cartridge has a capacity of 512,000 sixteen-bit words. The data transfer rate is 720,000 bits per second, or 36,000 words per second.

The access mechanism has two heads, one for each side of the disk. The access time to move from one cylinder to the adjacent cylinder or two adjacent cylinders is 15 milliseconds (ms). A movement of 20 cylinders therefore requires 150 ms. An additional delay of about 20 ms is required to allow the carriage to stablize itself before reading or writing can begin.

IBM 1627 PLOTTER

The 1627 (Figure 11) is an incremental plotter that provides the user with a means of converting tabulated digital information into graphic form. Two models are available for attachment to the 1130 System.

Model 1 – Plotting Area: 11 inches by 120 feet
Increment: 1/100 inch steps at 300 steps per second
Model 2 – Plotting Area: 29-1/2 inches by 120 feet
Increment: 1/100 inch steps at 200 steps per second

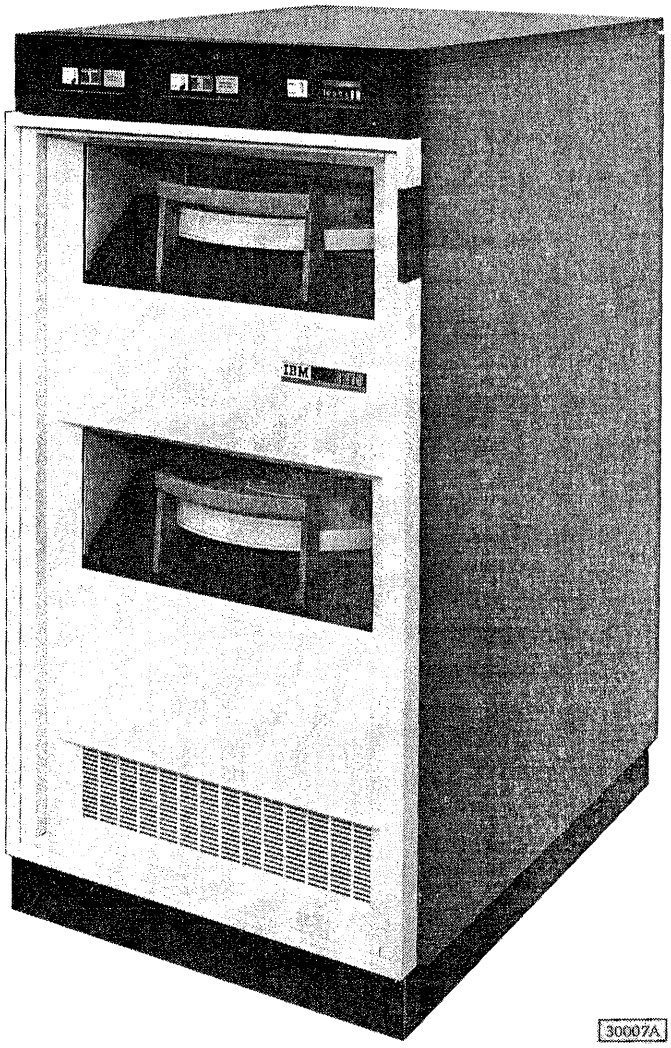

Figure 10. IBM 2310 Disk Storage

IBM 1231 OPTICAL MARK PAGE READER

The 1231 Optical Mark Page Reader (Figure 12) provides the 1130 System with low-cost mark reading capabilities.

The 1231 reads positional marks made by an ordinary lead pencil on an 8-1/2 by 11 inch paper document. Collection of these marks is controlled by the 1231, and the marks are available to the 1130 as one segment or two segments depending upon the programmed delay line storage in the Optical Mark Page Reader.

The 1231 has a rated speed of 2,000 documents per hour.

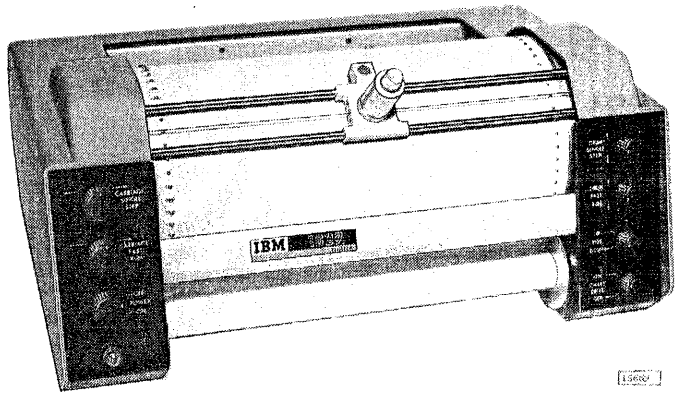

Figure 11. IBM 1627 Plotter

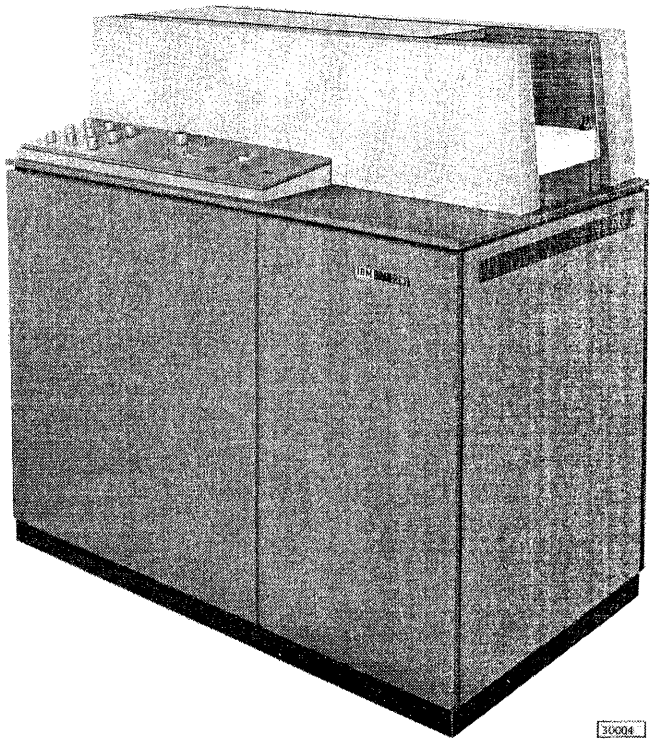

Figure 12. IBM 1231 Optical Mark Page Reader

IBM SYNCHRONOUS COMMUNICATIONS ADAPTER

The Synchronous Communications Adapter special feature enables the IBM 1130 Computing System to function as a point-to-point data transmission terminal, using either private or commercial common carrier (switched or non-switched) line transmission facilities. The adapter sends data to or receives data from the line transmission facilities under control of the stored program in the 1130. It operates on an interrupt-request basis similar to that used by other input/output devices in the 1130 System.

The Synchronous Communications Adapter (SCA) provides data interchange between remote locations and a central data-processing location. It provides direct communication with any model of System/360 which has the IBM 2701 Data Transmission Unit attached or System/360 Model 20 which has the Communications Adapter Feature. The SCA also provides communication with Synchronous Transmit-Receive (STR) devices such as the IBM 1009 Data Transmission Unit, the IBM 7701 and 7702 Magnetic Tape Transmission Terminals, the IBM 1013 Card Transmission Terminal, and the IBM 7710 and 7711 Data Communication Units, as well as other 1130 Systems.

All character coding is controlled by the stored program and is based on a character length of eight bits. Therefore, any character set which is recognized by both the transmitting terminal and the receiving terminal can be used.

The SCA operates in half-duplex mode using either two-wire or four-wire line transmission facilities. Data rates, selected by the operator, are 600, 1200, 2000, or 2400 baud (bits per second).

The "auto-answer" allows the programmer to control the answering of incoming calls. When the programmer desires to allow the answering of incoming calls, he issues an enable command. He may also disable the SCA by issuing a disable command.

The SCA audible alarm may be programmed to turn on to alert the operator. It may be turned off either by programming or by the operator.

IBM provides 1130 System users with a powerful set of programs and programming systems. They are specifically designed to relieve the user of much detail programming effort. Two programming systems are available for the 1130 System:

1. IBM 1130 Card/Paper Tape Programming System
2. IBM 1130 Disk Monitor System
   a. IBM 1130 Disk Monitor System, Version 1
   b. IBM 1130 Disk Monitor System, Version 2

This section presents a brief description of each programming system and its component programs.

Publications, supplying detailed information about each program, are listed in the Systems Reference Library publication IBM 1130 Computing System Bibliography (Form A26-5916).

IBM 1130 CARD/PAPER TAPE PROGRAMMING SYSTEM

This programming system is designed especially for use on an 1130 Computing System without disk storage. The following system units are supported by the IBM 1130 Card/Paper Tape Programming System.

- IBM 1131 CPU Model 1A, 1B, 2A or 2B
- IBM 1442 Card Read Punch, Model 6 or 7
- IBM 1134 Paper Tape Reader
- IBM 1055 Paper Tape Punch
- IBM 1132 Printer
- IBM 1627 Plotter
- 1131 Synchronous Communications Adapter

This programming system is comprised of four components that are available for either card or paper tape oriented 1130 systems:

- IBM 1130 Assembler
- IBM 1130 FORTRAN Compiler
- IBM 1130 Subroutine Library
- IBM 1130 Utility Routines

MACHINE REQUIREMENTS

The minimum machine configuration required for use with the IBM 1130 Card/Paper Tape Programming System includes:

1. IBM 1131 Central Processing Unit, Model 1A
2. IBM 1134 Paper Tape Reader and an IBM 1055 Paper Tape Punch or the IBM 1442 Card Read Punch, Model 6 or 7.

In addition to the machine units listed above, certain programs require other units. The additional units required are listed with the appropriate program description.

CARD/PAPER TAPE COMPONENTS

Assembler

The 1130 Assembler language permits the programmer to write (code) source programs in a symbolic language that is more meaningful and easier to use than the binary machine language. The symbolic language provides the programmer with mnemonic operation codes, special characters, and other necessary symbols. The use of symbolic labels (names) makes a program independent of actual machine locations. Unique mnemonic operation codes are included to relieve the programmer of coding the machine-language instruction modifications.

Macro instructions are included which (in conjunction with the program loaders) automatically provide linkage to the IBM supplied subroutines. The subroutines provided are listed in the Subroutine Library, which is described later.

The source program, punched in either cards or paper tape, is assembled into machine language by the 1130 Assembler. The object program is punched into the first 20 columns of the source card (by the card assembler) during the second pass of the two-pass assembler. This deck is termed the "list deck." The paper tape assembler punches the object program during the second pass of the source program.

Before the object program can be loaded into the CPU for execution, it must be acted upon by the Compressor Program. This program "compresses" the object information from several list-deck cards into one card. This deck, known as the Compressed Binary Object Program deck, can be loaded with the Relocatable Loader or it can be converted into core-image format by the Core-image Converter Program. The core-image format deck can be loaded by the Core-image Loader.

Either the Relocating Loader or the Core-image Converter Program will select (and supply the necessary linkage for) the subroutines used by the object program.

Fortran

FORTRAN (FORmula TRANslation) is a programming language that allows the engineer and scientist to utilize a computer for problem solving with only a slight knowledge of the computer and a relatively short period of training. FORTRAN is a language that is a compromise between the language of the computer and the language of the scientist and engineer. To satisfy the computer, FORTRAN statements are converted to machine language. To satisfy the engineer and scientist, as many of the detailed computer control operations as possible are eliminated from the job of writing programs, and a statement format close to that of the mathematical equation is used.

The source program, once it is punched into cards or paper tape, is compiled into an object program by the FORTRAN Compiler Program.

The object program can be loaded to core storage for execution by the Relocating Loader, or it can be changed to core-image format by the Core-image Converter Program and loaded to core storage by the Core-image Loader. The Relocating Loader or the Core-image Converter Program will select and automatically produce the linkage for the subroutines required by the object program.

Subroutine Library

The subroutines for the 1130 Computing System are a package of commonly used routines for data input/output, data conversion, and arithmetic functions. The subroutines required for operation of an object program are selected by the Relocating Loader or Core-image Converter Program when the object program is being processed.

The subroutines included in the Subroutine Library are:

Input/Output

- Card
- Disk
- Printer
- Console Keyboard
- Console Printer
- Paper Tape
- Plotter

Functional Subroutines

- Trigonometric Sine/Cosine
- Trigonometric Arctangent
- Square Root
- Logarithm (natural)
- Exponential

Arithmetic

This group includes 30 subroutines designed to augment the CPU arithmetic instructions. The subroutines perform such functions as floating-point operations for Add, Subtract, Multiply, Divide, etc. Only the subroutines required for operation of the object program are loaded to core storage during execution.

Conversion

This group includes 11 data conversion subroutines to be used to convert data from and to the various input/output codes of the I/O devices that can be attached to the system.

Additional Machine Requirements

In addition to the machine requirements previously listed for the 1130 System programs, one or more of the following units may be required for operation of the supporting subroutine. (For example, the Plotter Subroutine requires that the IBM 1627 Plotter be attached to the 1130 Computing System.)

- IBM 1132 Printer
- Disk Storage
- IBM 1627 Plotter

Utility Routines

The Utility Routines for the 1130 Computing System comprise the following:

Input/Output routine
Dump routines
Console routine
Load routines
Keyboard routine
Card Reproducting routine

The Input/Output routine performs the function of transferring information from one medium to another or to combinations of others. Input is accepted from cards or paper tape. Output can be to the Console Printer, 1132 Printer, paper tape, or card.

The Dump routines are used to output all or part of core storage to an output device, namely: card punch, Console Printer, or the 1132 Printer. Any area of core storage may be dumped; however, the first 500 words of core storage contain the dump routine itself. The output can be in either decimal or hexadecimal form.

The Console routine is a program testing aid which allows dumping of selected portions of core storage. This routine is contained in one card and requires only 80 words of core storage. All output is in hexadecimal form on the Console Printer.

The Loading routines are used to load the output of the Symbolic Assembler or the FORTRAN Compiler. The Relocating Loader accepts output directly from the compressor or compiler and loads the object program and the required subroutines to core storage for program execution.

The compressor or compiler output must be acted upon by the Core-image Converter Program before the object program can be loaded by the Core-image Loader.

The Keyboard routine is designed to assist the user in preparing source documents on cards or paper tape with the keyboard of the console typewriter. The size of the record for card output is limited to 80 characters and maximum record length for paper tape output is 3,648 characters. Cards are punched in IBM Card Code (12 bit). PTTC/8 is the output code for tape.

The Card Reproducing routine is designed to reproduce cards from 1130 Assembler source cards. This routine is extremely useful to customers who do not have off-line card-reproducing facilities. A header card is placed in front of the deck to be reproduced. The presence or absence of punched columns in the header card determines which columns in each card of the deck will be reproduced. If all 80 columns are to be punched, the maximum number of cards that can be punched at one time is 43. If only one column is to be punched, the maximum number of cards is 3500.

IBM 1130 DISK MONITOR SYSTEM

The IBM 1130 Disk Monitor System enables the user to assemble, compile, and execute programs written in either assembler language or FORTRAN. The programming system provides the ability to combine assembler language subprograms or FORTRAN subprograms into Assembled or FORTRAN compiled main programs in any combination. Jobs to be performed are stacked and separated by control records that identify the operation to be performed.

Two versions of the 1130 Disk Monitor System are described next. Version 1 utilizes the Single Disk Storage in the 1131 CPU and a limited number of features and units. The IBM 1130 Disk Monitor System, Version 2 is an expanded and improved system that will replace Version 1 and will be available for use with all disk drives and all features and units.

IBM 1130 MONITOR SYSTEM, VERSION 1

The IBM 1130 Monitor System, Version 1 is a disk-oriented programming system that utilizes the Single Disk Storage located in the 1131 CPU. The following system units are supported by the IBM 1130 Monitor System, Version 1:

- IBM 1131 CPU, Model 2A or 2B
- IBM 1442 Card Read Punch, Model 6 or 7
- IBM 1134 Paper Tape Reader
- IBM 1055 Paper Tape Punch
- IBM 1132 Printer
- IBM 1627 Plotter
- 1131 Synchronous Communications Adapter

The 1130 Monitor System, Version 1 is comprised of five components:

Supervisor Program
Disk Utility Program
Assembler Program
FORTRAN Compiler
Subroutine Library

Machine Requirements

The minimum machine configuration required for use with the IBM Monitor System, Version 1 includes:

1. IBM 1131, CPU, Model 2A
2. IBM 1134 Paper Tape Reader and an IBM 1055 Paper Tape Punch or the IBM 1142 Card Read Punch, Model 6 or 7.

Monitor Components

The Supervisor program provides the necessary control for the stacked-job concept. In other words, it reads and analyzes the control records, and transfers control to the proper program.

The Disk Utility Program is a group of routines designed to assist the user in storing information (data and programs) on the disk, and retrieving and using the information stored.

The Assembler Program converts user-written symbolic-language source programs into actual machine-language object programs.

The FORTRAN Compiler converts user-written FORTRAN-language source programs into actual machine-language object programs.

The Subroutine Library contains pre-written subroutines for data input/output, data conversion, and arithmetic functions.

The Monitor System coordinates CPU activity by establishing a common communications area in core storage which is used by the various programs that make up the Monitor System. It also guides the transfer of control between the various Monitor programs and the user's programs. Operation is continuous and setup time is reduced to a minimum, thereby effecting a substantial time saving in CPU operation and allowing greater programming flexibility.

IBM 1130 DISK MONITOR SYSTEM, VERSION 2

The IBM 1130 Disk Monitor System, Version 2 is an improved and expanded disk-oriented programming system. This system provides the capability of assembling, compiling, and executing programs for the following 1130 System units.

- IBM 1131 Central Processing Unit, Models 2A – 3D
- IBM 1132 Printer
- IBM 1134 Paper Tape Reader
- IBM 1055 Paper Tape Punch
- IBM 1231 Optical Mark Page Reader
- IBM 1403 Printer
- IBM 1442 Card Punch, Model 5
- IBM 1442 Card Read Punch, Model 6 or 7
- IBM 2310 Disk Storage
- IBM 2501 Card Reader
- 1131 Synchronous Communication Adapter

The IBM 1130 Disk Monitor System, Version 2 is compatible with the IBM 1130 Monitor System (Version 1). Programs developed using the IBM 1130 Monitor System (Version 1) and stored in the Disk System Format can be used with the IBM 1130 Disk Monitor System, Version 2.

The IBM 1130 Disk Monitor System, Version 2 allows the user to assemble, compile, and/or execute one program or a group of programs with a minimum of operator intervention. Jobs to be performed are stacked and separated by control records that identify the operation to be performed.

The remainder of this section is a brief description of the IBM 1130 Disk Monitor, Version 2. For a more complete description, refer to the Systems Reference Library publication IBM 1130 Disk Monitor System, Version 2, System Introduction (Form C26-3709).

The IBM 1130 Disk Monitor System, Version 2 is comprised of seven components:

Supervisor Program
Disk Utility Program
Assembler Program
FORTRAN Compiler
System Library
Core Image Loader
Core Load Builder

Machine Requirements

The minimum machine configuration required for use with the IBM 1130 Disk Monitor System, Version 2 includes:

1. IBM 1131 CPU, Model 2A
2. IBM 1134 Paper Tape Reader and an
   IBM 1055 Paper Tape Punch; an
   IBM 1442 Card Read Punch, Model 6 or 7; an
   IBM 2501 Card Reader and an
   IBM 1442 Card Punch, Model 5; or an
   IBM 2501 Card Reader and an
   IBM 1442 Card Read Punch, Model 6 or 7

Monitor Components

The Supervisor program provides the linkage between user programs and monitor programs. The supervisor program reads and analyzes control records, and transfers control to the proper program.

The Disk Utility program is group of routines designed to assist the user in storing information (data and programs) on the disk and retrieving and using the information stored.

The Assembler program converts user-written symbolic-language source programs into actual machine - language object programs.

The FORTRAN compiler converts user - written FORTRAN - language source programs into actual machine - language object programs.

The System Library contains (1) input/output (except disk input/output), data conversion, arithmetic, and function subprograms, (2) selective dump subroutines, and (3) special mainline programs for disk maintenance.

The Core Image Loader handles the locating and fetching of the core load, calling the Core Load Builder, and calling the appropriate Supervisor program into operation.

The Core Load Builder builds a specified mainline program into an executable core load. The mainline program, with its required subprograms, is converted from disk system format to disk core image format. The resulting core load is suitable for immediate execution or for storing on the disk in disk core image format for future execution.

The IBM Disk Monitor System, Version 2 coordinates CPU activity by establishing in core storage a common communications area, which is used by the various programs that make up the Monitor System. It also guides the transfer of control between the various monitor programs and the user's programs. Operation is continuous and set up time is reduced to a minimum, thereby effecting a substantial time saving in CPU operation and allowing greater programming flexibility.

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