Technical Information

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International Business Machines Corporation
Data Processing Division
112 East Post Road
White Plains, New York 10601

Ed Nanas
914 WHite Plains 9-1900

New Punched Card, Monolithic Technology . . .

IBM SYSTEM/3 -- A COMPUTER FOR SMALL BUSINESS

NEW YORK, N. Y., July 30 . . . Advanced computer technology and design, coupled with a break from traditional punched card format, mark today's announcement of IBM System/3.

Developed especially for small business firms, System/3 contains a number of major innovations, including:

-- A small 96-column punched card with 20 percent greater information capacity than the familiar 80-column card;

-- Disk storage ranging from 2.45- to 9.80-million characters;

-- RPG II -- an expanded version of a popular programming language, and

-- Monolithic Systems Technology (MST).

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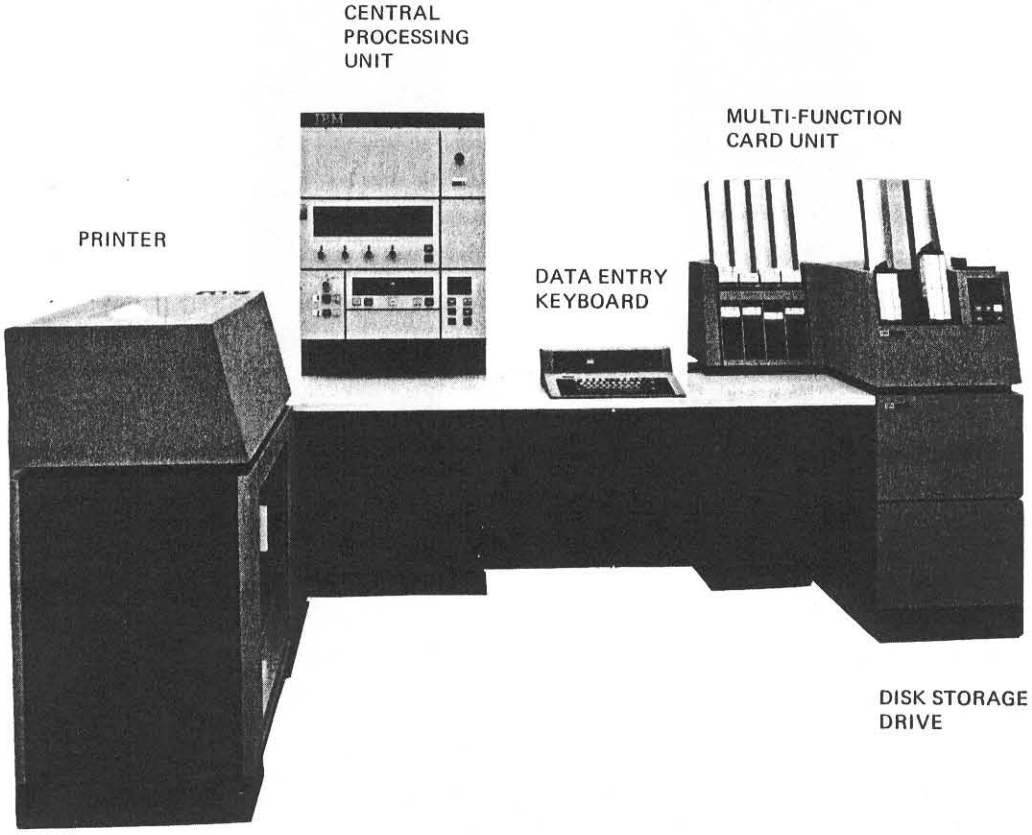
Typical Configurations

A typical System/3 disk-oriented configuration would consist of a central processing unit with a 12,288 character (byte) main core memory, a 4.90 million character disk file, a multi-function card unit (MFCU), an off-line sorter, 200 lines-per-minute printer and two data recorders. A typical card-oriented version might include an 8,192 character main core memory, MFCU, off-line sorter, a 100 lines-per-minute printer and a data recorder.

System/3 itself requires only 150 square feet of floor space. All system units -- printer, central processing unit and multi-function card unit -- are connected to each other by above-floor cables concealed behind a decorative panel.

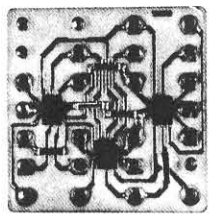


CENTRAL PROCESSING UNIT (CPU)

The CPU houses the addressable main storage, arithmetic and logic units, the control system with registers to sequence instructions and initiate communications between memory and input-output devices, an operator-oriented inquiry and control console, and an optional dual program feature.

The basic technology used is IBM's new Monolithic Systems Technology (MST), which provides up to five circuits in a module. In System/3, MST circuits enable switching speeds of from 8-12 nanoseconds (billionths of a second).

MST MODULE
(Shown four times actual size)



Basic Core Storage: 8,192 characters, expandable to 32,768 characters
Add time (two five-digit numbers); 26 microseconds
Memory cycle (to fetch and store eight bits): 1.52 microseconds
Internal Machine Code: Extended Binary Coded Decimal Interchange Code (EBCDIC) -- the IBM System/360 machine code, (eight bits plus a parity bit).

With the disk version of System/3, the optional dual program feature will enable two independent programs to be loaded and run concurrently. The CPU can move to another program when one in progress is using only an input or output unit. In this way, the high-performance capabilities of the CPU can be used with greater efficiency since the processor does not have to wait for the input/output devices to complete a job before working on a second program.

NEW IBM PUNCHED CARD

A new, small punched card -- only slightly larger than a standard wallet-sized credit card -- is the basic data medium for System/3. With 96 columns rather than the traditional 80, it can accommodate 20 percent more information and, despite its size, four lines of type can be printed on its face. The card characteristics are:

Dimensions: 2.63 inches high by 3.25 inches wide
Hole size: 0.046-inch diameter
Print positions: 128 (four lines of 32 positions) maximum
Punch positions: 576 over 96 columns
Code: 6-bit EBCDIC-like.

MULTI-FUNCTION CARD UNIT

The MFCU is a single machine that reads, punches, collates, prints and sorts cards in one path without intermediate operator handling. Two models are offered:

	Model 1	Model 2
Hoppers	2	2
Hopper Capacity	2,000 cards	2,000 cards
Stackers	4	4
Stacker Capacity	750	750
Read Rate	250	500
Punch Rate	60 cpm	120 cpm
Print Rate (3 lines on cards)	60 cpm	120 cpm
Print Rate (4 lines on cards)	48 cpm	96 cpm

DISK STORAGE FACILITIES

Disk storage for System/3 consists of one removable disk cartridge and one fixed disk on a single drive. In effect, this arrangement provides the capabilities of two disk drives. The entire unit can be installed at the customer's site and is housed in a sliding cabinet located beneath the MFCU. Four configurations of the disk storage unit will be available: Two using dual drives; two using a single drive.

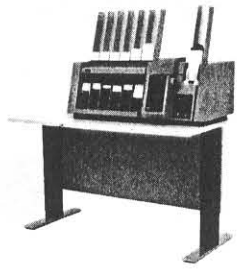
The single drive configuration accommodates two 14-inch disks (one fixed). Average access time for the 2.45 million character version is 153 milliseconds; 269 milliseconds for the 4.90 million character version.

Storage capacities of 7.35 million characters and 9.80 million characters are available on the two-drive configurations. The former require three 14-inch disks (one fixed, two removable); the latter, four disks (two fixed, two removable). Average access time is 269 milliseconds for both configurations.

PRINTERS AND SORTERS

System/3 printers are offered in 100- and 200-lines-per-minute models, with a 48 character set, 96 print positions. An optional Universal Character Set is available to extend the set to a maximum of 120 and the number of print positions to 132.

A printer-keyboard, which includes a Selectric unit and typewriter-style keyboard, is available as an option. Mounted on the console work table, the device may be used for both input and output functions. It supports such applications as inquiry, data entry, communication between operator and system and as a second printer.



Tabletop 1,000- and 1,500-cards-per-minute sorters are offered to users. Each has a hopper capacity of 2,000 cards and six stackers. Each stacker has a capacity of 650 cards. Special features permit sort selection, digit selection and alphabetic sorting with a reduced number of passes. The sorter uses photo-electric sensing and has a built-in card storage rack. The IBM 1255 magnetic character reader, used off-line, can process up to 500 checks and other bank documents per minute.

OFF-LINE DATA RECORDER

Designed especially for the new small card, System/3's off-line data recorder for punching and verifying cards incorporates a number of features that help improve operator performance and minimize the chance of entering incorrectly punched cards into the computer.

Data entered by the operator is stored temporarily in a delay line buffer. The card itself is not punched when a key is depressed. When the operator is satisfied that the data she has entered is correct, she releases the information in the buffer and the card is punched. If she suspects an error, she can erase the field and rekey the data.

The operator converts the data recorder to a verifier by flipping a switch. If there is a punching error, an error light will be displayed and the keyboard will lock. The operator may attempt to verify the card two more times and if the error light continues to come on and the keyboard locks after each attempt, the mistake is verified.

The data recorder's keyboard uses Elastic Diaphragm Switch Technology (EDST), originally developed by the company's Advanced Systems Development Division. EDST -- an array of flat pre-wired switches -- is employed instead of the many individual components, mechanical and electrical, generally used to connect a keyboard to the punching elements.

EDST arrays are designed to minimize maintenance requirements. They are made by printing a set of electrical conducting paths on a rigid board, and a complementary set of paths on an elastic sheet of a non-conductor. A transparent spacer with holes at each switch location is placed between the two. A light touch over one of the holes is enough to allow one set of conductors to come into contact with the other through the spacer hole, thereby closing the switch and allowing current to pass. When the pressure is released, the elastic springs back to its original position and the switch opens.

The low force necessary to activate the keyboard presented IBM engineers with a human factors problem. Test operators reported they did not experience the usual keyboard "feel" when they depressed a "key." This was somewhat unsettling. To overcome this lack of "feel" and response, the engineers developed a means of incorporating artifical "feel" into the EDST keyboard to duplicate that of conventional IBM 026 and 029 card punch keyboards.

Data recorder characteristics include:

Hopper and stacker capacity: 350 cards
Keyboard: 64 characters
Card Speed (punching, reading and printing): 20 columns per second
Delay line storage capacity: seven 96-column card images, including four program formats and three data storage areas.

An optional data entry keyboard for System/3 can serve dual functions. It will flow keyed data directly into the CPU and, with appropriate programming, can punch cards using the punching facility of the MFCU.

SYSTEM/3 PROGRAMMING

The programming language for System/3 is RPG II, a language based on the widely-used System/360 RPG.

Also, to assist new customers and those who may be making a transition from unit record to computer operations, the IBM Application Customizer Service will provide most of the tools needed to write application programs tailored to individual customer's needs.

To use RPG II, the customer writes his program using English-like statements and simplified coding specification sheets, describing all data processing functions the computer is to perform.

This information -- the form in which the input data will appear, how the calculations are to be performed, and the format of the desired report -- is punched on cards and entered into the computer via the MFCU. The RPG II compiler, stored in System/3's memory, handles the processing details.

RPG II contains a number of new programming facilities: The ability to "look ahead" at computer-stored data yet to be processed and the use of a debug facility for program testing.

The Application Customizer Service will be used to help customers prepare programs for order writing and invoicing, accounts receivable, inventory accounting, sales analysis, payroll and general ledger jobs.

The customer, working with an IBM representative, defines the particular job he wishes to perform by answering a series of prepared questions. His answers, in effect, will describe the steps the computer must take to handle the job, as well as the format of the report he wants.

This information then will be punched onto cards and fed into a computer at an IBM Basic Systems Center. The Application Customizer, an IBM proprietary program, examines the input data, analyzes the user's requirements and specifications, and quickly determines if the job can be done as the customer wishes.

The result of the analysis is a set of documents and programming aids -- a system flowchart, data dictionary, error listing, record listing, program definition and sample report. These are used by the customer's System/3 programmer to write the desired application program in RPG II.

The final step is testing of the completed program using representative data. If the program is satisfactory, "live" data is substituted for the test data and the program is ready to go to work. Programs may be easily updated by the customer because of the clear documentation.

The Application Customizer Service will be available to System/3 customers at IBM Basic Systems Centers around the country.

Program products for both card and disk versions include, in addition to RPG II, a sort program and utility programs.

System control programs for the card system include user maintenance and system initialization for the disk system: library maintenance, system management and disk utility functions.

SYSTEM/3 PRICES

A typical card version of System/3, including a data recorder and sorter, will be priced at $1,185 per month rental, or $54,400 purchase. A typical disk version of System/3 with two data recorders will rent for $1,870 monthly, or $83,900 purchase. The RPG II compiler will be licensed at $35 monthly for the card version and $45 for the disk system; other program products will be licensed for $10 per month. The Application Customizer Service is available from $180 to $265 an application, as a single charge.

Elements of System/3 were developed at IBM laboratories in Rochester, Minn., San Jose, Calif., Research Triangle Park, N. C., and East Fishkill, N. Y. The system will be manufactured at IBM facilities in Rochester and Boca Raton, Fla.

SYSTEM/3 DEVICES

System/3 devices include:

5410 Processing Unit
5424 Multi-Function Card Unit
5203 Printer
5444 Disk Storage Drive
5471 Printer-Keyboard
5475 Data Entry Keyboard
5496 Data Recorder
5486 Card Sorter

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