

The IBM Personal Computer

First Impressions

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IBM (International Business Machines Corporation) has at last introduced the keenly anticipated IBM Personal Computer. Based on Intel Corporation's 8088 microprocessor, the new machine is slated to appear in stores this month, with various hardware options, at

prices ranging from \$1565 to more than \$5000. Color graphics are built in, and up to 256 K bytes of user memory may be installed.

The hardware is impressive, but even more striking are two decisions made by IBM: to use outside software suppliers already established in the microcomputer industry, and to provide information and assistance to independent, small-scale software writers and manufacturers of peripheral devices.

Photo 1: *The new IBM Personal Computer is based on the Intel 8088 microprocessor and will be supported by software from well-known, independent sources. Shown here are the System Unit with two built-in 5-inch floppy-disk drives, the black-and-white video monitor, the adjustable keyboard, and an Epson MX-80 printer bearing the IBM label, all of which sells for \$4385.*

The list of software sources includes Microsoft, Digital Research, Personal Software, Peachtree Software, Softech Microsystems, and Information Unlimited Software. For hardware configurations including floppy-disk



drives, IBM will sell three different disk operating systems: CP/M-86 from Digital Research, the UCSD p-System from Softech Microsystems, and IBM Personal Computer DOS, developed by Microsoft in imitation of CP/M. IBM isn't trying to force the world to choose between the IBM DOS and other popular operating systems. The published documentation of IBM Personal Computer DOS will include the source-code listing of the BIOS (basic input/output system), and of the diagnostic programs executed automatically when the computer is turned on.

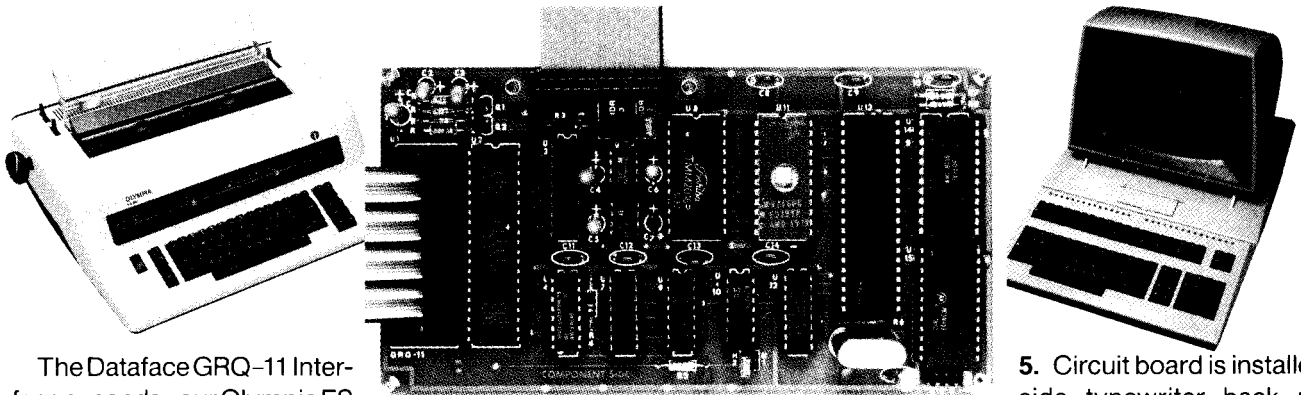
The hardware uses an interconnection scheme different from the industry-standard S-100 bus, but IBM doesn't want to exclude anyone from developing plug-compatible printed-circuit boards for installation in any of the vacant expansion slots inside the chassis. In fact, the company plans to publish a hardware manual with drawings and industry-standard specifications. IBM's attitude toward support for independent hardware and software efforts was summarized by Don Estridge, Director of Entry Systems Business for the IBM Personal Computer. "IBM will provide information for the existing cottage industry to design boards," Estridge said. "We're open to any software proposals."

General System Characteristics

The entry-level version of the IBM Personal Computer consists of the System Unit, which contains the 8088 microprocessor, a 40 K-byte built-in ROM (read-only memory) containing the extended version of Microsoft BASIC, a built-in speaker that can be programmed to play music, a power-on automatic self-test of system components, 16 K bytes of user memory in the form of semiconductor RAM (random-access read/write memory), a combination video-monitor and printer adapter, and empty space for two 5-inch floppy-disk drives. In this minimal configuration, the system uses an audio-cassette recorder for mass storage and an ordinary television set as a video monitor.

Not including the cassette recorder and monitor, the minimal system will sell for \$1565. With a single 5-inch, 160 K-byte floppy-disk drive and 64 K bytes of user RAM, the price increases to \$3005. An expanded business system with powerful color graphics, two floppy-disk drives, and an IBM-labeled Epson MX-80 dot-matrix printer costs \$4500. In addition to the 40 K-byte ROM, the system has a 16 K-byte RAM buffer for graphics operations. None of the user memory is required by the system software.

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3. Fifty thru 9600 Baud data rate options.
4. Two K buffer; supports X-on, X-off protocol as well as RTS signals.

5. Circuit board is installed inside typewriter back panel along side logic board. The

connection between boards accomplished by 40 pin jumper cable using existing socket. No soldering required. Power is provided to the GRQ thru two pins of the 40 lead cable. Installation in 10 minutes.

End user, Dealer, Distributor and OEM inquiries are welcome. For additional details, specifications and computer compatibility contact:

2372 A WALSH AVE., SANTA CLARA, CA 95050
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Plug-in circuit cards of user RAM are available in three denominations: 16 K bytes (\$90), 32 K bytes (\$325), and 64 K bytes (\$540). The user can increase the memory capacity to 256 K bytes using the available IBM boards and slots. (Outside companies could make a single memory board containing 256 K bytes of RAM, or expansion boards that contain even more.) All user memory is 9-bit, with one bit devoted to parity check. An edge connector on the back of the System Unit looks as if it is longing for a hard-disk drive, but IBM is mum on that possibility.

The 8088 processor communicates with memory and peripheral devices through an 8-bit data bus, but it conducts its internal affairs using the 16-bit instruction set of Intel's 8086 microprocessor. In the IBM Personal Computer, the 8088 operates at 4.77 MHz, with a cycle time for main storage of 410 nanoseconds; for access, the cycle time is 250 nanoseconds.

Together, the System Unit, keyboard, and a monitor make a very smart, full-feature terminal. A six-foot coiled cable connects the separate keyboard to the System Unit. You can adjust the keyboard's tilt toward you when it rests on a desktop, or you can hold it in your lap. The system supports both uppercase and lowercase characters, and all 83 keys have automatic repeat. Ten keys on the right side are for a numeric keypad and cursor controls, and ten special-function keys can be used for editing. The keyboard provides access to 256 characters, including all the ASCII (American Standard Code for Information Interchange) characters and many other characters useful for producing virtually any sort of graphics display.

IBM sells an 11½-inch green-phosphor video monitor for \$345. The monitor displays 25 lines of 80 characters each. You can adjust brightness and contrast or use soft-

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ware to activate underlining, high-intensity blinking characters, and reverse video.

With a color monitor, the IBM Personal Computer will support 16 foreground and eight background colors. In the medium-resolution graphics mode, screen resolution is 320 pixels (picture elements) across by 200 down. In the high-resolution graphics mode, resolution is 640 by 200 pixels. Text and graphics can be mixed, allowing you to label items in a graphics display.

One Centronics-compatible parallel printer port and one RS-232C serial I/O (input/output) port are standard. An asynchronous communications adapter (\$150) enables you to connect a modem to the serial port.

IBM is even offering a Game Control Adapter (\$55) that permits connection of user-supplied joysticks and paddles to the IBM Personal Computer.

Sales and Service

IBM's sales and service strategies show the computer giant's determination to develop quickly into a major force in the microcomputer market. Beginning this

month, the company is marketing the Personal Computer nationwide in four ways:

- through Computerland retail stores
- through Sears, Roebuck and Company's new business-machine stores (IBM will train the Sears sales personnel)
- through a special sales unit in the IBM Data Processing Division (for high-volume sales)
- through IBM Product Centers, which will make provisions for installment purchases

Only four Product Centers exist now, but IBM has selected many more cities around the country as sites for future centers. "In the course of the next two years," said C B Rogers, Jr, IBM vice president and group executive of the General Business Group, "we expect to be fairly well represented."

IBM will offer a 5 percent discount on sales of 20 to 49 units, 10 percent on sales of 49 to 150 units, and 15 percent on sales of 151 units or more. Educational institutions will also receive discounts.

At a Glance

Product Name

The IBM Personal Computer

Manufacturer

International Business Machines Corporation
Information Systems Division
Entry Systems Business
POB 1328
Boca Raton FL 33432

When Available

October 1981

Where Available

Sears, Roebuck and Company's business-machines stores
Computerland stores
IBM Product Centers
IBM Data Processing Division (volume sales)

Components

System Unit

Size: width 20 inches, depth 16 inches, height 5.5 inches;
weight (without disk drives) 21 pounds, (with two disk drives) 28 pounds

Electrical needs: 120 VAC

Processor: Intel 8088

Cycle Time: main storage, 410 nanoseconds; access,
250 nanoseconds

Memory: 40 K bytes of built-in ROM (read-only memory),
16 K bytes of user RAM (random-access read/
write memory); expandable to 256 K bytes

Standard: keyboard for data and text entry; audio-cassette
recorder connector; five expansion slots for
memory, display, printer, communications, and
game adapters; built-in speaker for music program-
ming; power-on automatic self-test of system com-
ponents; BASIC-language interpreter; 16 K bytes
of user RAM (all user RAM is 9-bit parity
memory)

Keyboard: 83 keys for data and text entry, 10 keys for
numeric entry and cursor control, 10 special func-
tion keys, and ASCII characters and special
graphics characters (total 256 characters);
automatic repeat on all keys; adjustable typing
angle; detachable six-foot coil cable

Disk drives: up to two 5-inch floppy-disk drives, 160 K bytes
each

Operating Systems

IBM Personal Computer DOS (Microsoft)
CP/M-86 (Digital Research)
UCSD p-System (Softtech Microsystems)

Software Available for IBM Personal Computer DOS

BASIC interpreter (Microsoft) standard; extended BASIC inter-
preter (Microsoft) \$40; Pascal compiler (Microsoft) \$300; VisiCalc
(Personal Software) \$200; Easywriter (Information Unlimited Soft-
ware) \$175; General Ledger, Accounts Receivable, Accounts
Payable (Peachtree Software) \$595 each; asynchronous com-
munications support \$40; Adventure (Microsoft) \$30

Hardware Prices

System Unit, 16 K-byte RAM, keyboard	\$1265
System Unit, 48 K-byte RAM, keyboard	
single floppy-disk drive, disk-drive adapter	2235
Monochrome video display	345
Combination monochrome-display adapter and printer adapter	335
Color-graphics-monitor adapter	300
16 K-byte memory-expansion kit	90
32 K-byte memory-expansion kit	325
64 K-byte memory-expansion kit	540
Disk-drive adapter	220
Disk drive (5-inch floppy disks)	570
Asynchronous communications adapter	150
Game-control adapter	55
Keyboard	270

IBM's service plans should meet or exceed those offered by other microcomputer manufacturers. For a start, IBM offers a 90-day warranty. Owners can extend warranties to a full year for between 7 and 9 percent of the purchase price of various system components, or buy annual service contracts for 10 to 15 percent of the purchase price of components. For example, an extended warranty for the System Unit costs \$88; a maintenance contract for the System Unit costs \$112. For the System Unit, disk drive, and disk-drive adapter, an extended warranty costs \$154, and a maintenance contract costs \$196.

Service will be available at Sears, Computerland, and from the IBM Product Centers, regardless of where you bought the computer. Service contracts with the IBM Product Centers call for exchange of major system components. IBM will send a replacement keyboard, printer, or System Unit by courier within 48 hours of the owner's call.

Three Ways to Generate Software

Recognizing the advantage that an existing broad software base gives to CP/M-compatible, Radio Shack, and Apple computers, IBM plans to meet the problem head-on with a three-part strategy.

First, when the Personal Computer reaches stores this month, it will be accompanied by a software offer including some application programs ready to run with IBM DOS. Here's a quick look at what IBM is offering:

- IBM Personal Computer DOS. This CP/M look-alike from Microsoft offers the familiar "A>" prompt character along with features for copying files and disks, comparing files and disks, initializing disks, displaying a directory, renaming files, and other housekeeping chores. Although it has a debugger and a line editor, IBM DOS does not yet have an assembler. It seems safe to speculate that Microsoft is hard at work on that.
- a cassette-level enhanced Microsoft BASIC interpreter that supports input/output instructions, use of the keyboard, display, light pen, and printer, and many editing and mathematical functions.
- a disk-level Microsoft BASIC that provides extensions including more powerful graphics, date and time-of-day functions, and communication capabilities; the enhanced graphics include such features as point, circle, and get/put display, and increased light-pen support for design work (\$40)
- a Pascal compiler, also from Microsoft (\$300)
- VisiCalc, the electronic-worksheet program from Personal Software
- Easywriter, the word-processing program from Information Unlimited Software (\$175)
- an asynchronous communications program (\$40) (This is written in BASIC and is menu-driven; the menu includes an option for the Dow Jones Information Services, another for The Source, and another for teletypewriter-like communications. IBM soon will also offer a full subset of Model 3270 emulation capabilities so that the

Personal Computer can appear to larger IBM systems as an IBM 3270 terminal.)

- general-ledger, accounts-payable, and accounts-receivable packages, from Peachtree Software, but with color and other enhancements for ease of use (\$595 each)
- Adventure, the fantasy-simulation game, from Microsoft (\$30)

The second part of IBM's software-development strategy is to offer Digital Research's CP/M-86 operating system and Softech Microsystem's UCSD p-System (which includes UCSD Pascal). Purchasers of these operating systems will have access to many third-party programs as they become available. IBM says it expects the availability of these operating systems to provide the opportunity for many current applications to be transferred to the IBM Personal Computer with minimal modifications. This approach will enable owners of the IBM Personal Computer to use a tremendous amount of software originally written for other common machines. Users can have everything that IBM offers without giving up software for the other two operating systems.

The third part of the IBM software strategy is to establish its own Personal Computer Software Publishing Department. The new department will solicit software from outside authors, both professional and amateur. IBM will send software-submission information packets to anyone who writes to IBM Personal Computer Software Submissions, Dept 765, Armonk NY 10504. IBM will also encourage its employees to write software for the personal computer (on the employees' own time). Authors will receive quarterly royalties based on actual sales.

A Shaking Out?

For those of us who dislike giants, the IBM Personal Computer comes as a shock. I expected that the giant would stumble by overestimating or underestimating the capabilities the public wants and stubbornly insisting on incompatibility with the rest of the microcomputer world.

But IBM didn't stumble at all; instead, the giant jumped leagues in front of the competition. Although the IBM Personal Computer has not (as of this writing) reached store shelves, it already seems to hold a firm position in the field. Its prices seem to compare favorably with available 16-bit S-100 systems. Furthermore, the cost of an IBM Personal Computer configured for word processing is not much more than that of an Apple II Plus, an Intertec Superbrain, or most other 8-bit machines fully equipped for word processing. A superior machine from the start, the IBM Personal Computer should grow in capability as outside vendors begin producing peripheral devices and add-on hardware for special applications.

In fact, the only disappointment about the IBM Personal Computer is its dull name. One rumor claimed that IBM referred to this computer internally as the Acorn. To me, it looks more like a Mighty Oak. ■