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Hardware

IBM

IBM's long-awaited small computer is here and it offers a surprisingly wide number of features to both personal and business users.

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ONE OF THE LONG-STANDING RUMORS IN THE COMPUTER INDUSTRY over the last few years had been that of IBM's entry into the personal computer field. That rumor began surfacing as early as 1976 and continued submerging and re-surfacing over the next few years.

The rumor became fact last summer when the computer giant jumped into the personal-computer fray with its IBM (IBM Personal Computer, P.O. Box 1328, Boca Raton, FL 33432) *Personal Computer*. This entry was made even more unusual by two departures from standard International Business Machine practices. First, the huge computer firm decided to use an outside software vendor for its personal computer, rather than using its own in-house resources. This was a radical departure in itself. The second departure was that the company actively encouraged software authors to write programs for the *Personal Computer* for its new Software Publishing Division.

In the past, it had been common practice for IBM to write its own computer software and set its own standards; then the rest of the industry had to follow its lead. However, this time, apparently acknowledging the long lead other software firms have had over the last few years, and recognizing the need for speed, the computer giant has changed its tack. But, despite this encouraging turn of events, there is a small fly in this ointment—the IBM disk operating system makes it mandatory that the user employ IBM's software.

From all reports, what has emerged in the form of the IBM *Personal Computer* is a powerful, user-friendly system that has sparked a great deal of interest and excitement. At the heart of this system is an Intel 8088 microprocessor. Although the internal architecture of this microprocessor is configured as 16 bits, there is an 8-bit bus interface. The CPU operates at a clock rate of 4.77 MHz, which indicates the IBM *Personal Computer* is a fast-acting unit.

The basic $1,565 unit (the full system lists at about $4,500) includes a 20 × 8 × 2-inch sloping keyboard, that weighs 6 pounds. It has 83 full-function keys for text and data entry and includes 10 keys for numeric entry and cursor control. There are 10-special function keys for scrolling, editing and other purposes. All told, there is easy access to 256 ASCII and special characters. The keyboard is detachable from the System Unit. This latter part contains 40K of Read-Only Memory that holds the operating system and BASIC, as well as 16K of user-accessible Random Access Memory. The System Unit is the heart of the Personal Computer.

An interesting feature of the keyboard, is the 6-foot coiled cord that connects it to the System Unit. With this cord, it is possible to have a very wide work area. All the keys repeat automatically when held down.

Mass storage expansion is available by adding double-density, single-sided 5¼-inch disks. Up to 160 K-bytes can be stored on each disk, allowing for a total storage capacity of 320K-bytes. These disks are contained in the System Unit, that also houses a power supply, fan, the cassette input and output ports, and a speaker for musical programming.

The System Unit, as noted, contains the 8088 microprocessor that drives this personal computer. Contained in the ROM found in this part of the system is a power-on self-diagnostic routine. About 2K

IBM'S *PERSONAL COMPUTER* can be used in the office or schoolroom, or at home, for self-instruction or simply for pleasure.

of the ROM is used for this.It checks all parts of the unit, including the microprocessor itself. Any problems are reported to the user. The unit also contains the BASIC language interpreter and the 16K RAM. This is a fairly compact unit too. It measures 20 inches wide, 16 inches deep and 5½ inches high. By using memory add-ons (plug-in modules) the RAM can be expanded to 256K, which makes this quite a powerful system when fully configured.

Although the user has the option of adding his own printer, IBM offers its own dot-matrix unit. It is an 80-character-per-second unit that also runs its own self-diagnostic to assure proper operation. Twelve typefaces are available for various printing needs and features include page spacing and column skipping for word processing and column applications. It is a bi-directional unit for increased speed and can print 40, 66, 80 or 132 characters-per-line. It has a replaceable ribbon cartridge and print head.

The 11½-inch optional cathode-ray-tube display uses a green-phosphor screen. The 720-by-350-pixel resolution level and wide bandwidth produce a sharp, stable display. The display is 25 lines deep by 80 characters wide and includes capabilities for underlining, high-intensity blinking characters and a inverse video for highlighting information. There are also upper and lower case letters displayed for word processing and brightness and contrast controls for reading comfort. An interesting feature of the display is the potential for non-display of an area of the screen a user might consider sensitive. For users not wanting the IBM monitor, the System Unit outputs NTSC video, so you can connect the System Unit to television monitor or, using an RF modulator, to a standard TV receiver.

The IBM's *Personal Computer* also features extensive color and graphics capabilities. It can display alphanumerics using 16 foreground, and eight background, colors. In the graphics mode, four colors are available. Its medium-resolution graphics display allows an array of 320 by 200 pixels. In the high-resolution mode that increases to 640 by 200 pixels.

Communications Ability is available through the use of an asynchronous communication line. This makes it easy to interface the IBM *Personal Computer* with databases (*The Source, MicroNet, CompuServe*) other computers, laboratory instruments or any other devices with a standard RS-232C asynchronous adapter. It is reported to be programmable and compatible with different bit and parity rates.

Other optional features include the addition and use of joysticks and paddles.

There are three versions of BASIC available for the IBM *Personal Computer*. These are based on the popular Microsoft BASIC. The cassette level BASIC is included in the ROM of every system and provides all the input-output instructions needed to enter and retrieve data. It supports the use of the keyboard, display, light pen and printer and provides a full complement of editing and mathematical functions. It also allows the user to program the user-definable special function keys and will also display the function of each definable key, although this feature can be defeated.

The other two levels of BASIC—disk and advanced—are optional. The disk extension supports the use of disk, while adding date, time of day and communications capabilities to the system. The advanced extension enhances the display graphics to include features such as POINT, CIRCLE and GET/PUT display, while increasing light pen and joystick support for design work and home entertainment.

Disk BASIC is part of the IBM disk operating system and requires 32K of RAM, while the advanced level requires even more RAM—in the area of 48K. Interestingly, the disk BASIC also provides support for the system's musical functions when the PLAY command is used.

The disk operating system itself, which supports one or more disk drives, allows the user to write or read from the system's removable disks, display a directory and rename, erase, display or copy files. It is similar, but not exactly the same, as the popular operating system CP/M, which is found in many personal computers. This effectively restricts the user to IBM-supplied software—you can't use the large number of CP/M-based programs that are on the market. However, this situation should be rectified soon. IBM has been working with Digital Research, the creators of CP/M, to make the operating system available on the *Personal Computer*. It has also been working with SofTech Microsystems, Inc. to make the advanced UCSD p-System available. These two changes should provide the opportunity for current applications software to be moved over to the IBM *Personal Computer* with minimal changes.

This personal computer also has another powerful language tool, a Pascal compiler. This language compiler allows separate compilations of program elements for maximum system performance. It also supports several programming features for advanced programming work.

A broad range of applications software is currently available from IBM for its new system. It includes the problem-solving program package for financial or mathematical forecasting and computations, *VisiCalc*; Peachtree Software's *General Ledger*; an accounts receivable and an accounts payable package, also from Peachtree Software; *EasyWriter*, a word processing package from Information Unlimited Software, Inc; Microsoft *Adventure*, and communications utilities.

The communications package is set up so the IBM *Personal Computer* will be able to communicate with larger systems. IBM intends to provide a full subset of 3270 emulation capabilities. As a result, this microcomputer is a good choice for both the hobbyist and the business system user and means that it can be interfaced with existing mainframes for data exchange.

And, speaking of data exchange, the Asynchronous Communications Adapter will support a baud rate of up to 9,600. This means you get a rapid and high-order data exchange.

Overall, the IBM *Personal Computer* seems to be a powerful tool for both the hobbyist and serious business user. Even though IBM entered the personal-computer fray late, it looks like its representative on the front lines of this battle is a potent contender. The competition will have its work cut out for it. **R-E**