

History of the IBM PC

The IBM PC (Personal Computer), was the original version and progenitor of the IBM PC compatible hardware platform. It was introduced on August 12, 1981. The original model was designated the IBM 5150. It was created by a team of engineers and designers under the direction of Don Estridge of the IBM Entry Systems Division in Boca Raton, Florida.

The phrase "Personal Computer" was common currency before 1981, and was used as early as 1972 to characterize Xerox PARC's Alto. However, because of the success of the IBM PC, what had been a generic term came to mean specifically a microcomputer compatible with IBM's specification.

During the second quarter of 2005, the Chinese Lenovo Group secured the rights to produce IBM branded personal computers. This move reflects IBM's present lack of interest in the personal computer in favor of the server/mainframe markets, as well as providing business consulting and information technology services markets.



The IBM PC was announced to the world on 12 August 1981, helping drive a revolution in home and office computing.

The IBM PC concept

The original PC was an IBM attempt to get into the home computer market then dominated by the Apple II and a host of CP/M machines.

Rather than going through the usual IBM design process, which had already failed to design an affordable microcomputer (for example the failed IBM 5100), a special team was assembled with authorization to bypass normal company restrictions and get something to market rapidly. This project was given the code name Project Chess.

The team consisted of just twelve people headed by Don Estridge. They succeeded - development of the PC took about a year. To achieve this they first decided to build the machine with "off-the-shelf" parts from a variety of different original equipment manufacturers (OEMs) and countries. Previously IBM had developed their own components. Second, they decided on an open architecture so that other manufacturers could produce and sell compatible machines - the IBM PC compatibles, so the

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specification of the ROM BIOS was published. IBM hoped to maintain their position in the market by royalties from licensing the BIOS, and by keeping ahead of the competition.

At the time, Don Estridge and his team considered using the 801 processor and its operating system that had been developed at the IBM research laboratory in Yorktown Heights, New York (The 801 was an early RISC microprocessor designed by John Cocke and his team at Yorktown Heights.) The 801 was at least an order of magnitude more powerful than the Intel 8088, and the operating system many years more advanced than the DOS operating system from Microsoft, that were finally selected. Ruling out an in-house solution made the team's job much easier and may have avoided a delay in the schedule, but the ultimate consequences of this decision for IBM were disastrous.

Unfortunately for IBM, other manufacturers rapidly reverse engineered the BIOS to produce their own royalty-free versions. Columbia Data Products produced the Multi Personal Computer, the first IBM-PC compatible computer. Compaq Computer Corporation announced the first portable IBM PC compatible in November 1982 (it did not ship until March 1983) - the Compaq Portable.



The first IBM PC had a 4.7Mhz processor and the cheapest model had 16K of memory.

Once the IBM PC became a commercial success the PC came back under the usual IBM management control, with the result that competitors had little trouble taking the lead from them. (In this regard, IBM's tradition of "rationalizing" their product lines - deliberately restricting the performance of lower-priced models in order to prevent them from "cannibalizing" profits from higher-priced models - worked against them).

As of June 2006, IBM PC and XT models are still in use at the majority of U.S. National Weather Service upper-air observing sites. The computers are used to process data as it is returned from the ascending radiosonde, attached to a weather balloon. They are being phased out over a several year period, to be replaced by the Radiosonde Replacement System.

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Commercial success

The first IBM PC was released on August 12, 1981. Although not cheap, at a base price of \$1,565 (around \$3,500 in 2006 figures) it was affordable for businesses - and it was business that purchased the PC. However it was not the corporate "computer department" that was responsible for this, for the PC was not seen as a 'proper' computer. It was generally well educated middle managers that saw the potential - once the revolutionary VisiCalc spreadsheet, the "killer app", had been ported to the PC as a feature of Lotus 1-2-3. Reassured by the IBM name, they began buying the machines on their own budgets to help do the calculations they had learned at business school.



For \$1,565, you got a computer and a keyboard. There was no monitor included and disc drives were optional. It included Microsoft's BASIC programming language.

IBM PC models

The models of IBM's first-generation Personal Computer (PC) series have names:

- A release photo of the original IBM PC (ca. 1981). The original PC had a version of Microsoft BASIC - IBM Cassette BASIC - in ROM. The CGA (Color Graphics Adapter) video card could use a standard television for display. The standard storage device was cassette tape. A floppy disk drive was an optional extra; no hard disk was available. It had only five expansion slots; maximum memory using IBM parts was 256 kB, 64 kB on the main board and three 64 kB expansion cards. The processor was an Intel 8088 (second-sourced AMDs were used after 1983) running at 4.77 MHz. IBM sold it in configurations with 16 kB or 64 kB of RAM preinstalled using either 9 or 36, 16 kbit DRAM chips.
- The original PC failed miserably in the home market, but was widely used in business. The "IBM Personal Computer XT" was an enhanced machine designed for business use. It had 8 expansion slots and a 10 megabyte hard disk. It could take 256 kB of memory on

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the main board (when 64 kbit DRAM was introduced); later models were expandable to 640 kB, which combined with the 384 kB BIOS ROM + video RAM space made up the full megabyte of memory that the 8088 could address. It was usually sold with a Monochrome Display Adapter (MDA) video card. The processor was still a 4.77 MHz Intel 8088 and the expansion bus still 8-bit Industry Standard Architecture (ISA) with XT bus architecture.

- The "IBM Personal Computer/AT", announced August 1984, used an Intel 80286 processor, originally at 6 MHz. It had a 16-bit ISA bus and 20 MB hard drive. A faster model, running at 8 MHz, was introduced in 1986. IBM made some attempt at marketing it as a multi-user machine, but it sold mainly as a faster PC for power users. Early PC/ATs were plagued with reliability problems, in part because of some software and hardware incompatibilities, but mostly related to the internal 20 MB hard disk. While some people blamed IBM's hard disk controller card and others blamed the hard disk manufacturer Computer Memories Inc. (CMI), the IBM controller card worked fine with other drives, including CMI's 33-megabyte model. The problems introduced doubt about the computer and, for a while, even about the 286 architecture in general, but after IBM replaced the 20 MB CMI drives, the PC/AT proved reliable and became a lasting industry standard.
- IBM Convertible
- IBM Portable
- IBM PCjr

The second generation IBM Personal System/2 (PS/2), are known by model number: Model 25, Model 30. Within each series, the models are also commonly referenced by their CPU clock rate.

All IBM personal computers are software compatible with each other in general, but not every program will work in every machine. Some programs are time sensitive to a particular speed class. Older programs will not take advantage of newer higher-resolution display standards.

Technology Electronics

The main circuit board in an IBM PC is called the motherboard. This carries the CPU and memory, and has a bus with slots for expansion cards.

The bus used in the original PC became very popular, and was subsequently named ISA. It is in use to this day in computers for industrial use. Later, requirements for higher speed and more capacity forced the development of new versions. IBM introduced the MCA bus with the PS/2 line. The VESA Local Bus allowed for up to three, much faster 32-bit cards, and the EISA architecture was developed as a backward compatible standard including 32-bit card slots, but it only sold well in high-end server systems. The lower-cost and more general PCI bus was introduced in 1994 and has now become ubiquitous.

The motherboard is connected by cables to internal storage devices such as hard disks, floppy disks and CD-ROM drives. These tend to be made in standard sizes, such as 3.5" (90 mm) and 5.25" (133.4 mm) widths, with standard fixing holes. The case also contains a standard power supply unit (PSU) which is either an AT or ATX standard size.

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Intel 8086 and 8088-based PCs require EMS (expanded memory) boards to work with more than one megabyte of memory. The original IBM PC AT used an Intel 80286 processor which can access up to 16 megabytes of memory (though standard DOS applications cannot use more than one megabyte without using additional APIs.) Intel 80286-based computers running under OS/2 can work with the maximum memory.

Keyboard

The original 1981 IBM PC's keyboard was severely criticised by typists for its non-standard placement of the return and left shift keys. In 1984, IBM corrected this on its AT keyboard, but shortened the backspace key, making it harder to reach. In 1987, it introduced the enhanced keyboard, which relocated all the function keys and the Ctrl keys. The Esc key was also relocated to the opposite side of the keyboard.

An "IBM PC compatible" may have a keyboard which does not recognize every key combination a true IBM PC does, e.g. shifted cursor keys. In addition, the "compatible" vendors sometimes used proprietary keyboard interfaces, preventing the keyboard from being replaced.

Character set

The original IBM PC used the 7-bit ASCII alphabet as its basis, but extended it to 8 bits with nonstandard character codes. This character set was not suitable for some international applications, and soon a veritable cottage industry emerged providing variants of the original character set in various national variants. In IBM tradition, these variants were called code pages. These codings are now obsolete, having been replaced by more systematic and standardized forms of character coding, such as ISO 8859-1, Windows-1251 and Unicode.

Storage media

Officially, the standard storage medium for the original IBM PC model 5150 was a cassette drive. Technologically obsolete even by 1981 standards, it was seldom used, and few (if any) IBM PCs left the factory without a floppy disk drive installed. The 1981 PC had one or two 180 kilobyte 5¼ inch single-sided double-density floppy disk drives; XT's generally had one double-sided 360 kB drive (next to the hard disk).

The first IBM PC that included a fixed, non-removable, hard disk was the XT. Hard disks for IBM compatibles soon became available with very large storage capacities. If a hard disk was added that was not compatible with the existing disk controller, a new controller board had to be plugged in; some disks were integrated with their controller in a single expansion board, commonly called a "Hard Card".

In 1984, IBM introduced the 1.2 megabyte dual sided floppy disk along with its AT model. Although often used as backup storage, the high density floppy was not often used for interchangeability. In 1986, IBM introduced the 720 kB double density 3.5" microfloppy disk on its Convertible laptop computer. It introduced the 1.44 MB high density version with the PS/2 line. These disk drives could be added to existing older model PCs. In 1988 IBM introduced a drive for 2.88 MB "DSED" diskettes in its top-of-the-line models; it was an instant failure and is all but forgotten today (but survives as a possible "size" choice in disk-formatting utilities).

Software

All IBM PCs includes a relatively small piece of software stored in ROM. The original IBM PC 40 kB ROM included 8 kB for power-on self-test (POST) and basic input/output system (BIOS) functions plus 32 kB BASIC in ROM (Cassette BASIC). The ROM BASIC interpreter was the default user interface if no DOS boot disk was present. BASICA was distributed on floppy disk and provided a way to run the ROM BASIC under PC-DOS control.

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The IBM PC launched with rudimentary games and tools, including a music tutorial.

Trivia

Much of the original development team, including Don Estridge, perished on August 2, 1985 during the crash of Delta Air Lines Flight 191. As a result of this disaster, IBM and many other companies set limits on the number of employees allowed on a single flight.