# The complete history of the IBM PC, part one: The deal of the century

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**Starting MS-DOS... —**

## Bill Gates, mysterious deaths, and the business machine that sparked a home revolution.

Jimmy Maher (UK) - 6/30/2017, 4:02 PM

***Nota bene:*** This is the first part of an epic, 8,000-word history of the IBM PC. You can find part two of the story over here.

One could claim that the IBM PC was not really IBM's first PC at all. In September 1975 the company introduced the IBM 5100, its first "portable" computer. ("Portable" meant that it weighed just 55 pounds and you could buy a special travel case to lug it around in.)

The 5100 was not technically a microcomputer; it used a processor IBM had developed in-house called the PALM which was spread over an entire circuit board rather than being housed in a single microchip. From the end user's standpoint, however, that made little difference; certainly it would seem to qualify as a personal computer if not a microcomputer. It was a self-contained, Turing complete, programmable machine no larger than a suitcase, with a tape drive for loading and saving programs, a keyboard, and a 5-inch screen all built right in along with 16K or more of RAM.

What made the 5100 feel different from the first wave of PCs were its price and its promoted purpose. The former started at around $10,000 and could quickly climb to the $20,000 range. As for the latter: IBM pushed the machine as a serious tool for field engineers and the like in remote locations where they couldn't access IBM's big machines, not as anything for fun, education, hacking, or even office work.

The last of these at least changed with two later iterations of the concept, the 5110 and 5120, which were advertised as systems suitable for the office, with accounting, database, and even word processing applications available. Still, the prices remained very high, and actually outfitting one for this sort of office work would entail connecting it to a free-standing disk array that was larger than the machine itself, making the system look and feel more like a minicomputer and less like a PC.

Enlarge / An archive photo from IBM showing the System/23 Datamaster, and presumably some university students.

It's nevertheless telling that, although it was almost never referred to by this name, the IBM PC when it finally arrived had the official designation of (with apologies to Van Halen) the IBM 5150, a continuation of the 5100 line of portable computers rather than an entirely new thing—this even though it shared none of the architecture of its older siblings.

In February of 1978 IBM began working on its first microcomputer—and it still wasn't the IBM PC. It was a machine called the System/23 Datamaster.

Designed once again for an office environment, the Datamaster was built around an Intel 8085 microprocessor. It

was large and heavy (95 pounds), and still cost in the $10,000 range, which combined with its very business-oriented, buttoned-down personality continued to make it feel qualitatively different from machines like the Apple II. Yet it was technically a microcomputer. IBM was a huge company with a legendarily labyrinthine bureaucracy, meaning that projects could sometimes take an inordinately long time to complete. Despite the Datamaster project predating the PC project by two years, the former didn't actually come out until July of 1981, just in time to have its thunder stolen by the announcement of the IBM PC the following month. Still, if the question of IBM's first microcomputer ever comes up in a trivia game, there's your answer.


Enlarge / The Atari VCS (2600)—which, believe it or not, is involved with the genesis of the IBM PC.

Robee Shepherd

## OK, now the story really begins

The machine that would become known as the *real* IBM PC begins, of all places, at Atari. Apparently feeling their oats in the wake of the Atari VCS' sudden *Space Invaders*-driven explosion in popularity and the release of its own first PCs, the Atari 400 and 800, they made a proposal to IBM's chairman Frank Cary in July of 1980: if IBM wished to have a PC of its own, Atari would deign to build it for them.

Far from being the hidebound mainframer that he's often portrayed as, Cary was actually something of a champion of small systems—even if "small systems" in the context of IBM often meant something quite different from what it meant to the outside world. Cary turned the proposal over to IBM's Director of (data) Entry Systems, Bill Lowe, based out of Boca Raton, Florida. Lowe in turn took it to IBM's management committee, who pronounced it "the dumbest thing we've ever heard of." (Indeed, IBM and Atari make about the oddest couple imaginable.) But at the same time, everyone knew that Lowe was acting at the personal behest of the chairman, not something to be dismissed lightly if they cared at all about their careers. So they told Lowe to assemble a team to put together a detailed proposal for how IBM could build a PC themselves—and to please come back with it in just one month.

Lowe assembled a team of twelve or thirteen (sources vary) to draft the proposal. In defiance of all IBM tradition, he deliberately kept the team small, the management structure informal, hoping to capture some of the hacker magic that had spawned PCs in the first place. His day-to-day project manager, Don Estridge, said, "If you're

competing against people who started in a garage, you have to start in a garage."

One might have expected IBM, the Goliath of the computer industry, to bludgeon its way into the PC market. Even as they congratulated themselves for having built this new market using daring, creativity, and flexibility stolid IBM could not hope to match, many PC players lived in a sort of unvoiced dread of exactly this development. IBM, however, effectively decided to be a good citizen, to look at what was already out there, and talk to those who had built the PC market to find out what was needed, where a theoretical IBM PC might fit.

In that spirit, Jack Sams, head of software development, recommended that they talk to Microsoft. Sams was unusually aware of the PC world for an IBMer; he had actually strongly pressed for IBM to buy the BASIC for the Datamaster from Microsoft, but had been overruled in favour of an in-house effort. "It just took longer and cost us more," he later said. Sams called Bill Gates on July 21, 1980, asking if he (Sams) could drop by its Seattle office the next day for a friendly chat about PCs. "Don't get too excited, and don't think anything big is about to happen," he said.

Enlarge / This is Bill Gates in 1984, aged 29. Now imagine how young he looked four years before this image in 1980, the year our story takes place.

Ann E. Yow-Dyson/Getty Images

Gates and Steve Ballmer, his right-hand man and the only one in this company of hackers with a business education, nevertheless both realised that this could be very big indeed. When Sams arrived with two corporate types in tow to function largely as "witnesses," Gates came out personally to meet them. (Sams initially assumed that Gates, who still had the face, physique, and voice of a twelve-year-old, was the office boy.) Sams immediately whipped out the non-disclosure agreement that was standard operating procedure for IBM.

"IBM didn't make it easy," Gates recalled later. "You had to sign all these funny agreements that sort of said IBM could do whatever they wanted, whenever they wanted, and use your secrets however they felt. So it took a little bit of faith." Nevertheless, he signed it immediately.

Sams wanted to get a general sense of the PC market from Gates, a man who was as intimately familiar with it as anyone. In this respect, Gates was merely one of a number of prominent figures he spoke with. However, he also had an ulterior motive: to see just what kind of shop Gates was running, to try to get a sense of whether

Microsoft might be a resource his team could use. He was very impressed.

After consulting with Gates and others, Lowe presented on August 8 a proposal for the machine that IBM should build. Many popular histories, such as the old PBS documentary *Triumph of the Nerds*, give the impression that the IBM PC was just sort of slapped together in a mad rush. Actually, a lot of thought went into the design. There were two very interesting aspects.

*Listing image by SSPL/Getty Images*

## An open architecture

At that time, almost all PCs used one of two CPUs: the MOS 6502 or the Zilog Z80. Each was the product of a relatively small, upstart company, and each "borrowed" its basic instruction set and much of its design from another, more expensive CPU produced by a larger company—the Motorola 6800 and the Intel 8080 respectively. (To add to the ethical questions, both were largely designed by engineers who had also been involved with the creation of their "inspirations.")

Of more immediate import, both were 8-bit chips capable of addressing only 64K of memory. This was already becoming a problem. The Apple II, for example, was limited, due to the need to also address 16K of ROM, to 48K of RAM at this time. Even where these CPUs' limitation weren't yet a problem, it was clear they were going to be soon.

The team therefore decided to go with a next-generation CPU that would make such constraints a thing of the past. IBM had a long history of working with Intel, and so it chose the Intel 8088, a hybrid 8-bit / 16-bit design that could be clocked at up to 5MHz (far faster than the 6502 or Z80) and, best of all, could address a full 1MB of memory. The IBM PC would have room to grow that its predecessors lacked.

The other interesting aspect was this much-vaunted idea of an "open architecture." In *Accidental Empires*, and even more so in *Triumph of the Nerds*, Robert X. Cringely makes it out to be a choice borne of necessity, just another symptom of the machine's slapdash origins: "An IBM product in a year! Ridiculous! To save time, instead of building a computer from scratch, they would buy components off the shelf and assemble them—what in IBM speak was called 'open architecture.'"

Well, for starters "open architecture" is hardly "IBM speak"; it's a term used to describe the IBM PC almost everywhere—and probably least of all within IBM. (In his meticulous, technically detailed *Byte* magazine article "The Creation of the IBM PC," for example, team-member David J. Bradley doesn't use it once.) But what do people mean when they talk about "open architecture?" Unfortunately for flip technology journalists, the "openness" or "closedness" of an architecture is not an either/or proposition, but rather, like so much else in life, a continuum.

Enlarge / Harry Garland and Roger Melen, co-founders of Cromemco, holding an S-100 backplane in 1981.

Cromenco

The Apple II, for example, was also a relatively open system. One of the only battles that Steve Wozniak won over Steve Jobs was the inclusion of expansion slots and the publishing of detailed schematics, which let people take the machine to places its creators had never anticipated and which bear a big part of the responsibility for its remarkable longevity. The CP/M machines that were very common in business were even more open, being based on a common, well-documented design specification, the S-100 bus, and

having plenty of slots themselves. This let them share both hardware and software.

Rather than talking of an open architecture, we might do better to talk of a modular architecture. The IBM would be a sort of computer erector set, a set of interchangeable components that the purchaser could snap together in whatever combination suited her needs and her pocketbook. Right from launch she could choose between a colour video card that could do some graphics and play games, or a monochrome card that could display 80 columns of text. She could choose anywhere from 16K to 256K of onboard memory; choose one or two floppy drives, or just a cassette drive; etc. Eventually, as third-party companies got into the game and IBM expanded its product line, she would be all but drowned in choices.

Most of the individual components were indeed sourced from other companies, and this greatly sped development. Yet using proven, well-understood components has other advantages too, advantages from which would derive the IBM PC's reputation for stolid reliability.

While sourcing so much equipment from outside vendors was a major departure for IBM, in other ways the IBM PC was a continuation of the company's normal design philosophy. There was no single, one-size-fits-all IBM mainframe. When you called to say you were interested in buying one of these monsters, IBM sent a couple of sales reps to discuss your needs, your finances, and your available space. Then together you designed the system that would best suit, deciding how much disk storage, how much memory, how many and what kind of tape drives, what printers and terminals and punched-card readers, etc.

In this light, the IBM PC was just a continuation of business as usual in miniature. Most other PCs of course offered some of this flexibility. It is nevertheless significant that IBM decided to go all-in for modularity, expandability, or, if we must, openness. Like the CPU choice, it gave the machine room to grow, as hard drives, better video cards, eventually sound cards became available. It's the key reason that the architecture designed all those years ago remains with us today—in much modified form, of course.

## In search of an operating system

The committee gave Lowe the go-ahead to build the computer. IBM, recognising itself that its bureaucracy was an impediment to anyone really, you know, getting anything done, had recently come up with a concept it called the Independent Business Unit. The idea was that an IBU would work as a semi-independent entity, freed from the normal bureaucracy, with IBM acting essentially as the venture capitalists. *Fortune* magazine called the IBU, "How to start your own company without leaving IBM." Chairman Cary, in a quote that has often been garbled and misattributed, called the IBU IBM's answer to the question, "How do you make an elephant [IBM] tap dance?" Lowe's IBU would be code-named Project Chess, and the machine they would create would be code-named the Acorn. (Apparently no one was aware of the British computer company of the same name.) They were given essentially free rein, with one stipulation: the Acorn must be ready to go in just one year.

Enlarge / The Tandy Radio Shack TRS-80, which used the Zilog Z80.

SSPL/Getty Images

Having been so favourably impressed with Bill Gates and Microsoft, Jack Sams returned to them almost as soon as IBM officially gave Project Chess the green light—on August 21, 1980. After having Gates sign yet another NDA, he was ready to move beyond the theoretical and talk turkey. He explained that IBM was planning to make its own PC, something that surprised no one in the room. In keeping with the philosophy of building a machine that could be configured to do anything, he planned to offer the user a choice of using a ROM-hosted BASIC environment similar to that of the Apple II, PET, and TRS-80, or of

booting into the disk-oriented operating system CP/M, hugely popular among business users.

Microsoft, the premier provider of microcomputer BASICs, was the obvious place to go for the first of these. They had also recently branched out into other compiled languages like Fortran, and Sams wouldn't mind having some of those either. Robert X. Cringely and others make much of IBM's turning to an outside vendor like Microsoft for its software (more of the "slapdash" trope), but this was really not at all unusual. Apple, Commodore, and Radio Shack amongst many others had in fact all done the same, sourcing their BASICs from Microsoft.

Enlarge / An ad for Digital Research's CP/M Graphics.


Sams was, however, very confused about something else. That spring Microsoft had introduced its first hardware product, the Z80 SoftCard. It was a Z80 CPU on a card which plugged into one of the Apple II's expansion slots. Once the card was installed, the user could elect whether to give control of her machine to its standard 6502 CPU or to the Z80; the card contained circuitry to allow the Z80 to use the Apple II's standard memory and other peripherals. Developed in partnership with Seattle Computer Products, a small hardware company with which Microsoft had quite close relations at this time, it was really a marvellous little hack.

Because CP/M ran only on Z80 processors, Apple II users had hitherto been cut off from the universe of CP/M business software. Now they had the best of both worlds: all of the fun and educational software that took advantage of the Apple II's graphics capabilities (not to mention VisiCalc), and all of the text-oriented, businesslike CP/M applications. The SoftCard became a huge success, second only to VisiCalc itself in making the Apple II the only 6502-based machine to be significantly adopted by American business; an Apple II with SoftCard soon became the single most popular CP/M hardware configuration.

Enlarge / The Microsoft Z80 SoftCard.


Because the SoftCard shipped with a copy of CP/M, Sams assumed that Microsoft owned the operating system. Now Gates explained that this was not the case: Microsoft had only licensed it from its real owner, a company called Digital Research.

Gates and Gary Kildall, the head of Digital and original programmer of CP/M, had known each other for years, and had developed a mutual respect and sort of partnership. When a new machine came out, Microsoft did the languages and Digital did the operating system. Steve Wood, an early Microsoft programmer:

> *When we were talking to another OEM, a hardware customer who wanted to run BASIC or any of our products, we got to a point by 1977 or '78 where we were always trying to get them to go to Digital first and get CP/M running because it made our job a whole lot easier. When we were doing custom things like the General Electric version or NCR version, it got to be a real*

> *headache. It made our lives a lot easier if someone would just go licence CP/M and get that up on their machines and then our stuff would pretty much run as is. And Gary would do likewise. If someone went to him to licence CP/M and they were looking for languages, he would refer people to Microsoft. It was a very synergistic kind of thing.*

Gates and Kildall had even discussed merging their companies at one point. As it was, there was a sort of unwritten understanding that Microsoft would stay out of operating systems and Digital would stay out of languages. In late 1979, however, Digital began distributing a non-Microsoft BASIC with some of its CP/M packages, a development Gates and others at Microsoft viewed as a betrayal of that trust.

Still, Gates dutifully called Kildall right there in Sams' presence to set up a meeting for Sams and his team for the very next day. He told him they were very important customers, "so treat them right." For his part, Sams was not thrilled. He was so very impressed with Gates and Microsoft, and "we really only wanted to deal with one person" for all of the systems software.

Yet he didn't see a choice. CP/M, you'll remember, ran on the Z80 CPU. Sams therefore needed much more than to just purchase a license from Digital; he needed them to agree to port the operating system to the newer 8088 architecture, and to do it on his schedule. The next morning he and his team were on an airplane bound for Pacific Grove, California, home of Digital Research.

## The mysterious circumstances of August 22, 1980

Enlarge / Gary Kildall in 1977.

Tom Munnecke/Getty Images

This is where the story gets famously unclear. Both Sams and Kildall were asked many times in later years about the events of August 22, 1980. Their stories are so factually disparate that it seems impossible to attribute their differences to mere shading or interpretation. Someone (or perhaps both), it seems, was simply not telling the truth.

Sams claims that he and his team arrived at the Victorian house that served as Digital's headquarters right on time, only to be told that Kildall had decided to take advantage of a beautiful day by blowing off the meeting and going flying in his private plane. Sams and company were left in the hands of Digital's business manager, Kildall's wife Dorothy. Shocked but stalwart, Sams pulled out his NDA as a prelude to getting down to business.

Now, on the face of it, this was an intimidating and unfair agreement, saying essentially that the other party could be sued if they revealed any of IBM's secrets, but that IBM had complete immunity from legal action for the reverse. Gates said he had "faith," and signed right away. Dorothy, however, said no, that she would have to consult with her lawyer first. While Sams fidgeted impatiently in the lobby, she and the lawyer, Gerry Davis, dithered until three o'clock in the afternoon, when she finally signed.

With most of the day gone and with the technical mastermind who would need to actually do the port not even present, negotiations didn't really get anywhere. Sams left Digital, frustrated and annoyed, without even the beginning of an agreement, and immediately started casting about for an alternative to dealing with these people.

For his part, Kildall (who died in 1994 under very strange circumstances) admitted that he was out flying when Sams arrived for his meeting. He claimed, however, that, far from joyriding (joyflying?), he was flying himself home from a business trip. He said it was perfectly okay for the IBM team to have been left in the hands of Dorothy at the beginning of the meeting, as she was much more involved in all business negotiations than he.

He nevertheless said that he was back by the afternoon, and that it was in fact him who convinced Dorothy and Davis to just sign the NDA and get on with it.

After that negotiations proceeded quickly, and IBM and Digital had a "handshake agreement" by the time the day was over. Further, Kildall claimed that he and Dorothy flew out that night (via commercial airliner this time) to begin a vacation in Florida, and that the IBM group happened to be on the same flight. There they all talked about their plans some more.

Sams says that he did not fly to Florida immediately after the meeting, but rather back to Seattle to continue to talk with Microsoft, admitting only that perhaps one or two members of the group might have gone directly back to Boca Raton. For years he also adamantly maintained that he never met Kildall at all that day, "unless he was there pretending to be someone else."

Only in recent years has Sams softened that stance somewhat, saying it's "possible" Kildall was there, although he "doesn't remember it." He also recently said, "We spun it, Kildall spun it, and Microsoft spun it." This might be read as the last refuge of a man who hasn't always been entirely truthful, but who knows really. There are witnesses that partially corroborate each version of events. A Digital executive and friend of Kildall named Tom Rolander says he was on the business trip with Kildall, and that they did indeed meet with Sams that afternoon. Meanwhile Davis, Digital's lawyer, says that he is certain no handshake deal was reached that day, and other IBM staffers do recall Sams saying immediately after the expedition that Kildall never showed up for the meeting.


Enlarge / Bill Gates shares a moment with Microsoft co-founder Paul Allen in 1987.

Ann E. Yow-Dyson/Getty Images

## East Coast businessman vs. Californian hippie

So, what to make of all this? We might start by looking at Kildall's personality in contrast to Gates'. Popular accounts of these events often boil Gates and Kildall down to caricatures, the maniacally driven East Coast businessman versus the laid-back California hippie. They're actually not awful as caricatures go. Both were wonderful hackers, but they could otherwise have hardly been more different. Gates was determined to prove himself and to *win*, over and over. When a bigger fish like IBM came calling, he was perfectly willing to humble himself, even to the point obsequiousness, as long as he needed them as a stepping stone to the next level.

(Once he didn't need them anymore, of course, all bets were off.) It may not have been grounded in the most admirable of traits, but Gates' ambition made Microsoft beloved by many of its partners. Not only had Gates assembled a very talented team, but they reflected their boss's personality in being willing to work like dogs and walk through walls to get the job done and outdo their competitors.

Kildall, meanwhile, often didn't even seem certain he wanted to be running a business in the first place:

> *In one of the darkest of those moments in the late '70s, Gary passed the parking lot by on his way into work, and continued around the block, realising that he just couldn't bring himself to go in the door. He circled the block three times before he could force himself to confront another day at DRI.*

One can't imagine a remotely similar moment of doubt plaguing Gates.

What was truly important to Kildall was the joy of hacking. Users needed just be patient. While he would be happy to work with IBM, they needed to get in line like everyone else. Certainly he wasn't interested in groveling to them. Digital's vice president in 1980, Gordan Eubanks, says, "Gary cared a lot more about partying than running a business." In addition to partying, Kildall cared about software. Gates cared about the software *business*. Eubanks:

> *The differences between Bill and Gary were just striking. Bill saw an opportunity, he would drive, he'd commit, he'd probably over commit, no problem. Gary was like, "I don't care, I'm Digital Research. You deal with me, and you deal with me on my terms."*

Enlarge / Jack Sams, appearing on the PBS show Triumph of the Nerds in 1996.


And then of course there's the personality of Sams, or rather of his corporate parent. IBM was the big dog in computers, and they expected to be treated like it. If they condescended to visit the likes of Microsoft or Digital, they should be treated like the VIPs they were, shown that the company in question really *wanted* their business.

When Digital failed to demonstrate its respect and thankfulness to the same degree as did Microsoft—and whatever else happened that day, it does seem pretty clear that this at least was the case; Eubanks describes Dorothy as constantly "bitchy" to everyone, including potential customers—Sams was angry. "Don't these people know who I am?" he must have wondered. Further, it's pretty clear that Sams was unhappy about having to deal with Digital in lieu of Gates before he ever boarded that flight for California. As our mothers always told us, going into something with a bad attitude usually yields a bad result.

One thing is certain, though: handshake or no handshake, and regardless of what impression Kildall might have been under, Sams was not pleased with his experience at Digital. He asked Gates, who had by this time signed an official consulting deal, whether he might find him an alternative to CP/M. Gates said he would see what he could do. In the meantime Sams claims he continued to try to work out something with Digital, but couldn't get a commitment to develop an 8088 CP/M on the strict timetable he needed. Eubanks says that Kildall just didn't find the project all that "interesting," in spite of the obvious, pressing business need for it, and thus worked on it only halfheartedly.

And then Gates came back with QDOS.

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*Thus concludes part one of the history of the IBM PC. Now read part two!*

*Jimmy Maher is the author of The Digital Antiquarian, an ongoing history of interactive entertainment and matters related in blog form. This article, about the history of the IBM PC, originally appeared there. If you enjoyed this article and the many others on his personal site, you can support his ongoing work by becoming his Patreon patron.*

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