

# Forgotten PC History - The True Origins of the Personal Computer

By Lamont Wood  
(ComputerWorld)

## The PC's back story involves a little-known Texas connection

For decades, histories have traced the PC's x86 lineage back to 1972, with Intel Corp.'s introduction of the 8008 chip, the 8-bit follow-on to the 4-bit 4004, itself introduced in 1971 and remembered as the world's first microprocessor.

But the full story was not that simple. For one thing, the x86's lineage can be traced back four additional years, to 1968, and it was born at a now-defunct firm in San Antonio. The x86 was originally conceived by an all-but-forgotten engineer, Austin O. "Gus" Roche, who was obsessed with making a personal computer. For another thing, Intel got involved reluctantly, and the 8008 was not actually derived from the 4004 -- they were separate projects.

Industrial designer John "Jack" Frassanito, head of John Frassanito & Associates Inc., a NASA contractor in Houston, remembers wincing while plans for the device were drawn by Roche on perfectly good tablecloths in a private club in San Antonio in 1968. He was then a young account manager for legendary designer Raymond Lowey (who did the Coke bottle and the Studebaker Avanti, among other things). Frassanito was sent to Computer Terminal Corp. in San Antonio to help design CTC's first product, an electronic replacement for the Model 33 Teletype. CTC had been recently founded with local backing by former NASA engineers Phil Ray and Roche.

After arriving in San Antonio -- where he soon joined CTC's staff -- Frassanito said that he quickly discovered that the teletype-replacement project was merely a ruse to raise money for the founders' real goal of building a personal computer.

## A hidden agenda

"When writing the business plan, they decided to stay away from the notion of a personal computer, since the bankers they were talking to had no idea what a computer was or wasn't," Frassanito recalled. "So for the first product, they needed something they could get off the ground with existing technology. But the notion from the get-go was to build a personal computer firm."

The resulting terminal, the Datapoint 3300, established CTC as a going concern, and planning began on the project that Frassanito realized was Roche's obsession. He remembers lengthy discussions with Roche about what a personal computer should do and look like. Roche often expressed himself using metaphors from various classics, such as Machiavelli's *The Prince*, which Frassanito found necessary to read.

To ensure a market for the machine, Frassanito said that the CTC founders decided to promote it (with appropriate programming) as a replacement for the IBM 029 card punch machine, and they gave it a half-height display to match the aspect of an IBM punch card. To keep it from being intimidating in an office, they gave it the same footprint as an IBM Selectric typewriter.

The resulting compact enclosure had heat problems, and in late 1969 and early 1970, the designers began looking for ways to reduce the number of components, including reducing the CPU board to one chip.

## The start of Intel's involvement

Frassanito recalled accompanying Roche to a meeting with Bob Noyce, head of Intel, in early 1970 to try to get Intel -- then a start-up devoted to making memory chips -- to produce the CPU chip. Roche

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presented the proposed chip as a potentially revolutionary development and suggested that Intel develop the chip at its own expense and then sell it to all comers, including CTC, Frassanito recalled. "Noyce said it was an intriguing idea, and that Intel could do it, but it would be a dumb move," said Frassanito. "He said that if you have a computer chip, you can only sell one chip per computer, while with memory, you can sell hundreds of chips per computer." Nevertheless, Noyce agreed to a \$50,000 development contract, Frassanito recalled.

Frassanito's recollection of Noyce's negative reaction is echoed in the transcript of a group interview done in September 2006 at the Computer History Museum in Mountain View, Calif. (download PDF). The group included six people who were involved in the development or marketing of Intel's first CPU chips: Federico Faggin, Hal Feeney, Ed Gelbach, Ted Hoff, Stan Mazor and Hank Smith. They agreed that Intel's management at the time feared that if Intel put a CPU chip in its catalog, the computer vendors that were Intel's customers for memory chips would see Intel as a competitor and go elsewhere for memories.

That fear, they indicated, was evident as late as 1973. The group also recalled that work was suspended on the CTC chip, called the 1201, in the summer of 1970 after CTC lost interest, having decided to go ahead with a CPU board using transistor-transistor-logic (TTL) circuits instead of relying on a chip-based design. TTL is the level of integration that preceded microcircuits, where a chip might have tens of transistors rather than thousands.

Hoff, then an Intel engineer, wasn't surprised. The CTC processor architecture "could go to 16,000 bytes of memory, and if you were going to spend that much on memory, then there was no sense in saving maybe \$50 on the processor by moving it out of TTL," Hoff told Computerworld. Memory fell to a penny a bit in 1972, he recalled, so 16KB would have then cost \$1,280 (around \$6,700 today).

## The 2200 debuts

CTC's TTL-based desktop personal computer, called the Datapoint 2200, was unveiled in 1970, with cassette tapes for 130KB of mass storage and 8K of internal memory. The first end-user sale (for 40 units) was to General Mills on May 25, 1970.

Following IBM's marketing model, the machines were leased: \$168 monthly for a machine with 8K of memory, and \$148 for 2K, with modems adding \$30 monthly. RAM was not then available, so for internal memory the unit used recirculating MOS memory, with an access time of up to 500 microseconds for the first byte and 8 microseconds per sequential byte thereafter.

Aaron Goldberg, who in the 1970s was a researcher at IDC and is now vice president at Ziff Davis Media Market Experts in New York, remembered the Datapoint 2200 as one of the first single-user minicomputers, in the same class as the IBM 5320. "These were industrial-strength products. They were trying to downsize [mainframe] business applications," he recalled.

The logic unit appeared to be 8 bits wide, but the processor actually had to loop eight times to process a byte, noted Jonathan Schmidt, then with CTC and now vice president at Perftech Inc. in San Antonio.

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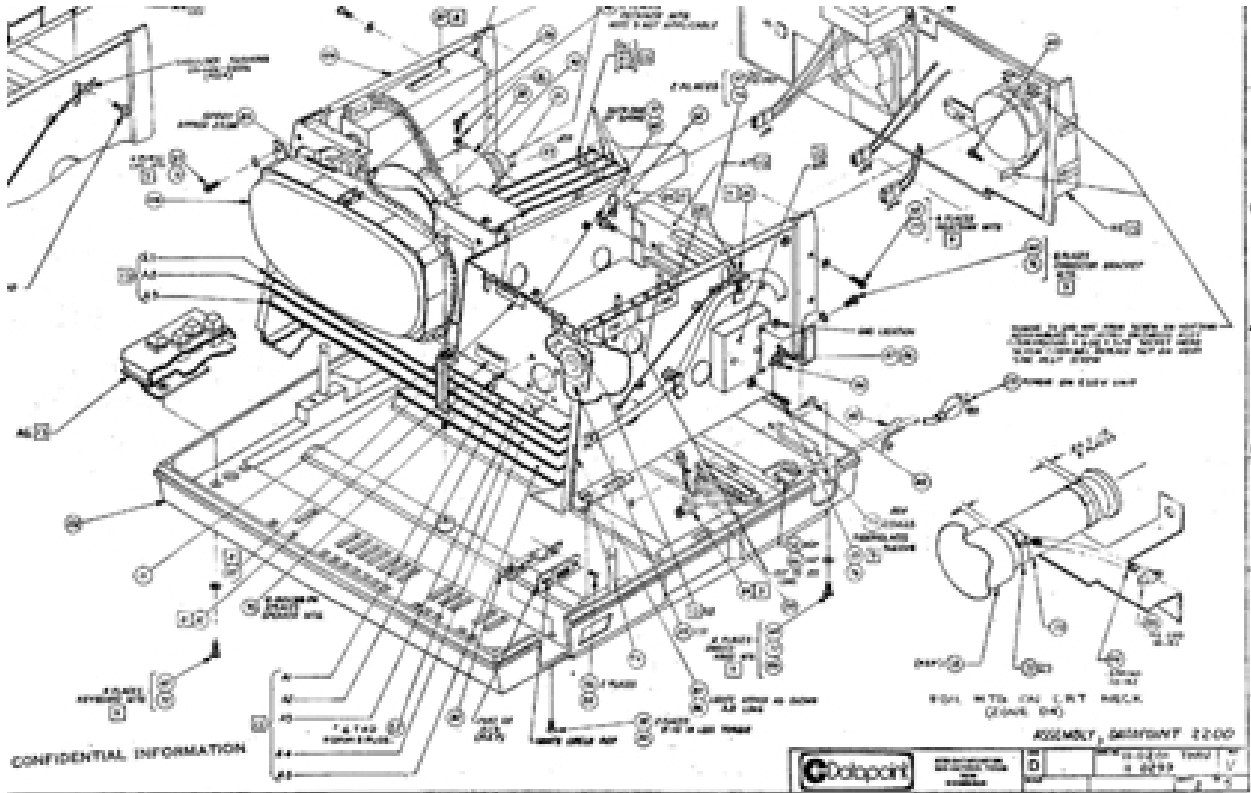
**Production version of the Datapoint 2200.**

At Intel, with the CTC chip on hiatus, development proceeded on the 4004, a 4-bit processor chip for Busicom, a now-defunct Japanese calculator firm that contracted with Intel before CTC, although work on the two projects began at about the same time. But after six months, Seiko Holdings Corp., another Japanese firm, expressed interest in using CTC's 1201 chip for a scientific calculator, and Intel resumed development on the CTC chip. The delay let the 1201 designers upgrade from a 16-pin to an 18-pin package.

CTC had also given a second-source contract to Texas Instruments Inc. Delivered in late 1970 or early 1971, the TI version of the 1201 chip never worked well, and the project was abandoned, Frassanito recalled. The Computer History Museum interviewees said that it was inadvertently sabotaged when TI used an initial specification -- produced for CTC by Intel -- that proved to be flawed.

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**Blueprint of the Datapoint 2200 enclosure, showing the crowded interior.**

Intel's 1201 chip was delivered to CTC in late 1971, but by then CTC was developing the Datapoint 2200 II, which ran much faster and supported a hard drive, and CTC's management was not interested in a chip that it now considered obsolete. Outvoting Roche, who Frassanito said was white-faced with shock at the decision, they dropped the project and abandoned the 1201 chip's intellectual property to Intel.

## **Giving all 1201 rights to Intel**

"Roche said the idea that you can print a computer on a chip is astounding, a profound innovation, and we should own the intellectual property," Frassanito recalled. "They said, why spend \$50,000 for a product we can't use? It was one of the worst business decisions in history."

The 4004 was put in the Intel catalog in November 1971, becoming history's first commercial microprocessor. The 1201, renamed the 8008, was offered in April 1972, for \$120. Unlike the 4004, the 8008 could use standard RAM (which had become available) and ROM memory, making it popular with embedded applications, the interviewees recalled. Since no one was using the chip initially to compete against the mainstream computer vendors, there was no backlash from them, and the nervousness of Intel's management eventually eased.

Also in 1972, design Patent 224,415 was issued to Roche, Ray, and Frassanito for the appearance of the Datapoint 2200, allowing them to say they held the patent for the first PC. (Other parties claimed utility patents for the microprocessor, and the precedence of these other patents was in litigation for decades.)

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In 1974, Intel brought out the 8080 chip based on the same architecture as the 8008, using suggestions from CTC engineers derived from developing the Datapoint 2200 II. Its use of a recently developed 40-pin package meant that fewer support chips were required to multiplex the output. Its descendants formed the x86 dynasty, especially after the 8088 was used in the first IBM PC in 1981. Therefore, any PC in use today can trace its ancestry to the Datapoint 2200.

"I can look at a current PC and still see the image of that original machine buried down in there, with a lot of other stuff, especially more registers," said Victor D. Poor, then a CTC executive, now retired in Melbourne, Fla.

## United States Patent Office

Des. 224,415  
Patented July 25, 1972

224,415

### COMPUTER TERMINAL

Jon P. Ray and Austin O. Roche, San Antonio, Tex.,  
and John R. Frassanito, Oyster Bay, N.Y., assignors  
to Computer Terminal Corporation, San Antonio, Tex.

Filed Nov. 27, 1970, Ser. No. 26,176

Term of patent 14 years

Int. Cl. D14-02

U.S. Cl. D26-5



FIG. 1

Opening screen at the Web site of the U.S. Patent and Trademark Office for design Patent 224,415, assigned to CTC's Ray, Roche and Frassanito.

Intel went on to make billions of dollars off its x86 line. As for CTC, it changed its name to Datapoint at the end of 1972, and some of the same engineers involved in the Datapoint 2200 project were involved in developing the first commercial local-area network -- ARCnet -- which came out in 1977. But in the 1980s Datapoint went into decline, thrown into turmoil by an accounting scandal. Later, like many minicomputer firms, it proved unable to compete with cheaper PCs -- Datapoint's progeny, ironically. Datapoint's remnants were liquidated in 2000.