

## John Presper Eckert

Although today's subject is American engineer and inventor **John Presper Eckert** (April 9, 1919 – June 3, 1995), the story is more about the invention of the “first” computer. Part of the controversy over who first built a computer depends upon the definition of “computer” is used. Blaise Pascal and Gottfried Leibniz invented mechanical calculating machines during the 17<sup>th</sup> century. Charles Babbage is generally credited with having conceived the



first digital computer. His *Analytical Engine* was a mechanical device designed to combine basic arithmetic operations with decisions based on its own computations. Unfortunately, he was unable to complete the engine he envisioned. In 1936 Alan Turing proposed the idea of a machine capable of processing equations without human involvement. At the beginning of 1943, while working on breaking the German's secret *Enigma Code*, Turing and other cryptographers constructed an electronic machine, the *Colossus*, to decode the German cipher. One might make a claim for Colossus as the earliest working programmable electronic computer, even though it was a special purpose instrument, suitable only for a limited number of tasks.

J. Presper Eckert was born in Philadelphia, the only son of a prominent real estate developer. At the William Penn Charter School, he was recognized for his exceptional mathematical abilities and his electronic ingenuity. In 1937 Eckert entered the Moore School of Electrical Engineering at the University of Pennsylvania, where he received a B.S. and M.S. in electrical engineering. He was such an engineering genius that he was given a post teaching electronics at the school soon after his graduation. At this time the Moore School was deeply involved in research to aid the war efforts. John William Mauchly was one of Eckert's students in a training course in electronics. The former held a doctorate in physics from John Hopkins University. Mauchly accepted a position as an instructor at the

Moore School, where he and Eckert became close friends and spent many hours discussing their mutual interest in designing and constructing computers.

The Moore School did research using early forms of computers, including a *Bush differential analyzer*, designed by Vannevar Bush and his colleagues at MIT. The machine was a general-purpose analog computer, driven by electric motors, which was used to solve problems involving differential equations. Copies of the analyzer were widely employed in the war effort, especially in creating firing and bombing tables. The analyzer consisted of replaceable shafts, gears, wheels, handles, electric motors, and disks; and it required much manual work to set it up. Eckert and Mauchly had ideas on how to construct a better computer. When their proposal for the design of a computer resulted in a \$400,000 contract from the Army, they collaborated on the construction of the *Electronic Integrator and Computer (ENIAC)*, a general-purpose computer.

Completed in February 1946, the *ENIAC* contained some 18,000 vacuum tubes and measured about 8 feet in height and 80 feet in length. It was more than 1000 times faster than its electromechanical predecessors and could perform up to 5,000 additions per second. Although the war was over by the time the *ENIAC* was operational, John von Neumann used it while working on top-secret problems associated with the development of nuclear weapons. When the University of Pennsylvania asked Eckert and Mauchly to sign over the *ENIAC* patent, they refused and in October 1946 left to form their own computer company. They received an order from Northrop Aircraft Company to build the *Binary Automatic Computer (BINAC)*. The National Bureau of Standards contracted with them to build the *Universal Automatic Computer (UNIVAC)*, the first computer produced for commercial use in the United States.

In 1950 Remington Rand Corporation acquired the Eckert-Mauchly Computer Corporation and the

rights to the *ENIAC* patent. Eckert remained with the firm and became an executive of the corporation when it merged with the Burroughs Corporation to become Unisys. Mauchly left the company to form Mauchly Associates of which he was president from 1959 to 1965, when he became chairman of the board. In 1966 Eckert and Mauchly shared the Harry M. Goode Memorial Award given by the Computer Society for their “pioneering contributions to automatic computing by participating in the design and construction of the *ENIAC*, the world’s first all-electronic computer, and of the *BINAC* and the *UNIVAC* ...” Mauchly felt it was a shame that he was best known for the invention of a computer when he had also invented the skateboard, which he considered an equally revolutionary tool. Mauchly died in Ambler, Pennsylvania at age 72. Eckert died of complications relating to leukemia in Bryn Mawr, Pennsylvania at age 76.

Eckert and Mauchly’s story is incomplete without mentioning the Atanasoff controversy over priority and purported “piracy.” In the mid 1930s Iowa State mathematician and physicist John Vincent Atanasoff concluded that the computational devices existing at the time were too slow and inaccurate for his purposes. With the assistance of his graduate student Clifford Berry, Atanasoff designed and constructed the *Atanasoff Berry Computer (ABC)* in 1939. Compared to today’s computers it was slow and had a miniscule memory. It was the first data processing machine to employ ideas such as the binary system, separate memory and computing functions, internal clock control, and the use of circuits for logical addition and subtraction. Because of wartime demands, Atanasoff was never able to get a patent for his invention. It was stored in the basement of the physics building and cannibalized for parts for other projects without Atanasoff’s knowledge.

In 1940 Atanasoff met Mauchly, described his computer, and unwisely agreed to show it to his new acquaintance. Mauchly spent several days at Atanasoff’s home where the inventor extensively briefed his guest about the computer and demonstrated it for his visitor. He even allowed Mauchly to leave

with papers describing its design. Many of Atanasoff's ideas were used in the design of *ENIAC*, leading to charges of piracy to be leveled against Mauchly. A long trial ensued and finally on October 19, 1973 Atanasoff was given the recognition and credit he deserved. In his ruling Federal Judge Earl R. Larson specified that "Eckert and Mauchly did not themselves first invent the automatic electronic computer, but instead derived that subject matter from Dr. John Vincent Atanasoff." The judge declared the *ENIAC* patent of Eckert and Mauchly to be invalid. The duo disputed the finding throughout their lives. In 1990 President George H. Bush acknowledged Atanasoff's pioneering work in computers by awarding him the National Medal of Technology.

**Quotation of the Day:** I have always taken the position that there is enough credit for everyone in the invention and development of the electronic computer." – John V. Atanasoff