

From The Times  
January 12, 2010

# Andrew Booth: scientist who invented the magnetic storage device

Andrew Booth was a computer scientist, physicist and engineer whose two key inventions helped to make the first computer possible.

He invented the magnetic storage device for computers, which uses the magnetic properties of materials to store data and which is still being used in computers today. He also invented the complex multiplication algorithm (a procedure or formula for solving a problem) now known as the "Booth multiplier". The Booth multiplier is an arithmetical routine still in use today in Pentium processors.

Booth realised in the late 1940s that the storage of data would be the most important and difficult problem to solve if viable computers were to be developed. He experimented with the physical properties of matter to see if they could be used as a mechanical memory.



Booth: in the late 1940s he realised that data storage would be the chief challenge in developing viable computers

But the most promising candidate was magnetism because of the durability of its effects. In May 1948 he was able to demonstrate the successful operation of a rotating drum, a brass cylinder that was coated with nickel, as part of the so-called automatic relay computer.

His drum store, the world's first, is now on display at the Science Museum, London. The rotating memory drum came to be used in computers all over the world and the principle of magnetic storage is about the only element of original computing technology in use today.

This led him to develop a stored-programme computer and a fully electronic version of the Automatic Relay Computer, called the Simple Electronic Computer. In 1951 Booth followed this with his all purpose electronic computer (Apec), one of the first generation of electronic computers.

As a result, 60 years later, almost every household in the developed world has at least one computer. All aspects of modern life depend on them; life without them is unimaginable.

Andrew Donald Booth was born in 1918 and grew up in Weybridge, Surrey. His father was a chief engineer on a ship. He attended the Haberdashers' Aske's Boys' School, which kindled his love of mathematics and physics. Leaving school in 1937 he went to Jesus College, Cambridge, having won a scholarship to read mathematics.

But he became increasingly unhappy with the abstract nature of pure mathematics and he left Cambridge without taking a degree. He immediately enrolled for an external degree at the University of London, which he obtained with a first.

By then the war had begun and he took several jobs in industry, becoming, for example, a graduate apprentice in an Armstrong Siddley aeroengine factory in Coventry working on the design of searchlights. While at Coventry he set up an X-ray department for the inspection of engine components and developed an interest in X-rays.

To pursue this he obtained a scholarship from the British Rubber Producers' Research Association, which enabled him to study the crystal structure of explosives in the department of chemistry at the University of Birmingham. In 1944 he received his PhD for research in crystallography. He then worked as a research physicist at the British Rubber Producers' Research Association in Welwyn Garden City.

In 1946 he was appointed as a lecturer at the Department of Physics at Birkbeck College, London, by the eminent physicist and crystallographer J. D. Bernal. In those days crystallographic research required huge amounts of laborious analysis and calculation with desk calculators. Bernal sent Booth to the US to learn about developments in computing.

He visited many of the computers that were under development in the US, returning to Birkbeck in 1946. In 1947 he returned to the US for a year to take up a Rockefeller Fellowship at the Institute of Advanced Study at Princeton.

He founded Birkbeck's Electronic Computation Research Laboratory, which in 1957 became the Department of Numerical Automation, the first of its kind. No other university at that time had a department dedicated to the study and teaching of computing; it was also one of the first to offer a degree course in computing. It is now Birkbeck's School of Computer Science and Information Systems.

In 1962 he left the UK to settle in Canada. He was appointed Dean of Engineering at the University of Saskatchewan. He helped to make the School of Engineering a centre of Canadian research. In 1972 he became the president of Lakehead University, Ontario where he developed the university's research programme. He retired in 1978.

He then moved to Sooke, British Columbia, where he established a private consultancy and continued to experiment in fields such as ocean acoustics and automated translation.

Booth wrote several books and many scientific papers. He was writing reviews for mathematical journals up to his death.

In 2004 he was made a Fellow of Birkbeck College. He was also elected a Fellow of the Institute of Physics, the Institute of Electrical Engineers and the Royal Society of Arts.

Booth was an all-rounder. In addition to developments in many scientific fields he was interested in music, particularly classical music and opera. He played the violin and was a keen mountain climber — he climbed the Empress Mountain on Vancouver Island on his 70th birthday.

He is survived by his wife, a daughter and a son.

**Andrew Booth, computer scientist, was born on February 11, 1918. He died on November 29, 2009, aged 91**