

University Challenge

The world's first programmable computer was developed at Manchester University

After the Second World War had ended, Manchester University appointed two new professors. Following his code-breaking work with Colossus, the world's first electromechanical computer, at Bletchley Park, Max Newman became professor of mathematics; and a radar engineer, F C Williams, was appointed head of electrical engineering. Williams brought with him a young assistant, Tom Kilburn, who was familiar with the problems of pulse electronic-memory devices, which he had encountered in his wartime work with radar. Kilburn was later to become the first professor of the new discipline of computer studies at Manchester University.

During a tour of radar establishments in the United States in 1946, Williams had been shown the prototype of the valve computer ENIAC (see page 46), and on his return to England he persuaded the Royal Society to invest £35,000 in a 'Calculating Machine Laboratory' at Manchester. The University was not alone in the race to build a stored program computer. The University of Pennsylvania was constructing the EDVAC, work on the EDSAC was under way at Cambridge University, and the development of the ACE continued at the National Physical Laboratory (see page 88). All these other projects, however, were using a memory store constructed of mercury delay line tubes. The Manchester team were building their machine around a memory device that Williams had invented using a cathode ray tube (CRT). By the autumn of 1947, Williams had succeeded in retaining 2,048 bits for several hours.

Using a 'Williams tube', the Manchester Mark I computer successfully ran a program in June 1948, thus becoming the world's first stored program computer. The Mark I could execute an instruction in 1.2 milliseconds. By using a CRT to store information, the memory had the advantage

of being random access, and the contents of the main store or the control register could be visually displayed.

Once the feasibility of using a Williams tube for memory storage was established, an enhanced Mark I was built that could perform work on optics design problems and the generation of prime numbers. The government chief scientist, Sir Ben Lockspeiser, was so impressed by the performance of the computer that he arranged for a commercial version of the Mark I to be built by a local Manchester company. The Ferranti Mark I became available in February 1951, preceding UNIVAC by five months and establishing itself as the first commercially available computer.

An important innovation on the Ferranti Mark I was its ability to modify instructions during processing using another store called the 'B' tube. At the required moment this could add its contents into the control register and thus modify the code of the original instruction. This principle speeded up the processing of programs. IBM used some of the Manchester patents in their early computers, and on a visit to their corporate headquarters in New York, where the company motto (THINK) was emblazoned everywhere, Williams was asked how the Manchester team had succeeded in building a computer where all the resources of IBM had failed. 'We just didn't stop to think too much!' Williams quickly replied.

The arrival of Alan Turing (see page 200) at Manchester in 1948, greatly stimulated programming activities. In 1950 Turing produced the first Manchester programming manual. Two years later, the Manchester team had the idea of building a more compact and economic computer. Their plans were accelerated by the invention of the transistor, and in November 1953 the world's first transistor computer became operational at Manchester.

The late 1950's saw America surging ahead in computer technology, resulting in the British government's decision to invest in a project that would help Britain regain the lead. The Atlas computer, built under the direction of Tom Kilburn, was commissioned in December 1962. It used a 48-bit word with single address format, a 16 Kbyte main store and an eight Kbyte read-only drum memory. Models were sold to the Atomic Energy Research Establishment at Harwell, and British Petroleum, and for many years the Atlas computer was considered to be the most advanced in existence.

Manchester Mark 1

Having successfully run a program in June 1948, the Manchester Mark 1 can claim to be the world's first stored program computer. Ferranti, then a local company, were commissioned to develop a commercial version of the computer, which came onto the market in early 1951



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