

Alan Turing

A brief biography, based on that formerly displayed in the 'Hall of Fame' in Bletchley Park mansion.

Alan Turing was born on 23 June 1912 in London. He went to Sherborne School in 1926 where in addition to the classics-oriented curriculum he studied science in his own time. His untidy habits and shy, hesitant, high pitched voice were to remain with him, as would his ability to think deeply, working from first principles. He seemed to some an anti-social loner, but with a sense of humour.

In 1931 he went up to King's College, Cambridge, where he was much happier, because of both the intellectual challenge and the tolerance of his homosexuality. He became a fellow of the College in 1935, and pursued his interest in mathematical logic. He published his most important theoretical work in 1936, *On computable numbers, with an application to the Entscheidungsproblem*, in which he proposed a machine that could perform logical operations, seen as the underlying foundation of digital computation. Later that year he moved to Princeton University in the USA, completing his Ph. D thesis *Systems of logic based on ordinals*, in 1938. He then returned to his fellowship at King's.

Turing was recruited by the Government Code and Cypher School in 1938 as they prepared for the possibility of war with Germany and reported to Bletchley Park on 4 September 1939, the day after war was declared. He was assigned to the Enigma research section, under [Dilly Knox](#), who soon reported that Alan Turing was producing a stream of ideas. Taking forward pre-war work by Polish codebreakers, Turing designed a machine for breaking Enigma - the Bombe - which by the autumn of 1940 was being used to help break Enigma-enciphered messages.

By December 1939 Turing had worked out the way the Germans chose their Naval Enigma message indicators. He later headed the naval Enigma decryption team in Hut 8, and soon he was being consulted from around the

organisation. After thinking deeply about a cryptographic problem, he could often suggest an approach that would open up a successful solution. In June 1940 Turing produced a cryptanalytic reference manual known in Bletchley Park as 'Prof's Book'.

Hut 8 steadily worked towards the breaking of Naval Enigma, and, after receiving captured material, succeeded in the summer of 1941 in breaking the vital U-boat key, Dolphin, virtually every day. Turing's method for reducing the number of possible wheel orders, 'Banburismus', was based on his development in sequential statistical analysis, an original contribution to mathematics.

In addition to his work on Enigma ciphers, Turing was involved in the attack on the German Lorenz enciphered teleprinter. He developed a statistical approach to breaking the Fish ciphers, called 'Turingery' in the Testery; the machinery in the Newmanry used a derivative of this approach. While Turing was not directly involved in the development of these machines, such as Colossus, the concepts behind them certainly stemmed from his discussions with [Max Newman](#).

In December 1942 Turing left Bletchley Park for the USA, to help with the US high-speed Bombes, and with a system of secure voice radio at Bell Labs. He returned home in August 1943, not to Bletchley Park but to nearby Hanslope Park, to work on the development of secure voice communications systems.

In 1946 Turing was made an Officer of the Order of the British Empire (OBE) for his wartime service.

After the war, Turing joined the National Physical Laboratory to design the computer, ACE. He produced a visionary design but was frustrated by slow progress. In 1946 and 1947 he gave a series of lectures in London on computer design, including the first to mention computer intelligence, the foundation of what is now known as artificial intelligence.

In October 1948 Max Newman invited Turing to join the Computing Machine Laboratory at Manchester University. He designed an arithmetic routine for the Manchester Baby computer and used the machines there for a variety of pioneering applications, including, artificial intelligence, a theory of growth in biology, and for modelling reactions. Turing was made a Fellow of the Royal Society in 1951 and a year later published *The chemical basis of morphogenesis*.

In 1952 Turing was convicted of gross indecency and died of cyanide poisoning in June 1954; the coroner recorded a verdict of suicide. In 2009 the Prime Minister, Gordon Brown, made an official public apology on behalf of the Government for the way Turing was treated, a signed copy of which can be seen at Bletchley Park. In 2013 he was granted a posthumous royal pardon, which was later extended to all those convicted under long-repealed legislation outlawing homosexual acts. This legislation has become known as 'Turing's Law'.