

## The story of the computer - Part B

**B. From 1930 to 1950:** This period is marked by the birth of the electronic computer. During these two decades, several computers were invented by scientists who are considered the pioneers of the electronic computer industry. These early computers did not store the program in their memory; they were all programmed with the use of series of external switches and dials. Five computing machines were prominent during this period:

- ❖ The ABC (*Atanasoff Berry Computer*): the first special-purpose computer that encoded information electrically. Invented by John V. Atanasoff and his assistant Clifford Berry in 1939, the ABC Computer was specifically designed to solve systems of linear equations.
- ❖ The Z1: a general-purpose mechanical computer that was built from 1936 to 1938 by the German mathematician, engineer, and computer pioneer Konrad Zuse.
- ❖ The Mark I: a huge electromechanical protocompiler built in the late 1930s at Harvard University under the direction of Howard Aiken. The project was sponsored by IBM and the US Navy, for which the Mark I provided vital calculations during the Second World War. The computer was approx. 17 m. long, 2.4 m. high, and weighed five tons. The Mark I was followed by three more advanced computing machines (*Mark II - IV*), also developed by Aiken. Of these three successors, the Mark IV, built in 1952, was a fully electronic computer.

9/9

0800 Antan started  
1000 stopped - antan ✓  
13:00 (032) MP - MC 1.2700 9.037 847 025  
032 PRO 2 2.130476415 9.037 846 995 correct  
convd 2.130476415 4.615925059(-2)  
Relays 6-2 in 033 failed special speed test  
in relay 11,000 test.  
Relays changed  
1100 Started Cosine Tape (Sine check)  
1525 Started Multi-Adder Test.  
1545 Relay #70 Panel F (moth) in relay.  
First actual case of bug being found.  
1630 Antan started.  
1700 closed down.

### The First "Computer Bug" (9 September 1947)

Moth found trapped between points at Relay #70, Panel F, of the Mark II Aiken Relay Calculator while it was being tested at Harvard University. The operators affixed the moth to the computer log, with the entry: "First actual case of bug being found". (The term "debugging" already existed; thus, finding an actual bug was an amusing occurrence.)

- ❖ The Colossus: the world's first programmable electronic digital computer invented in England in the years 1943-1945 by a team of telephone engineers led by Tommy Flowers. The Colossus was extensively used by British codebreakers for cryptanalysis, as it was designed to help decipher the Lorenz-encrypted messages between Hitler and his generals during the Second World War.

- ❖ The ENIAC (*Electronic Numerical Integrator and Calculator*): the first general-purpose, totally electronic computer made in 1946 by John Mauchly and J. Presper Eckert. The ENIAC used 18,000 vacuum tubes, was 30.5 m. long by 3 m. high, and weighed 30 tons.



John Mauchly

The aforementioned computers used memory only for storing data and were programmed externally with the use of wires or switches. Every time these machines had to be used to do a new task, their operators had to rewire them or turn hundreds of switches on and off. John von Neumann, one of the world's foremost mathematicians and physicists, proposed that both numbers (data) and orders (instructions) be stored in a uniform memory (*stored-program design*). The first computer to be designed based on von Neumann's concept was the EDVAC, made in 1950 at the University of Pennsylvania. Most of the digital computers built since then have been based on the von Neumann model.