Switching On

Behind the computer revolution lie amazing advances in 'miniature engineering'

The First Valve Computer

In 1943, at the height of the Second World War, a colonel in the US army requested a calculating machine for the artillery. The challenge was taken up by the University of Pennsylvania whose invention was presented in 1946, having taken 7,237 man-hours to perfect.

The machine was given the name ENIAC (Electrical Numerical Integrator and Calculator) and was the earliest valve computer. ENIAC used 18,000 valves, 1,500 relays and emitted the heat equivalent of 200 kilowatt fires. This enormous construction was housed in a room 9m by 30m.

Memory and reliability were the early problems. ENIAC could only store 20 10-digit numbers and all the programming had to be done by rearranging the wiring. In 1952 over 19,000 valves had to be replaced because the machine could only run for about two minutes before valves started to burn out.

ENIAC's life was short-lived and it went into retirement in 1952
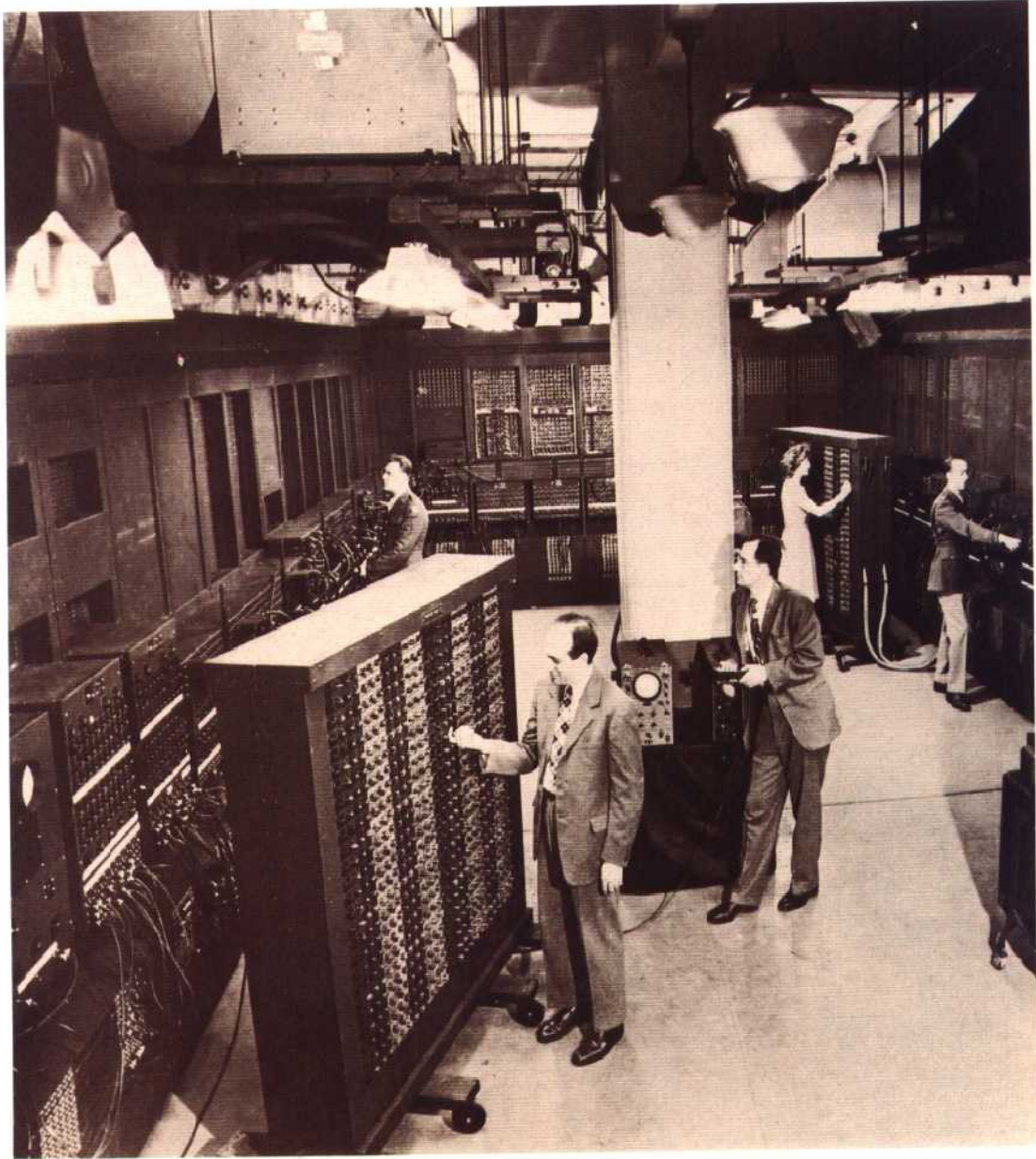
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Relay Switch

When current is passed through the coil that surrounds the iron rod, a magnetic force is created. This force attracts the bent strip of iron which is pivoted at the right angle bend. The strip turns on its pivot and presses the two contacts together thus closing the switch

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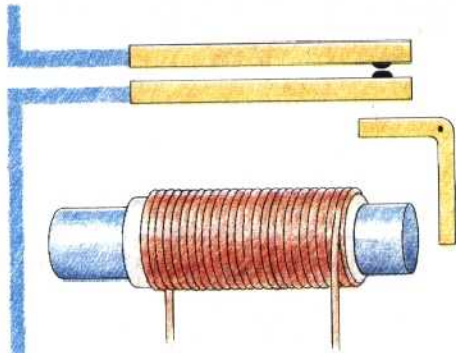
The modern computer contains millions of small electronic switches. These are fundamental to the design of computers; without them the technological revolution that has occurred since the Second World War could not have taken place.

In 1938, an electrical engineer, Claude Shannon, demonstrated that logical operations could be performed using electrical switching circuits. Since it was apparent that the operation of a computer consisted of a sequence of logical operations, the search was now on to make an electronic switch.

The first attempt resulted in the 'relay'. This switch was successfully used in pioneering