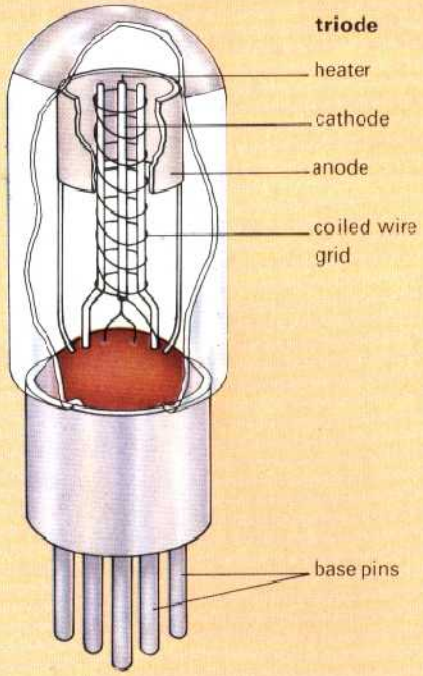
Valve

The device illustrated is a triode — a valve containing three electrodes, which are housed in a glass tube. The cathode (negative terminal) and anode (positive terminal) are separated by a coiled wire 'grid'. When the cathode is heated, it emits electrons, which are negatively charged and are attracted to the anode. The emission of electrons is promoted by a special chemical coating on the cathode.

The grid does not interfere with the flow of electrons unless a negative voltage is applied to it. It then repels the electrons and prevents them from passing through to the anode. The valve can thus be used as an electronic switch, which is turned off by applying a small negative voltage to the grid. 'First generation' digital computers contained thousands of valves used as switches in this way

In addition to the three fundamental components (cathode, anode and grid), most valves contain a number of additional elements to improve performance. The principle of operation, however, remains unchanged



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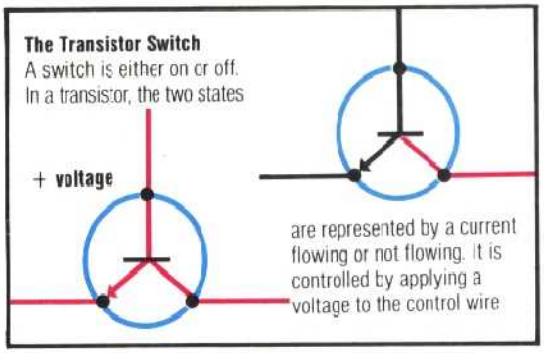
computers, but its design limited the growth of computers and their power. The relay was not wholly electrical in its operation and the mechanical components led to frequent breakdowns, unreliability and slow operation.

The first generation of working computers was characterised by the use of the valve in the essential role of the switch. These were completely electronic in operation and consequently faster. However they used large amounts of electricity (this was expensive and caused problems with generated heat) and were very bulky and not yet wholly reliable.

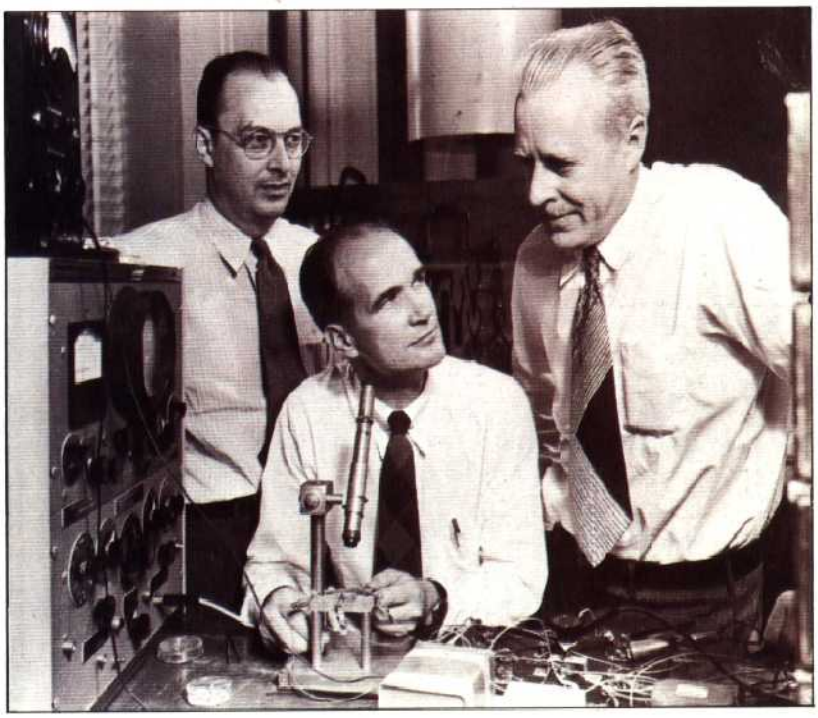
The invention of the transistor heralded a new generation of computers. Transistors are theoretically similar to the valve in operation, but superior in performance, smaller, and cheaper to manufacture. These advances took the computer out of the universities and military establishments and into the commercial world.

Today's computers still use transistors as switches, but the transistors are no longer discrete, separate items. On a silicon chip the size of a fingernail, there can be as many as a quarter of a million transistors, each one too small to be seen by the naked eye. Tiny though they are, each one is still a switch. By packing the thousands of switches needed to make a computer work onto a small chip of silicon, further dramatic savings in cost have become possible. The most expensive and powerful computers from the 1950's that filled a whole laboratory have been reduced onto a single chip, the powerhouse of today's micro. Computers are now small enough and cheap enough for almost anyone to own.



The Inventors Of The Transistor

The 1956 Nobel Prize was awarded to the team whose research led to the invention of the transistor in 1947. Pictured here at the Bell Telephone laboratories (left to right): Dr John Bardeen, Dr William Shockley and Dr Walter Brattain



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