Electric Circuit Encyclopedia Article

Electric Circuit

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Electric Circuit

An electrical circuit controls the flow of electricity. It is composed of various components, depending on its purpose. The most common components in a circuit are switches, capacitors, resistors, inductors, and potentiometers. Adding vacuum tubes (also known as valves) or semiconductors (such as transistors) changes the nature of the circuit, giving rise to the name *electronic* circuit. Circuits often include a fuse or circuit breaker to prevent a power overload.

The first electric circuit was invented by Alessandro Volta in 1800. He discovered he could produce a steady flow of electricity using bowls of salt solution that were connected by metal strips. Next, he used alternating discs of copper, zinc, and cardboard that had been soaked in a salt solution to create his voltaic pile (an early battery). By attaching a wire running from the top to the bottom, he caused an electric current to flow through his circuit. The first practical use of the circuit was in electrolysis, which is a process where electric current passed through a substance induces a chemical change. This led to the discovery of several new chemical elements.

The flow of electricity through a circuit is measured in amperes, named for André Marie Ampère (1775-1836), is the amount of charge flowing past a specific point in the circuit each second. Electric charge is measured in Coulombs, for Charles Coulomb (1736-1806). One ampere equals one Coulomb per second. (The electrical charge of one electron is 1.602×10^{-19} Coulomb). Voltage, named for Volta, is the driving force (electrostatic field) that "pushes" electrons through the circuit. The resistance of a circuit opposes the flow of electrons, and often causes heat. Georg Ohm (1787-1854) discovered that some conductors have more resistance than others, which affects their efficiency in a circuit. His famous law, known as *Ohm's Law*, states that the resistance in a circuit equals the voltage across a conductor divided by the current, or R=V/I. In its more common form the equation reads V=IR.