Induction or Coil

Coils are prevalent in various devices such as motors, transformers, and relay. When current flows through a wire, it generates a magnetic field; higher current results in a stronger field. The main power voltage appears as a sine wave; the surrounding magnetic fields can induce small voltages due to proximity. Voltage is induced when conductors move within magnetic fields or when the intensity of the magnetic field changes. To enhance the magnetic force, wires can be wound into coils and combined with ferromagnetic materials like iron. Electromagnets utilize this principle to trigger switches capable of handling high AC currents.

The strength of the magnetic field produced by a coil depends on its dimensions, windings, and core material; this property is quantified as inductance (measured in Henry). In DC circuits, voltage can only switch on or off. A simulated square wave signal demonstrates how current behaves differently with coils compared to resistive loads. Lenz's Law explains that induced currents oppose changes in their own flow; thus coils resist immediate changes in current.

Coils may seem obstructive but can be advantageous for energy storage.

In boost converters, closing a switch creates magnetic fields around the coil. Opening it allows the coil to release energy back into the circuit, increasing output voltage. Caution is necessary when using PWM signals with motors since coils can generate high-voltage spikes that may damage transistors.