

1 August 2008

By: Gabriel Gache, Science News Editor



Image of a typical Hub dynamo used to power the lights of bicycles Spacycles

How Dynamos Work

Direct current generators

Although the name dynamo was originally associated with all types of electrical generators, currently it is only used to describe mechanisms capable of producing direct current and small devices used to generate the power running the lights of bicycles (see featured image). A dynamo is basically a device able to convert mechanical rotation into electric current via Faraday's law. Michael Faraday was the first to invent the direct current generator in 1831 while rotating a copper disk inside the magnetic field produced by a permanent magnet. Later on, Faraday discovered that by rotating a coil inside a similar magnetic field, the voltage of the electric current produced by the dynamo increases according to the number of turns of wire inside the coil, thus increasing the power output of the device. Since then the design of electrical generators hasn't changed too much. As said in the previous paragraphs, a typical dynamo consists of one or more permanent magnets with a coil rotating inside their poles. The stationary part of the device is called the stator, while the rotating bit is known as the armature. When the coil is spun in the magnetic field produced by the permanent magnets, the magnetic flux starts to vary through the coil, creating an electric field which in turn drives the charge carriers through the wire, generating an electric current. The problem with the electric current created by dynamos is that it is alternating. Since at the time of the invention alternating current had no known use, the design was modified so that the device could produce direct current only. This is accomplished with the help of a commutator. As the coil rotates the electrical connections are periodically swapped with each other. Alternatively, it was discovered by accident several decades later that by powering the coil of a dynamo the armature of the device can spin on its own, thus laying the bases for the appearance of the electric motor.