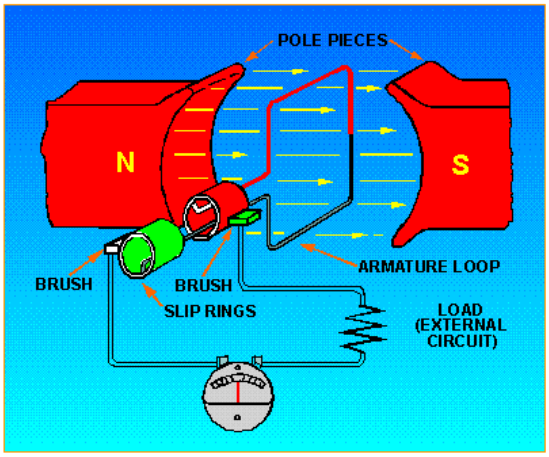
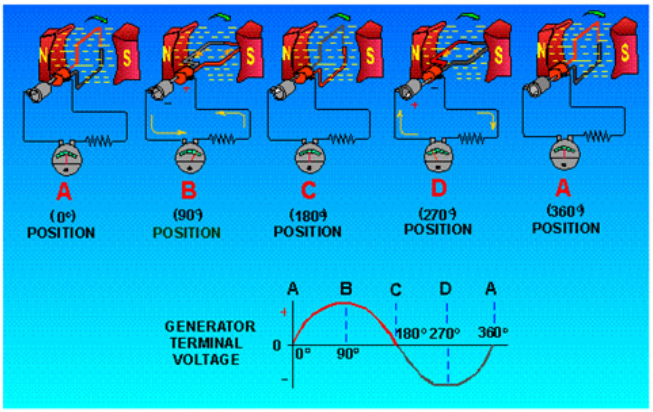
Lesson 6
Electric Generators

A generator is a device that converts mechanical energy into electrical energy. Most generators rely on a rotating coil in a magnetic field. Such rotation is typically caused by wind, tides, falling water, steam, etc.

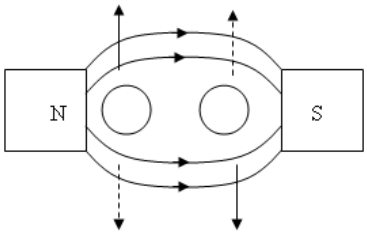
Consider a simple one loop AC generator:



Slip rings rotate with the loop while the brushes remain stationary. At the position shown here the conductor is not cutting across any field lines so no current is induced. As the conductor rotates through 360° current is induced while field lines are being cut as shown below.



Notice that in position B current is maximum in one direction. The current is induced as shown because of Lenz's law.

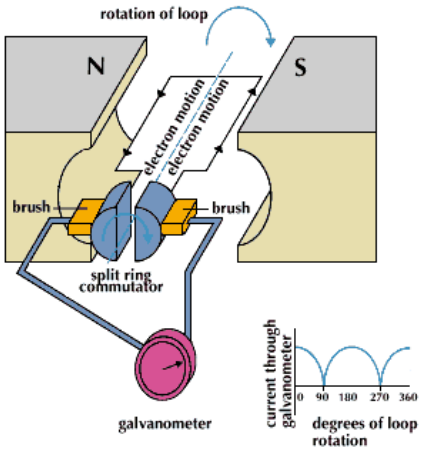


Note that the current output for an AC generator is as shown above.

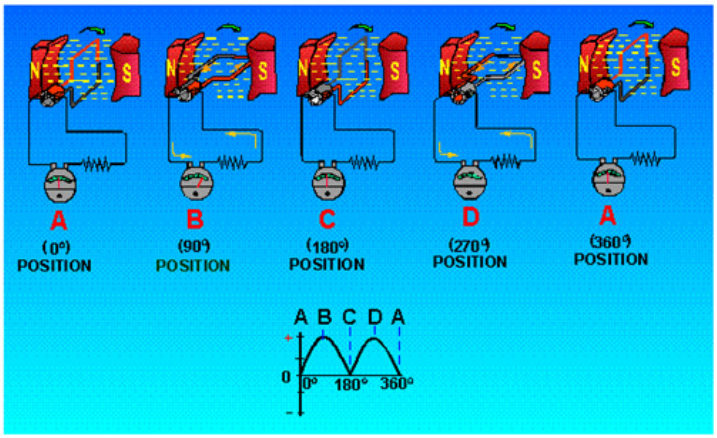
Simulation:
http://www.walter-fendt.de/ph11e/generator_e.htm

AC (alternating) current is defined as current that continually changes direction. The electrons are forced to repeat their back and forth motion.

DC Generator:
The DC generator looks very similar to an AC generator except for the use of a commutator instead of slip rings.



The commutator allows current to flow continuously in one direction. This kind of current is called DC or direct current. The kind of direct current from a generator is not exactly the same as that from a chemical source like a battery (because the current still drops to 0).



The bumpiness of the current is called the "ripple effect". To smooth out the bumpiness, we could use more than one loop each with its own set of commutators, or we could use a multi-segmented commutator.