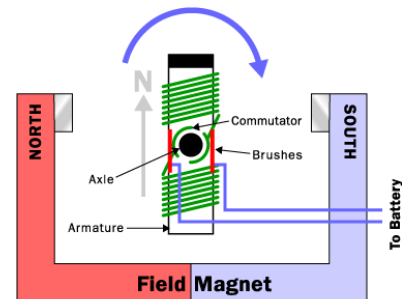


Motors

rezwan

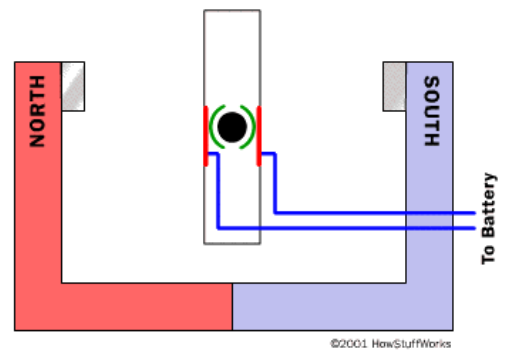


DC Motor

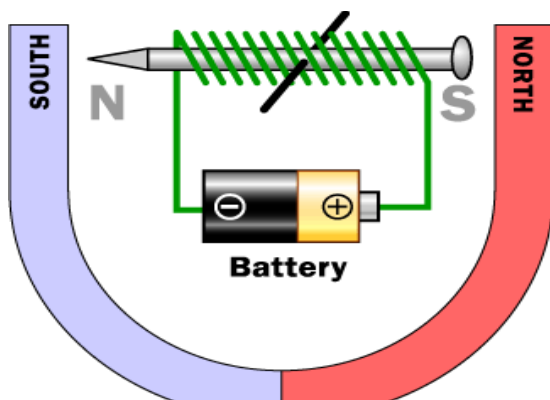
A simple motor has six parts:

- Armature or rotor
- Commutator
- Brushes
- Axle
- Field magnet
- DC power supply of some sort

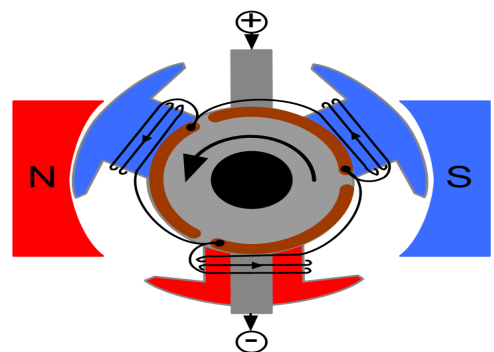
Two pole



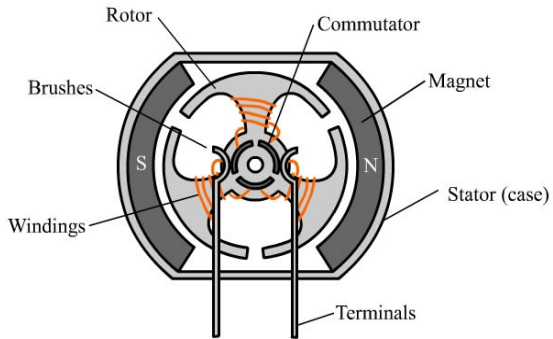
ElectroMagnetism



3-Pole DC Motor



Typical Brushed Motor in Cross-section



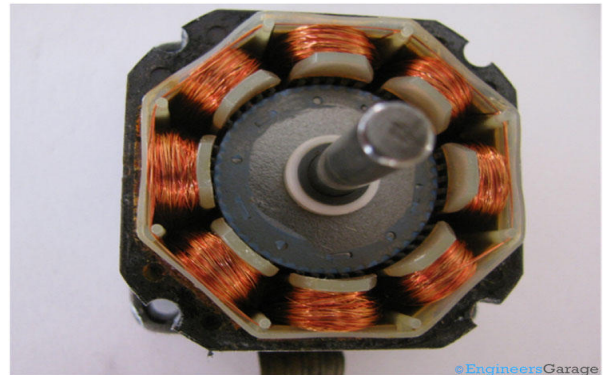
Stepper Motor

- A Stepper Motor or a step motor is a brushless, synchronous motor which divides a full rotation into a number of steps.
- Unlike a brushless DC motor which rotates continuously when a fixed DC voltage is applied to it, a step motor rotates in discrete step angles.
- The Stepper Motors therefore are manufactured with steps per revolution of 12, 24, 72, 144, 180, and 200, resulting in stepping angles of 30, 15, 5, 2.5, 2, and 1.8 degrees per step.

Brushless DC motor

Stepper/ Step Motor

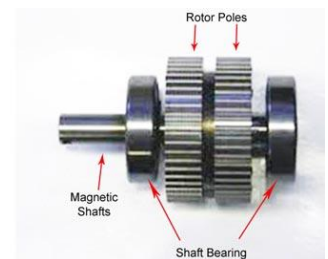
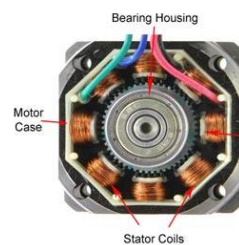
Stepper Motor Architecture

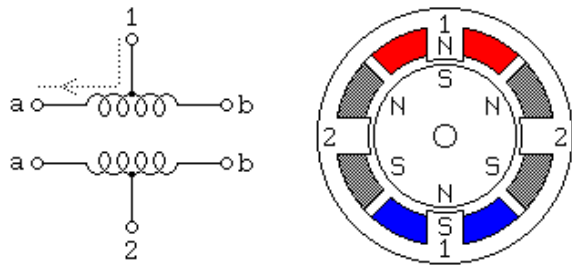


Problems with Brushed motor

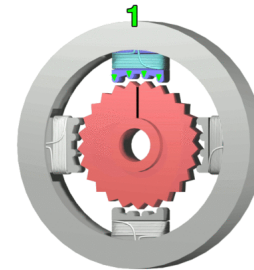
- The brushes eventually wear out.
- Because the brushes are making/breaking connections, you get sparking and electrical noise.
- The brushes limit the maximum speed of the motor.
- Having the electromagnet in the center of the motor makes it harder to cool.
- The use of brushes puts a limit on how many poles the armature can have.

Stepper Motor Architecture (contd.)

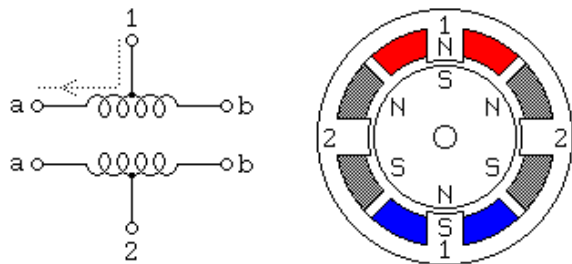




Animation from
http://en.wikipedia.org/wiki/Stepper_motor



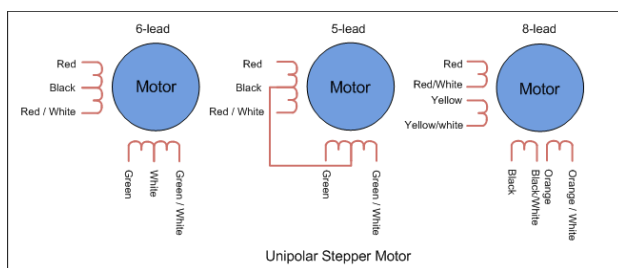
Unipolar motor (anime)



Animation Details from wikipeda

- Animation of a simplified stepper motor (unipolar)
- Frame 1: The top electromagnet (1) is turned on, attracting the nearest teeth of the gear-shaped iron rotor. With the teeth aligned to electromagnet 1, they will be slightly offset from right electromagnet (2).
- Frame 2: The top electromagnet (1) is turned off, and the right electromagnet (2) is energized, pulling the teeth into alignment with it. This results in a rotation of 3.6° in this example.
- Frame 3: The bottom electromagnet (3) is energized; another 3.6° rotation occurs.
- Frame 4: The left electromagnet (4) is energized, rotating again by 3.6° . When the top electromagnet (1) is again enabled, the rotor will have rotated by one tooth position; since there are 25 teeth, it will take 100 steps to make a full rotation in this example.

Different types of unipolar motor



Resources

- http://en.wikipedia.org/wiki/Stepper_motor
- <http://www.amci.com/tutorials/stepper-motor-figure1.2-animation.asp>
- <http://homepage.cs.uiowa.edu/~jones/step/>
- http://en.nanotec.com/steppermotor_animation.html
- <http://www.engineersgarage.com/articles/stepper-motors?page=6>
- <http://www.stepperworld.com/>
- http://en.wikipedia.org/wiki/H_bridge