

ELECTRIC MOTOR

12V DC DEMONSTRATION MODEL

HOW AN ELECTRIC MOTOR WORKS.

Electric motors change electric energy into mechanical energy. In other words, they use electricity to move things. There are many kinds of electric motors for many different uses. For instance when you start a toy car, the battery gets connected to a little motor which makes the wheels turn. Inside an automobile door an electric motor moves the glass window up or down. Building elevators are raised and lowered by powerful electric motors. Can you think of other examples?

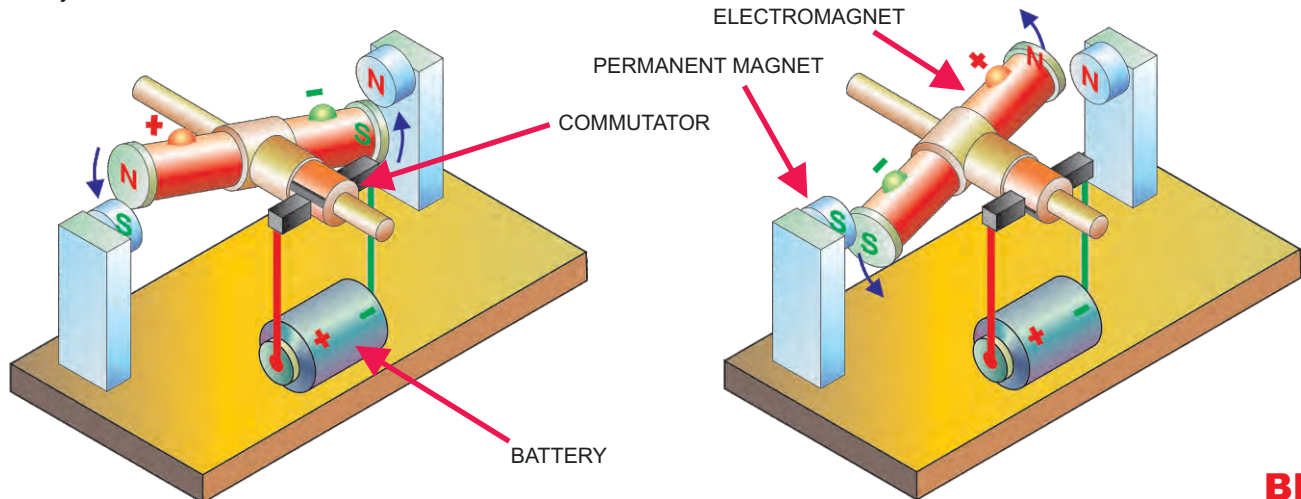
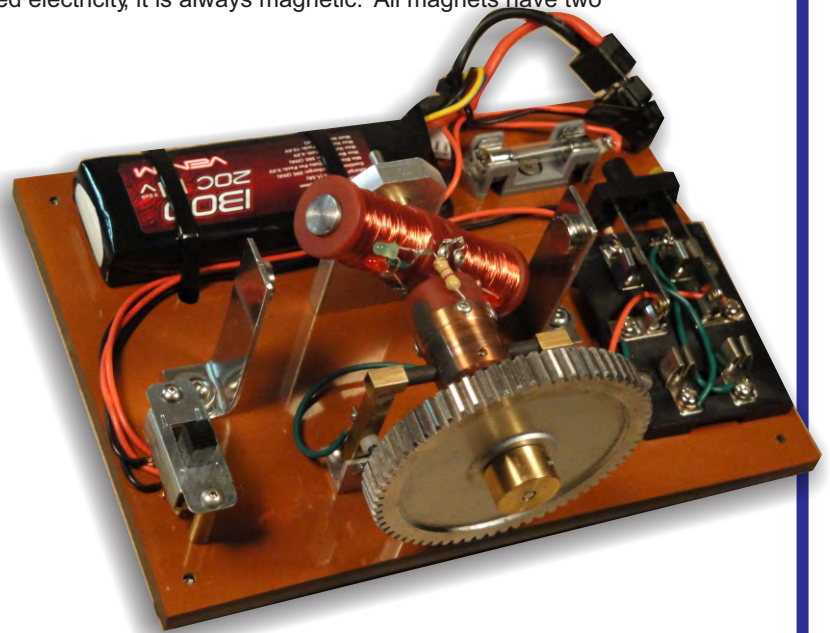
The essential parts of this motor are a 12 volt battery, two permanent magnets, an electromagnet, and a commutator. The electromagnet and the commutator are mounted on a turning shaft, these rotating parts are called the rotor.

An electromagnet consists of a coil of wire wrapped around an iron core. When electricity runs through the coil the iron becomes a magnet. An electromagnet is magnetized only when connected to an electric source. A permanent magnet, on the other hand, does not need electricity, it is always magnetic. All magnets have two poles, north (N) and south (S).

If the direction of the electricity is reversed in an electromagnet, the poles are also reversed. The north becomes south and the south north. As you may know, the north side of a magnet attracts the south side of another magnet but it pushes away the north side of the other magnet. Opposite poles attract and the same poles repel. This is what makes the motor work.

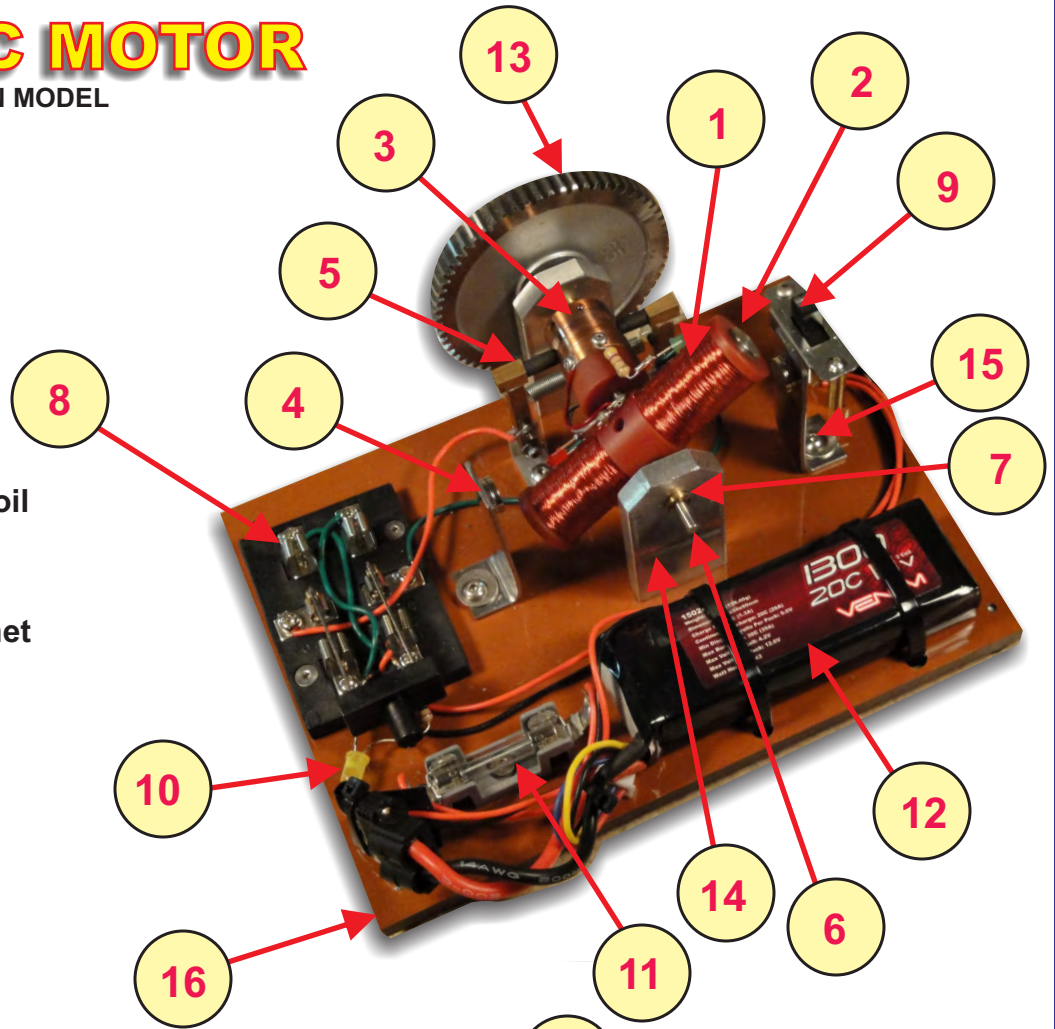
On the bottom figure at left, the electromagnet poles are the opposite of the permanent magnets, so the rotor is turning toward the permanent magnets because S attracts N and N attracts S. But as the electromagnet goes in front of the permanent magnets, the commutator plays a trick on the electromagnet and changes the electric sides.

Now the side that was positive becomes negative, and the negative becomes positive. This makes the electromagnet change the poles, N to S and S to N. Now the electromagnet poles are the same as the permanent magnets and they want to move away. See the right figure. This keeps the rotor turning until the electromagnet reaches the other side and the commutator changes the electricity again. This keeps repeating and the motor keeps running as long as the battery is connected.

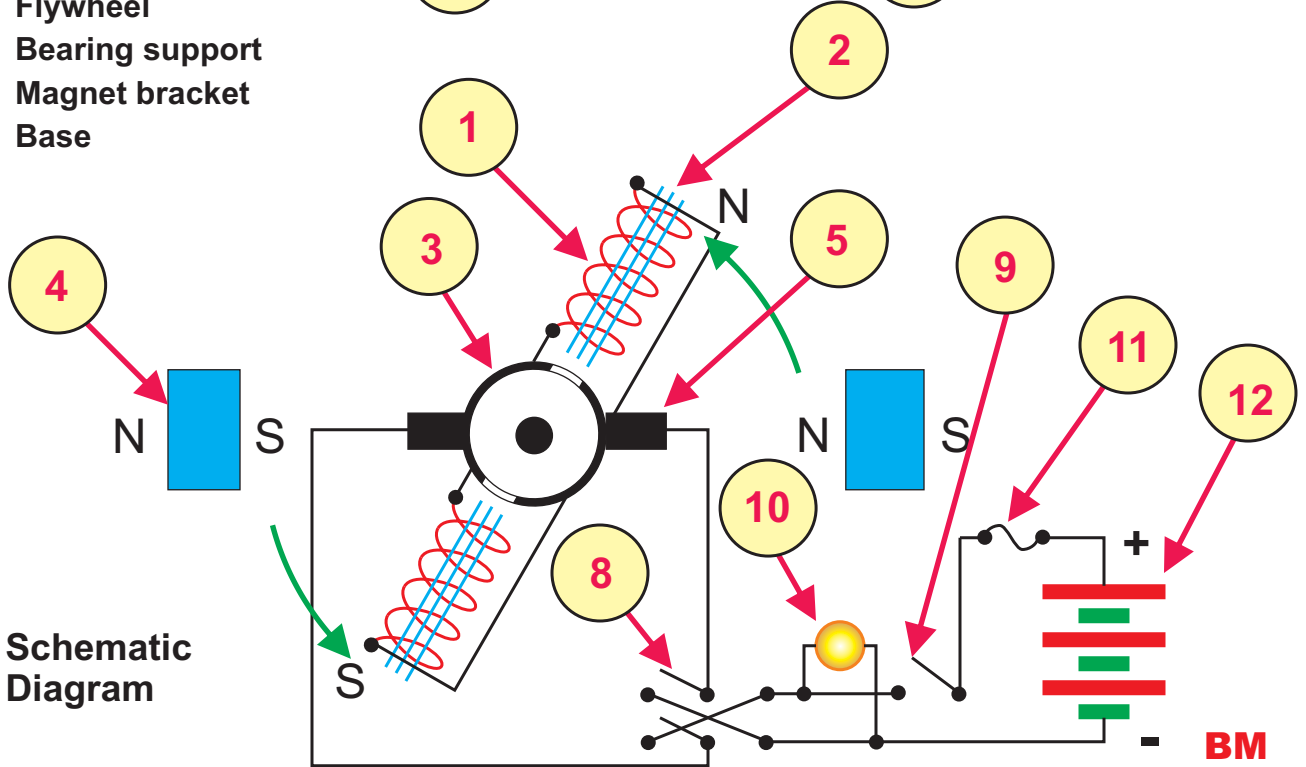


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- 1 Electromagnet coil
- 2 Iron core
- 3 Commutator
- 4 Permanent magnet
- 5 Brush
- 6 Shaft
- 7 Bearing
- 8 Direction switch
- 9 Power switch
- 10 Led light
- 11 Fuse
- 12 12v DC battery
- 13 Flywheel
- 14 Bearing support
- 15 Magnet bracket
- 16 Base



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