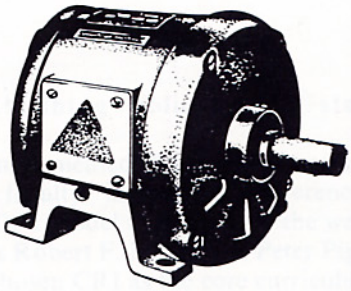
Tuner's Topics

The DC Motor

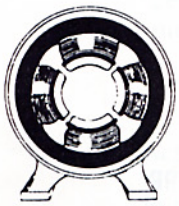


by
SP4 Tuner Tropo

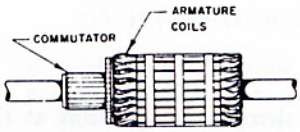
Last issue we explained the AC motor. This time we will describe the features of the DC motor.

There are three main parts to a DC motor—the STATOR, ARMATURE or ROTOR, and BRUSHES.

The stator stays still. A simplified stator consists of a metal ring upon which are mounted several electromagnets.



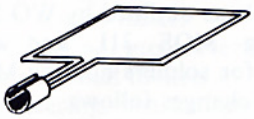
ACTUAL STATOR



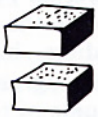
ACTUAL ARMATURE

ACTUAL BRUSHES

SIMPLIFIED STATOR



SIMPLIFIED ARMATURE



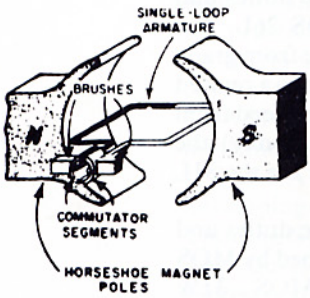
SIMPLIFIED BRUSHES

The armature or rotor rotates. Several coils of wire are wound around a drum or shaft. The ends of each coil are connected to small blocks (segments) of copper. These segments are placed side by side to form a cylinder called the COMMUTATOR. A simplified armature is a loop.

The brushes ride directly on the commutator. Brushes are actually carbon blocks. Simplified brushes are small blocks.

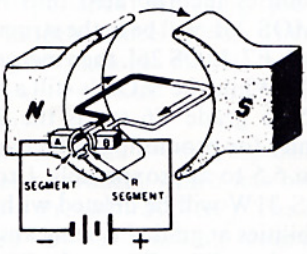
Put the stator, armature, and brushes together, and you've got a DC motor.

When you connect the stator to a DC power source, the shaft rotates at a high rate of speed. The brushes touch the commutator segments and current flows through the armature coils. The commutator is one of the most important parts of the motor because it conducts current into the armature coils while the armature turns. Current flow through the armature coils produces a magnetic field that opposes the field setup by the stator. It is this opposition of the armature field against the stator field that makes the armature turn.



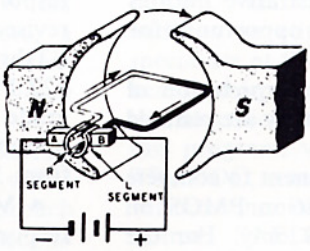
1.

To make the motor work, connect the brushes to a DC source. The brushes make current flow through the loop, causing the loop to rotate between the poles of the magnet.



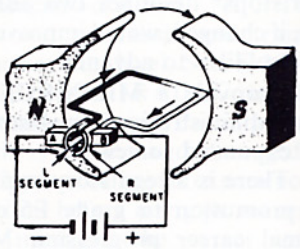
2.

Current flows from Neg (-) battery, through brush A and segment L, into the dark side of the loop and out the white side, through segment R and brush B to POS (+) battery.



3.

The dark side rotates around to magnet pole "S" and the white side moves around to pole "N" thus completing one half of a cycle. Rotation of the commutator causes the current flow through the loop to reverse its direction.



4.

The direction of current is now reversed. The white side moves up and the dark side moves down, making the loop rotate another half cycle, or one complete cycle in all. As the loop rotor returns to its original position a new DC cycle begins.