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The DC generator

Dr George Dransfield: The dynamo in this torch is a type of DC generator.

As I wind, a coil of wire inside the dynamo moves through a magnetic field.

This induces a potential difference across the coil.

This is called the generator effect.

When the circuit is complete, a current flows through the bulb, making it light up.

If I wind faster, the bulb gets brighter.

And if I stop winding, the light turns off.

Here is a diagram of a DC generator.

We have north and south magnetic poles and the orange lines represent the magnetic field lines.

Here is the coil, which is connected to a circuit powering the bulb.

The key to a DC generator is a special component called the split ring commutator.

In a DC generator, as the coil is turned, it passes through the magnetic field.

As the coil moves perpendicular to the field lines, there is a maximum potential difference induced across the coil.

As there is a complete circuit, this causes a current to flow through the coil.

The induced potential difference drops to zero when the coil moves parallel to the magnetic field lines.

The coil is connected to the outside circuit by the split ring commutator.

The connection switches every half turn.

Here is a graph showing how potential difference changes over time.

In a DC generator, a large potential difference is induced as the wire cuts through perpendicular to the magnetic field lines.

As the wire moves parallel to the magnetic field lines, there is no induced potential difference.

In this position, the split ring commutator effectively disconnects the coil from the external circuit just before it swaps over the connections.

The potential difference stays positive, so the line bounces back upward on the graph.

This graph shows one complete turn of the coil.

Remember, in a DC generator, the split ring commutator reverses the connection every half turn, which is how the dynamo keeps the current flowing in one direction through the bulb.

(MUSIC)