

The scenario

Subject (field/title)	Electromagnetism / Ruhmkorff coil
Length of movie	1:52
Main Goals	Operation of the transformer
Detailed Goals	Presentation of the principle of operation of the Ruhmkorff coil as a high-voltage transformer supplied with direct current.
Structure and description of the experiments	
1. Introduction	Description: The operation of a Ruhmkorff coil is presented, enabling the generation of high voltage with a high frequency of changes
2. Main topic	Description: Use of Maxwell's laws in a DC-powered transformer
Part 1	<p>Tools: Ruhmkorff coil, DC power supply</p> <p>Description: The Ruhmkorff coil is made of a transformer whose primary winding has a much smaller number of turns than the secondary winding, and a magneto interrupting the current flow in the winding. Both windings are mounted on a common open iron core. Thanks to the magneto connected with direct voltage, changes in the current intensity (and thus the electric field) around the primary winding are obtained. Changes in the electric field cause changes in the magnetic field, which in the secondary winding causes changes in the electric field strength and charge flow. This way, a high voltage (several hundred thousand volts) with high frequency is created in the secondary winding. Changes in the magnetic field in the transformer core are used to operate the magneto, which alternately closes and opens the circuit supplying the primary winding. The alternating opening and closing of the circuit allows changes in the current intensity in the primary circuit, necessary to obtain an alternating magnetic field, which, according to Maxwell's laws, is necessary to create an alternating electric field (in the secondary winding).</p> <p>Questions: How does a classic transformer work? Will the classical transformer fulfil its role when supplied with electricity with a constant voltage?</p> <p>Conclusions: An alternating electric field is needed to generate an alternating magnetic field and vice versa, which is in accordance with Maxwell's laws and is used in the operation of the transformer and in the generation of electromagnetic waves.</p>
3. Summary and notes	<p>During the experiment, you can pay attention to the operation of the magneto.</p> <p>Level: secondary school</p>