



# Electromagnetism

Science, Physics, Biology  
TVO 1987

Science SOL **BIO.5, BIO.8, PH.12**

6 10-minute programs for grades 11-12

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The historical discovery of the magnetic properties of lodestone led to the scientific understanding of Earth's magnetic field. This series explores this mysterious force from early experiments to the concepts of electromagnetic induction, the motor principle, generators, and transformers. It also looks at fascinating modern theories about the role of Earth's magnetic field in the extinction of species, and about the ways that animals use it for navigation.

**101. Earth's Magnetic Field**—A chronology of the discoveries made about the properties of lodestone, from the initial discovery that lodestone had a mysterious attraction to iron, to the conclusion that Earth itself is a huge magnet.

**Va. SOL Science: PH.12**

**102. Magnetism and Electron Flow**—This program introduces the left-hand rule for predicting the relationship between the direction of the magnetic field and the direction of the electron flow in a conductor. The extended magnetic field surrounding a helix is demonstrated.

**Va. SOL Science: PH.12**

**103. Domain Theory**—This program examines the electromagnet and illustrates the relative conductivity of various metals at the atomic level. The left-hand rule for coils is introduced, and the way that atoms of materials such as iron and steel arrange themselves in domains is shown.

**Va. SOL Science: PH.12**

**104. The Motor Principle**—This program introduces the motor principle by using the analogy of a futuristic magnetic rail gun. It also shows current flowing through a simple loop of wire within an external magnetic field, causing the loop to rotate partially; with the addition of a split-ring commutator, continuous rotation is achieved.

**Va. SOL Science: PH.12**

**105. Electromagnetic Induction**—In 1830, British scientist Michael Faraday discovered the principle of electromagnetic induction. This is demonstrated, along with the principle (Lenz's law) that the induced magnetic field always opposes the changing external magnetic field.

**Va. SOL Science: BIO.5**

**106. Life in the Field**—The effects of Earth's magnetic field on all forms of life are dramatically illustrated. The program looks into the theory that many animals became extinct as a result of occasional reversals of Earth's magnetic field, and the use of the

magnetic field for navigation by animals is examined.

**Va. SOL Science: BIO.8**