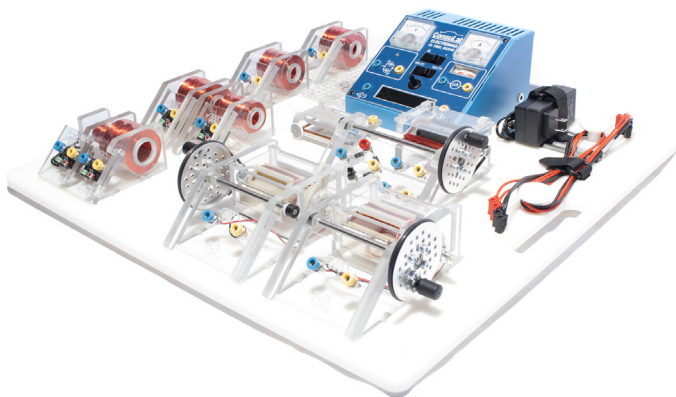


## ELECTROMAGNETISM TRAINER



### INTRODUCTION

The ConsuLab CL-1902 Electromagnetism trainer is designed for your students to physically demonstrate, test, measure, and experience electromagnetism using a "hands-on" approach to learning. Many aspects of a modern vehicle, whether a car, truck, combustion powered, hybrid or electrically driven, depend on some form of electromagnetism.

Demonstrate, visualize and experience hands-on the principles of electromagnetism as applied to modern vehicles. Students will prove their learning through a series of self-paced student exercises and experiments while they practice and demonstrate basic principles of electro-magnetism.

### PHYSICAL CONFIGURATION

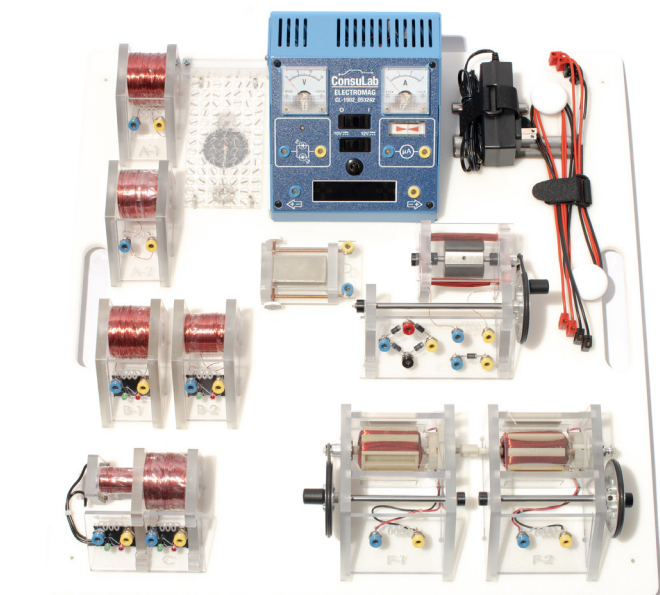
- The product is designed to be used individually per student
- Reverse polarity switch and polarity indicators on power supply
- Configured with 4mm sockets throughout for student circuit construction
- 22" x 22" (compatible ConsuLab format EM-200 series cabinets)
- Circuit construction wires (2 red and 2 black jumper wires included)
- Powered by CSA/UL approved power supply
- Includes measurement instrumentation:
  - System voltage with analog voltmeter
  - System amperage with analog ammeter
  - Student wired bicolor LEDs for polarity
  - Student wired galvanometer (micro-ammeter) for current direction and strength
- Includes a compass, magnetic field indicator, 3" bar magnet, 5" ferrous rod and 5" non-ferrous rod

### SAFETY

- All components are protected from electrical damage due to incorrect or short-circuit wiring
- Robust, student-resistant design

### TIME

- Minimal setup time, under 5 minutes to be ready for use
- Easy to inventory all included components
- Provided student exercises and experiments guide students through learning process
- Up to 50+ hours of instructional time depending on individual instructor preferences
- ALL individual components have a storage place on each trainer



## ELECTROMAGNETISM TRAINER



### TYPE OF ACTIVITIES TO BE DONE WITH TRAINER

- **PHYSICAL EXPERIMENTS**
  - Visualizing magnetic fields
  - Feeling the attraction and repel of magnetic fields
  - Visualizing mutual induction
  - Demonstrating operating principles of relays and solenoids
- **ELECTRICAL MEASUREMENTS POSSIBLE:**
  - Ohmmeter
  - Ammeter
  - Voltmeter
  - Oscilloscopes

### EDUCATIONAL SUPPORT MATERIALS

- Operation manual
- Student assignments
- Instructor's manual
- How-to video
- After the sale product training available



### MODULE A

- Two identical coils with different winding directions and hollow cores
- Demonstrates basic magnetic fields, electromagnet function, solenoid function using magnetic fields to generate AC current
- Experiments with bar magnets, steel, and aluminum rods

### MODULE B

- Two coils with different number of turns and hollow cores
- Demonstrates induction from one coil to another
- Demonstrates effects of number of turns on electromagnetic strength
- Includes red and green polarity indicator LED's

### MODULE C

- Two coils one inside the other with permanent multi rod coil iron core
- Inner coil is movable for different demonstration applications
- Demonstrates induction from one coil to another like ignition coil
- Demonstrates "step-up" and "step-down" transformer (coil) operation
- Includes red and green polarity indicator LED's

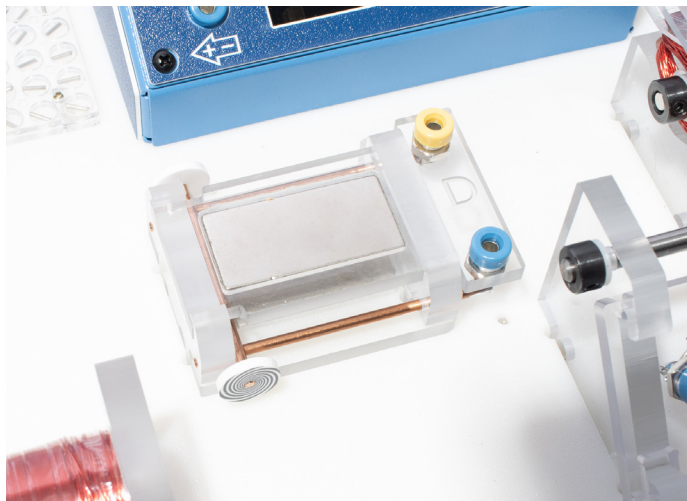




## TRAINING AIDS

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## ELECTROMAGNETISM TRAINER



### MODULE D

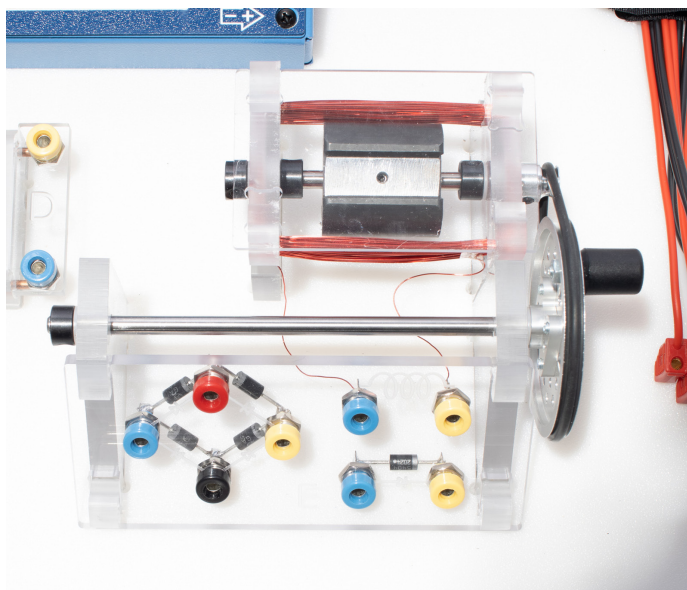
- Physical manifestation of the right-hand rule

### MODULE E

- AC generator with permanent magnet rotor and coil stator
- Single diode for demonstration of half-wave rectification
- Full 4-diode rectifier bridge for demonstration of full-wave rectification

### MODULE F

- Two brushed DC electric motors that can be used as motor or generator
- Motors can be coupled together
- Motor brush timing can be adjusted on one motor



## PRODUCT SPECIFICATIONS

### DIMENSIONS AND WEIGHTS

- 56 cm (22 in) W x 56 cm (22 in) L x 13 cm (5.25 in) H / 61 x 61 x 33 cm (24 x 24 x 13 in) packaged.
- Weight : 12.7 kg (28 lbs) / 13.6 kg (30 lbs) packaged.

### INCLUDED EQUIPMENT

- Magnetic field demonstrator
- AC/DC wall mount adapter 48W
- 8 cm (3 in) x 1.25 cm (½ po) permanent magnet rod
- 12 cm (5 in), x 1.25 cm (½ po) aluminum rod
- 12 cm (5 in), x 1.25 cm (½ po) steel rod
- 2 x 75 cm (32 in) red jumper leads
- 2 x 75 cm (32 in) black jumper leads
- Compass

### INCLUDED DOCUMENTATION

- Operation manual
- Student assignment manual
- Instructor's manual

### ELECTRICAL REQUIREMENTS

- 120VAC 60HZ 1.3A

### OPTIONAL EQUIPMENT

- Multi-unit (up to 16) storage and transport case
- Single unit storage and transport case

