

Electrical Systems

Catalogue Number	77-8046-0000
Category	Electronics and Electrical Control
Duration	15 Hours

Activity 1: Getting Started

- Electricity and Electronics
- Virtual Training Panel Components
- Who Discovered Electricity?
- Safety Practices with Electricity

Activity 2: Introduction to Electricity

- Electrical Energy
- Conduction
- Insulators
- Semiconductors
- Static Electricity
- Electrical Current
- Electrical Circuits
- Grounding
- Measuring Current
- Task: Producing Static Electricity
- Task: Showing that Electrical Current Requires a Circuit

Activity 3: Magnetism and Electromagnetism

- Magnetism
- Electromagnetism
- Task: Building an Electromagnet with a Wood Core
- Task: Building an Iron-Core Electromagnet

Activity 4: Electrical Power Supplies

Power Supplies

Alternating Current and Direct Current

Transformers

Generators

Batteries

Rectifiers

Impedance

Voltage Regulators

Task: Using Batteries as a DC Power Supply

Task: Using a Motor as a Generator

Task: Using the Transformer as an AC Power Supply

Task: Connecting a Bridge Rectifier

Task: Connecting a Voltage Regulator to a Rectifier Output

Activity 5: Instrumentation

Multimeters

Measuring Current

Ammeters

Measuring Voltage and Resistance

Oscilloscopes

Task: Setting the Multimeter Zero Reading

Task: Measuring the Voltage of the Battery Supply

Task: Measuring the Resistance of Devices

Task: Measuring the Current of a Circuit

Activity 6: Output Devices

Electrical Output Devices

Lamps and LEDs

Electric Motors

Buzzers and Speakers

Task: Operating Output Devices using Alternating Current

Task: Operating Output Devices using Direct Current

Activity 7: Control Devices

Control Devices

Switches

Relays

Mechanical Relays

Solid State Relays

Potentiometers and Rheostats

Potentiometers

Rheostats

Task: Controlling an Output Device with a Slide Switch

Task: Controlling an Output Device with a Relay

Task: Controlling an Output Device with a Potentiometer

Task: Controlling an Output Device with a Rheostat

Activity 8: Circuit Protection

Short Circuits

Fuses

Circuit Breakers

Ground-fault Interrupters

Task: Creating an Open Circuit

Task: Using a Circuit Breaker to Protect a Circuit

Task: Creating a Short Circuit

Power Failures

Activity 9: Electrical Conditioners

Resistors

Capacitors

Rectifiers

Diodes

Task: Using Resistance in a Circuit

Task: Using Capacitance in a Circuit

Task: Using a Diode as a Conditioner in a Circuit

Task: Using a Zener Diode as a Conditioner in a Circuit

Task: Using a Switching Diode as a Conditioner

Activity 10: Electronic Conditioners

- Electronic Conditioners
- Anatomy of a Semiconductor
- N-Type and P-Type Semiconductors
- P-N Junctions
- Transistors
- Integrated Circuits
- Operational Amplifiers
- Audio-transformers
- Task: Using Transistors
- Task: Using Op-amps
- Microelectronics and Computer Memory

Activity 11: Series Circuits

- Series Circuits
- Calculating Resistance and Capacitance in Series
- Troubleshooting Series Circuits
- Advantages of Series Circuits
- Breadboards
- Task: Connecting a LED in Series
- Task: Connecting Resistors in Series
- Task: Confirming Ohm's Law for a Series Circuit
- Task: Measuring Voltages in a Series Circuit
- Task: Performing a Continuity Check of a Breadboard
- Task: Observing Capacitors Connected in Series

Activity 12: Parallel Circuits

Parallel Circuits

Problems in Parallel Circuits

Determining Current in a Parallel Circuit

Ohm's Law

Capacitors in Parallel Circuits

Resistors in Parallel Circuits

Task: Connecting Output Devices in Parallel and Series

Task: Comparing a Parallel Circuit to a Series Circuit

Task: Connecting Resistors in Parallel

Task: Connecting Capacitors in Parallel

Activity 13: Controlling Electrical Output

Controlling Output Intensity - Rheostats

Controlling Output Intensity - Potentiometers

Sequence of Output Operations

Task: Connecting a Rheostat as a Dimmer for Control

Task: Connecting a Sound Level Attenuator for a Speaker

Task: Controlling and Measuring LED Current

Task: Controlling and Measuring Motor Current

Task: Observing a Circuit that Uses Sequential Operation

Activity 14: Logic Gates

Digital Logic - The Basis of Digital Computers

Logic Circuits

Logic Gates

AND Gate

OR Gate

Binary Tables

NOT, NAND and NOR Gates

Diode OR Gate

Diode AND Gate

Task: Creating an OR Gate

Task: Creating a NOR Gate

Task: Creating an AND Gate

Task: Creating a NAND Gate

Task: Creating an OR Gate using Transistors

Task: Creating a NOR Gate using Transistors

Task: Creating an AND Gate using Transistors

Task: Creating a NAND Gate using Transistors

Activity 15: Conclusion

Electrical and Electronic Graphic Symbols

Task: Constructing a Circuit from a Schematic Diagram

Post-test