

Electricity: Principles & Applications *by Richard Fowler*

1-1 Work and Energy

- 1-2 Unit of Energy
- 1-3 Energy Conversion
- 1-4 Efficiency 1-5 Structure of Matter
- 1-6 Electric Charge
- 1-7 Valence Electrons
- 1-8 Free Electrons
- 1-9 Ions
- 1-10 Static Charge and Static Electricity
- 1-11 Static Discharge
- 1-12 Uses of Static Electricity

Electrical Quantities and Units

- 2-1 Charge
- 2-2 Unit of Charge
- 2-3 Current and Current Carriers
- 2-4 Current in Solids
- 2-5 Current in Liquids and Gases
- 2-6 Current in a Vacuum
- 2-7 Unit of Current-The Ampere
- 2-8 Voltage
- 2-9 Unit of Voltage-The Volt
- 2-10 Polarity
- 2-11 Sources of Voltage
- 2-12 Resistance
- 2-13 Conductors
- 2-14 Insulators
- 2-15 Semiconductors
- 2-16 Unit of Resistance-The Ohm
- 2-17 Temperature Coefficient
- 2-18 Resistivity
- 2-19 Resistors
- 2-20 Power and Energy
- 2-21 Unit of Power
- 2-22 Efficiency
- 2-23 Powers of 10
- 2-24 Multiple and Submultiple Units
- 2-25 Special Units and Conversions

Basic Circuits, Laws, and Measurements

- 3-1 Circuit Essentials
- 3-2 Circuit Symbols and Diagrams
- 3-3 Calculating Electrical Quantities
- 3-4 Measuring Electrical Quantities

Circuit Components

- 4-1 Batteries and Cells
- 4-2 Lead-Acid Cells
- 4-3 Nickel-Cadmium Cells
- 4-4 Carbon-Zinc and Zinc Chloride Cells
- 4-5 Alkaline-Manganese Dioxide Cells
- 4-6 Mercuric Oxide Cells
- 4-7 Silver Oxide Cells
- 4-8 Lithium Cells
- 4-9 Miniature Lamps and LEDs
- 4-10 Resistors

- 4-11 Switches
- 4-12 Wires and Cables
- 4-13 Fuses and Circuit Breakers
- 4-14 Other Components

Multiple-Load Circuits

- 5-1 Subscripts
- 5-2 Power in Multiple-Load Circuits
- 5-3 Series Circuits
- 5-4 Maximum Power Transfer
- 5-5 Parallel Circuits
- 5-6 Conductance
- 5-7 Series-Parallel Circuits
- 5-8 Voltage Dividers and Regulators

Complex-Circuit Analysis

- 6-1 Simultaneous Equations
- 6-2 Loop-Equations Technique
- 6-3 Node Voltage Technique
- 6-4 Superposition Theorem
- 6-5 Voltage Sources
- 6-6 Thevenin's Theorem
- 6-7 Current Source
- 6-8 Norton's Theorem
- 6-9 Comparison of Techniques

Magnetism and Electromagnetism

- 7-1 Magnetism and Magnets
- 7-2 Magnetic Fields, Flux, and Poles
- 7-3 Electromagnetism
- 7-4 Magnetic Materials
- 7-5 Magnetizing Magnetic Materials
- 7-6 Magnetomotive Force
- 7-7 Saturation
- 7-8 Demagnetizing
- 7-9 Residual Magnetism
- 7-10 Reluctance
- 7-11 Magnetic Shields
- 7-12 Induced Voltage
- 7-13 Magnetic Quantities and Units
- 7-14 Electromagnets
- 7-15 DC Motors
- 7-16 Solenoids
- 7-17 Relays
- 7-18 Hall-Effect Devices

Alternating Current and Voltage

- 8-1 AC Terminology
- 8-2 Waveforms
- 8-3 Types of AC Waveforms
- 8-4 Quantifying Alternating Current
- 8-5 The Sine Wave
- 8-6 AC Generator
- 8-7 Advantages of Alternating Current
- 8-8 Three-Phase Alternating Current

Power in AC Circuits

- 9-1 Power in Resistive AC Circuits
- 9-2 Power in Out-Of-Phase Circuits
- 9-3 True Power and Apparent Power
- 9-4 Power Factor

Capacitance

- 10-1 Terminology
- 10-2 Basic Capacitor Action
- 10-3 Voltage Rating
- 10-4 Unit of Capacitance
- 10-5 Determining Capacitance
- 10-6 Types of Capacitors
- 10-7 Schematic Symbols
- 10-8 Capacitors in DC Circuits
- 10-9 Capacitors in AC Circuits
- 10-10 Capacitors in Series
- 10-11 Capacitors in Parallel
- 10-12 Detecting Faulty Capacitors
- 10-13 Undesired, or Stray, Capacitance
- 10-14 Capacitor Specifications
- 10-15 Uses of Capacitors

Inductance

- 11-1 Characteristics of Inductance
- 11-2 Unit of Inductance-The Henry
- 11-3 Factors of Determining Inductance
- 11-4 Types of Inductors
- 11-5 Ratings of Inductors
- 11-6 Inductors in DC Circuits
- 11-7 Ideal Inductors in AC Circuits
- 11-8 Real Inductors in AC Circuits
- 11-9 Inductors in Parallel
- 11-10 Inductors in Series
- 11-11 Time Constants for Inductors
- 11-12 Preventing Mutual Inductance
- 11-13 Undesired Inductance

Transformers

- 12-1 Transformer Fundamentals
- 12-2 Efficiency of Transformers
- 12-3 Loaded and Unloaded Transformers
- 12-4 Transformer Cores
- 12-5 Types of Transformers
- 12-6 Impedance Matching
- 12-7 Transformer Ratings
- 12-8 Series and Parallel Windings
- 12-9 Off-Center-Tapped Windings
- 12-10 Three-Phase Transformers

R, C, and L Circuits

- 13-1 Impedance
- 13-2 Adding Phasors
- 13-3 Solving RC Circuits
- 13-4 Solving RL Circuits
- 13-5 Solving RCL Circuits
- 13-6 Resonance
- 13-7 Filters

Electric Motors

- 14-1 Motor Classifications
- 14-2 Motor Ratings
- 14-3 Motor Enclosures
- 14-4 Squirrel-Cage Induction Motors
- 14-5 Synchronous Motors
- 14-6 Other Types of Motors

Instruments and Measurements

- 15-1 Digital Multimeter
- 15-2 Meter Movements
- 15-3 Analog Ammeters
- 15-4 Analog Voltmeters
- 15-5 Meter Loading
- 15-6 Analog Ohmmeters
- 15-7 Insulation Testers
- 15-8 Wheatstone Bridge
- 15-9 Wattmeters
- 15-10 Frequency Meters
- 15-11 Measuring Impedance
- 15-12 Measuring Inductance and Capacitance

Residential Wiring Concepts

- 16-1 Electrical Codes
- 16-2 Power Distribution
- 16-3 Service Entrance
- 16-4 Cables and Conductors
- 16-5 240-V Branch Circuits
- 16-6 120-V Branch Circuits
- 16-7 Switched-Receptacle Outlet
- 16-8 Multiple Switching
- 16-9 Lighted-Handle Switches
- 16-10 Circuit Interrupters
- 16-11 Feeder Circuits
- 16-12 Low-Voltage Control Circuits
- 16-13 Electronic Control Circuits

Glossary of Terms and Symbols

- Appendix A Common Tools
- Appendix B Soldering and the Soldering Process
- Appendix C Formulas and Conversions
- Appendix D Cooper Wire Table
- Appendix E Resistivity of Metals and Alloys
- Appendix F Temperature Coefficients of Resistance
- Appendix G Trigonometric Functions
- Appendix H Capacitor Codes and Color Codes
- Appendix I The Oscilloscope
- Appendix J Basics of Cramer's Rule
- Index