Basic Electricity
4 Days, 2.8 CEUs

A firm grasp of the fundamentals of electricity is the basis for becoming a successful electrical maintenance technician. All too often, maintenance personnel have to jump right into electrical maintenance with no training, or perhaps minimal on-the-job training that skips the fundamentals and focuses solely on a specific application. This may result in technicians performing tasks without understanding the reason why or the implications of changes they are making on the electrical circuit. All this can lead to unsafe activities and damages to electrical equipment.

This course provides basic information regarding quantifying and measuring basic elements in a DC and AC electrical circuit. Participants are introduced to basic electrical circuit components and basic circuitry troubleshooting.

This course is intended for new or cross-training technicians, electricians and supervisors responsible for maintenance of electrical equipment.

Pre-Requisites
The participant should bring a scientific calculator

Lab and Classroom Attire
AVO is committed to the personal safety of each participant and requires safety glasses, long pants and ANSI rated “safety-toe” work shoes for lab activities. Lecture courses may involve a tour of a work or shop area and for this reason open-toe shoes and shorts are not considered appropriate attire for the classroom.

Learning Objectives
To receive 2.8 CEUs, the participant must attend 4 days of class (28 contact hours) and attain a minimum grade of 80% on the final exam. Upon completion of this course, the participant will demonstrate that he/she is able to:

- Perform basic mathematical operations required for basic electricity calculations
- Explain the basic concepts of current flow and electromotive force
- List methods for producing electromotive force and elements required for a complete electrical circuit
- Identify the circuit effects of resistors
- Use the Ohm’s Law equation to solve for values in a circuit
- Calculate values in series, parallel and complex circuits
- Describe generation and measurement of AC
- Outline methods for determining impedance in R-L-C Circuits
- Determine three-phase current, voltage and power
- Utilize basic electrical circuit components
- Develop a systematic approach to electrical troubleshooting

SCOPE

Day 1* (7 contact hours)
I. Introduction
II. Review of Mathematics
   A. Whole Numbers
   B. Decimals and Scientific Notation
   C. Basic Operations with Numbers
   AM Break
III. Fundamental Concepts of Electricity
   A. Matter
   B. The Atom
   C. Electron Theory
   Lunch
D. Fractions or Parts of Whole Numbers
E. Fraction Operations
PM Break
IV. Producing and Using Electromotive Force
   A. Methods to Produce an EMF
   B. Electrical Circuit

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*Class scheduling times may vary based on discussions and size of class

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4 Days, 2.8 CEUs

SCOPE

Day 2 (7 contact hours)
V. Resistance
   A. The OHM
   B. Resistivity
   C. Resistors
AM Break
VI. OHM's Law
   A. Ohm's Law as an Equation
   B. Solving for Current
   C. Solving for Voltage
Lunch
   D. Solving for Resistance
   E. Solving for Power

Day 3 (7 contact hours)
VII. Series Circuits
   A. Characteristics
PM Break
   B. Solving Series Circuits
   C. Voltage Rises and Drops

VIII. Parallel Circuits
   A. Characteristics
   B. Solving Parallel Circuits
AM Break
IX. Solving Series-Parallel/Parallel-Series Circuits
   A. Resistors in Complex Connections
   B. Calculating Circuit Values
Lunch
X. AC Fundamentals
   A. Waveforms
   B. Basic AC Generation
   C. Sine Wave Characteristics Measured
PM Break
   D. Trigonometry Review
   E. Sine Waves In-Phase
   F. Sine Waves Out-of-Phase

Day 4 (7 contact hours)
XI. Inductance and Capacitance
   A. Inductance
   B. Capacitance
   C. Reactance and Impedance
AM Break
   D. Series and Parallel R-L-C Circuits
   E. Power and Power Factor in an AC Circuit

XII. Three-Phase Circuits
   A. Generating Three-Phase Voltages
Lunch
   B. Wye-Connected Alternators
   C. Delta-Connected Alternators
   D. Three-Phase Power Measurement

XIII. Circuit Components
   A. Switches
   B. Disconnecting Means
   C. Relays and Contactors
PM Break

XIV. Basic Circuitry and Troubleshooting
   A. Function of Circuit Components
   B. Developing Circuits
   C. Troubleshooting

XV. Conclusion
   A. Review
   B. Final Exam