

# Electronics Troubleshooting

4.5 Days, 3.6 CEUs

Electronic devices are ubiquitous in residential, commercial and industrial environments. In order to properly install, test and trouble-shoot these electronic components, it is necessary to understand the fundamentals of electronic circuits. Due to the tight coupling between electronic and electrical systems, when a problem occurs, it is often the electrician who is the first responder called upon to troubleshoot the problem. Electricians who incorrectly apply conventional electrical troubleshooting techniques to electronic devices often damage the equipment. For effective trouble-shooting, this course provides knowledge of various types of electronic circuits combined with a systematic troubleshooting approach.

## Who Should Attend

This hands-on course is built on the foundation of the Electronics for Electricians course and is intended for electricians and technicians, who install, repair or troubleshoot electronic systems.

Participants must wear long pants and safety toe shoes to complete the lab portion of this course.

## Learning Objectives:

Upon completion of this course the participant will demonstrate, by attaining a minimum grade of 80% in the final exam, that he/she will be able to:

1. Select and use appropriate test equipment for various applications.
2. Systematically troubleshoot electronic circuits.
3. Isolate and repair circuit faults.

## SCOPE

### Day 1\*

#### I. Introduction

- A. Schedule
- B. Course Outline

#### II. Troubleshooting Concepts and Techniques

- A. Electronics Definition
- B. Schematics
- C. Functional Block Diagrams
- D. Troubleshooting Process
- E. Conceptual Models
- F. Intermittent Symptoms
- G. Known Good Components or Circuits
- H. When You Don't Have a Schematic
- I. Power and Grid Issues
- J. Long Signal Changes

#### III. Troubleshooting Systems With Passive Components

- A. Conductor Failure Modes
- B. Resistor Color Code
- C. Intro to Electronics Learning Lab
- D. Intro to NI Multisim

### Day 2

- E. Capacitor Failure Modes
- F. Inductor Applications
- G. Relay Failure Modes
- H. Oscilloscope Familiarization Exercise

#### IV. Troubleshooting Circuits With Semiconductor Components

- A. Over Voltage Transients
- B. Diode Failure Modes
- C. Transistor Failure Modes
- D. SCR Failure Modes
- E. Thermistor Failure Modes

### Day 3

- F. RTD Failure Modes
- G. ESD Precautions
- H. FET Failure Modes
- I. MOV Failure Modes
- J. Troubleshooting Exercises

### Day 4

#### V. Troubleshooting Circuits With ICs Oscillators

- A. Failure Modes For ICs
- B. Thermistor Failure Modes
- C. Troubleshooting Exercises

### Day 5 (1/2 Day)

- D. Inverter Circuits
- E. Troubleshooting Exercises
- F. Labs

#### VI. Conclusion

- A. Questions and Answers
- B. Supplemental Material Discussions
- C. Review
- D. Final Exam

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

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