

# Portable Electrical Control Troubleshooting Training | eLearning Course

**Introduction to Troubleshooting - W11129-AA01UEN-E1**

Objective 1: Describe Two Categories of Troubleshooting and Give an Application of Each

### Troubleshooting Definition

Troubleshooting is the process of finding the cause of a machine malfunction. This cause is known as a fault. Faults can cause a machine to behave erratically.

For example, a fault could cause the machine to stop, skip a step, or perform a step incorrectly. The malfunction you observe is called a symptom.

When troubleshooting a machine, you start by identifying the symptom or symptoms. What follows should be a systematic troubleshooting process to find the cause as quickly as possible and fix it.

Click here to play the animation.

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## eLearning Courses: M11132/M11129

Amatrol's Multimedia Courseware - Portable Electric Relay Control (M11132) introduces the functions of relay logic control circuits used in industrial, commercial and residential applications. The course describes functions and application of functions covered in control logic, including logic elements such as AND, OR, NOT, NOR, and NAND. Ladder diagrams are explained and learners connect, operate, and design a ladder diagram using one or more logic elements. Additional concepts include electro-pneumatic solenoid valves; sequencing control including relay operation, relay application, limit switch operation and application; and timers and advanced systems including time-delay relays, multiple cylinder control, and machine modes of operation. Finally, the additional Multimedia Courseware - Portable Electric Relay Control Troubleshooting (M11129) focuses on methods used for troubleshooting problems in relay control components and systems.

## In-Depth Electrical Control Curriculum

### Essential Knowledge Connected to Real-World Skills

Amatrol's portable electric relay control troubleshooting eLearning course covers important topics, such as:

#### Control Logic

Learners begin with an introduction to control logic, including logic elements (AND/OR/NOT/NOR/NAND), ladder diagrams, and electro-pneumatic solenoid valves. Individual lessons focus on topics like the six elements of control logic, five rules of drawing a ladder diagram, the function of a solenoid-operated fluid power valve, and the function of a power diagram. Learners will also practice skills, such as connecting/operating an AND/OR/NOT/NOR/NAND logic, reading/interpreting the operation of a circuit given a ladder diagram, and designing a control circuit in a ladder diagram format to operate a solenoid valve.

## Sequencing Control

In this module, learner will encounter components of sequencing control, including relay operation, relay applications, limit switch operation, and limit switch applications. Individual lessons focus on topics like the function/operation of an electromechanical relay, the operation of a relay performing control logic, the function of a limit switch, and the operation of a safety interlock circuit. Learners will also practice skills, such as reading/interpreting a basic ladder diagram, designing a logic circuit that uses a relay, designing a logic circuit that uses a limit switch to sequence an event, and designing a continuous-cycle cylinder reciprocation circuit with a safety interlock.

## Timers and Advanced Systems

Learners using Amatrol's Electric Relay Control eLearning course will study the principles of timers and advanced systems, including time-delay relays and applications, multiple cylinder control, and machines modes of operation. Individual lessons focus on topics like the operation of an on-delay/off-delay timer relay, the operation of a timer relay, how multiple cylinders are controlled using one limit switch, and two applications of manual controls. Learners will also practice skills, such as connecting/operating a control circuit with a timer relay, designing a control circuit to perform time-driven sequencing, connecting/operating a dual-cylinder control circuit using two limit switches, and designing a continuous-cycle, synchronized cylinder circuit with a manual mode.

## Troubleshooting

Amatrol's portable electric relay control troubleshooting eLearning course uses [FaultPro](#), an electronic fault insertion system that is only available from Amatrol, to insert faults into the system for troubleshooting. During the learning process, FaultPro allows learners to insert faults in the system as they progress through the step-by-step procedures learning industrial troubleshooting methods. Then, FaultPro can be set to randomly select and insert a fault to test a learner's troubleshooting abilities and prepare them to solve real-world technical problems once they're in the field. This system allows learners to use a digital multimeter to perform troubleshooting skills like: testing input and output devices, relays, and relay logic circuits.

**NOTE:** Learning system also available without troubleshooting (990-EC1/M11132).

## Interactive eLearning with Learning Management System

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### Highly-Interactive Multimedia Format Appeals to All Learning Styles

Amatrol's portable electric relay control troubleshooting eLearning course features interactive eLearning curriculum that integrates various types of learning methods to create an engaging, effective learning experience. Amatrol's multimedia [eLearning](#) curriculum includes text with voiceovers, videos, 3D animations, pictures, and interactive activities, quizzes, and self-reviews.

### Free Learning Management System (LMS)

Amatrol eLearning is easy-to-use for both students and instructors. Its web-based interface is simple to navigate and available on any WebGL-compatible Internet browser. Instructors love Amatrol eLearning for its simple, yet sophisticated Learning Management System (LMS). The LMS allows instructors to create custom courses, monitor student participation, track course progress, assess knowledge levels prior to a course, and test knowledge levels after completion. Learners appreciate the fact that they can start and stop as needed, moving through each Amatrol course at their own pace. If a self-review reveals that they didn't understand a particular topic as well as they thought they did, they can revisit it before moving on.

## Virtual Simulator

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### This course includes a virtual simulator!

Amatrol's Portable Electric Relay Control Troubleshooting eLearning curriculum also features a virtual simulator that allows learners to practice hands-on skills even when they don't have access to the physical trainer. Virtual

simulators replicate hands-on equipment in such great detail that learners will feel like they are using the actual equipment. Learners perform essentially the same industry-based tasks using the virtual equipment that they would perform using equipment hardware. Virtual simulators offer instructors and learners great flexibility when learning remotely or when a physical trainer must be shared by multiple learners.

## Additional Info

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### Requires:

- Computer (see [Computer Requirements](#))

### Options:

- Portable Electric Relay Control Troubleshooting Learning System (990-EC1F)
- **NOTE:** Learning System Available Without Troubleshooting (Equipment: 990-EC1; eLearning Course: M11132)

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