Basic Electricity II Interactive Video

EdTech 533: YouTube for Educators	
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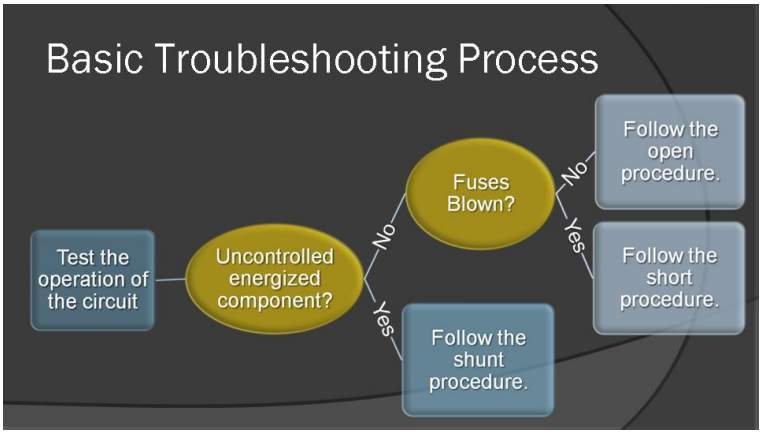
Description	A basic course describing the technique for troubleshooting electrical faults. The faults covered in this course are opens, shorts, and shunts.
Target Learner	Linemen, Electrical and Gas Service Technicians at the apprentice level. Students in an electrical technology program.
Prereq Knowledge/ Skills needed	Students should have completed Basic Electricity I, and have a firm understanding of a multimeter's operation.
Equipment Needed	La Porte Training Center troubleshooting boards, multimeter.

General Information

This course contains 5 videos. The first video describes the general troubleshooting procedure, and the 4 sub-videos cover the specific troubleshooting areas of **initial testing**, **shunts**, **shorts**, and **opens**. The flowchart for the course, which is included in the first video, can be seen here:



CTRL+ Click on the blue boxes to see their respective videos.

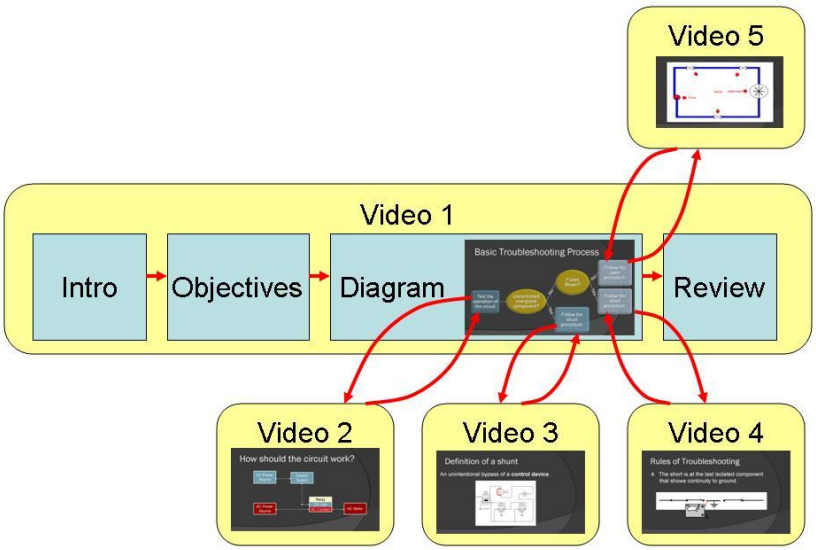
The purpose of the course is to teach the students to troubleshoot basic electrical circuits. This troubleshooting flowchart is the foundation for the troubleshooting that we teach at the La Porte Training Center. Many of the circuits that we use are very simple by design, even if they are energized at 13,000 V and higher. The troubleshooting techniques described in this video series readily apply to our students.

This video series is one that I wanted to make for a long time, and this assignment provided me with the opportunity.

One of my goals for this project was to make the videos as modular as possible. That is, I wanted them to gel together, but I also wanted them to work independently. Any one of the videos should be able to stand alone as a "mini-lesson." They are enhanced by the branching lesson, but not dependent upon it.

The map on the following page shows the interconnections between the course videos. Video 1 is the "trunk" of the tree, while 2-5 are the branches. I've provided links to each video in the flowchart and the map below for your convenience.

General Information (continued)



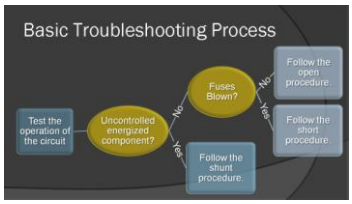
Links to the video clips are actually on the map. Click on the video box to go to the applicable video.

List of software, equipment, and materials used (All software applications are for the PC)

MS Office	This document was made in MS Word, and the slides, flowcharts, diagrams, animations, etc used in the video were made with MS PowerPoint. In addition, some clip art was used from MS PowerPoint and Microsoft.com, as allowed under their licensing agreement.
Adobe Production Suite	Photo-Editing was done in Photoshop CS4, and final video edits were done in After Effects CS4 and/or Premiere Pro CS4.
Camtasia	Screen capture in PowerPoint.
Audacity	Audio recording and editing.
DAZ Studio	3D images. Only used for still shots in these videos.
Paint.NET	Circuit Diagrams and simple effects.
Camera	The camera used for all live action videos was a Samsung HMX-20C.
Microphone	All voice audio was recorded with a Logitech USB Desktop Microphone.
YouTube Annotation Tool	This was the key to the whole project. All embedded links, branches, pauses (for students to answer situational questions) and notes were added using the YouTube annotation tool.

Storyboard (Video 1) - Troubleshooting Overview.

Video Screenshots



Video 1

This first video describes the overarching principles of electrical troubleshooting, and serves as the navigation video for the series.

The first video provides a general overview of our troubleshooting process. It is built around the flowchart shown in the sample image to the left of here. The purpose of this course is to teach the concepts, patterns, and methods of basic electrical troubleshooting.

Troubleshooting electrical circuits is an area of maintenance work that generally distinguishes a trained technician from a novice. Good technicians can study their systems and use an efficient, effective process for finding the fault. Poor technicians use the trial and error approach, also known as "Easter egging" because it involves looking into every nook and cranny of the device until the problem is found. This approach is a waste of time and money.

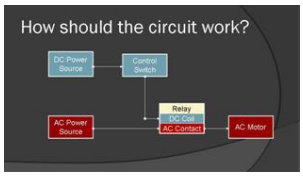
Over the years, we have developed a simple, systematic troubleshooting process for our students, that helps them to "get their feet wet" when it comes to troubleshooting. When technicians combine this pattern for troubleshooting with knowledge and understanding of their circuits, they are better equipped to minimize outages.

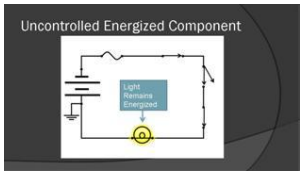
This video's objectives draw from ALL of the videos in the series. They include:

1) Describe the initial steps of troubleshooting.
2) Explain the difference between the indications of a shunt, an open, and a short.
3) Troubleshoot faults in the circuits provided at the La Porte training center.

Storyboard (Video 2) - Initial Testing

Video Screenshots





Video 2

The second video describes the initial testing that an operator should perform while troubleshooting. The purpose of this lesson is to teach you what questions to ask when gathering your initial troubleshooting data.

When troubleshooting, it's tempting to start taking readings right away, but it is better to just set the meter aside initially. If you think about it, good doctors don't just start operating right away; they sit down and ask questions about your symptoms, and then follow up with tests based on the information you give them. Likewise, good mechanics doesn't just start randomly replacing parts. Instead, they start the car, and look, listen, and feel to determine where the trouble may be. Operating the circuits, especially those that have multiple inputs, will tell you a lot about which region of the circuit the fault might be located.

IN addition to fault location, the video describes how to find an uncontrolled energized component, and how to check for blown fuses.

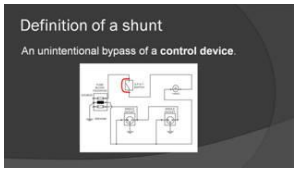
Note that, unlike the videos that follow this one, no practice problems were provided.

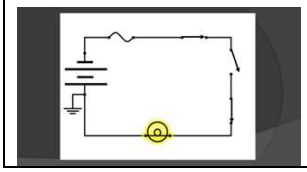
The objectives of this lesson are:

1) Isolate a problem to a region of a circuit, based on your initial indications.
2) Identify an uncontrolled energized component.
3) Identify a blown fuse.

Storyboard (Video 3) - Troubleshooting Shunts

Video Screenshots





Video 3

The third video describes the symptoms and troubleshooting techniques for a shunt.

A shunt is an unintentional bypass of a **control device**. Shunts are generally very easy faults to find. In many cases, you don't even need to pick up your multimeter. Let's take a look at a few rules for finding shunts.

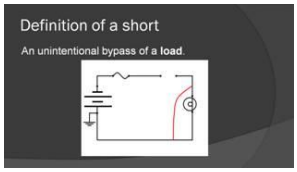
After explaining the operation of the circuit, practice problems are given to the viewer to reinforce the lessons learned.

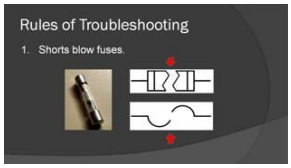
The objectives of this lesson are:

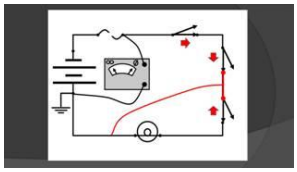
1) Define a shunt.
2) Explain the process of finding a shunt.
3) Find a shunt in a circuit.

Storyboard (Video 4) - Troubleshooting Shorts

Video Screenshots







Video 4

The fourth video describes the symptoms and troubleshooting techniques for a short.

A short is an unintentional bypass of a load. Note that this is different than a shunt in that it is bypassing a load, and not a control device. We find a short by measuring resistance to ground and isolating the components. As you isolate, you will find that the short is at the last isolated component that shows continuity to ground.

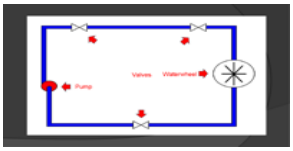
After explaining the operation of the circuit, practice problems are given to the viewer to reinforce the lessons learned.

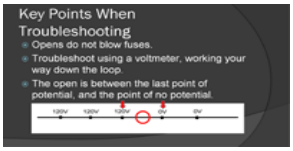
The objectives of this lesson are:

1) Define a short.
2) Explain the process of finding a short.
3) Find a short in a circuit.

Storyboard (Video 5) - Troubleshooting Opens

Video Screenshots





Video 5

The fifth video describes the symptoms and troubleshooting techniques for an open.

An open is an unintentional break in the path for current flow. We troubleshoot opens by taking voltage readings along the source path (relative to ground) until we find a drop in potential. The open is between the last point of potential and the point of no potential.

After explaining the operation of the circuit, practice problems are given to the viewer to reinforce the lessons learned.

The objectives of this lesson are:

1) Define an open.
2) Explain the process of finding an open.
3) Find an open fault by in a circuit.