



Electronics Troubleshooting And Repair



# Electronics Troubleshooting And Repair

## Introduction:

Electronic equipment can develop a wide variety of problems. The act of troubleshooting arises in order to make the problems disappear so that the equipment works as per the expectation. This training provides an understanding of troubleshooting processes and various troubleshooting techniques.

Further the training is concerned with the calculation of fault currents in practical electrical power systems. Short-circuit currents are associated with large amounts of very destructive energy and therefore calculations must be made to ensure that the short-circuit ratings of equipment are adequate to cater for these high currents. An accurate assessment of these currents is also essential for determining the settings of the system protection devices.

## Targeted Groups:

- Electricians
- Design electrical engineers
- Electrical supervisors
- Plant electricians
- Operations & maintenance engineers, supervisors & technicians
- Maintenance technicians

## Course Objectives:

At the end of this conference the participants will be able to:

- Know the important of safety precaution when dealing with AC and DC electronic circuit.
- Use an analog/digital multimeter to measure voltage, current, resistance and continuity for troubleshooting purposes
- Differentiate between AC and DC circuit.
- Remove and solder electronic components from and onto PCB board.
- How to protect PCB board from moisture, water and vibration.
- Use the right chemical spray to clean PCBs.
- Understand how electronics components work with the help of diagrammatic explanation.
- Calculate the code value of resistors, potentiometers and capacitors
- Identify and test most of the basic electronic components so that troubleshooting work can be performed on electronics equipment.
- Read semiconductor substitution manual book and find the best replacement parts from search engine.
- Understand Semiconductor Part Number and Datasheet specifications
- Read basic electronic schematic diagram of a typical equipment
- Enhance their testing and soldering skills
- Know where to buy electronics parts locally and internationally
- See the functions of specialized test equipment ESR and Ring Tester in checking different types of electronic components.

- Understand the importance of Pure Copper Grounding cable
- Analyze a DC circuit board to find out how significant a bad component can impact the function of the circuit.
- Troubleshoot a given circuit board with real bad components in it.
- Understand the ways how one can improve their electronics repair skills.
- Develop a technical mindset/knowhow and be able to think on their own how to fix technical issues and find a solution how to handle technical works without much supervision.
- Read circuit Schematic Diagrams.
- Understand why a power supply will have decreasing/increasing unstable output voltage and power blink problem the moment you turn it On.
- Understand why the output measure good but the power supply immediately shutdown when the load is connected
- Start to troubleshoot a power supply with no blown parts
- Use DC ammeter, light bulb and Flickering method to isolate power supply problems thus speeding up the repair process.
- Use a Digital/Analog Oscilloscope to perform critical waveform checking on mainboards with power on if available.
- Use a simple EEprom/Flash Rom Programmer Copier to copy EEprom/Flash Rom data for troubleshooting purposes.
- Use a Rework Station to extract and solder SMD/Spider ICs on circuit board
- To trace shorted component in mainboard with the help of DC Power Supply.
- Locate components that are going to burn/short circuit by using a heat checker device.

### **Targeted Competencies:**

- Identification of causes of electrical faults
- Recognition of unsymmetrical faults in transformers
- Partial discharge phenomena and how to apply the required analysis
- Representation of unsymmetrical faults in a power system
- Simulation for protection relays configuration

### **Course Content:**

#### **Unit 1: Introduction to Troubleshooting**

- Troubleshooting Basics
- Common Troubleshooting Techniques
- Gaining Circuit Familiarity
- Getting Prepared for Troubleshooting

#### **Unit 2: Failure Analysis and Prevention in Electronic Circuits**

- Failure Symptoms
- Failure Causes
- Failure Types
- Some Useful Terms in Failure

#### **Unit 3: Device Troubleshooting**

- Tools for Servicing
- Test and Measuring Instruments
- Safety Issues - Test and Tagging of Portable Electrical Equipment
- Testing of Passive Components
- Testing of Semiconductor Devices
- Testing Bipolar Transistors
- Testing Other Active Components
- Testing Diodes, Transistors and In-circuit Semiconductors Using Oscilloscopes
- Switches
- Safety Issues for Plugs, Sockets and Portable Appliances

#### **Unit 4: Troubleshooting Digital Systems**

- Moving from Analog to Digital
- Moving into the Digital Circuits
- Typical Faults in Digital Systems
- Digital Circuit Troubleshooters
- Digital Integrated Circuits
- Programmable Logic Device PLD and Memory Definitions
- Precautions

#### **Unit 5: Power Supply and Subsystems Troubleshooting**

- Power Supply
- Regulators
- Switched Mode Power Supplies SMPS
- Oscillators
- Amplifiers
- Troubleshooting Microprocessor Based Systems

#### **Unit 6: Phenomenal Troubleshooting**

- Noise
- Intermittent
- Sources of Interference
- Static Discharge
- EMI/EMC and its Sources

#### **Unit 7: Maintenance and Safety Aspects**

- Aims of Maintenance
- Advantages of Preventive Maintenance
- Importance of Sound Maintenance Management
- Maintenance Policy
- Maintenance Organization
- Maintenance Manuals
- Safety Aspects