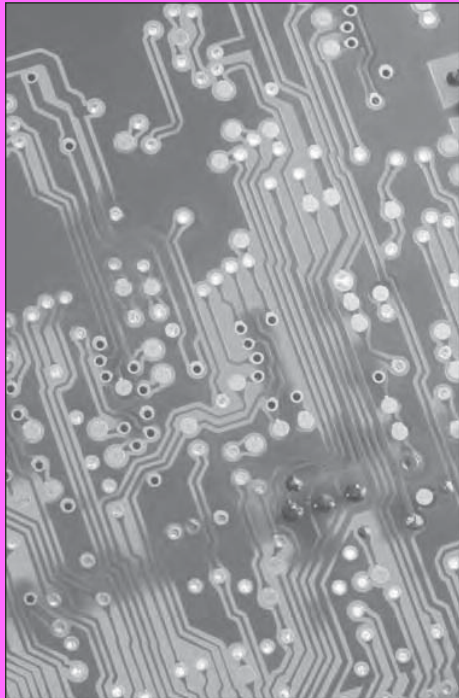

PRACTICAL TROUBLESHOOTING OF ELECTRONIC CIRCUITS FOR ENGINEERS AND TECHNICIANS



OBJECTIVES:

At the end of this workshop you will be able to:

- Recognise and efficiently troubleshoot common electronic component and circuit problems
- Demonstrate the construction and operation of common electronic components
- Utilise common electronic terminology
- Effectively apply the principles of analog meters, digital meters and oscilloscopes
- Identify electronic component symbols
- Identify components and read their values
- Implement procedures for the testing of electronic components
- Confidently carry out simple repair procedures for the correction of faults on printed circuit boards

WHO SHOULD ATTEND:

- Those who wish to be able to multi-skill into electronics
 - Maintenance technicians, electricians, foremen and engineers
 - All engineering, operations or management personnel who are directly or indirectly involved with electronics controls
 - Those involved with the installing, programming, maintaining and purchasing of electronic control equipment
 - Those who want to improve their understanding and capabilities in electronic technology
 - Those involved with sales and installation of electronic products into industry
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The Workshop

The Practical Troubleshooting of Electronic Circuits workshop will teach you how to recognise and efficiently troubleshoot common electronic component and circuit problems. The workshop will give you a solid understanding in common electronic terminology and symbols, as well as the construction and operation of common electronic components. The general troubleshooting process is explained, followed by a brief study of various hand tools and electronic test and measuring instruments. You will learn to implement procedures for the testing of electronic components as well as carry out simple repair procedures for the correction of faults on printed circuit boards with confidence.

Practical Sessions

This is a practical, hands on workshop enabling participants to work through practical exercises which reinforce the concepts discussed.

The Program

INTRODUCTION

BASIC CONCEPTS

- Current, voltage, resistance and power
- Units and abbreviations
- Direct and alternating current

DISCRETE COMPONENTS, PART 1

- Resistors, inductors and capacitors
- Transformers and bridge rectifiers
- Diodes and bipolar junction transistors
- JFETS and MOSFETS
- SCRS, DIACS and TRIACS
- LEDS

CIRCUIT LAWS

- Ohm's Law
- Kirchhoff's Voltage Law
- Kirchhoff's Current Law

AMPLIFIERS

- Small signal amplifiers
- Power amplifiers
- Amplifier frequency response
- Amplifier applications

USING TEST EQUIPMENT, PART 1

- Current measurement
- Voltage measurement
- Resistance measurement
- Analogue meters
- Digital meters
- Oscilloscopes

INDUSTRIAL PRACTICES

- Soldering aids
- Printed circuit boards preparation
- Component preparation
- Constructing a soldered joint
- Common defects in soldered joints
- Desoldering
- Safety in the work area

INTRODUCTION TO TROUBLESHOOTING

- Open circuits
- Short circuits
- Testing diodes, DIACS and TRIACS
- Testing BJTS, JFETS and MOSFETS
- Testing digital and linear IC'S
- Testing other electronic components
- Components out of tolerance
- Troubleshooting and using circuit laws
- Gaining circuit familiarity
- Troubleshooting basics
- Common troubleshooting techniques

FAILURE ANALYSIS AND PREVENTION IN ELECTRONIC CIRCUITS

- Failure symptoms
- Failure causes
- Failure types
- General preventive measures

TESTING IN ELECTRONIC CIRCUITS

- Equipments/devices used in testing (ex. logic analyser, spectrum analyser, multimeter, oscilloscope, ICR meter, DVM, MDA, AWG etc.)

DEVICE TROUBLESHOOTING

- Diode, transistor, resistor, capacitor, op-amp, thermocouple, microprocessors, multivibrator, thermister, switch, PLD, FLASH, RS-232, PCI bus and transmission lines

DESIGN TROUBLESHOOTING FOR DIGITAL AND ANALOG SYSTEMS

- Moving from analog to digital
- Measuring signal and noise in high-speed digital and analog circuits
- Design troubleshooting

LOGICAL TROUBLESHOOTING

- Component level troubleshooting
- Board level troubleshooting
- System level troubleshooting

POWER SUPPLY

- Introduction
- Power delivery input impedance
- Linear power supply

PCB TESTING

- PCB design techniques
- SMT technology
- Soldering and desoldering techniques
- Practical tips and tricks for PCB design
- Solder flux and heat sink
- Troubleshooting strategies
- (Special tools, clips, cleaners, sprays, extension and scope probes)

SAFETY ASPECTS

- Generic precautions
- Specific precautions
- Safety steps at installation time

SUMMARY, OPEN FORUM & CLOSING