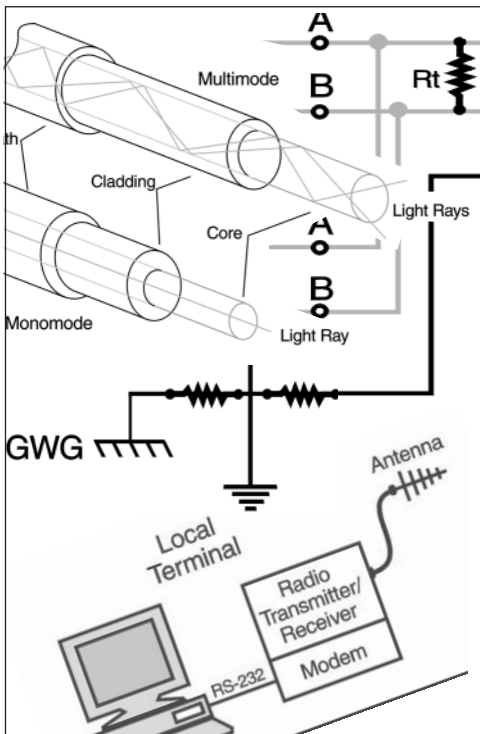


Practical

# TROUBLESHOOTING & PROBLEM SOLVING OF INDUSTRIAL DATA COMMUNICATIONS

Including: RS-232, RS-485, Industrial Protocols, Fiber Optics, Industrial Ethernet, TCP/IP, DeviceNet & Fieldbus



## YOU WILL LEARN HOW TO:

- Identify, prevent and troubleshoot industrial communications problems
- Fix over 60 of the most common problems that occur in industrial communications systems
- Troubleshoot industrial communications systems from RS-232, RS-485, Fiber Optics, Fieldbus to Ethernet
- Analyse problems, diagnose and fix them
- Fault find your Ethernet and TCP/IP network problems

## WHO SHOULD ATTEND:

Anyone working with or required to troubleshoot industrial communications systems ranging from RS-232 to Fieldbus and Ethernet systems, including:

- Instrumentation and Control Engineers/Technicians
- Process Control Engineers
- Network Planners
- Electrical Engineers
- Test Engineers
- System Integrators
- Electronic Technicians
- Designers
- Consulting Engineers
- Design Engineers
- Plant Managers
- Systems Engineers
- Shift Electricians



*Technology Training that Works*

## THE WORKSHOP

The objective of this workshop is to help you identify, prevent and fix common industrial data communications problems. The focus is "outside the box". The emphasis is on practicals that go beyond typical communications issues and theory and focuses on providing you with the necessary toolkit of skills for solving your industrial communications problems whether it be RS-232/RS-485, Modbus, Fieldbus and DeviceNet or a Local Area Network such as Ethernet.

Industrial Communications systems are being installed throughout the plant today from connecting simple instruments to Programmable Logic Controllers to the PCs throughout the business part of the enterprise. Communications problems range from simple wiring problems to intermittent transfer of protocol messages.

The communications system on your plant underpins your entire operation. It is critical that you have the knowledge and tools to quickly identify and fix problems as they occur to ensure you have a secure system. No compromise is possible here. This workshop distills all the tips and tricks learnt with the benefit of many years experience. It offers a common approach covering all of the sections with each standard/protocol having the following structure:

- Quick overview of the standard
- Common problems and faults with this standard
- Description of tools used
- Each of the typical faults are then discussed in detail with details on fixing them

This workshop focuses on the main issues of troubleshooting the industrial communications network of today to enable you to walk onto your plant or facility to troubleshoot and fix problems as quickly as possible.

## ON-SITE TRAINING

- ✓ **SAVE** over 50% by having an IDC workshop presented at your premises.
- ✓ Customise the training to **YOUR** workplace.
- ✓ Have the training delivered when and where you need it.

Contact us for a **FREE** proposal.

## THE PROGRAM

### DAY ONE

*Includes over 30 practical fixes for: RS-232/RS-485/Industrial protocols/ASI Bus/DeviceNet systems methodology given with real world examples*

#### INTRODUCTION

- Overview of course
- List of typical problems

#### OVERALL METHODOLOGY

- Common symptoms, problems and solutions
- How to quickly identify likely causes
- Overall basic steps
- Communications issues
- Grounding/shielding/noise

#### BASIC STANDARDS:

##### RS-232

- Fundamentals
- Problems: cabling, male/female, DTE/DCE, 9-pin, handshaking, voltages, noise, isolation
- *RS-232 Practical Troubleshooting Session*

##### RS-485

- Fundamentals
- Problems: cabling, common mode voltage, converters, isolation, idle state, terminations, control - hardware/software
- *RS-485 Practical Troubleshooting Session*

##### Current Loop

- Fundamentals
- Problems: cabling, isolation

##### Fiber Optics

- Fundamentals
- Problems: splicing, interface to cable, connectors, multimode, monomode, laser vs LED transmitters, driver incompatibility, bending radius, shock, installation issues
- *Fiber Optics Practical Troubleshooting Session*

#### INDUSTRIAL AUTOMATION STANDARDS:

##### Modbus

- Fundamentals
- Problems: no response, exception reports, noise, radio interfaces, physical and application layers
- *Modbus troubleshooting session*

##### Modbus Plus

- Fundamentals
- Problems: cabling, grounding, shielding, terminators, token passing

##### Data Highway Plus/DH485

- Fundamentals
- Problems: cabling, grounding, shielding, terminators, token passing

##### HART

- Fundamentals
- Problems: cabling, configuration, intrinsic safety

##### ASI Bus

- Fundamentals
- Problems: cabling, connections, gateways

##### DeviceNet

- Fundamentals
- Problems: topology, power and grounding, signal voltage levels, common mode voltage, terminations, cabling, noise, node, communication problems, creeping errors

### DAY TWO

*Includes over 40 practical troubleshooting tips for Profibus/Foundation Fieldbus/Ethernet and TCP/IP*

#### PROFIBUS PA/DP/FMS

- Fundamentals
- Problems: cabling, fiber, shielding, grounding, segmentation, colour coding, addressing, token bus, unsolicited messages, fine tuning of impedance terminations, drop-line lengths, GSD Files, intrinsic safety

#### FOUNDATION FIELDBUS

- Fundamentals
- Problems: wiring, grounds, shielding, wiring polarity, power, terminations, intrinsic safety, voltage drop, power conditioning, surge protection, configuration

#### INDUSTRIAL ETHERNET

- Fundamentals
- Protocol analysis
- Problems: noise, thin & thick coax and connectors, UTP cabling, wire types, components, incorrect media selection, jabber, too many nodes, excessive broadcasting, bad frames, faulty auto-negotiation, 10/100MBit/s mismatch, full/half duplex mismatch, faulty hubs, switched networks, loading
- *Industrial Ethernet Practical Troubleshooting Session*

#### TCP/IP

- Fundamentals
- Software utilities (ping, arp, netstat)
- Protocol analysis
- Problems: internet layer, IP addresses, subnet mask, routers, transport layer, triple handshake, incorrect ports
- *TCP/IP Practical Troubleshooting Session*

#### RADIO & WIRELESS COMMUNICATIONS

- Fundamentals
- Problems: reliability, noise, interference, power, distance, licences, frequency, over and under modulation
- *Radio & Wireless Practical Troubleshooting Session*

## PRACTICAL SESSIONS

There are over 7 practical sessions in this workshop where you will troubleshoot the following systems:

- RS-232
- RS-485
- Modbus
- Fiber Optic Cabling
- Ethernet
- TCP/IP

As well as the following problem solving exercises:

- Problem Solving Exercise for PLCs
- Problem Solving Exercise for Instruments