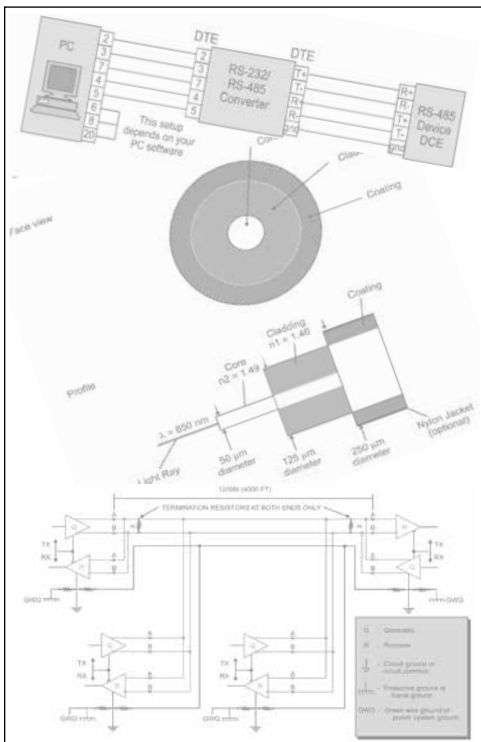


PRACTICAL TROUBLESHOOTING AND PROBLEM SOLVING OF MODBUS PROTOCOLS



YOU WILL LEARN HOW TO:

- Identify, prevent and troubleshoot Modbus protocol communications problems
- Gain a practical toolkit of skills for working with Modbus
- Work competently with Modbus and RS-232, RS-485, wireless and Ethernet
- Gain skills to fault find your Modbus based Ethernet, RS-232/485, wireless, 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:

- Consulting engineers
- Designers
- Design engineers
- Electrical engineers
- Electronic technicians
- Instrumentation and control engineers/technicians
- Network planners
- Plant managers
- Process control engineers
- Shift electricians
- Systems engineers
- System integrators
- Test engineers



Technology Training that Works

The Workshop

Modbus industrial communications systems (based on RS-232/RS-485 and Ethernet) are being installed throughout industry today, from connecting simple instruments to Programmable Logic Controllers to PCs throughout the business part of the enterprise. Communications problems range from simple wiring problems to intermittent transfer of protocol messages. Whilst the main issues with the Modbus protocol will be covered in this workshop, a clear understanding of the protocols and standards that transport Modbus protocol data units are required in order to effectively work with Modbus. This includes such standards as RS-485/RS-232 and Ethernet (preferably industrial Ethernet) and TCP/IP. Modbus, effectively one of the few (arguably, the only) industrial messaging protocols recognised by the Internet world (port 502) has one of the largest installed bases worldwide with more than 7.2 million installed nodes. The Modbus TCP/IP profile has recently been accepted by the International Electro-technical Commission (IEC) as a Publicly Available Specification (IEC PAS 62030) and is now eligible to become part of future editions of the International Standards IEC 61158 and IEC 61784-2. So it enjoys the status of a widely available open standard available to everyone. And thus the popularity. Whilst detractors will say the Modbus protocol lacks some of the refinements of the newer offerings on the market, there is no doubt that it is one of the most popular standards available in the industrial world today.

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 distils all the tips and tricks learnt with the benefit of many years of experience.

Practical Sessions

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

Practical sessions include:

- RS-232 (COM port) basics
- RS-232 point to point communications
- RS-485 basics
- Logging and protocol analysis on serial (RS-232/RS-485) communications system
- Modbus Serial operation: RTU mode
- Modbus Serial operation: ASCII mode
- Setting up a basic Ethernet network
- IP configuration
- Protocol analysis on Ethernet network
- Modbus/TCP
- Modbus (Serial) over IEEE802.11 wireless
- Installation and configuration of Modbus/TCP to serial communication gateway

To gain full value from this workshop, please bring your laptop/notebook computer.

The Program

DAY ONE

INTRODUCTION

- What is Modbus?
- Overview of the Modbus standards
- Modbus and IDA
- How Modbus relates to the RS-232, RS-485, Ethernet and TCP/IP standards

OVERALL TROUBLESHOOTING METHODOLOGY

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

BASIC SERIAL COMMUNICATIONS STANDARDS

- RS-232
 - Fundamentals
 - Problems: UART settings (baud rate, parity, etc), cabling, DTE/DCE, handshaking, voltage levels, noise
- RS-232 practical troubleshooting session*
- RS-485
 - Fundamentals
 - Problems: cabling, common mode voltage, voltage levels, transient protection, biasing, termination, control (hardware/software), noise

RS-485 practical troubleshooting session

THE MODBUS SERIAL STANDARD

- Fundamentals: overall concept, protocol stack, client/server interaction, PDU and ADU
 - Modbus RTU vs. Modbus ASCII: frame structures and timing considerations
- Problems: timeouts, checksums (CRC/LRC), incorrect function codes/data parameters, exception responses

Modbus serial troubleshooting session

MODBUS PLUS

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

DAY TWO

INDUSTRIAL ETHERNET

- Fundamentals
- Protocol analysis
- Problems: noise, connectors, cabling, wire types, jabber, excessive broadcasting, bad frames, faulty auto-negotiation, network loading, component failure

Ethernet practical troubleshooting session

TCP/IP

- Fundamentals
- Software utilities (ipconfig, ping, arp, tracert, netstat)
- Protocol analysis
- Problems: IP addresses, subnet masks, default gateways, TCP connections

TCP/IP practical troubleshooting session

MODBUS/TCP (MODBUS OVER TCP/IP)

- Fundamentals: overall concept, protocol stack
- Packet structure: PDU, ADU, MBAP header
- TCP connectivity issues
- Protocol analysis
- Modbus/TCP to Modbus serial gateways
- Problems: TCP connection problems, timing issues

Practical session with Modbus over TCP/IP

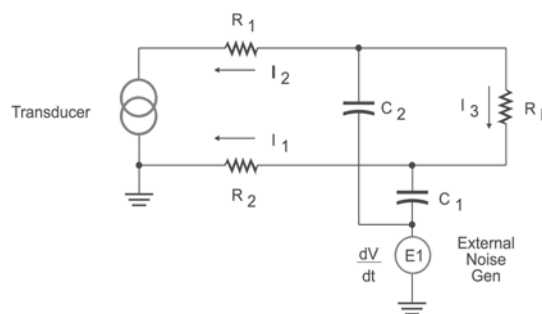
RADIO AND WIRELESS COMMUNICATIONS

- Fundamentals
 - Problems: noise, interference, power, distance, channel separation, encryption
- Practical session with Modbus/TCP over IEEE802.11*

TROUBLESHOOTING TIPS AND TRICKS

- Summary of all the problems faced
- Further troubleshooting tips

SUMMARY, OPEN FORUM AND CLOSING



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.