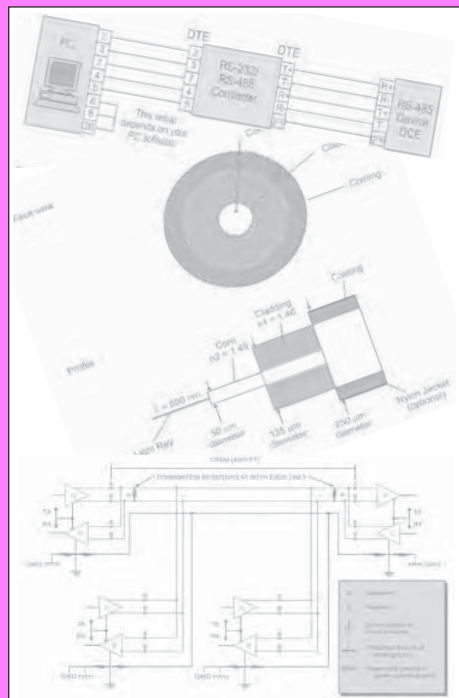


PRACTICAL TROUBLESHOOTING AND PROBLEM SOLVING OF MODBUS PROTOCOLS

Including RS-485, RS-232, Wireless, Ethernet and TCP/IP Industrial Data Communication Systems



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 Modbus systems such as:

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

The Workshop

Modbus is one of the few (if not the only) industrial messaging protocols recognised by the internet world, using port number 502. It has one of the largest installed bases world-wide with more than 7.2 million installed nodes. The Modbus/TCP profile has recently been accepted by the International Electrotechnical Commission (IEC) as a Publicly Available Specification (IEC PAS 62030) and is now eligible to become part of the future editions of the International Standards IEC 61158 and IEC 61784-2. It enjoys the status of an open standard, available to everyone, hence its popularity.

Whilst detractors will say Modbus 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.

This two-day workshop focuses on the main issues of troubleshooting Modbus serial (i.e. Modbus over RS-232, RS-485) and Modbus/TCP (i.e. Modbus over TCP/IP and Ethernet) installations.

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

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

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, tracer, 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