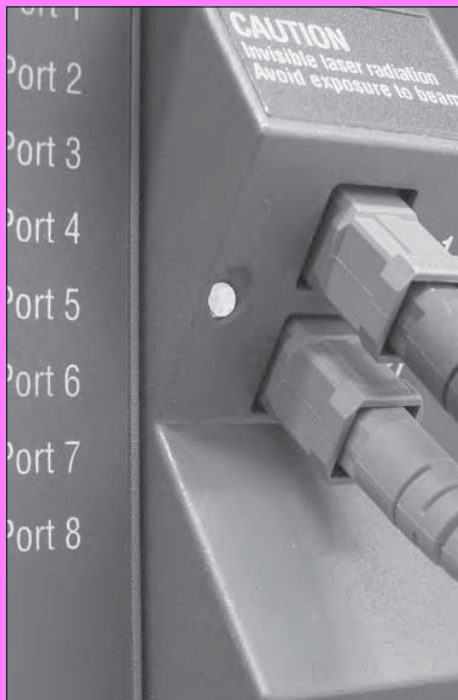

PRACTICAL FIBER OPTICS FOR ENGINEERS AND TECHNICIANS



WHAT YOU WILL GAIN:

- Practical hands-on experience in jointing, splicing and testing fibre optic systems
- A solid knowledge of fibre optic communications systems
- State of the art fibre optics technology and installation practices
- Correct procedures for cable installation and termination
- How to design and install your own fully operational fibre optics system
- New approaches to troubleshooting including how to use an OTDR

WHO SHOULD ATTEND:

The workshop will benefit engineers and technicians involved in specifying, commissioning and maintaining industrial fibre optic systems, but who have little previous experience in this field, including:

- I & C Engineers and Technicians
- Telecommunications Engineers and Technicians
- Maintenance Engineers and Technicians
- Electrical Engineers and Electricians
- Project Engineers and Managers
- Process Control Engineers
- Consulting Engineers
- Systems Engineers

The Workshop

This comprehensive two-day workshop will provide you with the necessary background to understand the fundamentals of fibre optic systems and their individual components including fibres, cable construction, connectors, splices and optical sources and detectors. Various pitfalls associated with the implementation of fibre optic systems are discussed and workable solutions to these problems are provided. It will provide you with the knowledge to develop the required techniques for design, installation and maintenance of fibre optic systems.

The workshop places significant emphasis on the practical techniques of component installation and system design. You will have the opportunity to get hands-on experience with mechanical and fusion splicing and with fitting the popular industrial fibre connectors. A fibre optic link design software package is provided to allow you to practice actual link design practicals using various parameters. Finally, you will have the opportunity to practice using various fibre optic test equipment such as optical sources and power meters.

Practical Sessions

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

- Fibre Optic Link Design - a complete design of a fibre optic link
- Optical Power Measurement - the use of an optical source and an optical power meter
- Continuity Tester - the principles of operation of a simple fibre optic continuity tester
- Optical Time Domain Reflectometer (OTDR) - demonstration on the practical use of OTDR with a video presentation
- Optical Connectors - gain experience in the techniques of fitting fibre optic connectors

The Program

INTRODUCTION TO FIBRE OPTIC SYSTEMS

- Introduction and overview
- Background to fibre optics
- Fibre optics vs copper systems

DEFINITIONS AND BASIC PRINCIPLES

- Data communications and communications channels
- Transmission modes
- The electromagnetic spectrum
- Revisiting copper

THEORY OF FIBRE OPTIC TRANSMISSION

- Fundamental principles of operation
- Light transmission nature of glass
- Numerical aperture
- Modal propagation in fibres
- Multimode, single mode, step-index and graded index
- Bandwidth of fibres
- Modal and chromatic dispersion
- Absorption, scatter, bending, radiation and mismatches
- Other types of fibres

CONSTRUCTION OF FIBRE OPTIC CABLES

- Cable objectives
- Tensile ratings and structural elements
- Strengthening members
- Housings, sheaths and moisture barriers
- Classes of cables

CONNECTING FIBRES

- Optical connection issues
- Fibre end preparation
- Splicing fibres
- Connectors and optical couplers

OPTICAL DRIVERS AND DETECTORS

- Light emitting diodes and lasers
- Transmitter modules
- Safety considerations
- PIN photodiodes
- Receiver modules
- Optical amplifiers

INSTALLING FIBRE OPTIC CABLES

- Preparation, installation rules and procedures
- Bending radius, cable tension and cable reels
- Cable trays, conduits and lubricants
- Indoor cable installation and leaving extra cable
- Outdoor cable installation and environmental conditions
- Splicing trays, organisers, termination cabinets, breakout boxes, patch and distribution panels

FIBRE OPTIC SYSTEM DESIGN

- Initial design considerations
- Future capacity, reliability and operating wavelength
- Repeaters and amplifiers
- Design loss calculations and link loss budgets
- Design bandwidth calculations

TESTING OF FIBRE OPTIC SYSTEMS

- Concepts of optical measurement
- Continuity and insertion loss testing
- Optical Time Domain Reflectometry (OTDR)
- Bit Error Rate (BER) testing
- Eye diagrams and laboratory fibre tests

TECHNOLOGIES THAT USE OPTICAL FIBRES

- Low speed modems
- 10 Base F/FDDI/FIOLR
- 100 Base F
- ATM
- LANs/MANs/WANs
- Analog modulators for video and microwave links
- HDTV