LIGHT BRIGADE®

The Leader in Fiber Optic Training

DVD Catalog

Staff Development DVDs

For instances when classroom training is not an option, the Light Brigade has created professional-quality DVDs that together offer the equivalent of 20 hours of classroom training. This menu-driven series of DVDs incorporate high-quality video clips, animations and graphics to enhance the learning experience. Individually, they can be used as refresher training on key fiber topics or to provide more focus on a specific area of concern.

The content is unbiased and provides an international perspective, including film footage and standards. Peer review occurred during both the scripting and production phases.

For those who plan to use the DVDs as staff development tools, they are formatted for easy presentation either by selectable chapters or in continuous play mode. Each DVD includes a quiz in Microsoft® Word format to allow the viewer to test their knowledge. An instructor's version with answers is available upon request.

DVDs by Topic

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Staff Development DVDs

Introduction to Fiber Optics

Fiber optics is an amazing technology that allows our daily voice, video and data transmissions to occur with ever-increasing quality and lower costs. This DVD contains fourteen introductory chapters that have been selected from our set of Light Brigade Staff Development DVDs in order to showcase related fiber-optic products and disciplines for those new to the technology to learn, enjoy, and appreciate.

This comprehensive reference tool provides an overview of fiber optics as a whole, including where and how optical fiber is used, its history, the basics of fiber structures, optical theory, and terminology. Through the use of vivid animations, graphics, and manufacturing, installation and operation footage, the content examines the components and disciplines involved with fiber optics and the role each plays in today's fiber optic communication systems.

105 minutes • Part Number W-6D-101 • $50
ISBN 978-0-9815211-1-4

See the preview on YouTube

DVD Contents

Fiber Optic Applications 9:08
See how optical fiber technology is used in voice, video, and data communications networks worldwide. Learn how fiber optics benefits a variety of applications.

A Brief History 5:55
This chapter covers how fiber optics evolved with help from pioneers such as Daniel Colladon, Charles Kao, Donald Keck, and other innovators who paved the way for today's fiber optic communications.

Light Basics 3:08
This primer examines optical theory through animations that demonstrate how principles such as wavelength, refraction, and reflection apply to optical fibers.

Fiber Structures 3:36
This chapter reviews the basic structures of optical fibers. It explains numerical aperture, as well as how the core, cladding, and coating function in multimode and single-mode fibers.

Fiber Optic Cable 6:17
Fiber optic cables physically protect the internal fibers and are designed to handle the physical and environmental needs of today's users. Learn about the cabling process and variations in cable structures.

Fiber Optic Splicing 5:58
Optical fibers can be spliced with low losses and still maintain their physical integrity. This chapter looks at two unique, reliable splicing processes: mechanical and fusion.

Fiber Optic Connectors 9:32
Proper connectorization is key to a successful fiber-optic link. Learn about performance factors such as attenuation, reflection, and repeatability, and review issues applicable to single-mode and multimode fiber.

Panels, Closures, and Pedestals 8:11
The chapter introduces the many products designed for cable and fiber management. From indoor panels to specialty products for fiber to the home, proper cable management is essential.

Fiber Optic Testing 6:30
Testing fiber spans confirms performance and allows for troubleshooting as needed. This chapter serves as an overview of available equipment and the tasks required to correctly perform a variety of tests.

Troubleshooting a Fiber Optic Link 3:13
This chapter introduces typical single-mode and multimode testing issues along with the roles of installation and maintenance technicians.

OTDR Theory and Operation 3:27
Learn what makes the optical time domain reflectometer unique for manufacturing, installation, maintenance, and troubleshooting of optical fibers, cables, splices, and various passive components.

Fiber Optic Active Devices 9:02
All fiber transmission systems incorporate lasers, LEDs, and photodetectors. Other active devices, such as optical amplifiers, are used in long haul, CATV, or FTTx installations. This chapter introduces the various roles of active components along with important issues such as wavelength, attenuation, and dispersion.

Fiber Optic Passive Devices 12:30
Passive devices allow users to split, direct, switch, tap, and multiplex optical signals. This chapter looks at the types available, from simple components to complex integrations used in DWDM, FTTx, and ROADM applications.

System Loss Budgets 18:41
For those designing fiber optic communication systems, this chapter explains how to perform loss budgets for single-mode and multimode systems. Details include how to incorporate light sources, photodetectors, wavelengths and fiber types for short to long haul, point-to-point, FTTx, ITS, and WDM systems.

Bonus materials include a glossary, acronym list, and student quiz. A matching instructor version is available upon request.

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Staff Development DVDs

Fundamentals of Fiber Optics

The true power of technology lies not in the hardware of today's devices, but in the networks that interconnect them. Whether it be small local area network in an office or campus setting, a metropolitan area network that connects thousands of users, or the vast global reach of the Internet, fiber optics plays a lead role in providing this seamless connectivity.

This award-winning DVD explores the fascinating history and evolution of optical fibers and their applications. It incorporates video clips, animations, and graphics that detail how optical fibers are manufactured, tested, and installed. The DVD is unbiased and provides an international perspective, including film footage and standards.

Whether your need is single-mode, multimode, plastic or application-specific optical fibers, this DVD is a basic primer on the major types of fibers, their structure, history, and applications.

For those planning to use the DVD as a staff development tool, it is formatted for easy presentation either by chapters or in continuous play mode.

80 minutes • Part Number W-6D-112 • $125
ISBN 978-0-9754542-0-6

See the preview on YouTube

DVD Contents

A Brief History.....5:55
This chapter begins by explaining the need for communications systems, and then provides a brief history of how pioneers such as John Tyndall and Charles Kao provided the breakthroughs necessary for the development of optical fiber.

Advantages of Fiber Optics 3:22
This chapter details the advantages and benefits that optical fiber provides to bandwidth, signal attenuation, noise immunity, size, and weight, making it the optimum physical medium for communications.

Light Basics.....3:08
To use optical fibers, one must understand basic optical theory. In this chapter, graphical animations describe wavelength, refraction, reflection, and total internal reflection and how they each apply to optical fibers.

Fiber Structure.....3:36
This chapter reviews the basic structures of optical fibers. It explains numerical aperture, as well as how the core, cladding, and coating function in multimode and single-mode fibers.

Attenuation.....8:40
This chapter explains wavelength, the decibel, and intrinsic and extrinsic causes of attenuation. Learn the effects of absorption and scattering at various wavelengths and the difference between macro- and microbending.

Fiber Manufacturing.....5:03
Over the years, manufacturers have developed different processes for manufacturing optical fibers. Watch footage from Corning, OFS/Lucent, Nortel, and others, and observe various methods and techniques.

Multimode Dispersion.....11:24
This chapter focuses on modal dispersion, which causes differential mode delay, the effect of light sources with overfilled launch conditions, mode conditioning patchcords, and methods of measuring bandwidth including effective modal bandwidth.

Single-mode Dispersion 8:30
This chapter describes what chromatic, waveguide, material and polarization mode dispersion are through the use of animation and live shots, as well as how each type applies to single-mode fibers.

DWDM 7:05
Optical multiplexing has evolved from basic WDM to dense WDM to coarse WDM. Explore WDM and how it works. Learn about four wave mixing and how dispersion compensation fiber is applied.

Plastic Optical Fiber.....4:09
Plastic optical fiber is used in many unique applications. Learn about standard step index plastic optical fiber structures with high and low numerical apertures, and explore POF manufacturing and applications.

Specialty Fibers 2:52
As optical communications has grown, so has the need for "application specific optical fibers." This chapter is an introduction to dispersion compensating, erbium, select cut-off wavelength, cladding mode suppression, and more.

Fiber Optic Applications 9:08
Local, storage, metropolitan, and wide area networks use fiber to communicate. Understand the fiber types used in these networks. CATV, hybrid fiber coax architecture, FTTx, FITL, and security applications are covered.

Bonus materials include a student quiz. A matching instructor version is available upon request.

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Staff Development DVDs

OTDR Theory and Operation

The optical time-domain reflectometer (OTDR) is used to test the light-transmission ability of an optical fiber cable or span, and to determine the location and magnitude of a problem. The OTDR is the most widely used and versatile instrument for testing optical cables during installation, maintenance, and restoration. It can determine the length of a fiber and its end-to-end loss as well as the amount of reflected light and loss from various discrete components within the fiber.

Modern OTDRs can locate and evaluate the losses of fusion splices, optical splitters, and connectors and can even report whether each location and loss is within certain specification tolerances.

Among all electronic test instruments, the OTDR is truly unique in its combination of extremely high dynamic range, rapid acquisition capabilities, and high resolution. No other instrument used for any test application can boast over 200 dB of electrical dynamic range, nearly 1 GHz of bandwidth, and a 10-MHz sampling rate, all in the same package.

86 minutes • Part Number W-6D-121 • $125
ISBN 978-0-9754542-1-3

See the preview on YouTube

DVD Contents

Introducing the OTDR.....3:27
This chapter introduces the role of the OTDR and what makes it unique when used for manufacturing, installation, maintenance, and troubleshooting of optical fibers, cables and various passive components.

How the OTDR Works.....9:51
The OTDR incorporates both optical and electrical components in order to detect and measure reflections. Signatures are explained, along with their causes and tendencies. Understanding these signatures is critical for proper testing.

OTDR Evolution.....4:01
The OTDR has evolved from the benchtop model of the late 1970s to today's portable and powerful platform OTDR. Review its progress including mainframes, the mini-OTDR, and fault finders.

Platform OTDRs.....11:57
As technology changed, so did the role of the OTDR. In recent years, the OTDR has become a platform that offers a variety of testing options including dispersion, spectrum analysis, visual inspection, and optical switching.

OTDR Settings and Menus.....9:33
Using an OTDR requires that the operator must understand how to set up the instrument's many features and capabilities for the task at hand. Explore OTDR menus and their application in testing fiber optic spans.

Specialty OTDRs.....2:34
A variety of specialty OTDRs have been created for specific needs, such as military or aerospace applications. Learn how these variations are used to measure optical components in optical subassemblies and systems.

Acceptance Testing.....14:24
An OTDR's key role is the acceptance testing of optical fibers and cables. Proper preparation, cleaning and termination are demonstrated along with settings, cursor placement, and automatic versus manual operations.

Measuring Splice Loss.....2:45
A key task for users is identifying and measuring splices in the optical cable span. Learn how and where to place cursors for accurate measurements and why bidirectional and dual wavelength testing is recommended.

Measuring ORL.....4:00
Reflectance is recognized today as a limitation of high-performance systems. Explore the components that cause reflection and how the OTDR uses pulsewidth, deadzone boxes and optical terminators to measure connector reflectance.

Testing the Outside Plant.....3:54
This chapter focuses on the final measurements necessary after a single-mode fiber span has been installed, spliced, and terminated. Learn how this test defines future maintenance documentation in your fiber network.

Testing Local Area Networks.....11:55
This chapter focuses on short-distance and LAN applications. As network speeds grew, so did the need for full documentation. This chapter focuses on the OTDR's role to inspect, measure, and verify span performance.

Testing Optical Splitters.....6:53
Newer fiber-optic applications that involve optical splitters require a specific OTDR setup to identify and measure. This chapter reviews the instrument adjustments necessary for these tasks.

Bonus materials include a student quiz. A matching instructor version is available upon request.

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Fiber Optic Test Equipment and Testing Fiber Optic Links

In any complex system, testing and maintenance play a vital role in keeping the system operating at peak efficiency. The test equipment employed by today's fiber-optic installers and technicians are a critical part of that role. From simple power meters to specialized inspection equipment, a variety of test instruments have evolved over the years for the purpose of acceptance testing, troubleshooting, and documenting fiber-optic links. Technicians not only need knowledge of the theory behind these instruments, but the ability to choose the correct instrument for the task.

This DVD takes a look at the products and applications involved in testing fiber-optic links. This includes background on light sources and detectors, along with applicable optical theory. Common standards and recommendations are addressed, as well as established testing values.

The content also addresses common problems and challenges that occur in fiber testing. Different testing techniques and methods are highlighted to help the viewer understand the choices available from the manufacturing industry.

81 minutes • Part Number W-6D-131 • $125
ISBN 978-0-9754542-3-7

See the preview on YouTube

DVD Contents

Introduction to Fiber Testing 6:30
Fiber optic testing requires that equipment be tailored for the application. This chapter serves as an overview of available equipment and the tasks required to correctly perform an attenuation test.

Selecting Test Equipment 9:08
Users must understand how different elements affect the final measurement. The roles of instrument resolution, dynamic range, launch conditions, and calibration are discussed.

Cleaning..... 9:56
The need for connector cleanliness is critical for successful installation. This chapter focuses on the various contaminants, where and why they occur, along with cleaning products and techniques.

Basic Loss Testing.....7:00
This chapter describes three basic techniques to perform optical loss testing for multimode or single-mode spans, and includes the needs and background for bidirectional, dual wavelength testing.

Multimode Testing 9:30
This chapter examines multimode testing scenarios including LED and VCSEL sources, 50/125 and 62.5/125 testing and new smart optical loss test equipment. It also deals with different options for launch conditions.

Single-mode Testing 7:06
Most single-mode fiber spans are longer and have higher fiber counts than multimode spans. Bidirectional dual wavelength testing is covered, along with special wavelengths for testing new technologies such as FTTx.

Testing Transmitters and Receivers.....3:03
Testing optical power levels should be a requirement for any fiber optic user, not just high-end users. This chapter shows how and why to perform basic power level testing of transmitters and receivers, and to document the results for future comparisons.

Testing Dissimilar Connectors 5:02
This chapter deals with the background of testing dissimilar connectors, as well as how to perform these optical loss tests. MT-RJ and military types are included, along with potential problems with mismatched end polishes on single-mode connectors.

Measuring Reflection 6:05
Today the impact of reflectance is being recognized as a limitation in high-performance systems. This chapter explains the roles of components causing reflections and how the test to measure the amount of reflectance in a span is performed.

Fiber Identifiers 2:58
Fiber identifiers have become invaluable in determining whether a fiber is carrying live traffic and its direction. This chapter focuses on how fiber identifiers work and how to use them when performing mid-entry or "express" entries into fiber-optic spans.

Visual Tracers 4:39
This chapter reviews the types of visual tracers available and how they are commonly used. Included is a detail of problems that can be resolved with visual tracers, including damaged or contaminated connectors, tracing fiber spans, or identifying micro/macrobends.

Visual Inspection.....6:27
Safely identifying contaminated or damaged connectors is critical for fiber technicians. This chapter explores inspection equipment such as videoscopes, microscopes, and interferometers. Key points include magnification and resolution issues.

Fiber Optic Talk Sets 2:50
Fiber optic talk sets have always provided technicians with a quick and reliable method of communications when testing fiber optic links. This chapter reviews the applications and features that should be addressed when communication is required.

Bonus materials include a student quiz. A matching instructor version is available upon request.

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Troubleshooting A Fiber Optic Link

Technicians must have the necessary skills, knowledge, and equipment to efficiently troubleshoot the problems that arise during the installation, termination, splicing, and operation of fiber optic links. It is essential to quickly identify these problems and their locations and implement a proper, cost-effective solution.

This DVD focuses on two distinct perspectives: the technician during the installation and testing process, and the maintenance technician who is responsible for the link after the network is operational. Common installation problems are examined, as well as problems that may appear as the network ages. We detail the steps required to isolate and resolve these and keep a fiber network operating in a reliable manner. The background and key features of various types of test and inspection equipment and the roles in which they are used are also discussed.

The DVD closes with a chapter on system related problems that focuses on local area networks, troubleshooting data systems, CATV analog transmission of video signals and telephone companies using digital transmission of voice signals.

90 minutes • Part Number W-6D-141 • $125
ISBN 978-0-9754542-3-7

See the preview on YouTube

DVD Contents

Introduction 3:13
Troubleshooting a fiber span requires familiarity with different approaches and techniques. This chapter introduces typical single-mode and multimode issues, along with the roles of installation and maintenance technicians in a troubleshooting scenario.

Identify, Locate, and Resolve 4:43
Learn how to apply the "identify, locate, and resolve" philosophy to your troubleshooting discipline. Efficient isolation of the malfunction is the primary goal. Correct application of knowledge and equipment will simplify testing and troubleshooting.

Connection Faults 5:24
Connection points are the most frequent location of faults for both single-mode and multimode terminations. Learn how contamination, damage and other connector issues can degrade network performance, along with the equipment used to locate and resolve them.

Span Faults.....9:23
Single-mode spans tend to be long with heavy outside plant exposure, while multimode spans tend to be shorter and generally found in campus or building environments. Examine frequent trouble spots for both fiber types and methods for their quick identification.

Faults at Splice Locations 7:10
Splices occur frequently in single-mode installations. The marriage of the cable, closure, and splice in the outside plant, as well as the use of pigtails, needs to be understood. The limitations of OTDRs in accurately distinguishing the cause are also discussed.

Single-mode Acceptance Testing 18:10
The installer's role is to verify that both components and the span meet specifications. Standards provide us benchmark values; proper understanding and application of the concepts involved provides us with the means to achieve and maintain those values.

Single-mode Troubleshooting.....15:00
Correctly applying troubleshooting skills and techniques is critical when a network is down or having intermittent problems. This chapter focuses on the identification and isolation of a variety of problems that a technician will encounter.

Multimode Acceptance Testing.....9:51
This chapter focuses on how the OTDR and OLTS can be used to recognize fibers that do not meet specification. A variety of potential trouble spots are identified to familiarize the viewer and aid in deciding the best course for resolution.

Multimode Troubleshooting 8:19
This chapter focuses on examples of common and uncommon problems that technicians will encounter in fiber-optic systems. It expands on techniques and the roles of different test equipment, as well as the best methods for isolating and confirming the cause.

System Related Problems.....8:01
This chapter provides an overview of problems that are not fiber-specific, but still affect the operation of a fiber optic link. Analog CATV, digital telephony, and local area network applications are included, along with common optical transmitter and receiver issues.

Bonus materials include two troubleshooting guides and a student quiz. A matching instructor version is available upon request.

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Fiber Optic Cable

Fiber optic cables protect the optical fibers that allow worldwide communications to operate efficiently. Since 1975, cable manufacturers have improved upon designs and materials to offer greater flexibility in cable selection and usage.

This DVD discusses the many types of optical cables and their applications, and takes you on a tour of a cable plant to see how cable is manufactured from the initial fiber acceptance through the final testing prior to shipping.

The content spotlights a variety of cable designs: central and stranded loose buffered cables for the OSP installers; tight buffered distribution, breakout, and cordage cables for premises; ribbon, armored, composite, and indoor/outdoor cable; and OPGW and ADSS cables for utilities. Each cable type is prepared, including end- and mid-entry, fan-out kits, Kellems grips, and specialty hardware. Specifications and other critical details that apply to cable installation and operation are also reviewed.

106 minutes • Part Number W-6D-151 • $125
ISBN 978-0-9754542-4-4

See the preview on YouTube

DVD Contents

Introduction 6:17
Learn about the cabling process and the variations in cable structures that have been developed for the physical protection of the internal fiber structures.

Cable Applications 11:06
Learn about cable structures designed for aerial, underground, ducted, buried, premises or industrial environments. Many variations of optical cables, designed for standard and unique applications, are reviewed along with new installation methods.

Loose Buffered Cables.....7:56
Loose buffered cables are used by service providers in the outside plant for aerial, underground and ducted installations. Learn about cable elements and types, including stranded, central tube, armored, ribbon, and FTTx drop cables.

Tight Buffered Cables.....7:34
Tight buffered cable styles, such as distribution, breakout, composite or hybrid, are commonly used in premises applications. Learn new variations including indoor/outdoor and sub-unit distribution cables, as well as new termination and access techniques.

Cable Manufacturing 14:43
Take a tour through the cabling process from acceptance to final cable testing. Watch processes including color coating and cable sub-structures including armoring, ripcords, jacketing, strength members, and markings.

Cable Specifications 8:05
Anyone designing or installing optical cables must understand proper cable installation and operation including bend radius and tension. This chapter includes physical size issues and environmental and grounding issues.

Loose Buffered Cable Preparation.....20:35
Learn how to prepare armored and unarmored stranded and central tube cable structures. See how to install fan-out kits and attachment hardware. Learn about mid-entries for trunk and feeder applications, including FTTx.

Tight Buffered Cable Preparation.....10:17
Learn how to prepare distribution, sub-unit distribution, breakout cables, and cordage. Watch the process for installing fan-out kits and attachment hardware. Learn how to perform a mid-entry on sub-unit indoor/outdoor distribution cables for protective, alternate route ring and ITS networks.

OPGW Cables.....4:28
Optical power ground wire cables, used by utilities, provide unique challenges for technicians and installers. This chapter reviews the types, variations, and applications along with the cable's structure and materials.

OPGW Preparation.....7:23
OPGW has unique disciplines, tools, processes, and attachment hardware. This chapter takes the viewer step-by-step through an OPGW preparation sequence.

ADSS Cables.....6:31
All dielectric self-supporting cables are the strongest variation of loose buffered cable. This chapter covers the types, applications, and specialized hardware for ADSS installations.

Bonus materials include a student quiz. A matching instructor version is available upon request.

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Fiber Optic Splicing

Since fiber optics first appeared in the 1970s, the industry recognized that for it to become a viable transmission technology, reliable splicing methods had to be developed. The ultimate goal was a process that did not require excessive skill or expense to perform yet resulted in a low-loss, low-reflectance, optical joint with high mechanical strength and long-term reliability.

Today, better fibers, tolerances, and equipment are available to users through a multitude of splicing products and techniques that have been designed to meet their specific needs and applications. Newer fusion splicers have been developed to handle the application-specific optical fibers used in optical sub-assemblies.

The DVD covers PAS, LID, and fixed V-groove fusion splicers for ribbon, FTTx, and premises applications, as well as mechanical splicing for emergency restorations and premises applications. The correct methods of preparing, cleaving, splicing, and protecting optical fibers are also demonstrated. Lab, manufacturing, field, and close-up footage and detailed graphics make this an essential tool for today's splicer.

95 minutes • Part Number W-6D-161 • $125
ISBN 978-0-9754542-5-1

See the preview on YouTube

DVD Contents

Introduction to Splicing.....5:58
The splicing of optical fiber has evolved to encompass single-mode, multimode, and application-specific optical fibers. This chapter looks at the correct methods of preparing, cleaving, splicing, and protecting optical fibers using a cross-section of splicing equipment and techniques.

Splicing Applications.....9:02
Fiber optic splicing is performed in the field, the factory and in the laboratory. Splicing applications include outside plant, inline, pigtail, emergency restorations, and fiber to the user (FTTx), in addition to premises and acceptance testing.

Fiber Preparation.....4:34
This chapter examines fiber preparation from the stripping of the optical coating from single strand and ribbon fibers through to the cleaning process. It covers safe handling of fibers, coatings, and tools.

Cleaving the Fiber.....9:42
Fiber endfaces must be made perfectly flat, smooth, and perpendicular to the fiber axis. Cleaving tools come in a variety of styles for single and ribbon fibers. Key points of review include length and angle control, blade types and tool/blade life.

Fusion Splicing Techniques.....17:55
This chapter examines how the various methods of fusion splicing, including manual, local injection detection, profile alignment, and ribbon splicing, each function. Also included are splice protectors such as butterfly, heat shrink, and recoaters.

Mechanical Splices.....18:34
Mechanical splices are simple, low-cost components designed to align a pair of fibers in three axes while also providing physical protection. They can be either permanent or temporary and are used in applications such as premises, FTTx, intelligent transportation systems, or emergency restorations.

Outside Plant Splicing.....10:05
Splicing is not just the physical joining of the optical fiber, but also the preparation of the work site, optical cable, closure, and patch panels. This chapter details splicing in outside plant applications, including inline and pigtail splicing.

Multimode Splicing.....5:37
Splicing in multimode applications offers low insertion loss and reflection levels. It provides a transition from indoor to outdoor cables in order to meet NEC requirements and easy access for acceptance testing. Multimode splicing is quicker and has a higher yield than connectorization techniques, providing cost benefits to installers.

Specialty Splicing.....5:21
Specialty fibers are developed and chosen with specific transmission benefits in mind. This chapter covers the splicing of various specialty fibers, including polarization maintaining, double-clad, high N.A., photosensitive, and erbium- and ytterbium-doped fibers.

Splice Optimization.....7:27
Obtaining optimum splice quality depends primarily on the fiber, the cleaves, and the cleaning process. While many fusion splicers come programmed with a number of presets, environmental conditions can also affect splice quality, especially for fibers with poor tolerances. This chapter covers issues a splicer may confront, how to identify them, and recommendations on how to resolve them.

Bonus materials include a student quiz. A matching instructor version is available upon request.

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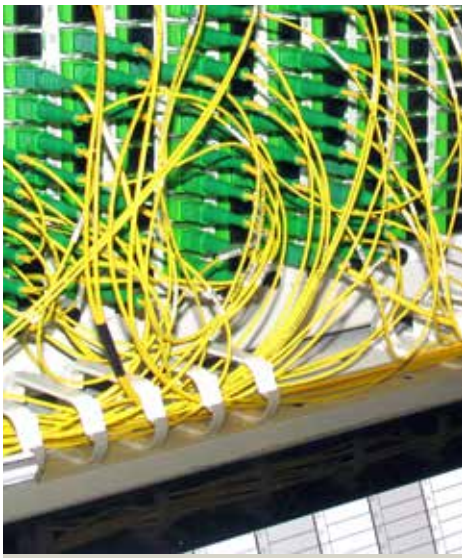

Fiber Optic Patch Panels, Splice Closures and Pedestals

Fiber and cable management products are protective structures that house and protect splices, connectors, and optical splitters in order to ensure reliable system operation. These products must be properly designed for cable grounding, strain relief, fiber routing and access and should be chosen to best fit the application. However, before the proper type can be selected, one must understand the function and features of each distinct type.

This DVD examines the role that traditional products such as patch panels, enterprise panels, and distribution panels play in fiber networks. In addition, FTTx-specific products such as fiber distribution hubs, fiber access terminals, multiport service terminals, and FTTx splice closures are detailed.

Just as a chain is only as strong as its weakest link, so are the quality and integrity of a fiber-optic system. Only by carefully planning and protecting your system can you keep your optical chain strong.

105 minutes • Part Number W-6D-172 • $125
ISBN 978-0-9815211-4-5

See the preview on YouTube

DVD Contents

Introduction 8:43
The chapter introduces the types of products available for cable and fiber management for outside plant and premises applications. Single-mode and multimode cable structures are reviewed, along with preparation, routing, and applications, including FTTx.

Patch Panels 13:35
The patch panel provides the mechanical interface between transmission equipment and the optical cable in outside plant and premises applications. This chapter covers cable management, terminology, applications, and recommendations for handling a wide range of fiber types and cable structures including enterprise, data centers, and service provider locations.

Splice Panels 3:39
The splice panel comes in several variations, including the traditional method for splicing and routing pigtails to patch panels, along with entrance panels and new products for FTTx applications. Cable routing and installation options are also covered.

Distribution Panels 4:19
Designed for patching and splicing, the distribution panel now has more diversity than ever with new variations including fiber management bays, FTTx panels, and premises panels. Options for both designers and installers are covered.

Entrance Cabinets 3:15
Entrance cabinets not only simplify code compliance, they also lower installation costs and rack space at hub locations by centralizing the splicing at one location. This allows patch panels to be distributed and installed as space allows.

Premises Panels 8:05
Premises panels are used in factories, office buildings, and local area networks. Learn about standards and terminology as well as the challenges faced by those installing single-mode and laser-optimized multimode fiber. Also addressed are cable terminations and management from cross-connect to fiber-to-the-desk products.

OSP Closures 9:15
Splice closures are key for protection and management of cables and fibers in the outside plant. Learn about closures available for different types of fiber, cable, and applications. Content includes re-entries, fiber and cable routing, and environmental and mechanical issues.

FTTx Splice Closures 7:46
Fiber to the user (FTTx) has created a new generation of products specifically designed for the cable transitions between the FDH and the subscriber. This chapter covers installation and splicing options, as well as multiport service terminals designed specifically for FTTx in the OSP.

Fiber Distribution Hubs 8:28
Fiber distribution hubs address the many challenges present with cable terminations and OSP optical circuit management. Learn about the capabilities of FDHs and the options available for both designers and installers.

Fiber Optic Pedestals 8:00
As fiber gets closer to homes and buildings, pedestals provide the last termination point for fiber circuit management before the customer's facility. Learn about the features and options available, including express entries.

Loose Tube Cable Preparation 20:36
Learn how to prepare armored and unarmored stranded and central tube cable structures. See how to install fan-out kits and attachment hardware. Learn about mid-entries for trunk and feeder applications, including FTTx.

Tight Tube Cable Preparation 9:22
Learn how to prepare distribution, sub-unit distribution, breakout cables, and cordage. Watch the process for installing fan-out kits and attachment hardware. Learn how to perform a mid-entry on sub-unit indoor/outdoor distribution cables for protective, alternate route ring and ITS networks.

Bonus materials include a student quiz. A matching instructor version is available upon request.

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Fiber Optic Connectors

Since fiber optics first appeared in communication networks, the connector has been critical to the success of the fiber link. The installation of a fiber transmission system would be impossible without some way of connecting fibers with low signal loss. Early connectors suffered from poor alignment tolerances and stability problems, yet they were installed by the millions. Since these early days, manufacturers have strived to produce innovative solutions to today's multitude of connectivity needs.

While manufacturers must adhere to strict standards and performance specifications, the final performance of a system and its links ultimately lies in the hands of the fiber-optic technician. From polishing to cleaning to visual inspection, a technician must properly terminate each fiber at the lowest loss and reflection levels possible in order to achieve optimum performance.

Yield — the number of connectors that test good after termination — is a critical concept. In general, the cost of the connector plug itself is minimal compared to the cost of the labor required to install it. Having skilled and knowledgeable technicians will increase yield and lower the total installed cost of the system.

118 minutes • Part Number W-6D-181 • $125
ISBN 978-0-9754542-7-5

See the preview on YouTube

DVD Contents

Introduction 9:32
This chapter introduces the many applications, roles, and locations where fiber optic connectors are commonly used, as well as performance issues such as attenuation, reflection, and repeatability. Also included are issues for single-mode and multimode applications, including outside plant, premises, and specialty applications such as military and aerospace.

Connector Styles 12:10
This chapter covers the discrete parts of connectors, including ferrules/termini, alignment sleeves, plugs, and receptacles (adaptors). It also addresses the various styles of fiber optic connectors that are available (e.g., SC, ST, FC, LC, multi-fiber, *et al*) and their evolution.

Tolerances 7:49
Optical terminations involve various fiber and mechanical tolerances related to the precision ferrules and alignment sleeve. This chapter addresses the many kinds of tolerances for common multimode and single-mode fibers, connectors, and their impact on the optical performance of the connection.

Bonding and Scribing.....17:23
This chapter covers the methods used to bond, hold, and align optical fibers for factory and field terminations. It also discusses scribing tools and techniques.

Polishing 10:14
Whether connectors are polished in a controlled factory setting or by hand in the field, proper polishing of the optical endface is required for low attenuation, low reflection, and optimum performance.

Cleaning.....14:16
Before an optical endface is inspected, the plug, ferrule, or termini needs to be clean. Cleaning optical surfaces minimizes damage, lowers attenuation, and improves reflection values. This chapter explores various techniques and products for cleaning plugs and adaptors in both manufacturing and field installations.

Endface Verification 12:43
Visual inspection is critical to confirm that the optical endface is undamaged and free of contaminants. Microscopes, digital inspection scopes, and interferometers are all used for this purpose. This chapter reviews each type of product and their applications. It also reviews common causes of damage and contamination.

Testing Patchcords 10:41
This chapter includes how to test single-mode and multimode cable assemblies for attenuation and reflections in both factory and field environments. It details test methods, fiber optic test procedures, and standards.

Multi-fiber Connectors 14:07
This chapter covers the types of multi-fiber connectors including MPO/MTP, MT-RJ, FDDI/FSD, ESCON, and backplane connectors such as the MU. Specialty connectors, such as the HDTV connector, are reviewed along with connector styles used specifically in military and aerospace applications.

Specialty Connectors.....5:32
Special variations of fiber optic connectors have evolved to meet attenuation requirements and to test systems and fiber spans. This chapter addresses products such as attenuators, terminators, and loopback devices along with their applications.

Yield.....4:16
This chapter summarizes the role of those terminating fiber optic interconnection devices. Yield is the actual loaded cost of a termination and includes the component cost, the consumables, and the associated labor.

Bonus materials include a student quiz. A matching instructor version is available upon request.

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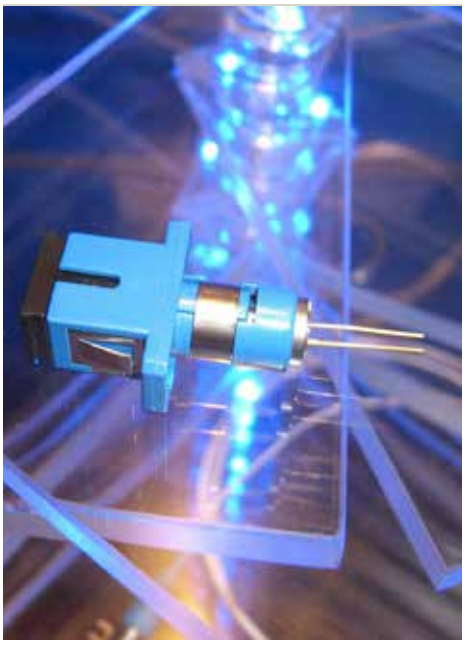

Fiber Optic Active Devices

Electronics play an important role in fiber optic systems because they provide an interface between the optical fiber and equipment such as telephones and computers. These optoelectronic components fall into two broad categories: devices that convert signals between optical and electrical formats, such as transmitters and receivers; and devices that manipulate light but are powered by electronic circuits, such as optical amplifiers and modulators.

Active devices are electronic components that manipulate electrons to perform the intended function. They require a source of energy to operate and have an output that is a function of present and past input signals. This DVD examines a wide array of active devices available for fiber optic systems, as well as related topics such as thermal noise, loss budgets, optical sub-assemblies, component and system analysis, and bit error rate testing.

121 minutes • Part Number W-6D-191 • $125
ISBN 978-0-9754542-8-2

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Bonus materials include a glossary, acronym list, and student quiz. A matching instructor version is available upon request.

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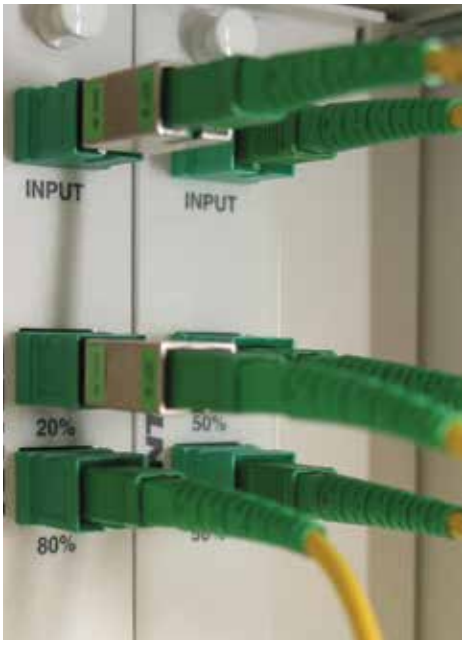

Fiber Optic Passive Devices

This DVD serves as a primer on the various types of passive devices that have been developed for use in fiber optic communication systems. These purely optical components work by guiding, refracting, and reflecting light and are a cost-effective alternative to their electro-optical counterparts. These devices have become commonplace and are seeing widespread use in DWDM, FTTx, and ROADM communication systems.

Individually selectable chapters detail the theory, manufacture, and employment of various passive components and optical sub-assemblies, including an in-depth look at the technology and products used in wide, coarse, and dense wavelength division multiplexing.

Later chapters discuss the evolution of optical add/drop multiplexing, and the specifics of testing and test equipment for passive components.

118 minutes • Part Number W-6D-201 • $125
ISBN 978-0-9815211-0-7

See the preview on YouTube

DVD Contents

Introduction 12:27
Since their development, passive devices have grown from simple splitting devices to sophisticated components capable of controlling individual wavelengths. This chapter takes a look at the various passive devices available today.

Optical Couplers.....19:05
Optical couplers use resonant coupling to combine or split multiple signals. This chapter examines fused biconical taper splitters, planar lightwave circuits, tap splitters, and common split ratios supporting network requirements.

Optical Filters and Gratings.....16:12
Fiber-optic filters began as simple attenuators that created loss between a transmitter and a detector. They soon could combine multiple transmitters and detectors within the same wavelength window or even commit or extract multiple wavelengths into a single fiber core.

WDM Components.....11:22
Wavelength division multiplexing (WDM) devices are optical components and subassemblies that allow a single fiber to carry two or more wavelengths. This chapter looks at products including filters, gratings, diplexers, triplexers, and interleavers.

WDM Systems.....15:27
Fiber optic WDM systems expand the transmission capacity of existing or planned fiber spans by multiplexing wavelengths within the ITU standardized optical bands. This chapter examines how WDM systems are used in short haul, long haul, metropolitan, traffic and FTTx applications.

Dispersion Compensators.....11:49
Dispersion compensators can be either passive, using specialized optical fibers, or feedback controllers that actively tune a laser's output. This chapter explores the different types available and how they function.

Optical Switches 10:39
Optical switches re-direct the addressed data signals that re-configure fiber optic communication systems. This chapter discusses optical cross-connects, MEMs, bypass switches, matrix switches, and more.

ROADMs 8:23
Reconfigurable optical add/drop multiplexers (ROADMs) are tunable products that remotely provision a network without sending personnel to modify fibers at panels, closures, or hub sites. Learn how ROADMs evolved from original OADMs as well as how they function

Design and Testing 12:04
The equipment used to test passive and tunable components ranges from simple loss test sets to sophisticated optical spectrum analyzers. This chapter reviews the testing of optical components, sub-assemblies, and systems during manufacturing, integration, and deployment.

Bonus materials include a glossary, acronym list, and student quiz. A matching instructor version is available upon request.

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Fiber Optic System Design

Careful design and planning are vital for the long-term reliability of fiber optic systems. This DVD demonstrates how to design a fiber optic transmission system that will suit your requirements now and for years to come. The content focuses on issues that are critical when designing local, metropolitan, and wide area networks, including physical layout, component integration, and calculating loss budgets.

The DVD features ten chapters that can be viewed individually, based on your need and design focus. The content discusses a myriad of design processes from simple point-to-point networks to the more advanced DWDM, ROADM, FTTH, and FTTB systems.

Special focus is given to the factors that can degrade signal quality, including attenuation, dispersion (for single-mode fibers), and bandwidth (for multimode fibers). New technologies for 100 Gb/s systems are discussed, and challenges and examples are provided for various applications.

106 minutes • Part Number W-6D-211 • $125
ISBN 978-0-9815211-2-1

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DVD Contents

The Design Process 10:13
Proper selection and usage of the transmission equipment, protocols, fiber types, and wavelength are required to maintain good end-to-end signal quality. This chapter reviews the topologies, architectures, and other elements required in the design process.

Transmission Systems.....10:14
Active devices are required to address attenuation, dispersion, and reflection for successful system design and operation. This chapter addresses the types of active devices used in fiber optic transmission equipment and their relationship to fiber types and wavelengths.

Multimode Bandwidth 12:40
This chapter focuses on modal dispersion in graded index multimode fibers, and the launch conditions of VCSEL sources required for Gigabit transmission. Live footage and animations allow for better understanding of the manufacturing and testing of OM1, 2, 3, and 4 multimode fibers.

Multimode Loss Budgets.....6:32
Developing a loss budget for a multimode system is vital, regardless of the system's application. This chapter covers typical fiber optic transmission equipment and the physical components used in LANs, security systems, and factory applications.

Single-mode Dispersion 15:53
Chromatic and polarization dispersion have an impact on high-data-rate or long-distance systems. This chapter examines these complicated phenomena, plus looks at dispersion compensation, frequency-shift keying, forward error correction, and coherent detection.

Single-mode Loss Budgets 9:49
This chapter details the development of fiber optic loss budgets for point-to-point single-mode systems that use G.652 and G.655 fibers. Topics covered include types and examples of sources and detectors used in short and long haul spans, and safety margins.

WDM Systems.....17:12
Wavelength division multiplexing expands the transmission capacity of fiber spans by combining wavelengths within ITU-standardized optical bands. This chapter examines how CWDM and DWDM systems are used in long haul, metropolitan, traffic, and FTTx applications. Optical amplification, optical add-drop multiplexing, and system design software are also discussed.

ROADMs 8:24
Reconfigurable optical add/drop multiplexers consist of wavelength selective and tunable products that can remotely provision DWDM networks. This chapter reviews the types, options, and issues and challenges related to incorporating ROADMs in your network.

FTTH.....6:36
For those involved with FTTH and FTTB systems, this chapter examines the options available for point-to-point active Ethernet systems and point-to-multipoint passive optical networks, including topologies, splitter placement options, power levels, density, and take rate, along with migration and growth for next generation FTTH systems.

System Integration 8:26
This chapter focuses on how physical layer products, including fiber, cable, connections, splices, panels, closures, and cable management cabinets are selected and integrated into operational systems for outside plant and premises installations.

Bonus materials include a student quiz. A matching instructor version is available upon request.

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Fiber Optic Safety

In today's workplace, job safety has never been more important. Workplace injuries can take an enormous toll in terms of lost quality of life, operating costs of business, and decreased profitability.

A successful safety culture begins with an organization's management team and extends down throughout the entire organization. When strong health and safety practices become part of the operational fabric of an organization, everyone wins. Employers and employees who work together to identify and control hazards on the job can save lives and money while improving business and productivity.

This DVD serves a primer on the safety elements and concerns of anyone working with fiber optic communication systems, lasers, and optical amplifiers. The content includes visual safety based on national and international standards, as well as physical safety for optical fibers, chemicals, and cable installation or repair.

86 minutes • Part Number W-6D-221 • $125
ISBN 978-0-9815211-3-8

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DVD Contents

Introduction to Safety Issues....11:32
Development of a safety program is critical for any organization. This chapter provides an overview of fiber optic, laser, and mechanical safety disciplines, safe optical fiber handling, laser classifications, and protective measures for lab, manufacturing, and user environments.

Introduction to Lasers....13:39
This chapter explains the basics of laser theory, the types of laser light sources used in fiber optic communication systems, and how the laser's invention led to the development of the optical fibers that helped to create today's fiber optic communications industry.

Safe Use of Lasers....12:05
It is important to understand and apply the safeguards defined by the ANSI Z136.2 and the IEC 60825-2 standards. This chapter discusses laser classifications and power levels, as well as the control measures for eye and skin exposure.

Handling Optical Fibers....6:16
Technicians who work with optical fibers must pay close attention to eye and skin safety. This chapter discusses concerns and possible problems including safe disposal of fiber waste for lab, manufacturing, splicing and termination scenarios.

Safe Cable Handling and Installation....12:09
This chapter addresses hazards in cable placement, such as heavy equipment, cable pulling tension, fall protection, proximity to high voltage, and working in trenches. Cable preparation safety includes the proper use of tools and the safe disposal of cable debris.

Solvent and Chemical Safety....3:24
Fiber optic technicians use different chemicals, adhesives, and solvents when working with optical fibers and cables. This chapter covers many of the common ones, plus required right-to-know documentation such as materials safety data sheets.

Personal Protective Equipment....9:07
This chapter discusses the types of safety glasses specifically designed for use near lasers and optical fibers in lab, manufacturing, and user applications. Also included is the importance of the correct clothing and breathing apparatus for various fiber related tasks.

Safety in Confined Spaces....4:44
This chapter includes an overview of confined spaces per the ANSI Z.117 standard, as well as related topics such as suffocation, toxic gasses, requirements for safety harnesses, entrapment issues, and possible safety issues related to water in vaults and manholes.

Optical Safety in Fiber Optic Systems....8:30
While most fiber optic communication systems use low optical power, the ITU G.664 and G.39 standards address possible safety issues with DWDM and long haul systems, as they may incorporate high power EDFA and Raman optical amplifiers. Types of optical inspection and test equipment required are covered along with specialized safety products.

Emergency Restoration....4:55
Many emergency restorations occur due to bad weather conditions. Working "against the clock" to quickly bring back service online can lead to potential safety hazards. Examples include national disasters, weather related conditions, and proximity to high voltages.

Bonus materials include a student quiz. A matching instructor version is available upon request.

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High-speed Fiber Optic Systems

The fiber optic revolution periodically adjusts to address ever-changing market requirements. As fiber optic network speeds race beyond 100 Gigabits, innovative solutions are being developed that not only offer lower latency but greater reliability, flexibility, and scalability. To complete the transition from on-off keying to the latest advanced modulation formats, new products and platforms must incorporate technologies such as coherent transmission and forward error correction. Optical amplifiers and system factors such as optical signal-to-noise ratio in complex DWDM systems are also critical considerations in high-speed networks.

This DVD examines how advanced modulation formats improve spectral efficiency through techniques such as amplitude modulation, amplitude shift keying, and phase shift keying. In addition, the content highlights constellation diagrams, coherent detection in receivers, optical transport networks, super channels, modules, and test equipment. Additional chapters focus on how active and passive devices are integrated into transmission equipment for applications such as DWDM.

114 minutes • Part Number W-6D-232 • $125
ISBN 978-0-9815211-5-2

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DVD Contents

Advanced Modulation Techniques.....20:44
Advanced modulation formats carry information using all parameters of a light wave — amplitude, phase, and the state of polarization. High speed fiber optic systems require standardized modules and a method of modulation, which differs based on the distance and data rate. This chapter discusses modulation formats with constellation diagrams.

Coherent Detection.....5:38
Coherent detection is based on the concept of interferometric detection. Learn how it is used in receivers to correct linear fiber propagation impairments, and how it is key to high-speed systems such as Super Channels.

Forward Error Correction.....5:09
Adding or interleaving redundancy into a data stream allows errors to be corrected at reception, without retransmission. Learn how forward error correction is used alongside coherent detection to improve the reliability of 100G, 400G, and future terabit optical communication systems.

Transmitters and Receivers.....10:02
This chapter describes how active optical and electrical components are manufactured and integrated together. Key elements required for system operation include data rate, signal modulation, bandwidth, wavelength, fiber type, performance levels, source and detector selection, and integration.

Optical Signal-to-noise Ratio 14:39
Signal-to-noise ratio is a measurement that compares the level of an information-carrying signal to the level of the background noise on a transmission channel. This chapter describes what OSNR is and how it is used to characterize the performance of DWDM components and systems.

Transmission Systems.....15:02
Active devices are required to address attenuation, dispersion, and reflection for successful system design and operation. This chapter addresses the types of active devices used in fiber optic transmission equipment and their relationship to fiber types and wavelengths.

WDM Systems.....19:16
Wavelength division multiplexing expands the transmission capacity of fiber spans by combining wavelengths within ITU-standardized optical bands. This chapter examines the requirements of optical components such as optical amplifiers and filters for CWDM and DWDM and how they are used in long haul, metropolitan, traffic, and FTTx applications.

Optical Amplifiers.....12:34
This chapter reviews how Raman amplifiers, erbium doped fiber amplifiers, and semiconductor optical amplifiers work and how they are used in fiber optic communication systems including DWDM.

Testing and Test Equipment.....10:18
As the complexity of fiber optic communication systems increases, current test equipment is required to verify performance, quality, and operation from components to installed systems. Learn the role of optical spectrum analyzers, wavelength and power meters, and component and system analyzers.

Bonus materials include a student quiz. A matching instructor version is available upon request.

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Contents

Fundamentals of Fiber Optics..... 105 mins

This DVD provides the foundation for anyone involved with fiber optics. Learn about fiber theory, terminology, fiber manufacturing the types of fibers and how optical fibers link the world in today's voice, video, and data communication systems.

OTDR Theory and Operation..... 86 mins

The OTDR is a crucial tool for testing and troubleshooting fiber networks. Learn to read OTDR signatures, to set up an OTDR for acceptance testing, span testing, and troubleshooting, and to test for attenuation, ORL, and reflectance. Other chapters focus on FTTx and premises applications and specialty PMD and CD testing.

Fiber Optic Test Equipment and Testing Fiber Optic Links ..... 81 mins

This DVD explains various types of fiber optic test equipment, their features, and how they are used to test and maintain fiber optic components and systems. Test standards and techniques are included for those specifying or performing test procedures.

Troubleshooting a Fiber Optic Link.... 90 mins

Proper selection and usage of fiber optic test equipment is key to an effective maintenance program. Learn how to choose the best equipment and technique for the task at hand. The DVD has chapters specific to multimode and single-mode acceptance testing and troubleshooting, including common problems and the equipment best used to locate and resolve the problem.

Fiber Optic Cable..... 106 mins

Outside plant, utility, and premises applications employ many different types of fiber optic cable. Learn about various cable types and structures, how cables are manufactured, how to prepare cable for splicing and termination, and how to read cable specifications.

Fiber Optic Splicing ..... 95 mins

Low loss splicing is the cornerstone of optimal network performance. Learn about the various types of mechanical and fusion splicers and how each operate. Learn about the step by step procedures for preparing and cleaving fibers for splicing. For those involved in manufacturing one chapter address specialty splicers.

Fiber Optic Patch Panels, Splice Closures and Pedestals..... 105 mins

A host of cable management products have been developed for indoor premises, hub locations, outside plant, FTTx, and end user locations. This DVD covers the many types, along with key points that designers and installers should know to select and deploy.

Fiber Optic Connectors..... 118 mins

Proper connectorization is critical to the success of a fiber link. This DVD covers the multiple types and key elements of fiber optic connectors. Inspection, cleaning, yield, and the importance of attenuation and reflection testing are also discussed.

Fiber Optic Active Devices ..... 121 mins

A fiber optic system cannot function without light sources, detectors, and optical amplifiers. Learn how these devices function and are integrated into transmission systems, and how different types of tests are performed.

Fiber Optic Passive Devices ..... 118 mins

DWDM, FTTx, and ROADM fiber optic systems incorporate an enormous amount of optical passive devices. Learn about the many types of passive devices from components to systems. This DVD explains how these unique products work and how they are integrated to increase network bandwidth and reliability.

Fiber Optic System Design..... 112 mins

Learn to design multimode or single-mode fiber optic systems. This DVD addresses loss budgets, bandwidth, dispersion, and system integration. Additional chapters discuss the design process, transmission, WDM, ROADM, and FTTH systems.

Fiber Optic Safety..... 86 mins

This DVD serves as a safety primer for anyone working with fiber optic systems, components, fibers, and chemicals, whether it is in a lab, on the manufacturing floor, or as an end user. Learn about laser types and safety standards including visual safety for optical light sources and amplifiers.

Buy the 12-DVD set and receive the *High-speed Fiber Optic Systems* DVD for free.

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