GLOBAL FIBER OPTICS

2015 Catalogue

Global Fiber Optics

Table of Contents

I
HIGH DENSITY RIBBON PRODUCTS

High Density Cassettes

The **LC 24 Fiber** and **SC 12 Fiber Cassettes** are a compact, high-density fiber optic solution to conserve bay and enclosure space. These cassettes eliminate the need for highly trained fiber optic termination crews and equipment.

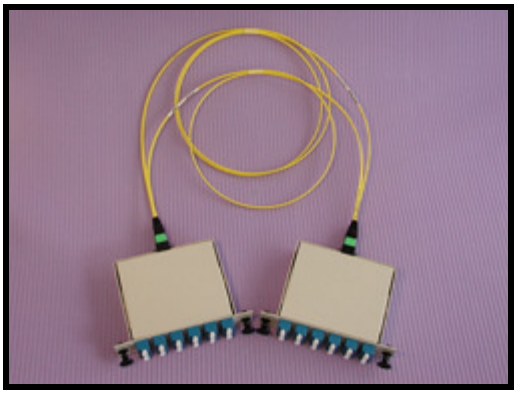
LC 24 Fiber Cassettes

The **LC Cassette Module** is a compact, high-density fiber optic solution to conserve bay and enclosure space. The **LC** to **MTP** connector transition is protected in a metal case that gives good fiber protection and an aesthetically pleasing appearance. The cassette can also be easily swapped during a maintenance cycle.

The **LC** connector is half the size of the **SC connector**, which is significant when space is an issue.

The **MTP** is a multi-fiber optic connector, which accepts a 12-fiber ribbon cable. The MTP ferrule is most commonly angled for SM applications and flat for MM applications. The angled **MTP connector** gives a back reflection of –60dB or more. The **MTP connector** is either male or female. The male has two alignment pins protruding from the end of the ferrule.

The **cassette** is a metal case measuring 11.5cm x 9.5cm x 3cm. (4.5in. x 3.75in. x 1.25in.). The cable assemblies are manufactured using 12-fiber ribbon cable, a flat cable resembling a ribbon, where the 12 fibers are situated side by side.



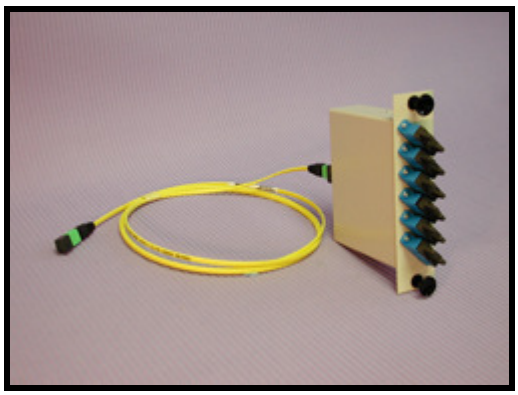
LC Cassette Layout with Trunk Cable

The cassettes fit into a Siecor 12 port panel rack mount enclosure with Part Number **FDC-CMH-072**. This application would hold a capacity of 288 fibers. The cassettes can be adapted to fit into enclosures other than the one previously mentioned.

SC 12 Fiber Cassette

The **SC 12 Fiber Cassette** is a compact, high-density fiber optic solution to conserve bay and enclosure space. The **SC** to **MTP** connector transition is protected in a metal case that gives good fiber protection and an aesthetically pleasing appearance. The cassette can also be easily swapped during a maintenance cycle. The **SC connector** is also a space saver because of its push/pull mating.

The **cassette** contains 1 – 12 fiber **SC** to **MTP SM cable assembly**, 6 duplex SM **SC adapters** and 1 **MTP adapter**. Therefore, 12 connections can be made. The cassette is a metal case measuring 11.5cm x 9.5cm x 3cm. (4.5in. x 3.75in. x 1.25in.) The distance between the mid point of holes for the grommets and plungers is 13.7cm (5 3/8in.). The dimensions for the SC port plate are 3.5cm x15cm (1 3/8in.x 6in.)

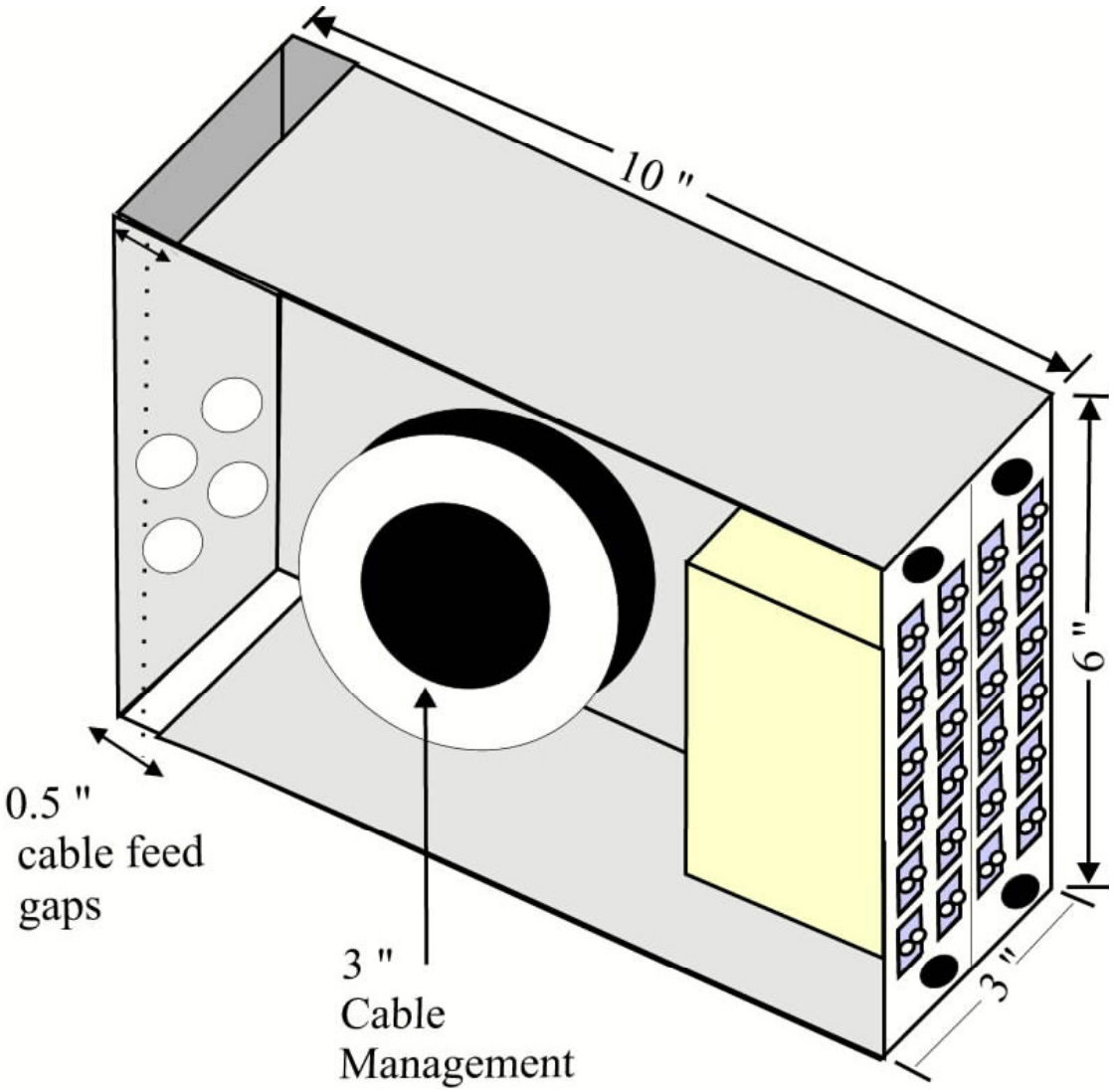


SC-MTP 12 Fiber Cassette with Ribbon Cable

The cassette fits into a Siecor 12 port wall mount enclosure with Part Number **FDC-CMH-072**. The port plate of the cassette could be adapted to fit into enclosures other than the previously mentioned Rack Mount Enclosure.

Double Cassette Enclosure

The double cassette is a compact, high-density fiber optic solution to conserve bay and enclosure space. The double cassette can be equipped with two **LC 24-fiber cassettes** or two **SC 12-fiber cassettes**. The cassettes are inserted in a metal case that gives good fiber protection and an aesthetically pleasing appearance. The cassettes can also be easily swapped during a maintenance cycle. The **high-density double cassette** is a metal enclosure measuring 25.4cm x 7.6cm x 15.2cm (10in. x 3in. x 6in.).

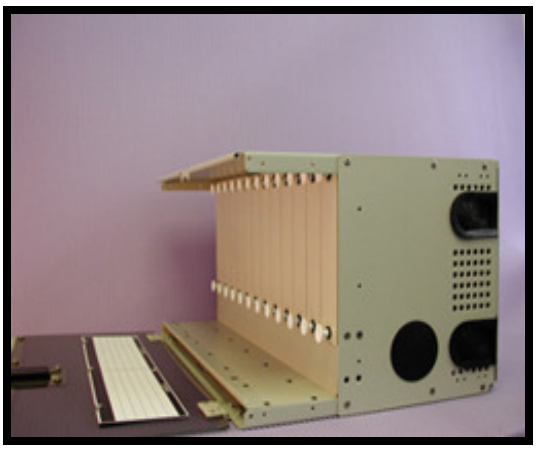


Rack Mount Enclosure FDC-CMH-072

The **Fiber Distribution Center** is a **Rack Mount Enclosure** single cabinet designed to house fiber optic connectors and splices. The dimensions are 17" x 11" x 9". The unit accommodates 12 connector panels or modules. The dimensions of the port plates that the enclosure will accommodate are 3.5cm x 15cm (1 3/8" x 6") with a midpoint of 13.8cm between the plunger/grommet holes. The **FDC** is typically part of a system that is a fiber optic cross-connection between outside plant cables and opto-electronic equipment in a central office, computer room, or remote terminal equipment location. This unit fits into 19 or 23-inch equipment racks.

i. *Open design for easier connector access*
ii. *Flip card for record keeping*
iii. *Cable entry grommets*
iv. *Larger routing guides for better cable management*
v. *Smoke-tinted front door*
vi. *Can be wall-mounted with brackets ordered separately*
vii. *Removable hinged front and rear* doors

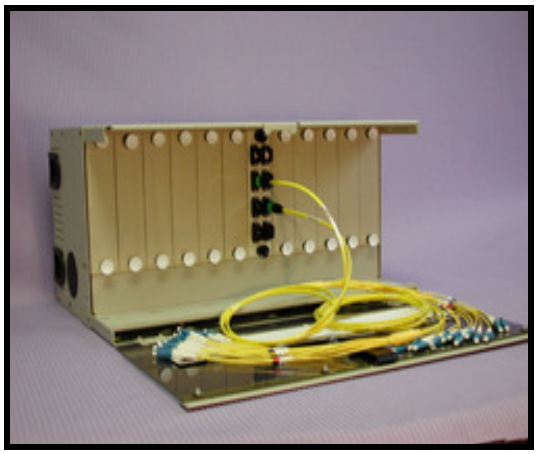
Rack Mount Enclosure Front View



Rack Mount Enclosure Side View

High Density MTP 96 Fiber Plate

Global Fiber Optics Corp. has designed a **High Density MTP Fiber Plate** that has a capacity of 96 fibers in a 6" x 1 3/8" (15 cm. X 3.5 cm.) area. The plate has eight 12-fiber MTP ribbon cable ports. MTP 12 fiber trunk cables connect to the inner side of the plate inside the enclosure. A 12 Fiber MTP Fan-out Cable connects to the outer side of the plate. The graphics below show two MTP-LC 12-fiber Singlemode cable assemblies connected to the high-density MTP plate fan-out.



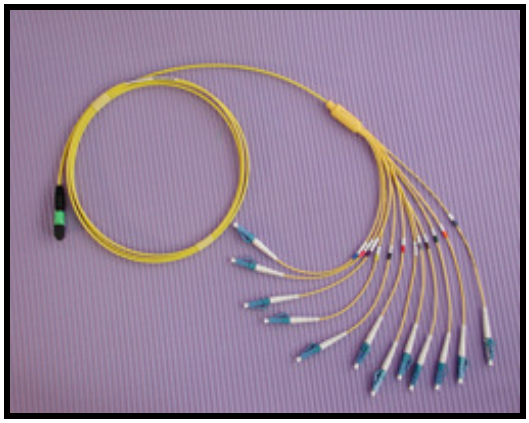
High Density 8 Port MTP Layout

High Density MTP Fiber Plate

TRUNK RIBBON CABLES

MTP-LC 12 Fiber Ribbon Trunk Cable

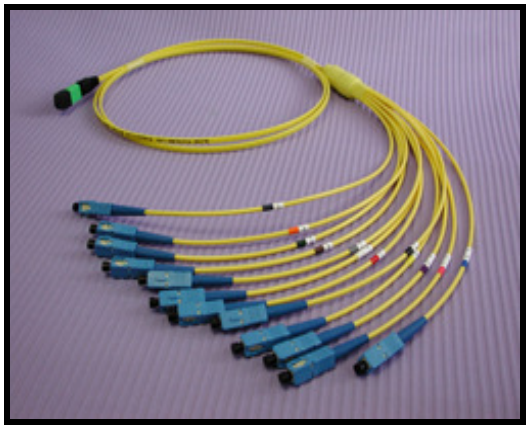
Connects from High Density MTP 96 Fiber Plate LC Female Adapters.



12 Fiber Singlemode MTP-LC Breakout 1.6mm Jacket

MTP-SC 12 Fiber Ribbon Trunk Cable

Connects from High Density MTP 96 Fiber Plate SC Female Adapters.



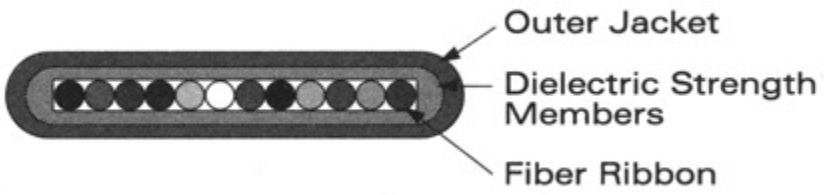
12 Fiber Singlemode MTP-SC Breakout 3.0mm Jacket

MTP Fiber Optic Cable Assembly

The **MTP** to **MTP fiber optic cable assembly** is a multi-fiber alternative to the traditional 12-fiber distribution and breakout cables. The **MTP** is a connector manufactured specifically for a multi-fiber ribbon cable. The Singlemode fiber optic connectors have an angled ferrule allowing for minimal back reflection while the multimode connector ferrule is commonly flat. The **ribbon cable** is flat and appropriately named due to its flat ribbon like structure which houses 12 fibers side by side in a jacket 3/16 of an inch or 5mm wide.

Fig. A) MTP Angled Connector and 12 Fiber Ribbon Cable (no jacket)

Fig. B) MTP Angled Connector and 12 Fiber Optic Ribbon Cable



12 Fiber Ribbon Cable (Cross section)

It is a **cost effective** alternative to a 12-fiber distribution or breakout cable.

i. There is a **reduced cost** in connectors as one **MTP connector** replaces 12 standard connectors.
ii. **Saves labour time** because you mate 12 fibers of the MTP at the same time.
iii. The **12-fiber MTP-MTP Ribbon Cable Assemblies** are an effective way of saving conduit space due to their flat ribbon-like structure allowing for a higher density of cables to occupy a particular conduit in installation.

MTP to MTP LASER LINK CABLE ASSEMBLIES

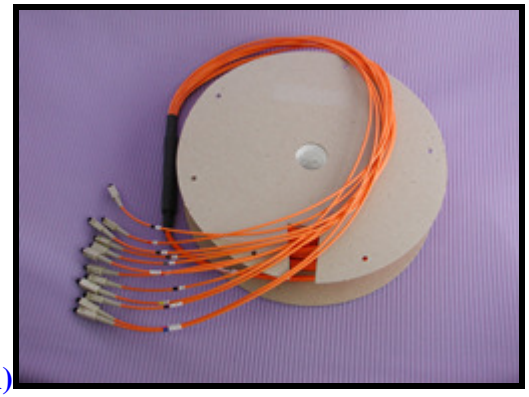
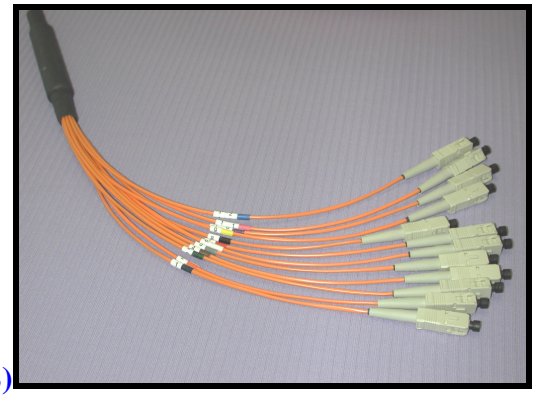
These 48 or 72 fiber trunks use a high performance 10gig laser link fiber used in 10gig Ethernet networks. This 10gigabit laser link high performance micro core cable is more robust than the stacked ribbon cable. The micro core design allows the cable to bend in all directions. The laser link cable has a larger bandwidth at 10GHz as apposed to the giga link stacked ribbon cable, which can achieve a bandwidth up to 800MHz.

For more information contact us @:
Phone #: *905-606-0601*
Fax #: *1 866 339-1473*
E-mail: *chrisrhills@gmail.com*

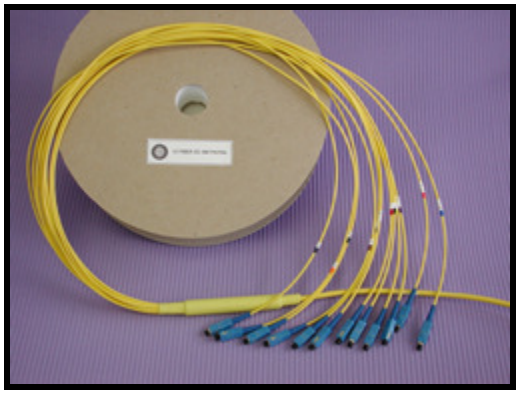
II
FIBER OPTIC CABLE ASSEMBLIES

FIBER OPTIC TRUNK CABLES

Global Fiber Optics Corp. will manufacture **Multimode** or **Singlemode Fiber Optic Trunk Cables** in 6, 12 and 24 fibers. We will customize the length of the breakout for your application. We can also stagger the lengths of the individual fibers for a tidy layout.

A)  **B)** 

12 Fiber SC MM Distribution Cable with 1 meter Breakout
Fig. A) broken out with 3.0 mm furcation tubing
Fig B) broken out with 2.0 mm furcation tubing
****also available in 900um breakout and in various breakout lengths***



12 Fiber SC SM Distribution Cable with 1 meter Breakout

****also available in 900um & 2.00 mm breakout and in various breakout lengths***

III
ENGINEERING SERVICES

FIBER OPTIC CABLE STRIPPER

The 7045 programmable fiber optic cable stripper is designed for processing jacketed fiber optic cables. It provides precise stripping of the outer jacket, Kevlar sleeve, secondary and primary coatings on all common single and multi-mode cables. The machine is capable of a maximum stripping length of 75 mm and a maximum diameter of 4.5 mm. The high level of precision of all the components and the microprocessor control system ensure that the processed cables can be reproduced to perfection.

Technical Specifications:

Stripping throughput	Approx. 120-360 pieces/hour (depending on cable type and program parameters)
Max. cable diameter	4.5mm (0.18”)
Max. stripping length	75 mm (2.95”)
Max. stripping levels	9

FIBER OPTIC CABLE CUTTER

The OC 3950 is a quick and precise machine used for measuring and cutting round cable, tubing and flat ribbon cable. The automatic cutter can be configured with different blade materials (ex. tool steel for cutting copper wire or carbide for cutting fiber optic cable w/Kevlar).

Special Features:

- Measures and cuts wire up to 4 AWG, round material up to .59" (15 mm) O.D. and flat material up to 3.94" (100 mm) wide
- Cuts multi-conductor, fiber optic and coaxial cable
- Rapid production capability

Technical Specifications:

Production Rate	6,540 pcs./hour for 4.00" (100 mm) long 2,800 pcs./hour for 40.00" (1000 mm) long
Max. Diameter	0.59" (15 mm)
Max. Width	3.94" (100 mm)
Max Wire Size	4 AWG stranded copper

Engineering Service

Global Fiber Optics Corp. introduces to the market an extensive variety of fiber optic engineering services in niche areas of competence. Services include project design, product design, site surveys, network design, splicing, termination and testing services, troubleshooting and emergency restoration, as well as building draft services. Global Fiber Optics Corp. also provides custom design of the following specialized fiber optic cable components:

Cable Assemblies
Fiber Optic Enclosures
High Density Cassettes
Mil-38999 Cable Assemblies
Fiber Optic Ribbon Cable Assemblies
Large Core Fiber Optic Assemblies

Maintenance Contracts

Global Fiber Optics Corp. can install fiber optic cables, systems and troubleshoot or service existing systems to meet your communications needs. System installation or maintenance services include fiber optic terminations, fiber optic enclosures, fiber optic splice trays, OTDR testing, dB Loss testing and fiber optic fusion splicing. We also do installation of breakout kits and pull socks on cables supplied by the customer or Global Fiber Optics.

Enclosure Installation/Service – Wall & Rack Mount
Splice Tray Installation/Service – Universal, Fusion
Testing – OTDR, Attenuation, dB loss end to end
Fusion Splicing – single-mode and multimode
FMS Module Installation/Service – left and right hand fiber management system modules
Terminations – Biconic, ESCON, FC, FC/APC, FDDI, LC, MPO, MT-RJ, ST, SC, SC/APC

For more information contact us @:
Phone #: *905-606-0601*
Fax #: *1 866 339-1473*
E-mail: chrisrhills@*gmail.com*

Cable Assemblies

Global Fiber Optics Corp. specializes in **custom patch cords, jumpers** and **cable assemblies**. If you have a project that requires a special patch cord, then we will propose a solution to suit your needs.

i. **Multimode and Singlemode cable assemblies with differing core sizes** - *9/125um, 50/125um, 62.5/125um, 100/140um, 200/230um, 940/1000um*

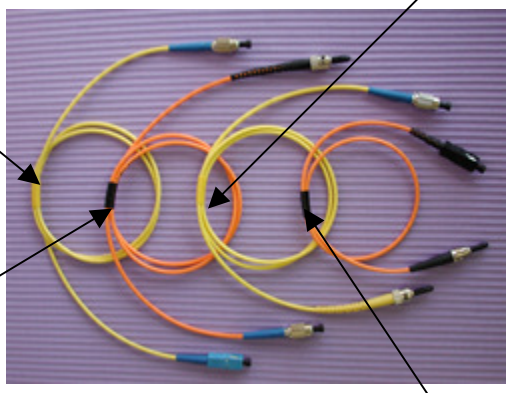
ii. **Multimode and Singlemode connectors** - *D4, FC, FC/APC, FDDI, LC, Mini BNC, MTP, MT-RJ, SC, SC/APC, SMA, ST, MU, BICONIC, MPO, ESCON*

iii. **Multimode and Singlemode cable** - *900um, Simplex and Duplex 1.6mm and 3mm jackets, Breakout, Distribution, Loose Tube, Ribbon*

Multimode and Singlemode Patch Cords (3mm jacket)

FC to SC singlemode simplex

FC to ST singlemode simplex



ST to FC multimode simplex

SC to ST multimode simplex

Multimode Duplex Patch Cord

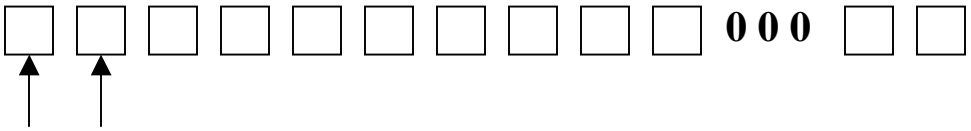
SC-SC Multimode Duplex Patch Cord

Singlemode Duplex Patch Cord

FC to ST Singlemode Duplex Patch Cord

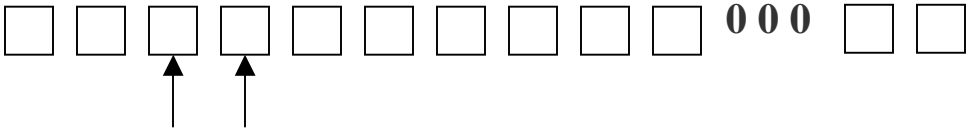
Cable Assembly Legend

The following cable assembly legend is for your convenience while you are ordering fiber optic cable assemblies. The document can be printed, filled in and faxed to us with your specific needs.



Number of Fibers (2 spaces)

02 , 04 , 06, 08, 12, 24, 36, etc.

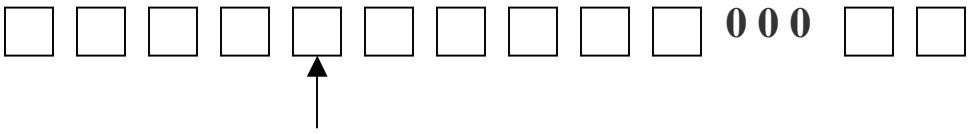


Connector on each end (2 spaces)

A	B	C	D	E	F	G	H	I	J	K
FC/APC	Biconic	SC	D4	MTP Male	FC	SC/APC	SC/UPC	FDDI	MTP Female	MT-RJ Female

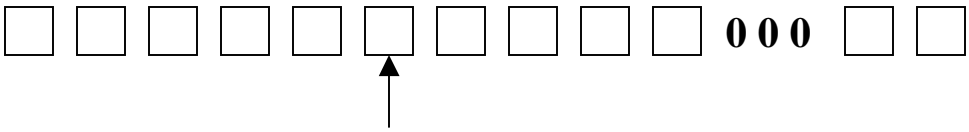
L	M	N	O	P	Q	R	S	T	U
LC	Mini BNC	ESCON	UV 77	Pigtail (no connectors)	MU	MT-RJ Male	SMA 905	ST	FC/UPC

V	W	X	Y	Z
CLEAVE	MPO Female	MPO Male	SC Duplex	SMA 906



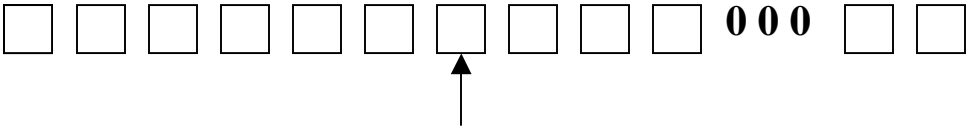
Fiber Type (1 Space)

H	M	S
Hybrid (SM/MM)	Multimode	Singlemode



Core/Cladding Size (1 Space)

1	2	4	5	6	8	9
100/140	200/230	940/1035	50/125	62.5/125	800/840	9/125

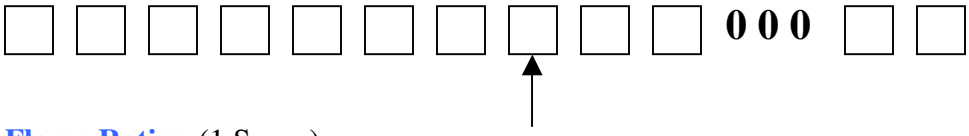


Cable (1 Space)

A	B	C	D	E	F	G	H
Armored Distribution	Breakout	Simplex	Distribution	Round patch	Furcation	1.6mm jacket	Ribbon (Bare Fiber)

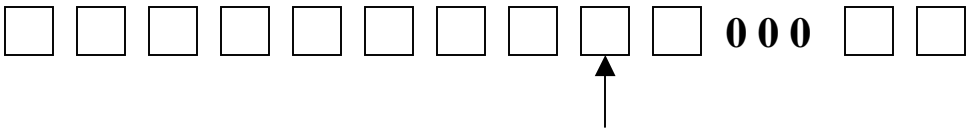
L	N	Q	R	S	X
Loose Tube	No Cable	Ribbon Round (Ruggedized)	Ribbon Flat (Ruggedized)	Shipboard	Duplex (For duplex connectors)

Z	9
Zipcord	900u Buffered



Flame Rating (1 Space)

N	P	R
Non Rated	Plenum	Riser



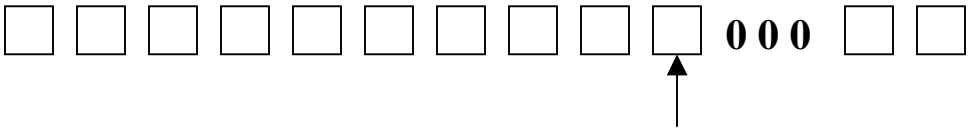
Termination Type (1 Space)

A	B	C	D	E	F	G
Fusion Splicing	Breakout with 3mm Furcation Tubing	Breakout/ FMS customer supplied	Cassette	Breakout with 900um Furcation Tubing	Breakout/ FMS	Breakout with 1.6mm Furcation Tubing

H	I	J	K	L	M
Breakout with 2mm Furcation Tubing non rated	Installation/ Normal/ Splice Tray	Installation/ Breakout	Installation/900u Distribution terminations	Installation/ Fusion Splicing	FMS only

N	P	Q	R	S	T	U	V
Normal	Partial Termination of All Existing Fibers	Breakout with 1.2mm Furcation Tubing	B/O, Partial Termination of All Existing Fibers	Splice Tray	Breakout Staggered	Ribbon Furcation Tubing	90 Degree Cleave & Normal

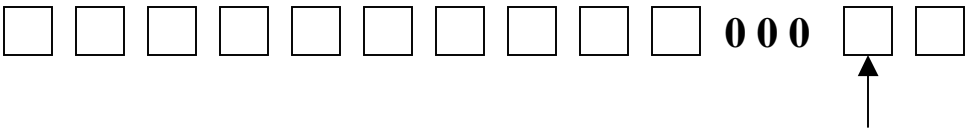
W	X	9
Waterproof Closure	90 degree boot/Staggered End	90 Degree Boot/Normal



Fiber Accessories (1 Space)

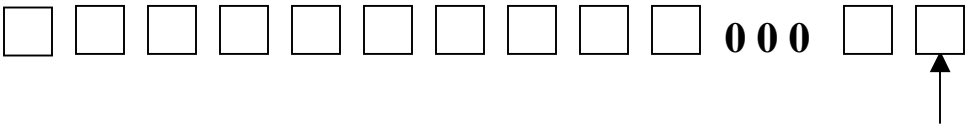
C	F	H	I	L
Custom Labels	FIS Fusion Splice Sleeve	Heyco Gland both ends with pull sock	Innerduct	Liquid tight

P	R	S	U	X
Pull Sock	Corning Fusion Splice Sleeve	Customer supplied liquatite	Liquid tight/pullsock	Non of the Above / No Pull Sock



Breakout Length (1 Space)

Length in Meters (m): for example 1m, 2m, etc.



Connector Manufacturer (1 Space)

A	C	E	F	G	I	J	L
AMP	Corning	GC Technologies	FIS	Gandi 77 Fiber	Seiko	Johanson	FIS (Metal Ferrule Connector)

M	N	P	S	T	V	X
Molex	Atlantic Vision	No Connectors	Senko	T&B	Avaya	Customer Supplied Connector

Cable Connector Specifications

MM—Multimode **SM—Singlemode**

Connector type	Insertion Loss (dB)	Mating Cycles	Temp. Range (degrees C)	Return Loss (dB)
D4 SM	0.3	1000	-40 to +80	50
FC SM	0.3	1000	-40 to +80	55
FC/APC	0.25	500	-30 to +70	70
FDDI MM	0.6	500	-20 to +65	-
LC MM	0.3	500	-30 to +70	-
LC SM	0.3	500	-30 to +70	55
Mini-BNC MM	0.21	500	-40 to +80	-
MTP MM	1.0			-
MTP SM	1.0			
MT-RJ MM	0.3			-
MT-RJ SM	0.3			
SC MM	0.3	500	-40 to +60	-
SC SM	0.3	500	-40 to +80	55
SC/APC	0.3	500	-30 to +70	70
SMA MM	1.5	200	-55 to +105	-
ST MM	0.3	500	-40 to +60	-
ST SM	0.3	500	-30 to +70	55

For more information contact us @:
Phone #: *905-606-0601*
Fax #: *1 866 339-1473*
E-mail: *chrisrhills@gmail.com*

IV
OPTICAL RETURN LOSS and INSERTION LOSS

OPTICAL RETURN LOSS and INSERTION LOSS

Back Reflection Testing, Return Reflection and Return Loss are terms to describe the optical energy reflected back towards the source due to an air gap between two fibers. It is especially important in Singlemode systems to minimize return loss so that output power level of the source remains stable.

Global Fiber Optics Corp. can test your cable assemblies with an optical return loss meter to ensure you meet the specifications required by the end customer.

INTERFEROMETRY MEASUREMENTS

Interferometry Testing is used in the fiber optic field to measure the three key physical endface parameters of a PC polished connector. These parameters include:

i. Radius of Curvature
ii. Eccentricity of Polish (Apex Offset)
iii. Fiber Undercut or Protrusion (Fiber Height)

Global Fiber Optics Corp. can provide hard copy Interferometry results.

This test can also evaluate the radius of curvature and Apex offset of unterminated connectors and multiple fiber connectors. This process helps in the screening process to eliminate **out-of-spec ferrules** before connectorization.

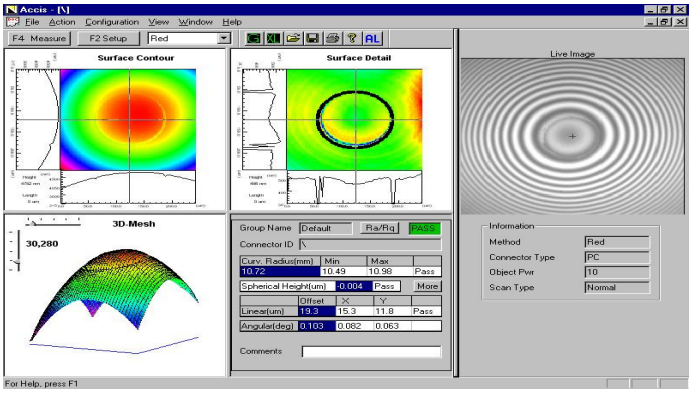
It is also useful in the measurement of **protruded and recessed fibers** especially in connector terminations where fibers should be protruded or recessed.

The system provides information on fiber heights and curvature on sections of **multi-fiber connectors**.

Adhesive reliability can be checked on fibers that have been pushed back due to temperature and pressure.

A CLOSER VIEW OF THE INTERFEROMETRY MEASUREMENT

Interferometer Measuring a Singlemode Connector



The Interferometry results
(Includes radius of curvature, linear offset, spherical height)

For more information contact us @:
Phone *#: 905-606-0601*
Fax *#: 1 866 339-1473*
E-mail: *chrisrhills@gmail.com*

V
FIBER OPTIC TRAINING

Course 1:

FUNDAMENTALS OF FIBER OPTICS TRAINING

A. Course Benefits:

Course content is adapted to incorporate hands-on fiber optic training on your specific in-house equipment supported by Fiber Optic theory to realize your specific business and technical goals. The course also incorporates a high degree of student participation to reinforce course material using group exercises.

B. Who Should Attend:

This one-day fiber optic training course is intended for persons with some prior experience in Fiber Optics.

OPTICAL THEORY AND FIBERS

Optical Theory

- Tyndall's Demonstration
- Digital Encoding Schemes
- Fiber Advantages
- Refraction
- Fresnel Reflections
- Digital Transmission
- Duty Cycle
- Frequency/Wavelength Relationship
- Snell's Law
- Decibels Optical Fibers

Optical Fibers

- Total Internal Reflection
- Singlemode Fibers
- Multimode Systems
- Graded Index Fibers
- Fiber Specifications
- Absorption
- Loss and Bends
- Chromatic Dispersion
- Wavelength Windows
- Optical Cabling
- Minimum Bend Radius
- Fiber Contamination
- Numerical Aperture
- Advantages/Disadvantages of Singlemode
- Index Profiles
- Advantages/Disadvantages of Multimode Systems
- Attenuation
- Scattering
- Dispersion
- Bandwidth
- PCS Fibers
- Buffer Types
- Tensile Strength and Crush Resistance
- Plenum Cable

OPTICAL COMPONENTS

Optical Sources

- Optical Sources
- Advantages/Disadvantages of Lasers
- Advantages/Disadvantages of LED'S
- Transmitters Characteristics
- Output Power
- Transmitter Duty Cycle
- Logic Types
- Lasers
- LED'S
- Transmitters
- Data Rate
- Output Spectrum
- Rise/Fall Times

Optical Detectors

- Avalanche Photodiodes (APD'S)
- Receivers
- Data Rate
- Bit Error Rate (BER)
- Multimode Components
- Duty Cycle
- Handling Bursty Data
- Carrier Detect
- Pin Photodiodes
- Receiver Specifications
- Peak Input or Sensitivity
- Sensitivity vs. BER
- Wavelength
- AC Coupling
- Rise/Fall Times
- Link Trade-offs

Optical Connectors and Splices

- Connector/Splice Specifications
- Insertion Loss
- PC Connectors
- Materials
- Singlemode Components
- Popular Connector Types
- Relative Insertion Loss
- Environmental Specifications
- Termination
- Multimode Components

TESTING AND INSTRUMENTATION

- Common Optical Tests
- Attenuation Measurement
- OTDR Trace
- Sources and Power Meters
- Link Power Budget
- Power and Attenuation
- Optical Time Domain Reflectometers
- OTDR Attenuation
- Insertion Loss

PRACTICAL CONSIDERATIONS

- Pull box Dimensions
- Turn Fittings
- Patch Panels/Enclosures
- Sharp Bends
- Exit Slots
- Patch Panel Layout

OPTICAL NETWORKS

- Bus Topology
- Star Topology
- Ring Topology
- FDDI Topology

ADDITIONAL HANDS-ON TRAINING

- Connector Termination
- OTDR Testing & Measurement
- Power Source and Meter Testing
- Fusion Splicing

NOTE:
Please note that these additions may or may not be included in the course fee depending on the equipment you have in-house.

For more information contact us @:
Phone *#:905-606-0601*
Fax #: 1 866 339-1473
E-mail*: chrisrhills@gmail.com*

Course 2:

FIBER OPTIC TESTING

A. Course Benefits:

Course content is adapted to incorporate hands-on fiber optic training on your specific in-house equipment supported by Fiber Optic theory to realize your specific business and technical goals. The course also incorporates a high degree of student participation to reinforce course material using group exercises.

B. Who should attend:

This one-day fiber optic testing training course is intended for persons with some prior experience in Fiber Optics.

OPTICAL THEORY

- Decibels
- Loss and Bends
- Bandwidth
- Minimum Bend Radius
- Fiber Contamination
- Attenuation
- Dispersion
- Wavelength Windows
- Tensile Strength and Crush Resistance

OPTICAL TRANSMITTERS

- Optical Sources
- Advantages/Disadvantages of Lasers
- Lasers
- LED'S

OPTICAL RECEIVERS

- Avalanche Photodiodes (APD'S)
- Pin Photodiodes
- Receivers

TESTING AND INSTRUMENTATION

COMMON OPTICAL TESTS

End to End Loss Testing

- Power and Attenuation
- Attenuation Measurement*
- Insertion Loss*
- Bare Fiber Testing
- Long Wavelength Loss Measurement*
- **End to End Loss Test***
  - -> Cable Substitution Loss Test*
  - -> Cut Back Loss Test
- Measurement Accuracy
- Specialized Test Cables
- Mixed Connector Testing
- Equipment required on-site
- Sources and Power Meters
- **Design Concepts**
  - -> Link Power Budget
  - -> Power Budget Examples/Calculations
  - -> Comparing Calculated/Actual Losses
- Flashlight Test (Loopback)*
- Loopback Loss Test*
- Bi-directional Loss measurements*
- Fiber Optic Talk Sets
- Fiber Identifiers

OTDR Testing

- Optical Time Domain Reflectometers
- OTDR Attenuation*
- OTDR Dead Zone*
- OTDR Resolution Limitations
- OTDR Index of Refraction Settings
- Providing hard copy OTDR results*
- Visual Fault Locators
- Fault Location*
- **Splice Loss Error Correction**
  - -> Matched Fibers
  - -> Unmatched Fibers
- OTDR Theory & Block Diagram
- OTDR Receiver Saturation
- OTDR Pulse Width*
- **OTDR Trace Examples and Analysis**
  - -> Non Reflective Fusion Splice*
  - -> Reflective Mechanical Splice*
  - -> Reflective Connector Splice*
  - -> Faulty Splices*
  - -> Fiber Launch Reflections*
  - -> Fiber End Face Reflections*

PRACTICAL CONSIDERATIONS

- Pullbox Dimensions
- Turn Fittings
- Patch Panels/Enclosures*
- Sharp Bends
- Exit Slots
- Patch Panel Layout

NOTES:
*1. The * beside a topic indicates that hands-on exercises are a part of this topic.*
2. A course binder is included as part of the training for future reference.
3. Hands-on portion of the training is done using the same equipment installers use on-site.

For more information contact us @:
Phone *#:* *905-606-0601*
Fax *#: 1 866 339-1473*
E-mail*:* *chrisrhills@gmail.com*

TRAINING SCHEDULE: CANADA

Fundamentals of Fiber Optics Training Schedule (Canada) 2014

October 15, 2014
November 19, 2014
January 21, 2015

i. **Course dates are flexible.**
ii. **Will only take place if a sufficient number of students are registered.**

Fiber Optic Testing Training Schedule (Canada) 2014

October 16, 2014
November 20, 2014
January 22, 2015

For more information contact us @:
Phone *#:* *905-606-0601*
Fax *#: 1 866 339-1473*
E-mail*:* *crhills@global-fiber-optics.com*

APPENDIX A

Fiber Optic Training Videos

(CD-ROMs are also available for each title except Lasers as a Tool)

Fiber Optic Technology Series:

Part # VIDEO	Part # CD-ROM	Title
W-4LA	*N/A*	**Lasers as a Tool** The video features all the Lasers and their applications in Fiber Optic communications, manufacturing, machining, detection, quality control as a measurement tool, medical research, entertainment and laser fusion applications. *Length: 22 minutes*
W-4LB	**W-5LB**	**Introduction to Fiber Optic Theory/Fiber Structure** This introductory video covers optical theory and its relationship to optical fibers; optical issues such as reflection, refraction and wavelength; fiber types such as Singlemode, Multimode, core, cladding and coatings. **I. History** **II. Fiber Manufacturing** **III. Optical Theory** *Refraction* *Reflection* *Wavelength* *Attenuation* *Numerical Aperture* **IV. Fiber Types and Structures** **V. Dispersion**

		Modal *Chromatic* **VI. Cutoff Wavelength** **VII. Comparison** **VIII. Advantages** *Length: 25 minutes*
W-4LC	**W-5LC**	**Cable/Cable Preparation** This video covers cable types, structures and related building codes and specifications along with proper techniques, tools and methods to prepare the cable for use with splicing and connectorization. **I. Cable Manufacturing** **II. Cable Structures** **III. Indoor and Outdoor Cable Types** **IV. Cable Jackets and Applications** **V. Specialty Cables** **VI. Building and Installation Codes** **VII. Cable Preparation** *Loose tube Cable* *Breakout Cable* *Distribution Cable* *Fan Out Kits* *Breakout Kits* *Length: 32 minutes*
W-4LD	**W-5LD**	**Connectors, Connectorization/Patch Panels** This video reviews connectors, vendors, bonding techniques, and system specifications involving fiber optic connectors, basics of connector design, termination, styles and applications. **I. Connector Types** **II. Bonding Techniques** **III. End Finishes** **IV. Termination** **V. Visual Inspection** **VI. Basic Testing** **VII. Jumpers and Pigtails**

		VIII. Patch Panels *Types* *Applications* **IX. Attenuators** **X. EIA/TIA 568A Issues** *Length: 32 minutes*
W-4LE	**W-5LE**	**Fiber Optic Testing, Troubleshooting & Documentation** The video covers test equipment and specific applications and techniques for education and enhancement of user skills. The video also reviews the equipments' application along with the various standards, procedures and documentation requirements. **Types of Test Equipment** **I. OTDR's** *Main Frame* *Mini* *PC* *Fault Finders* **II. Light Sources & Power Meters** **III. Talk Sets** **IV. Variable Attenuators** **V. Visual Tracers** **VI. Microscopes** **VII. Reflectometers** **VIII. The Roles of Test Equipment & Their Operation** **IX. Acceptance Testing** **X. Span Testing** **XI. Maintenance** **XII. Restoration** **XIII. Test Documentation** **XIV. Restoration Strategies** **XV. Restoration Kits** **XVI. Faults & Location Techniques** *Length: 37 minutes*

W-4LF	**W-5LF**	**Applications** This video is an overview of where and how fiber optics is being used in communication systems to meet the changing requirements of voice, video and data communications. **I. Fiber Optics Role in a Communications World** **II. New Trends in Communications** *Telecommuting* *Teleconferencing* *Video Conferencing* *Security* *Smart Homes* **III. Communications** *LAN's* *WAN's* *MAN's* *Voice: T-Carrier* *SONET* *Fiber to the Curb* **IV. Video** *CCTV* *Broadcast* *HDTV* *CAD* *Imaging* **V. Data** *LAN's* *Ethernet* *Token Ring* *IEEE 802.3* *IEEE 802.5* *FDDI* *ATM* *SMDS* **VI. Sensing/Sensors** **VII. Medical** **VIII. Entertainment** *Illumination* *Lasers* **IX. Audio** **X. Virtual Reality** *Length: 40 minutes*

W-4LG	**W-5LG**	**Fiber Optic LED's, Lasers and Detectors** The video covers components and their operation, wavelength compatibility as well as cost issues, packaging and industry trends. New technologies are also addressed such as tunable lasers and optical amplifiers. **I. Types** **II. Functions** **III. How They Work** **IV. Applications** **V. Operating Issues** **VI. Analog & Digital Issues** **VII. LED's** *Edge and Surface Emitters* **VIII. Lasers** *Fabrey-Perot* *DFB* *Tunable* *Amplifiers* *Classifications* *Safety* **IX. Detectors** *APD's* *PIN's* *PIN-FETS* *Hybrids* *Materials* *Issues* **X. Transceivers** *Packages* *Design* *Standards* **XI. Modules and Transmitters** **XII. System Performance Budgets** *Length: 37 minutes*

W-4LH	**W-5LH**	**Couplers, Switches and Isolators** The fiber optic couplers, switches and isolators are covered with their applications at the present and how they may be used in the future. **I. Issues** **II. Introduction** **III. What Are They?** **IV. How Do They Work?** **V. Applications** **VI. Couplers** *Splitters* *Wavelength Division Multiplexers* *Bi-Directional Couplers* *Star Couplers* **VII. Switches** *Applications* *Types* *Loss Issues* *Methods* *Issues* **VIII. Isolators** *Functions* *Length: 25 minutes*
W-4LI	**W-5LI**	**Installation** Every Fiber Optic Cable requires proper techniques for a successful installation. Building codes and standards, environmental issues, proper design, routing, equipment for installation, topologies, applications and reliability concerns are addressed. **I. Indoor Cable Installation** *Campus* *Plenum /Risers* *Pulling of Cable* *Cable Trays* *Raceways* *Conduits* *Air Blown Fiber*

		II. Outdoor Cable Installation *Direct Buried* *Trench Installations* *Boring* *Pressurized Cable* *Vaults* *Manholes* *Handholes* **III. Aerial Installations** *OPGW* *ASDD* *Lashing* *Aerial Ducts* *Figure Eight* **IV. Special Issues** *Building Codes* *Installation Standards* *Grounding/Bonding* *Firewalls* *Cable Markings* *Slack Points* *Routing* *Length: 30 minutes*
W-4LJ	**W-5LJ**	**Safety** Fiber Optic safety issues for field and lab applications are covered in this video. Examples of good safety practices, standards and areas of concern are presented. **I. Safety in the Work Area** **II. Safe Handling of Optical Fibers** **III. Safe Disposal of Optical Fibers** **IV. Laser Safety** **V. Ultraviolet Light** **VI. Chemicals and Right-To-Know Laws** **VII. Safety Standards** **VIII. Protective Clothing and Eyewear** **IX. Safety in Installations** **X. Confined Spaces** **XI. High Voltage** **XII. Safety Tools** *Length: 20 minutes*

W-4LK	**W-5LK**	**Plastic Optical Fiber** This industry, with its higher bandwidth fibers, has grown to voice, video and data requirements from the previous application of illumination. This fiber optic video shows applications and potential applications and also how the POF works. **I. POF Fibers** **II. POF Fiber Theory** **III. Advantages** **IV. Handling and Preparation** **V. Applications of POF** *Automotive* *Lighting* *Signs* *Communications* *Isolation* *Education* **VI. POF Future Trends** *Length: 15 minutes*
W-4LM	**W-5LM**	**Dense Wavelength Division Multiplexing** Dense Wavelength Division Multiplexing video and CD-ROM gives a thorough explanation of this technology. Roles of the components and how they are integrated into a DWDM network will be covered. The understanding of types of fibers and their impact in designing and implementing the systems are demonstrated along with graphics of four wave mixing, dispersion characteristics, dispersion compensation and optical multiplexing and demultiplexing techniques. **I. History of DWDM** **II. The Need for DWDM** **III. Laser Characteristics** **IV. Fibers & Fiber Issues** Dispersion Shifted Fibers Four Wave Mixing Non Zero Dispersion Shifted Fibers Dispersion Compensation Fibers

		V. ITU Standards & Industry Trends **VI. Multiplexing & Demultiplexing Light** **VII. DWDM for Long Haul Systems** Oceanic & Inter Exchange Carriers **VIII. DWDM for Metropolitan Area Networks** CLECs, Utilities & Private Networks **IX. The Future of DWDM** *Length: 34 minutes*
W-4LN	**W-5LN**	**System Design** This video provides visual insights into the proper design of optical fiber communication systems for voice, video, and data communications from physical layout and calculating loss budgets for both singlemode and multimode networks. **LOCAL AREA NETWORKS (LAN's)** **I. Topologies** **II. Fiber Selection** **III. Connector Selection** **IV. Routing Issues** **V. Hubs, Patch Panel and Media Outlets** **VI. System Issues** **VII. System Loss Budgets** **VIII. Fiber Backbones** **IX. Fiber to the Desk** **WIDE AREA & METROPOLITAN AREA NETWORKS** **I. Topologies** **II. Fiber Selection** **III. Connector and Splice Issues** **IV. Closures and Distribution Panels** **V. Manholes, Handholes and Vaults** **VI. Route Redundancy Issues** **VII. System Loss Budgets** **VIII. Restoration Planning Through Design** **IX. Fiber to the Curb** **X. Future Flexibility** **XI. System Issues** *Length: 30 minutes*

W-4LP	**W-5LP**	**History of Fiber Optics**
W-4LS	**W-5LS**	**Fiber Optic Splicing and Splice Enclosures** The types of mechanical splices and fusion splicers are reviewed, how they work and their applications. The related tools, hardware and installation issues are also covered for a background in understanding and use of the splicing products. **I. Fusion Splicers** *Manual* *LID* *PAS* **II. Fusion Splicing** **III. Maintenance & Operation Issues** **IV. Mechanical Splices** *UV* *Mechanical* *Reusable* **V. Splice Tools** *Preparation* *Cleaning* *Cleaving* **VI. What Causes Splice Losses?** **VII. The Splicing Environment** **VIII. Closures** *Applications* *Types* *Environmental Protection* *Length: 32 minutes*

For more information contact us @:
Phone *#: 905-606-0601*
Fax #: 1 866 339-1473
E-mail: *chrisrhills@gmail.com*

How-to-Series:

Part # Video	Part # CD-ROM	Title
W-7LA	**W-8LA**	**How To Perform Optical Loss Testing** Optical Loss Testing focuses on the light source and power meter in performing optical loss test measurements on Singlemode and Multimode cables in Local Area Networks and Wide Area Networks. Various testing methods with their advantages and disadvantages are covered along with the importance of documentation. **I. Characteristics of Optical Loss Testing** *Power Meter & Light Source* **II. Importance of Documentation** **III. Optical Loss Testing Methods** *Conventional Point to Point* *Optical Loss Test Sets* *Automated Test Sets* *Using Splitters* *Using Talk Sets & Splitters* *Length: 19 minutes*
W-7LB	**W-8LB**	**Understanding and Using the OTDR** Understanding and Using the OTDR will take you step-by-step through operation and the fiber optic measurements. The OTDR is used to Acceptance Testing, Splice Monitoring and Emergency Restoration applications. **I. Characteristics of an OTDR** **II. Signatures** *Reflective Events* *Non-reflective Events* *Splice Gains* *Roll Offs* **III. Using the OTDR**

		Terminating the Fiber *OTDR Setting* *Wavelength* *Index of Refraction* *Pulse Width* *Modes of Operation* *Use of Cursor* *Finding Distance to a Fiber Break* *Ghosts* *Acceptance Testing* *Splice Monitoring* *Restoration* *Length: 24 minutes*
W-7LC	**W-8LC**	**How To Prepare Fiber Optic Cables** How To Prepare Fiber Optic Cables will help the technician gain the knowledge and skill to properly handle and prepare fiber optic cable to reduce damage and failure of a system, which may in the future bring a network down. **I. Preparing Fiber Cable** *Tight Buffered Distribution* *Breakout* *Loose Tube Gel-filled* **II. Breakout and Fan-out Kits** **III. Armored Cables** **IV. Mid Cable Entry** **V. Safety Issues** *Length: 18 minutes*
W-7LD	**W-8LD**	**How To Cleave, Polish and Inspect a Fiber Optic Connector** How To Cleave, Polish and Inspect a Fiber Optic Connector demonstrates the efficiency of the equipment, tools and techniques involved in cleaving, polishing and inspecting both Multimode and Singlemode fiber optic connectors. **I. Multimode and Singlemode Connectors** *Prepare Fiber* *Strip Fiber*

		Clean Fiber *Cleaving* *Polishing* *Testing* **II. Analysis of Termination & Testing Disciplines** *Impact on Rework Time, Cost & Materials* *Length: 29 minutes*
W-7LE	**W-8LE**	**How To Perform a Fiber Acceptance Test** How To Perform a Fiber Acceptance Test details critical issues as well as equipment and techniques to successfully perform an acceptance test on cable before it is pulled. **I. Importance of Documentation** **II. Visual Inspection** **III. OTDR Inspection Test** **IV. Optical Continuity Test** **V. Light Source-Power Meter Technique** *Length: 16 minutes*
W-7LF	**W-8LF**	**Singlemode Fiber Optics Emergency Restoration** Singlemode Fiber Optic Emergency Restoration describes common damage scenarios and how to quickly locate faults and restore service. **I. Examples of Typical Cable Damage in:** *Aerial Installations* *Underground Installations* **II. How To Assess a Restoration** *Initial Assessment* *Necessary Test Equipment & How to Use the Equipment* *Optical Power Meter* *Visual Laser Tracer* *OTDR* **III. Planned Permanent Restoration vs. Temporary Emergency Restoration** *Importance of Documentation* **IV. Emergency Restoration Kit Contents** *Restoration Scenario* *Length: 37 minutes*

W-7LG	**W-8LG**	**How To Perform an Optical Loss Budget** How To Perform an Optical Loss Budget calculates the optical power available at the output of the transmitting source, the optical power required at the receiver's detector and the attenuation of optical power between the transmitter and receiver. The optical loss budget states how the optical power available will be used for TIA/EIA standard, Wide Area Networks, and CATV networks using Singlemode fiber. **I. System Design Process** *Transmission System* *Media Type-Multimode & Singlemode Fibers* *Physical Plant Examples* *Fiber Optic Transmit & Receive Equipment Types, Options & Limitations* **II. Loss Budgeting Examples (step by step demonstration)** *Local Area Network* *Attenuation & Bandwidth Examples using 50/125 and 62.5/125 fibers* *Not to Exceed Loss Budgets for Contractors* *Singlemode Fiber Link* *Analog CATV Link in a Hybrid Fiber-Coax Application* *Optical Amplifiers & Splitters* **III. Review of Design Options** *Wavelengths* *Fiber Structures* *Transmitters-Lasers, LEDs & VSCELs* *Receiver-PIN & APDs* *Physical Plant Losses* *Manufacture Options* *Length: 35 minutes*
W-7LH	**W-8LH**	**How To Cleave and Splice Optical Fibers** How To Cleave and Splice Optical Fibers details the correct methods of preparing, cleaving, splicing and protecting optical fibers. Precision is required in optical splicing to minimize attenuation with proper alignment and to protect the fiber at the splice point. Overview of Mechanical Splicing and Fusion Splicing

		I. Safety Concerns **II. Preparing the Fiber** *Removing Jackets* *Kevlar Cutting* *Coating Stripping* **III. Cleaning Issues for Fibers and Tools** **IV. Cleaving the Fiber** *Causes of Losses and Failures* *Overview of Cleaving Tools* **V. Mechanical Splice Examples** **VI. Fusion Splicing** *How the Fusion Splicer Works* *Setting up the Splicer* *Preparing & Cleaving the Fiber* *Installing Heat Shrink & Butterfly Splice Protectors* *Tips to Getting a High Quality Splice* *Causes of Bad Splices and How to Resolve* *Affects of Altitude, Humidity and Temperature* *Length: 26 minutes*
W-7LI	**W-8LI**	**How to Prepare a Fiber Optic Patch Panel**
W-7LJ	**W-8LJ**	**How To Clean Fiber Optic Connectors** How to Clean a Fiber Optic Connector video reviews the products, applications and their proper usage. It shows the causes of contamination when using various cleaning techniques and demonstrates the different products used to clean: **I. Fibers** **II. Connector end faces** *Alcohol based products* *Compressed air products* *Tape products* *Cloth products* **III. Cleaning sleeves and mated connector parts** *Length: 31 minutes*

For more information contact us @:
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Fax *#: 1 866 339-1473*
E-mail*:* *chrisrhills@gmail.com*