QwikConnect

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Strap Yourself In!

IT'S A FIBER OPTIC REVOLUTION

THE GLENAIR EYE-BEAM™ FIBER OPTIC REVOLUTION

Fiber optic systems carrying digitized video, voice and data continue to multiply. High-speed fiber optic interconnect technologies enable specialized applications in avionics, robotics, weapon systems, sensors, space and other high performance environments. Precision-engineered fiber optic contacts, or termini, are the key to delivering low data loss and reliable, repeatable performance in fiber optic connection systems.

The advantages of a connection system that can transmit the equivalent of 24,000 telephone calls simultaneously through fibers thinner than a human hair go beyond this mind-boggling data transmission rate. Fiber optic systems save size and weight, are immune to EMI interference, are electrically isolated for spark-free performance, and transmit signals that are nearly impossible to intercept for enhanced security.

The challenge for many fiber optic applications is environmental. With data transmitting through a fiber core only 9.3 microns in diameter, a single speck of dust on a conventional butt-joint contact terminus could completely disrupt transmission. This might not be a problem in a controlled, sealed environment—but a military communication shelter rapidly deployed in a windy desert, or a metropolitan commuter train speeding down a gritty, snow-covered track present less than ideal environments for fiber optic operation.

The revolutionary Glenair Eye Beam™ Expanded Beam Fiber Optic Terminus addresses these environmental challenges and delivers enhanced performance to fiber optic interconnect systems. Join us as we explore the use of the Eye-Beam™ fiber optic termini in exciting and emerging fields.

The Eye-Beam™ Lens Terminus Advantage

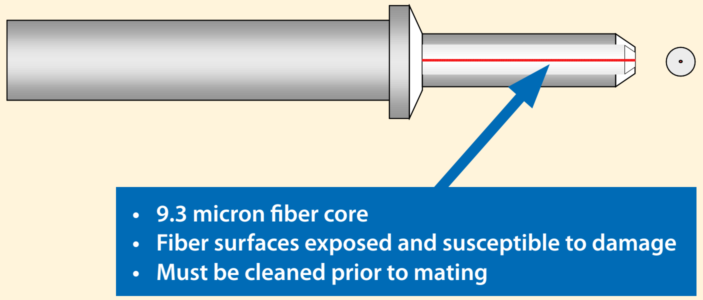
The Glenair Eye-Beam™ fiber optic terminus is a graded index lens-equipped, expanded-beam optical transmission system. It delivers outstanding performance in challenging environments and eliminates maintenance cycles. The low insertion loss Eye-Beam™ offers comparable performance to standard butt joint termini in a package that's built to withstand rugged use and frequent mating/de-mating in field conditions.

The Glenair Eye-Beam™ contact utilizes an innovative free-floating expanded beam lens and ultra-high precision ceramic alignment sleeves as well as custom designed nickel alloy terminus bodies to ensure perfect axial alignment and optimal optical performance. Best of all, the Eye-Beam™ can be integrated into virtually any circular or rectangular connector package.

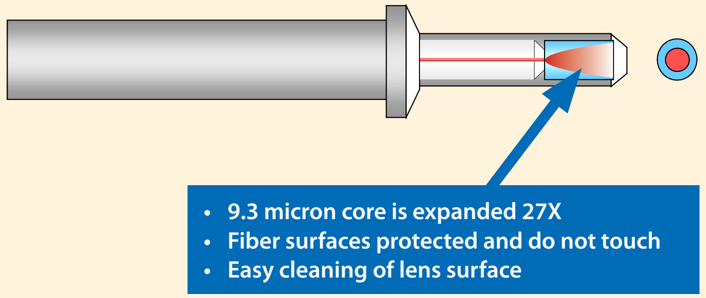
Tactical Field Deployment

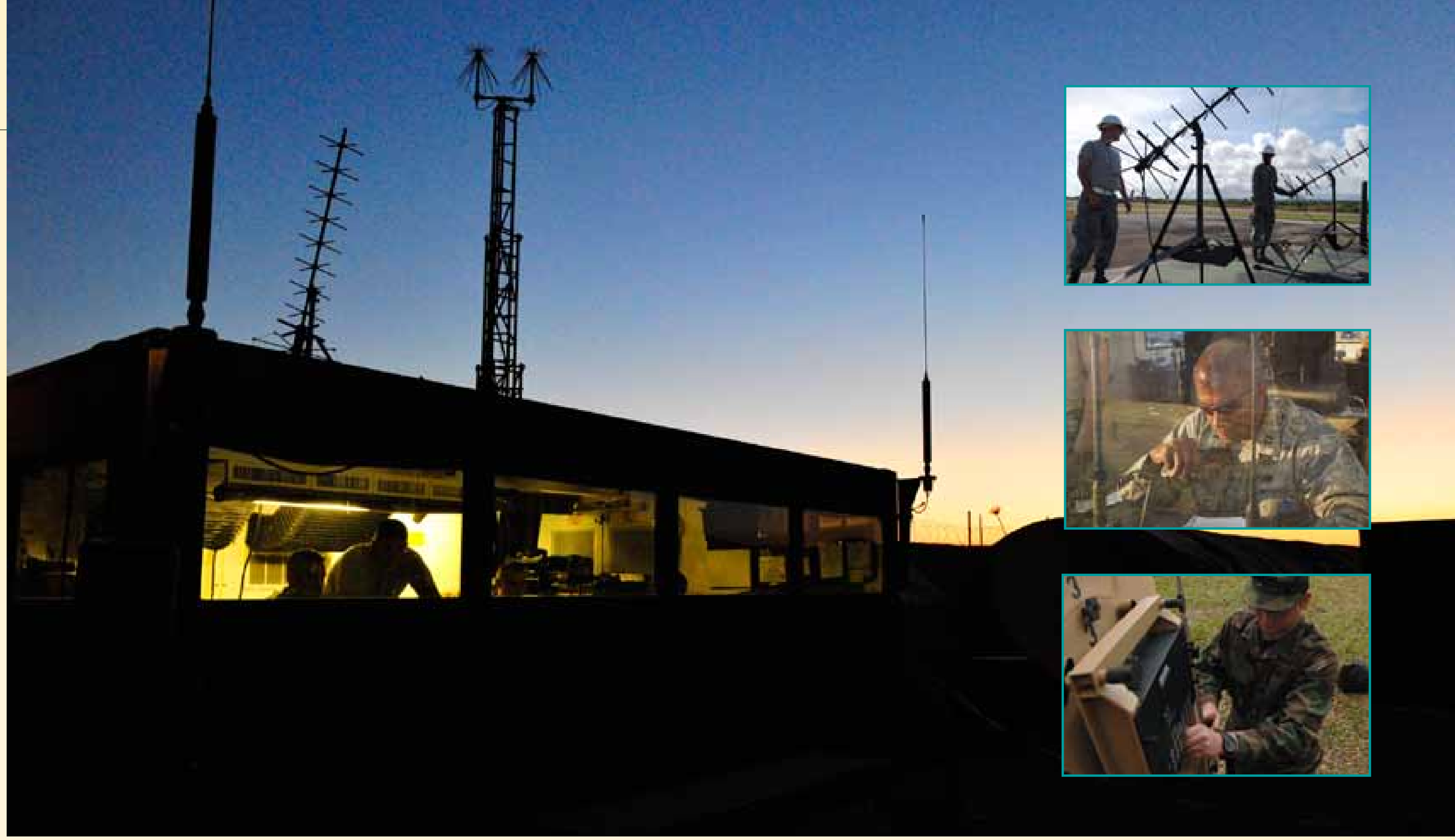
Mobile Tactical Shelters are an integral part of Army and Marine battlefield communication systems. These mobile, rapidly deployable shelters provide a vital communication capability. Voice over IP (VoIP) technology allows voice, video and data to be consolidated into one fiber cable system, greatly simplifying deployment. The fiber optic interconnect system for these shelters must be reliable in extreme environments, and able to stand up to rapid mating and de-mating in the field.

Butt-Joint Fiber Optic Terminus



Eye-Beam™ Expanded Fiber Optic Terminus





Main Photo: Command and control specialists work inside a Mobile Air Reporting Communications shelter at Camp Marmal, Afghanistan. The MARC is an air-deployable mobile tactical shelter that provides CRW Airmen with the ability to communicate with aircraft as well as schedule and track cargo movements worldwide. Inset Photos: Mobile tactical shelter specialists installing rooftop antennae, working inside a shelter, and checking communications equipment.

Rapid "Daisy-Chaining" of Tactical Fiber Cables

Tactical military applications rely on rapid, trouble-free deployment of interconnect cabling. Glenair GFOCA hermaphroditic expanded beam connectors and cables are the perfect solution for frequent mating and unmating of fiber optic cabling in harsh application environments. The sealed Eye-Beam™ expanded beam interface prevents contamination of the optical path, while the hermaphroditic coupling provides operational flexibility and cost savings. Glenair offers both discrete connectors as well custom cable assemblies and field-ready spooled cable sets.

Extreme Harsh Environments

Rail system interconnect design presents many challenges. Reducing weight is a critical issue in high-speed and Maglev rail systems. Shielding electromagnetic interference is also important, especially in sensitive electronic systems such as engine monitoring and diagnostic sensors. Basic mechanical protection of interconnect cables, conductors and contacts is a standard requirement especially when frequent mating and unmating is required, or when cables are routed through exposed intercar or undercar locations. To ensure rapid and accurate car linking and cabin reconfigurations, interconnects must be easy to couple and keyed to avoid mis-mating. Vibration, shock and connector decoupling problems are also common in rail applications, and require focused attention when selecting shell materials and mating technologies. As passenger and crew safety is paramount, interconnection systems must not compound flammability, smoke or toxicity risks.

Eye-Beam™ fiber optics in a ruggedized, reverse-bayonet connector package meet the environmental challenges of rail systems

On board the SIVision High-Definition mobile broadcasting unit—a "control room on wheels" for audio and video electronic field production.

But make no mistake: the overriding challenge is environmental. Rail and transportation systems represent one of the most challenging environments for the long-term survivability and reliability of interconnect cables and assemblies. From high-speed rail transportation systems to heavy railway freight lines, the standard daily fare of the rail industry is one harsh environmental challenge after another.

Glenair Eye-Beam™ fiber optics in a ruggedized, reverse-bayonet connector package meet the environmental challenges of rail systems, standing up to shock, vibration, moisture, and temperature fluctuation while delivering the reliable high-speed data transmission advantages of fiber optics.

Fiber Optics for High Definition Broadcasting

Fiber optic systems are implemented in remote television broadcast systems for sporting events or on-location news reporting. In the television industry this is known as electronic field production, or EFP. Multi-camera video editing, advanced graphics and sound equipment must be reliable and portable, built into a truck or van—a "control room on wheels"—where space is at a premium. A single fiber optic connection can simultaneously transport bidirectional digital and analog video, as well as two-way camera control, audio, data, sync, tally/call, prompter, and intercom signals between a high-definition camera and the mobile studio truck. A fiber optic system transmits signals digitally and optically, so broadcasters and producers are assured of the highest quality audio and video, free from interference or grounding problems.

Broadcast fiber optic interconnect systems must be quickly deployable for on-location news broadcasting, and able to stand up to the rigorous conditions presented on the sidelines of a football game or a weather report from the site of a tropical storm. Glenair Eye-Beam™ termini provide the space-saving and lightweight, yet rugged and durable connection that this exciting industry demands.

Eye-Beam™ Solutions and Future Applications

At Glenair, we are serious about the business of engineering the right solution for every application. We continue to design and enhance fiber optic solutions for standard military and commercial connectors, and develop new fiber optic technologies for exciting new applications like robotics and future soldier systems.

MIL-DTL-38999 Connectors

The MIL-DTL-38999 connector is currently the most commonly specified multi-pin cylindrical interconnect in fiber optic aerospace applications. When used to connect multiple strands of fiber simultaneously, the D38999 connector functions as a container or shell for the precision termini which perform the actual marriage of the fiber strands.

Glenair's unique alignment techniques maximize optical performance and provide reliable, repeatable interconnection of optical fibers. Ferrule design—critical to performance—has traditionally relied upon a machined stainless steel terminus incorporating a precision micro drilled hole. Glenair's unique precision ceramic ferrules, with concentricity and diametric tolerances controlled within one micron (.00004 of an inch), meet the needs of high bandwidth and low allowable insertion loss applications. In fact, Glenair's ferrules are approximately 10 times more accurate than alternative designs, and have reduced insertion loss values from 1.5dB to less than .5dB (typical loss for Glenair termini is .3 dB).

Glenair has engineered Eye-Beam™ D38999 connectors for use in applications such as high definition video camera equipment, high speed routers for long haul transmission, and military and commercial avionics applications.

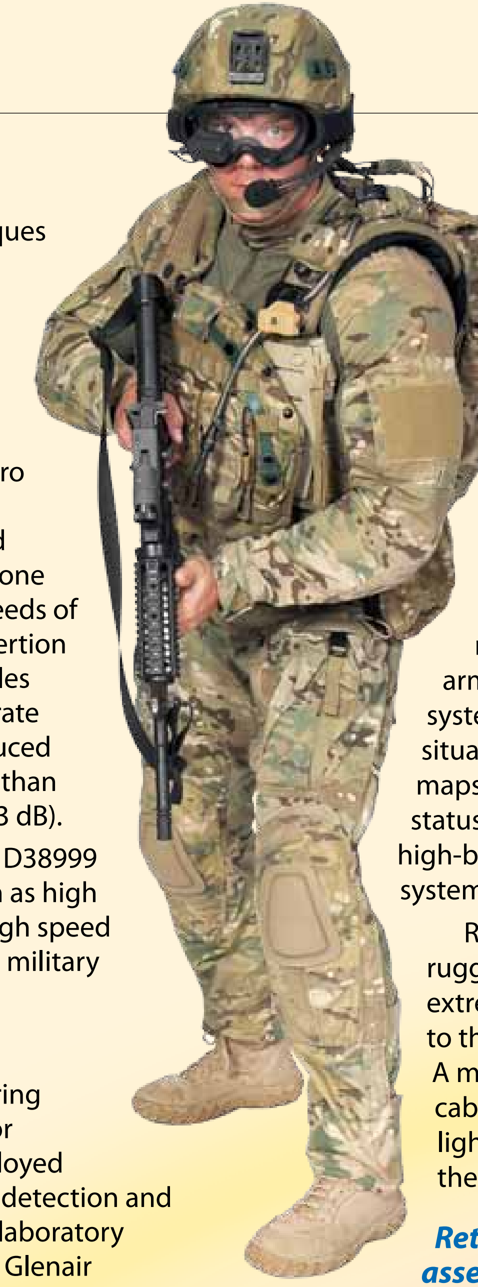
Eye-Beam™ Fiber Optics in Robotics

Robots are relied on in manufacturing and industry to do jobs in dangerous or dirty environments. They are also employed in increasingly complex tasks in bomb detection and disposal, earth and space exploration, laboratory research, and remote surgical systems. Glenair COTS (Commercial Off-The-Shelf) Eye-Beam™ fiber optic termini can provide reliable high-speed data transmission in the challenging environments that these robotic applications present.

GFOCA Hermaphroditic Fiber Optic Connection System

Hermaphroditic coupling eliminates the need for adapters and male and female mating halves. Hermaphroditic housings also allow for rapid deployment without the use of male and female mating halves or other adapters, creating low loss Singlemode, Multimode and Hybrid "daisy- chained" links in a variety of insert arrangements

The rugged and reliable Glenair GFOCA Connection System with Eye-Beam™ termini is used by the Army for long-run battlefield ground system communications, and is also well suited to dockside naval communications, down-hole drilling and other harsh environment applications.



The Future Force Warrior System depends on a highly reliable, low-data loss connection system that is lightweight and able to stand up to rigorous use in challenging environmental conditions.

Eye-Beam™ and the Future Force Warrior

Future Force Warrior is a United States military project developing a lightweight, fully integrated combat system, implementing nanotechnology, powered exoskeletons, and magnetorheological fluid-based body armor for the "Army After Next." The system provides the soldier with enhanced situational awareness, communication data, maps, tactical intelligence and physiological status monitoring through an integrated high-bandwidth wireless communication system

Reliable data transmission and ruggedized mating/de-mating in the most extreme environmental situations are crucial to the Future Force interconnect system. A miniaturized, GFOCA hermaphroditic cable system with Eye-Beam™ termini for lightweight and reliable data connection is the perfect solution to these challenges.

Retrofitting of existing cable assemblies

Glenair can retrofit your existing cable assemblies with Eye-Beam™ fiber optic termini in your connectors. There is no need to undergo expensive and time-consuming replacement of entire cable systems to take advantage of Eye-Beam™ high reliability and performance.

The Eye-Beam™ Revolution

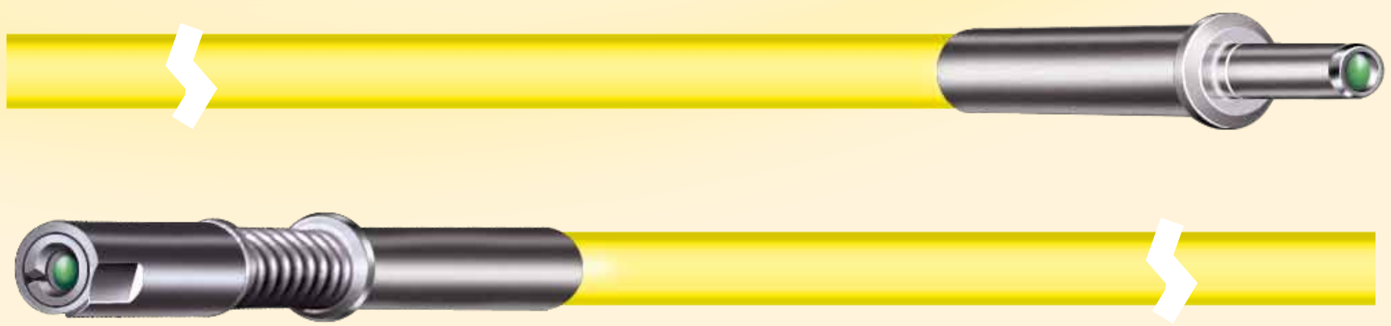
Glenair continues to make substantial investments in equipment, tooling, research and the industry's best engineering talent to develop new fiber optic technologies. Glenair Eye-Beam™ fiber optic termini solve environmental challenges for today's demanding fiber optic systems, and we will continue to develop the right solutions for tomorrow's applications. We are committed to providing complete, full-spectrum, "one-stop shopping" in fiber optic interconnect solutions.

GLENAIR EYE-BEAM™ ORDERING INFORMATION

Eye-Beam™ is supplied as either a factory terminated contact pigtail or point-to-point jumper. Pigtail assemblies are supplied in numerous contact formats for use with most high performance, tactical fiber optic connection systems. For example, Glenair Eye-Beam™ lens contacts with their unique expanded beam capability are supplied for MIL-DTL-38999, MIL-PRF-28876, GFOCA, and Series 80 Mighty Mouse, and are uniquely suitable for use in hybrid electrical/optical interconnect applications.

The supply of the pre-terminated expanded beam lens contacts allows users to perform a much simpler and easier fusion splice of pigtail wires in the field as opposed to actual contact termination, thus ensuring factory-level performance and low dB loss in the system.

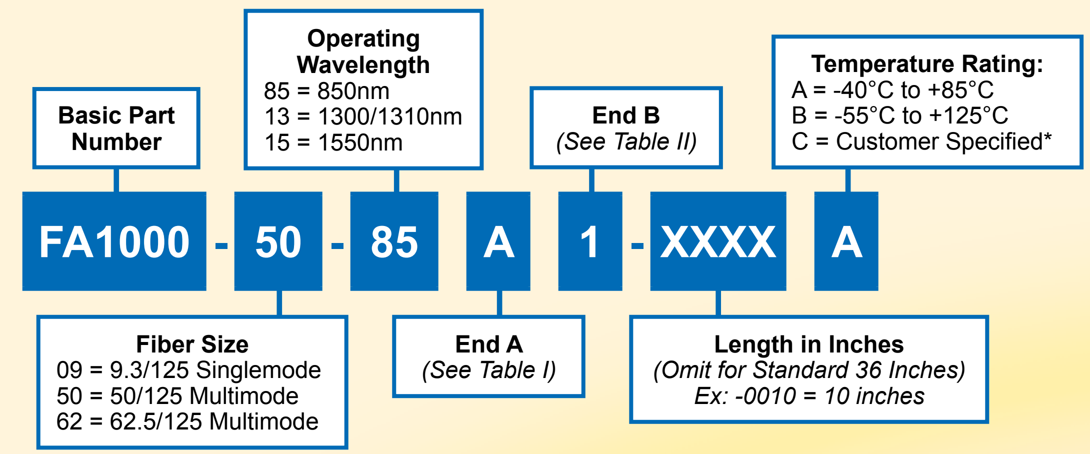
Glenair Eye-Beam™ fiber optics are also supplied in point-to-point jumpers with pin/socket, pin/pin, and socket/socket configurations. In addition, Glenair can supply Eye-Beam™ expanded beam jumpers with standard commercial type connectors at one end.



Factory terminated lens pin contact (top) and lens socket contacts on pigtail wires allow for easier fusion splicing in the field.

HOW TO ORDER

1. Eye-Beam™ system part numbers begin with the FA1000 Basic Part Number
2. Select fiber size (Consult factory for additional options)
3. Select operating wavelength
4. Select pigtail or jumper cable configuration. Pigtails and jumpers are supplied standard with 36 inches of fiber cable. Specific lengths available in part number breakdown as shown below.



**Note: For customer specific connectors and fiber, Glenair will assign a unique part number for the cable assembly.*

Table I Eye-Beam™ Contacts

Designator	Description	Connector Series
A	M29504/4 Style Pin (181-070)	MIL-DTL-38999
B	M29504/5 Style Socket (181-071)	MIL-DTL-38999
C	M29504/14 Style Pin (181-XXX)	MIL-PRF-28876
D	M29504/15 Style Socket (181-XXX)	MIL-PRF-28876
E	Mighty Mouse Pin (181-XXX)	Series 80 Mighty Mouse
F	Mighty Mouse Socket (181-XXX)	Series 80 Mighty Mouse
G	COTS Pin (181-XXX)	Glenair COTS System
H	COTS Socket (181-XXX)	Glenair COTS System
J	GFOCA Termini (181-067)	GFOCA (hermaphroditic)

Table II

A	M29504/4 Style Pin (181-070)
B	M29504/5 Style Socket (181-071)
C	M29504/14 Style Pin (181-XXX)
D	M29504/15 Style Socket (181-XXX)
E	Mighty Mouse Pin (181-XXX)
F	Mighty Mouse Socket (181-XXX)
G	COTS Pin (181-XXX)
H	COTS Socket (181-XXX)
J	GFOCA Termini (181-067)
1	LC Connector
2	LC APC Connector
3	FC Connector
4	FC APC Connector
5	ST Connector
6	SC Connector
7	SMA 905 Connector
8	SMA 906 Connector
9	Customer Specified*

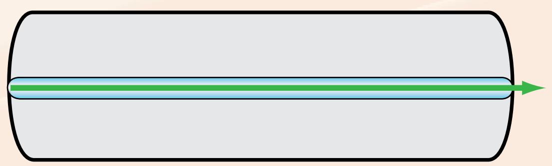
Fiber In Focus: Singlemode and Multimode Fiber Optic Systems

Fiber optics transmits data as light pulses down extremely thin strands of glass or plastic fiber. Singlemode and multimode are the two types of fiber used in optical fiber systems. Rays of light passing through a fiber do not travel randomly. Rather, they are channeled into modes—the thousands of possible paths a light ray may take as it travels down the fiber. A fiber can support as few as one mode and as many as tens of thousands. The number of modes in a fiber is significant because it helps determine the fiber's bandwidth.

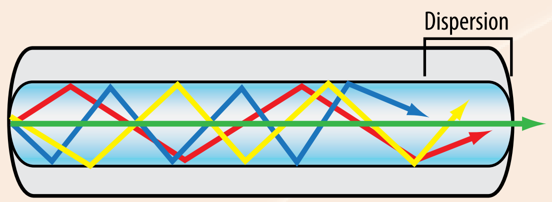
Both multi- and singlemode fibers have an outside diameter of 125 microns - a little thicker than a typical human hair. Light rays travel through the core of the fiber. Multimode fiber has a much larger core than singlemode fiber (typically 62.5 microns for multimode compared to 9 microns for singlemode), allowing hundreds of rays of light to propagate through the fiber simultaneously. Singlemode fiber's smaller core allows only one mode of light through. Paradoxically, the higher the number of modes, the lower the bandwidth of the cable. The reason is dispersion.

"Modal" dispersion is caused by the different path lengths followed by light rays as they bounce down the fiber (some rays follow a more direct route down the middle of the fiber, and arrive at their destination well before those rays which bounce back and forth against the sides). "Material" dispersion occurs when different wavelengths of light travel at different speeds. By reducing the number of possible modes, you reduce modal dispersion. By limiting the number of wavelengths of light, you reduce material dispersion, but both of these reductions in dispersion also reduce the information-carrying bandwidth of your fiber optic system.

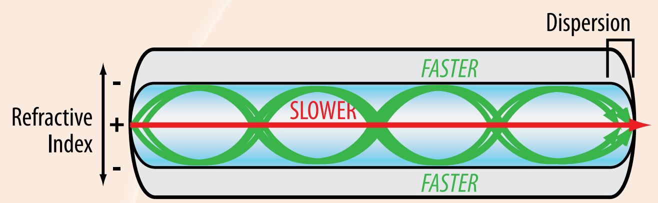
Singlemode fibers are manufactured with the smallest core size (approximately 8 - 10 um in diameter), eliminating modal dispersion by forcing the light pulses to follow a single, direct path. The bandwidth of a singlemode fiber so far surpasses the capabilities of multimode fiber that its information-carrying capacity is essentially infinite. Singlemode fiber is thus the preferred medium for long distance and high bandwidth applications.



A singlemode fiber has a much thinner core than a multimode fiber. Light pulses follow a single direct path. Bandwidth essentially approaches infinity—limited practically to about 100,000 gigahertz.



Multimode fiber, with a wider core than singlemode, allows numerous light beams to travel in different paths through the fiber—but since the beams arrive at different times, the aggregate "pulse" of the modes is dispersed.



Graded-Index Multimode fiber's core has a refractive index that decreases from the center to the edge. Light rays moving down the center axis move slower than those at the edge, which take a curved path instead of zigzagging as they do in step-index fiber. The modes at the edges arrive closer together with the modes in the middle which allows for less dispersion in the pulse.

Step-index multimode Plastic Optical Fiber is used today in automobile on-board information and entertainment systems

Multimode fiber is generally chosen for applications where bandwidth requirements fall below 600 MHz and is also ideally suited for short distance applications such as interconnect assemblies used within a single premise or contained space. Because of its larger size, multimode fiber is easier to polish and clean than singlemode, a critical concern in interconnect applications which expose the polished ends of the fibers to debris during connector mating and unmating.

Two types of multimode fiber

Step-index multimode fiber

This was the first fiber design, engineered with a relatively large core—up to 100 microns in diameter. Some of the light rays take a straight path through the fiber, while others bounce off the cladding and zigzag through. This causes the different groupings of light rays, called modes, to arrive separately at a receiving point. The pulse, which is an aggregate of different modes, begins to spread out and lose definition, or overlap. This can be prevented by leaving space between pulses, but this spacing limits bandwidth.

Today, step-index multimode is typically used in Plastic Optical Fiber. This is a large-core fiber (1mm) used for low-speed, short distance transmission applications like home or industrial networks, home appliances, or video surveillance systems. It has also gained a foothold in automobile on-board information and entertainment fiber systems like MOST and Flexray. This low-cost technology has the potential to carry broadband access to increasing numbers of businesses and homes, but is not suitable for longer distances or the higher speed data transfer needs of some applications.

Graded-index multimode fiber

This type of multimode fiber uses a core in which the refractive index gradually decreases from the center of the fiber out toward the cladding. Light rays moving straight down the center axis advance more slowly than rays near the outside edge. Also, rather than taking a zigzag path, light takes a helical curved path through the graded index fiber which shortens its travel distance. The faster light rays at the edge of the fiber arrive closer together with the slower straight rays from the center, allowing for a digital pulse with less dispersion. Bandwidth is hundreds of times greater than step index fiber. Graded index multimode fiber offers the easier use and durability of a larger-core fiber without the dispersion disadvantage of step-index fiber.

Today, fiber optic cable is an integral part of communication technology. From high-reliability graded-index multimode fiber used in aerospace or military applications, to integrated plastic optical fiber systems for automobiles, to high bandwidth singlemode fiber cables that run across oceans, fiber optic technology continues to develop and serve global information and communication needs.

CS Long Lines, a ship designed to lay the Trans-Atlantic fiber optic cable for AT&T. This ship was used to conduct the first deep-sea trials of fiber optic cable in 1982. AT&T laid and opened the first fiber-optic cable across the Atlantic in 1988.

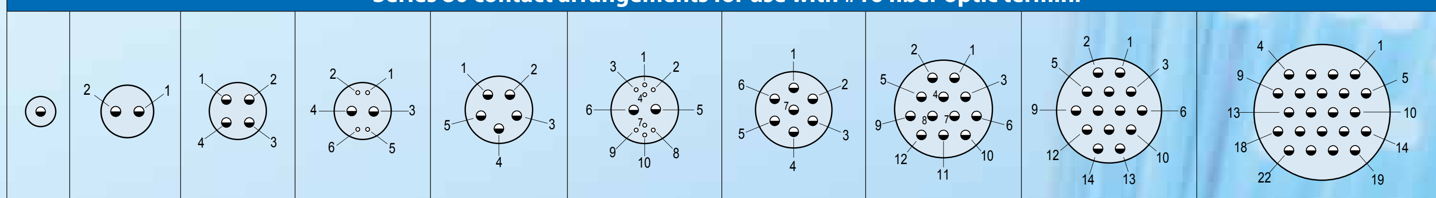
New Glenair High-Reliability Fiber Optic Interconnect Technologies

Series 80 Mighty Mouse Fiber Optic Connectors

Reduce size and weight of interconnection packaging with new Series 80 Mighty Mouse Fiber Optic connectors. Specially designed size #16 fiber optic termini can be used in any standard Mighty Mouse connector for 9/125 singlemode or 50/125 and 62.5/125 multimode fiber. These snap-in, rear-release termini have low insertion loss and are intended for high-reliability aerospace applications. Precision ceramic ferrules and sleeves ensure accurate fiber alignment and typical insertion loss of 0.5 dB. As mentioned, Series 80 connectors offer substantial reductions in size and weight compared to our D38999 type fiber optic connectors. Layouts range from 1 to 22 channels.

Series 801 receptacle with socket terminus and plug with pin terminus

Series 80 contact arrangements for use with #16 fiber optic termini



1 #16	2 #16	4 #16	2 #16, 4 #23	5 #16	2 #16, 8 #23	7 #16	12 #16	14 #16	22 #16

See Series 80 Mighty Mouse catalog for connector ordering information. Order connectors less contacts and order fiber optic termini separately. Cavity numbers are mating face view of pin connectors.

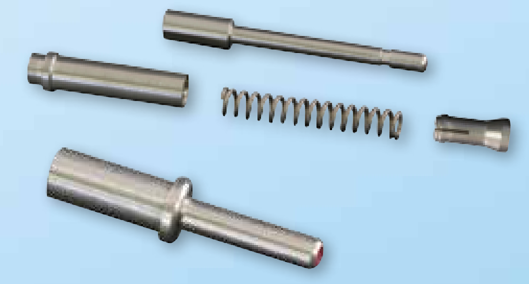
Glenair ARINC 801 Termini

Glenair introduces the new 181-076 ARINC 801 harsh environment optical termini for Multimode and Singlemode applications. Designed and manufactured for compliance with the ARINC 801 standard and to fit into any ARINC 801 cavity, the connector employs a removable sleeve-holder for easy access for inspection and cleaning operations. The Glenair ARINC 801 is ideal for applications requiring high data rates combined with high levels of vibration.

Genderless Fiber Optic Terminus (1.25 mm ferrule) for ARINC 801 Connectors

Glenair Jewel Ferrule Termini Alignment System

Glenair's #16 size Jewel Ferrule Termini employ a synthetic ruby pressed into stainless steel sleeve to enhance end-face polishing while ensuring precision alignment and tight fiber retention. Qualified to Boeing specifications, Glenair's 181-052 and 181-053 jewel ferrule termini are in our Same Day Inventory, bagged, tagged and ready to ship immediately.



Fiber Optic Jewel pin and socket termini for MIL-DTL-38999 Type 16 gauge

Glenair Size 20 Fiber Optic Connection Termini for any MIL-DTL-38999 Type Connector

MIL-DTL-38999 Size 20 pin and socket termini

Glenair designed the new 181-065 and 181-066 #20 size termini for systems designers and engineers to take advantage of standard D38999 insert layouts for fiber optic applications. The new #20 size termini fits into any standard #20 size cavity. Hybrid arrangements are a snap: populate the insert entirely with optical media or mix electrical copper contacts with optical termini for your application. Precision ceramic ferrules and alignment sleeves ensure accurate fiber alignment and typical insertion loss of 0.5 dB.

Eye-Beam™ Fiber Optics

The Glenair Eye-Beam™ contact utilizes an innovative free floating expanded beam lens and ultra high precision ceramic alignment sleeves as well as custom designed terminus bodies to ensure perfect alignment of optical signals and optimal optical performance. Best of all, the Eye-Beam™ can be integrated into virtually any circular or rectangular connector package.

Eye-Beam™ is supplied as either a factory terminated contact pigtail or point-to-point jumper. Pigtail assemblies are supplied in numerous contact formats for use with most high performance, tactical fiber optic connection systems: MIL-DTL-38999, MIL-PRF-28876, GFOCA, and Series 80 Mighty Mouse, and are uniquely suitable for use in hybrid electrical/optical interconnect applications.

Eye-Beam™ fiber optics in a Commital ruggedized, reverse-bayonet connector package

Proven Glenair High-Reliability Fiber Optic Interconnect Technologies

The Glenair MIL-DTL-38999 Series III Type Fiber Optic Connector System

Glenair's unique alignment techniques maximize optical performance and provide reliable, repeatable interconnection of optical fibers. Ferrule design—critical to performance—has traditionally relied upon a machined stainless steel terminus incorporating a precision micro drilled hole. Glenair's unique precision ceramic ferrules, with concentricity and diametric tolerances controlled within one micron (.00004 of an inch), meet the needs of high bandwidth and low allowable insertion loss applications. In fact, Glenair's ferrules are approximately 10 times more accurate than alternative designs, and have reduced insertion loss values from 1.5dB to less than .5dB (typical loss for Glenair termini is .3 dB).

Glenair MIL-DTL-38999 Series III Type fiber optic connectors and MIL-PRF-29504 qualified termini for use in Mil-Aero applications.

Glenair GFOCA hermaphroditic fiber optic connection system is optimized for rapid deployment in rugged field applications.

Glenair GFOCA Hermaphroditic Fiber Optic Connection System

Most commonly used by the army for long-run battlefield communications, the GFOCA Connection System is also well suited to dockside naval communications, down-hole drilling and other harsh environment applications. The hermaphroditic system uses low insertion loss butt-joint termini and a ruggedized coupling mechanism for reliable, repeatable mating. The genderless mating system is rated to 2000 cycles, depending on fiber media selection. GFOCA meets the requirements of MIL-PRF-83526/16 and /17 (draft) and is intermateable with other manufacturers' fiber optic connector systems.

The Glenair High Density (GHD) Fiber Optic Connector System

The Glenair High Density Fiber Optic Connector System is designed for applications that require reduced size and weight as well as outstanding optical and environmental performance. The System accommodates a broad range of singlemode and multimode fiber media, and offers insertion loss values less than .5dB (typical loss for Glenair termini is .3 dB). Dense cavity spacing is achieved with an innovative size #18 genderless Front Release terminus design that provides nearly double the density of standard M28876 and D38999 fiber optic connector series. The GHD system is also available with APC Angle Polish to reduce unwanted backreflection.

Glenair High Density (GHD) F/O connection system, available in multiple materials and platings, for use in both military and ruggedized commercial applications.

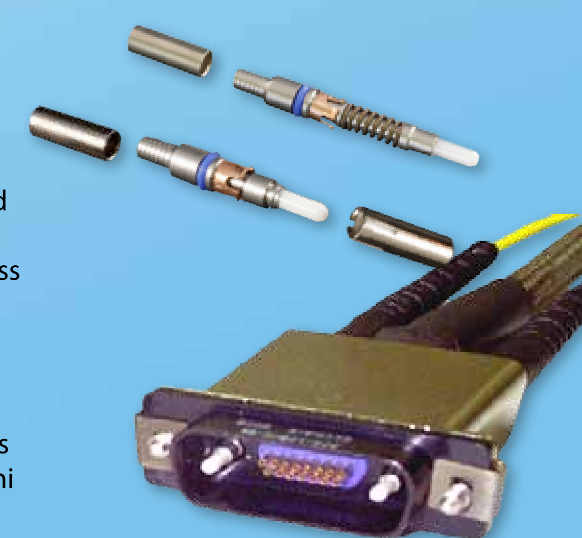
Glenair MIL-PRF-28876 style fiber optic connector and MIL-PRF-29504 qualified termini for use in Naval applications.

The Glenair MIL-PRF-28876 Fiber Optic Connector System

The use of fiber optics in shipboard and ship-to-shore data transmissions is growing rapidly, and the tight-tolerance MIL-PRF-28876 interconnect has become the universal standard for Navy shipboard applications. Glenair's new offering—final QPL expected first quarter 2011—delivers all the necessary performance from precise optical alignment, to environmental protection, corrosion resistance and weight reduction. The Glenair MIL-PRF-28876 connector and terminus is specifically geared for upgrade and retrofit applications where extending system life-cycles and reducing cost of ownership are principle requirements.

Glenair Size 16 Front Release Fiber Optic Connection System

Glenair designed the 181-011 and 181-012 series rear-insertion, front-release fiber optic contacts with retention and environmental sealing components directly on the termini. Termini snap into a machined cavity within the connector, and there's no upper limit on number of fiber cavities. In the unlikely event you break a retention clip or damage an O-ring, both component elements can be replaced without discarding the entire termini or connector. The termini uses precision ceramic ferrule and alignment sleeves coupled with stainless steel contact components. It accommodates all popular fiber sizes from 9/125 micron singlemode to 1,000 micron multimode. Glenair has extensive in-house expertise and capacity to machine custom connector shells (in all standard materials and finishes including aluminum alloy, stainless steel and titanium) to the precise tolerances required in fiber optic connection systems. The size 16 custom termini allows us to do so without costly tooling and engineering charges. Finished custom connector systems perform at insertion-loss levels (less than 0.5 dB) equivalent to other high-performance tactical fiber optic systems such as MIL-DTL-38999 and MIL-PRF-28876.



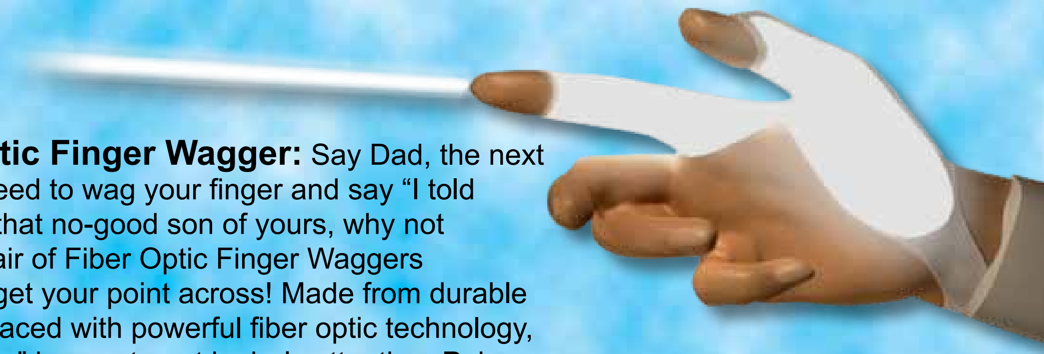
Glenair's size 16 front release custom fiber optic terminus facilitates easy integration of optical media into virtually any connector package.

THE LIGHTER SIDE OF FIBER OPTICS

Fiber optic interconnect systems are serious business at Glenair. But that doesn't mean we don't know a good time when we see it–Like these cool fiber optic related technologies available only to today's most discriminating shoppers.

Fiber Optic Party Blouse: Designed around well-established scientific principles first pioneered with bugs, this high-fashion garment takes its inspiration from Shakespeare's *Merchant of Venice*, "thus hath the candle singed the moth." The attractive, fiber optic-illuminated blouse is guaranteed to attract men (*homo erectus stupidius*) prone to dangerous temptation and calamitous downfall. Comes equipped with two, double-D batteries.

Fiber Optic Pumps: The perfect accessory for blind-dates with dark strangers, these fiber optic enhanced stiletto pumps are also suited for evenings out when you really want to see and be seen—such as a White House reception or that first meeting with your fiancée's parents. These attractive high-heels come equipped with your choice of popular audio "click-n-hear" recordings, such as Crime Mob's *"Rockin' Stilettos"* or The Bats *"Shoeshine."*



Fiber Optic Finger Wagger: Say Dad, the next time you need to wag your finger and say "I told you so" to that no-good son of yours, why not slip on a pair of Fiber Optic Finger Waggers and really get your point across! Made from durable nylon and laced with powerful fiber optic technology, the "Wagger" is sure to get junior's attention. Poke him in the eye for added effect!

Fiber-Optic Cavity Search: Airport security professionals the world over heralded the arrival of new full-body scanners and enhancements to the pat-down process. But technology marches on! Introducing the latest in intrusive, over-reaching, government run, airport security: the fiber optic "CaviScan." Using proven optical examination technology pioneered in endoscope and borescope devices for the medical industry, the CaviScan brings heightened (level-orange and up) security capabilities to even the smallest regional airport. Best of all, the CaviScan is safe for all ages and requires little or no formal training to use.

Fiber-Optic Invisibility Cloak: Old fashioned invisibility technology is passé and only mildly attractive. But cutting-edge invisibility technology developed in Japan is both provocative and potentially quite useful. Potential uses of the emerging technology may include invisibility gloves that allow pie-eating contest participants to enjoy an unobstructed view of their pie, or invisibility curtains that allow shut-ins to see outdoors even when the shades are drawn.

Fiber Optic "Cher Lounging Wig": For those evenings when you just want to stay at home and read a good book, the Cher Lounging Wig* fits the bill. Designed for casual comfort, the Cher brings a soft, warm, glow to "dress-down" evenings at home when "relaxed and comfortable" is the order of the day. You'll find the understated elegance of the Lounging Wig is perfect for those occasions when "you don't really care how you look, but still want to see where you are going." *lounging wig not endorsed by Cher.

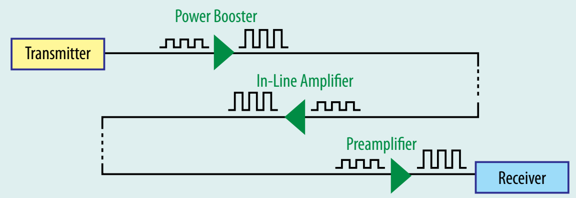
Fiber Optic Vocaloids: Inspired by the band Milli Vanilli--that fans sadly discovered could not sing—the fiber optic generated Vocaloid solves the problem of lead-vocalists who cannot dance or are too unattractive to perform successfully on stage. No longer will fans be subjected to aging or otherwise unattractive images of their favorite vocalists at "live" concerts. The surprisingly lifelike cartoon Vocaloid does it all: singing, dancing, political commentary, you name it. And the Vocaloid never gets tired, never demands a new contract and never gets strung out on addictive drugs.

Fiber-Optic Toothbrush: Ever wish you could both brush and admire your teeth at the same time? Then the "OptiClean" Fiber Optic Toothbrush was made for you. Constructed from sturdy hypoallergenic plastic and approved by the American Dental Association (not really), this fiber optic illuminated tooth brush is a Candle-Power juggernaut, emitting over 300 Lumens per radiated Watt throughout the teeth cleaning process.*

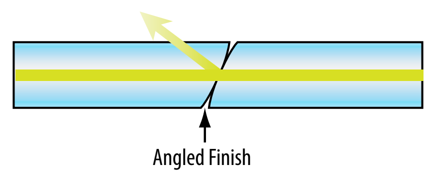
*OptiClean is not intended for use by children and is known to have caused blindness in laboratory tests.

Fiber Optic Illustrated Glossary

Amplifier A device inserted within a transmission path, that boosts the strength of an optical signal. Amplifiers can be placed just after the transmitter (power booster), between the transmitter and the receiver (in-line amplifier), or just before the receiver (preamplifier).

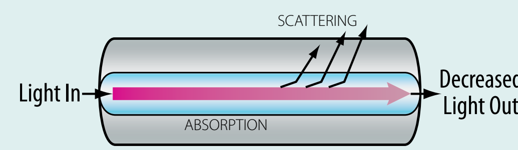


APC Abbreviation for Angled Physical Contact. A style of fiber optic connector with a 5° -15° angle on the connector tip for the minimum possible backreflection.

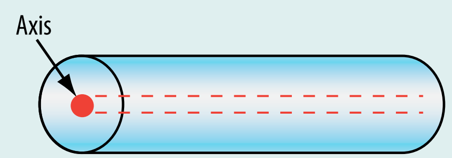


Attenuation Loss or decrease in power from one point to another in a fiber optic cable.

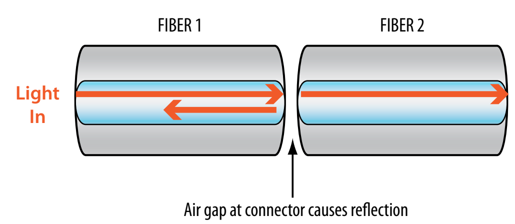
Attenuation Limited Operation The condition in a fiber optic link when operation is limited by the power of the received signal (rather than by bandwidth or by distortion). Attenuation is usually measured in decibels per kilometer (db/km) at a specific wavelength. The lower the number, the better the fiber.



Axis The center of an optical fiber.



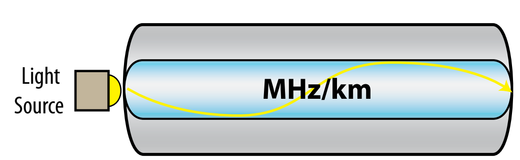
Backreflection (BR) A term applied to any process in the cable plant that causes light to change directions in a fiber and return to the source. Occurs most often at connector interfaces where a glass-air interface causes a reflection.



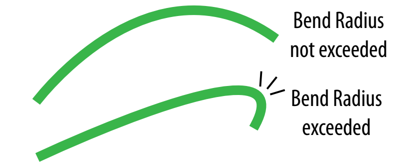
Backscattering The return of a portion of scattered light to the input end of a fiber; the scattering of light in the direction opposite to its original propagation.

Bandwidth The information carrying capacity of an optical fiber, expressed in MHz/km. The measure is dependent upon wavelength and type of light source.

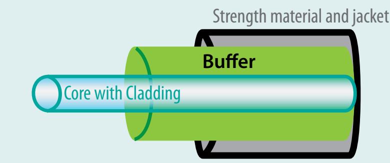
Bandwidth Limited Operation The condition prevailing when the system bandwidth, rather than the amplitude of the signal, limits performance. The condition is reached when modal dispersion distorts the shape of the waveform beyond specified limits.



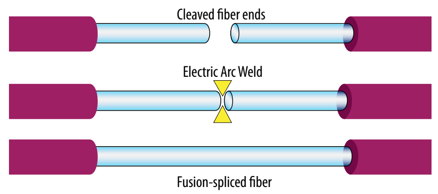
Bend Radius Radius a fiber or fiber optic cable can bend before breaking or suffering increased attenuation.



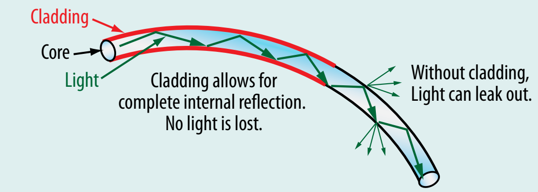
Buffer A protective coating applied directly to the fiber



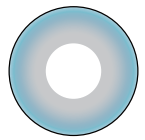
Butt Splice A joining of two fibers without optical connectors arranged end-to-end by means of a coupling. Fusion splicing is an example. Using an electric arc to weld two fiber optic cables together fusion splicing offers sophisticated, computer controlled alignment of fiber optic cables to achieve losses as low as 0.05 dB.



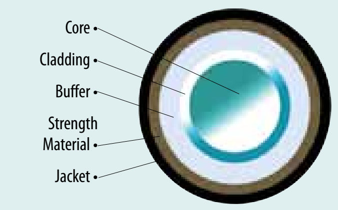
Cladding Material that surrounds the core of an optical fiber. Its lower index of refraction, compared to that of the core, causes the transmitted light to travel down the core.



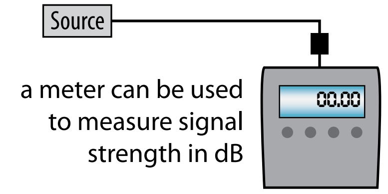
Cleave The process of separating an optical fiber by a controlled fracture of the glass, for the purpose of obtaining a fiber end, which is flat, smooth, and perpendicular to the fiber axis.



Core The light-conducting central portion of an optical fiber, composed of material with a higher index of refraction than the cladding. The portion of the fiber that transmits light.

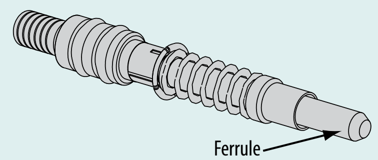


Decibel (dB) Unit for measuring the relative strength of a signal.

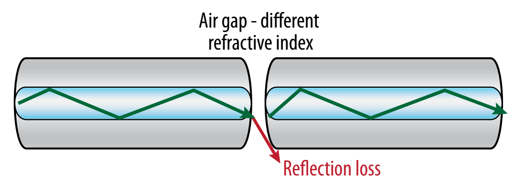


Fiber Optic Illustrated Glossary *continued*

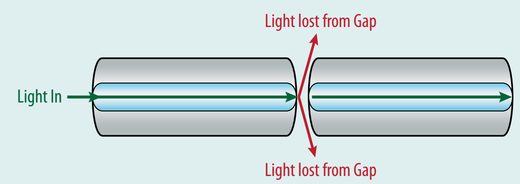
Ferrule A small alignment tube attached to the end of the fiber and used in connector termini. Generally made of stainless steel, ceramics, or zirconia, the ferrule is used to confine and align the stripped end of the fiber.



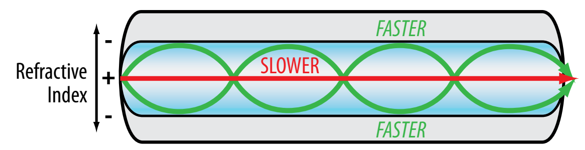
Fresnel Reflection Loss Reflection losses incurred at the input and output points of optical fibers due to the difference in refractive index between core glass and immersion media.



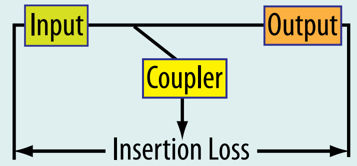
Gap Loss Loss resulting from the end separation of two axially aligned fibers.



GRIN Abbreviation for GRadient INdex. This type of multimode fiber uses a core in which the refractive index gradually decreases from the center of the fiber out toward the cladding. Light rays moving down the center axis advance more slowly than those near the edge, which take a helical curved path, shortening their travel distance. The faster rays at the edge of the fiber arrive closer together with the slower rays from the center, allowing for a signal with less dispersion.

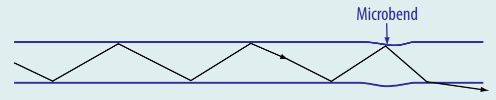


Insertion Loss Attenuation caused by the insertion of an optical component; in other words, a connector terminus or coupler in an optical transmission system.

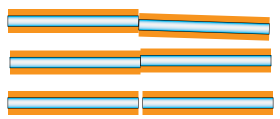


Interferometer An instrument that uses the principle of interference of electromagnetic waves for purposes of measurement. Used to measure a variety of physical variables, such as displacement (distance), temperature, pressure, and strain.

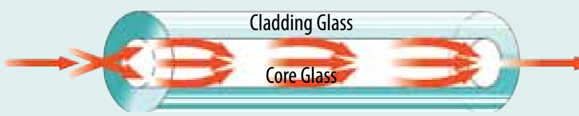
Microbending Mechanical stress on a fiber that introduces local discontinuities, which results in light leaking from the core to the cladding by a process called mode coupling.



Misalignment Loss The loss of power resulting from axial misalignment, lateral displacement, and end separation.

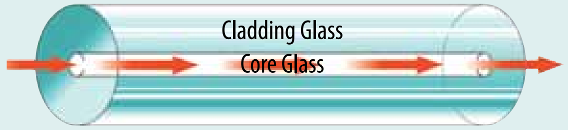


Multimode (MM) Fiber An optical fiber that has a core large enough to propagate more than one mode of light The typical diameter is 62.5 micrometers.



Optical Time Domain Reflectometer (OTDR) Testing system for fiber strands in which an optical pulse is transmitted through the fiber and the resulting backscatter and reflections are used to estimate attenuation and identify defects and the sources of localized losses.

Single-mode (SM) Fiber A small-core optical fiber through which only one mode will propagate. The typical diameter is 8-9 microns.



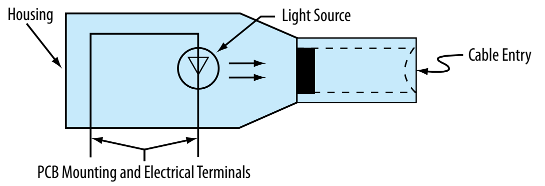
Source The means used to convert an electrical information carrying signal to a corresponding optical signal for transmission by fiber. The source is usually a Light Emitting Diode (LED) or Laser.

Transceiver An electronic device which has both transmit and receive capabilities.

Transducer A device for converting energy from one form to another, such as optical energy to electrical energy.

Transmission Loss Total loss encountered in transmission through a system.

Transmitter An electronic package which converts an electrical signal to an optical signal.



Fiber Optic Cable Preparation and Termination

The Right Fiber Optic Tool for the Job

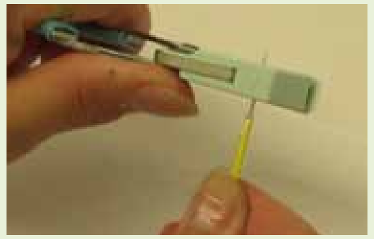
Fiber optic connectors are designed to be connected and disconnected many times without affecting the optical performance of the fiber circuit. The key to this performance is the error-free termination of the contact terminus to the fiber circuit—a task which requires the use of a wide range of specialized tooling. Glenair's extensive experience in building fiber optic interconnect cables has enabled us to select the right tools for each step in the termination and assembly process. Our Fiber Optic Termination and Test Probe Kits allow field technicians the convenience of completing final termination of precision termini on location for easy and efficient cable routing and installation. Each kit contains pin and socket polishing tools, jacket strippers, shears, scribes—literally all the tools and supplies required for ongoing termination and test of fiber optic systems. Polishing tools are also sold separately for factory use or as replacement parts in field termination kits.

The Glenair Fiber Optic Toolkit contains all of the tools you will need for fiber optic termination, plus a laminated card with termination instructions.

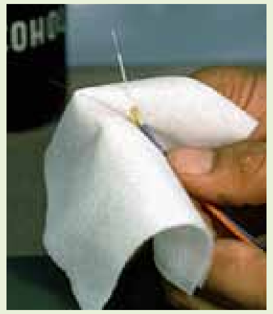
Typical Fiber Preparation

1. Measure and mark cable to desired length
2. Place jacket stripper on mark and squeeze gently until cutter closes
3. Using the tool, gently pull the cut section of jacketing off the cable

4. Mark Kevlar at specified length
5. Cut away excess Kevlar at measured mark with scissors
6. Slide clear heat shrink sleeve over buffer, using it to fold Kevlar back over cable jacket
7. After measuring, place buffer stripper on buffer jacket and squeeze gently until cutter closes
8. Strip buffer in several incremental steps to avoid damaging fiber



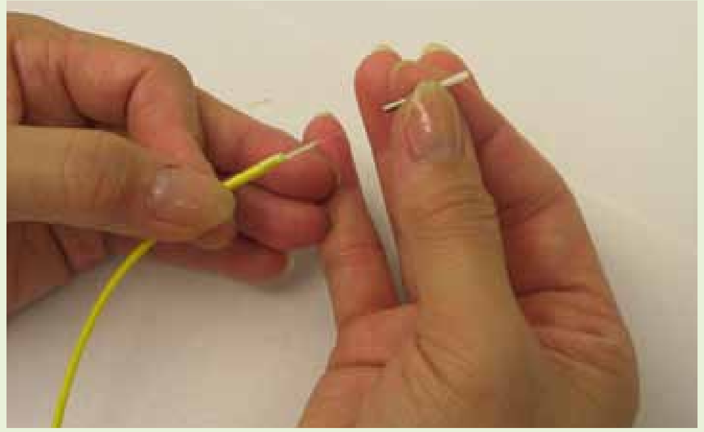
9. Clean fiber thoroughly using a lint-free, alcohol-soaked tissue



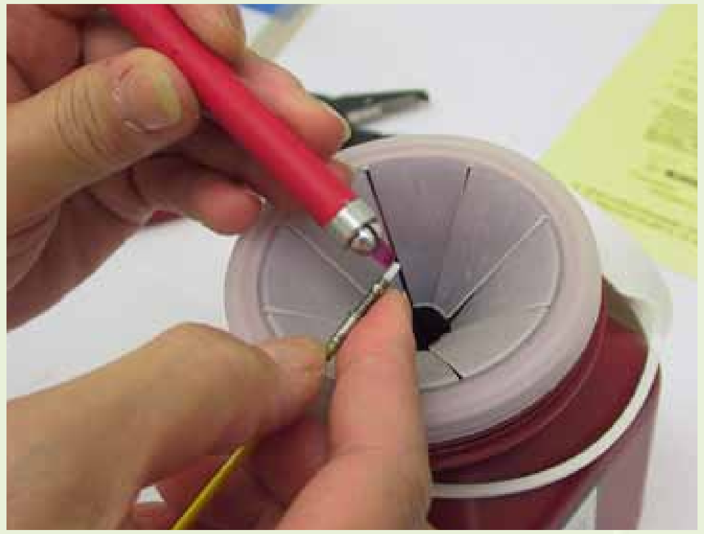
Typical Fiber Optic Cable Termination

1. Remove the separating clip and mix the epoxy thoroughly.
2. Remove syringe plunger and install needle tip
3. Cut open bi-pack and squeeze epoxy into applicator
4. Install plunger into filled applicator and remove air from needle
5. Slowly inject epoxy thru applicator until epoxy appears at the ceramic tip

6. Using a twisting motion, gently insert fiber into the terminus until it bottoms



7. Gently slide clear sleeve over the Kevlar, evenly distributing the Kevlar over the rear body
8. Using a heat gun, shrink the sleeve over Kevlar, securing the cable to the contact assembly
9. Clean any excess epoxy from the rear body with alcohol soaked swab
10. Add a small bead of epoxy to the ferrule transition
11. Heat cure epoxy to appropriate cure temperature and clean with alcohol
12. Cleave excess fiber from termini end



Glenair: The Fiber Optic Experts

With our depth of experience engineering fiber optic interconnect solutions, Glenair has developed all of the tools you will need for accurate fiber optic cable preparation and termination.

Visit our website at www.glenair.com or our youtube channel at www.youtube.com/user/GlenairInc for complete, easy-to-follow instruction videos for every facet of fiber optic preparation, termination, cleaning and testing.

Fiber Optic Inspection and Testing

Patented optical test and measurement system

Traditional optical test harnesses are expensive and easily contaminated in normal use. Glenair's test probe, in conjunction with our precise-mating test adapter, offers a complete solution to optical test and measurement. The probe design offers precision alignment with the use of ceramic ferrules and alignment sleeves. The spring design offers the same termination pressure as the MIL-PRF-29504 terminus. The built-in insertion and removal tool on the test probe allows for quick probing from one channel to the next with repeatable performance. The probe also houses a rubber strain-relief boot to protect the optical fiber from potential bend stress.

Specified by advanced military aircraft programs

The Glenair fiber optic test probe system has become a standard tool for the field testing of fiber optic media in front-line fighter jets and other advanced aircraft. With the upgrading of so many avionic systems to fiber optics, the need for fast and efficient troubleshooting equipment has become paramount. The traditionally heavy and expensive test harnesses of the past are now being replaced with Glenair's lightweight and easy-to-use fiber optic test probes and adapters.

Troubleshooting a shell size 25 MIL-DTL-38999 Series III Connector previously required an expensive test harness with 29 fiber optic terminations. Today, this test assembly has been replaced by Glenair with a single disposable probe jumper and a re-usable connector adapter. The system is now being used in advanced military aircraft programs as well as in naval weapons systems, sonar, video, audio, and a wide range of other military and commercial applications.

1. Attach test probes to light source and power meter

2. Insert probes into test connectors
3. Mate connectors together and 'zero' power meter

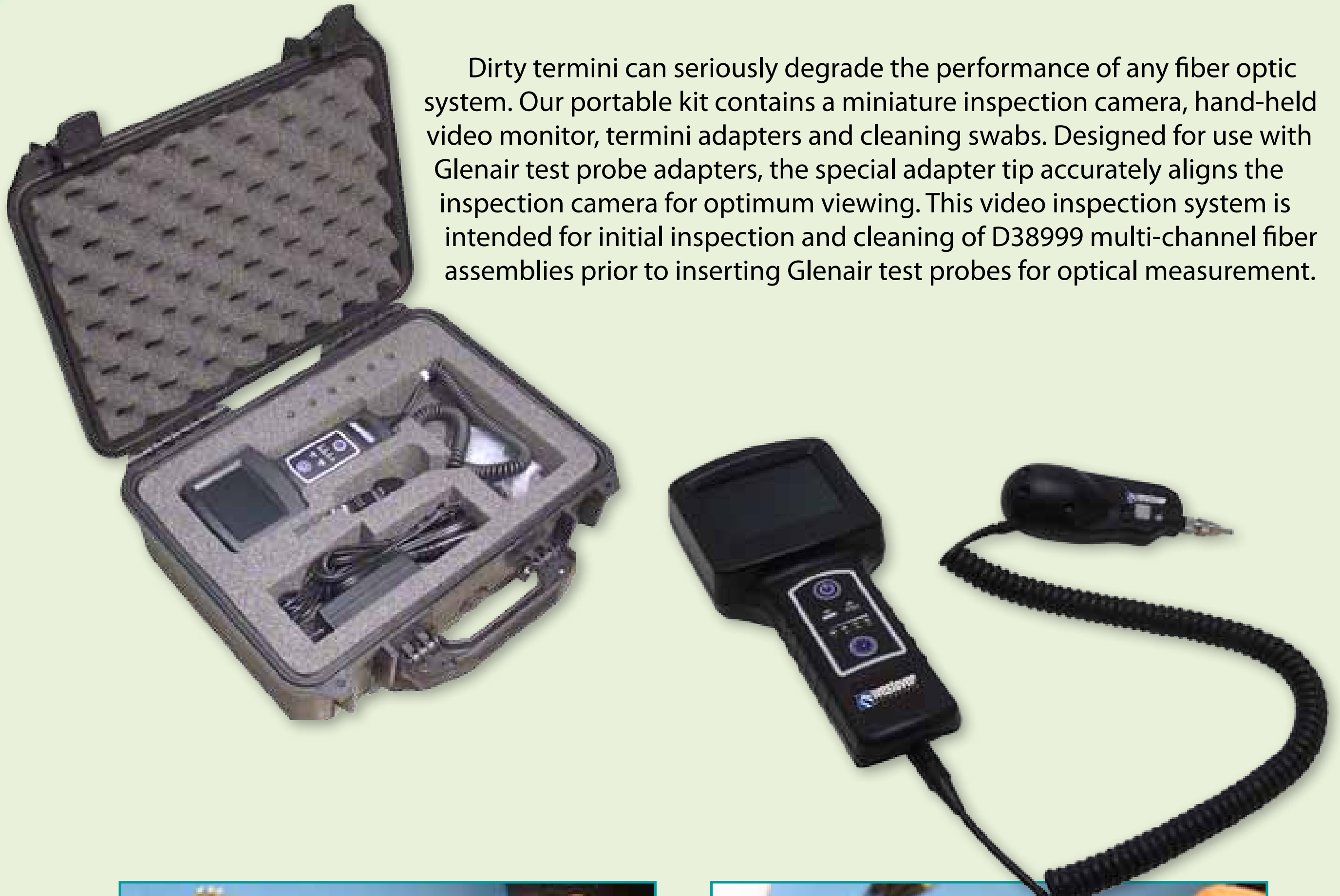
4. Connect the jumper (link) to be tested to the zeroed assembly.

5. With the link in place, a new power reading may be taken

Glenair fiber optic inspection and testing video instruction

For more information on Glenair's patented Fiber Optic Test Probe and Connector Adapter System and complete video instruction, please visit our website at www.glenair.com or our youtube channel at www.youtube.com/user/GlenairInc.

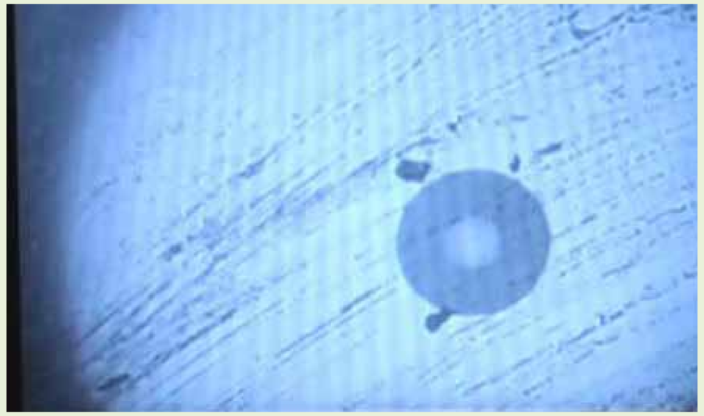
Fiber Optic Cleaning and Inspection Critical for Fiber Systems



Dirty termini can seriously degrade the performance of any fiber optic system. Our portable kit contains a miniature inspection camera, hand-held video monitor, termini adapters and cleaning swabs. Designed for use with Glenair test probe adapters, the special adapter tip accurately aligns the inspection camera for optimum viewing. This video inspection system is intended for initial inspection and cleaning of D38999 multi-channel fiber assemblies prior to inserting Glenair test probes for optical measurement.

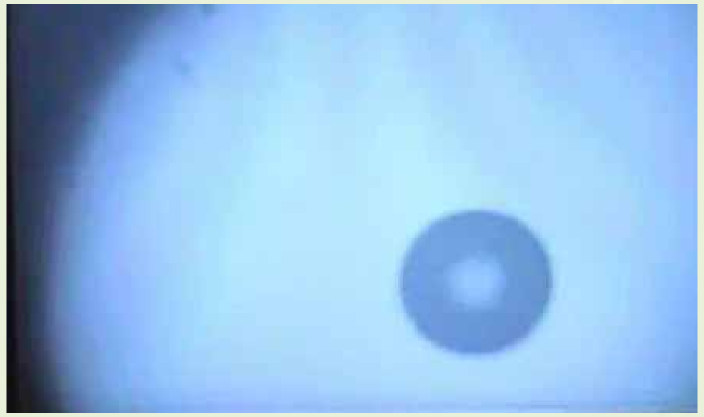
Compressed-air cleaning of a connector face, and swab cleaning of ferrule/fiber end of socket termini

1. Insert termini into video probe to assess cleanliness of termini face



Dirty terminus

2. Remove termini from probe and clean using swabs or auto cleaners



Clean terminus

Glenair Terminus Cleaning

Visit our website at www.glenair.com or our youtube channel at www.youtube.com/user/GlenairInc to see complete, easy to follow step-by-step video instructions to help you clean your fiber optic termini.

Glenair ASAP Fiber Optic Cable Assemblies

The World's Only Short Lead-Time Source for Harsh Environment Overmolded F/O Cable Assemblies

Overmolded Cable Assemblies

Glenair's overmolded cable assemblies are specifically designed to protect fiber optic and hybrid fiber/copper cables from the effects of moisture, heat, caustic chemicals and mechanical stress conditions. Glenair has been manufacturing these unique overmolded designs in fiber since 1984, and has produced tens of thousands of cables with zero real-time failures. Overmolding (as opposed to shrink boots or other sealing materials) brings added strength and environmental protection to critical interconnect systems. The overmolding process effectively isolates the transmission media from contaminating elements and protects the media from abrasion damage.

Glenair's ASAP Overmolded Fiber Optic Assemblies are available with our full line of composite thermoplastic and metal alloy connectors. Polyurethane is the applied standard overmolding, and other overmolding material types such as Viton® or Neoprene are available. These turnkey assemblies allow for rapid prototyping and performance testing of experimental systems as well as meeting the production requirements of short-leadtime applications.

Flexible, Lightweight, Crush Resistant—Everything You've Always Wanted in a Fiber Optic Cable

Standard Conduit Packaging

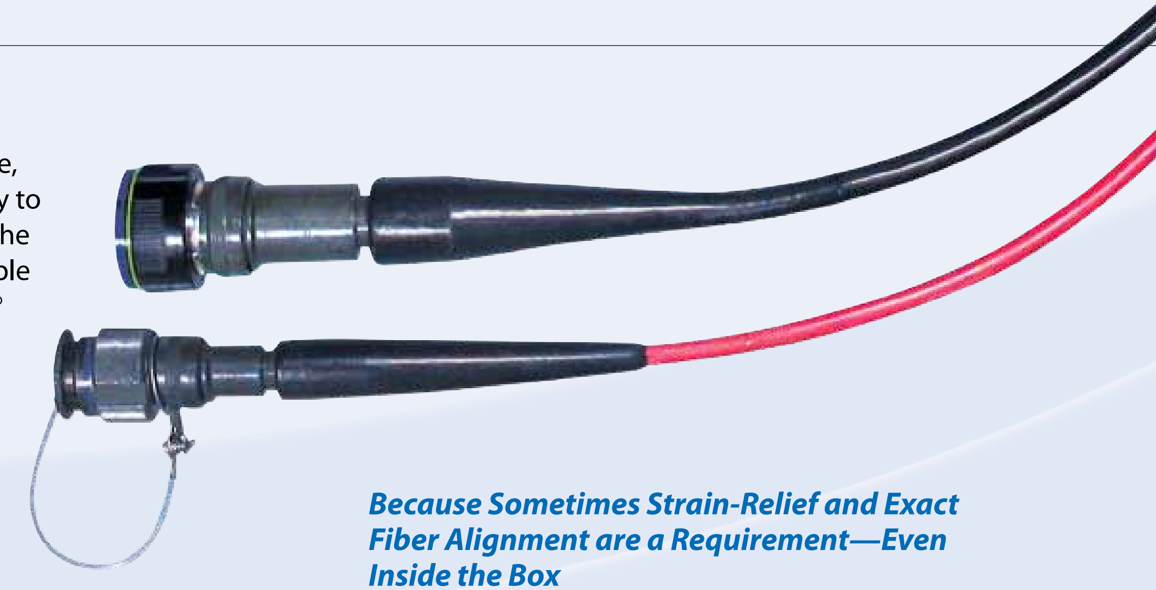
Glenair standard fiber optic conduit assembly includes fiber optic wiring, MIL-DTL-38999 Style Connectors, MIL-PRF-29504 Termini, Mil-Spec Dust-Caps, Conduit Adapter, customer specified marking and labeling and your choice of conduit materials and jacketing. From Teflon® or PEEK convoluted tubing, to brass metal-core conduit with a neoprene jacket and black dacron outer braid covering, Glenair can supply the conduit packaging that best serves your requirements for flexible, lightweight, crush-resistant fiber optic cable.

The Ideal Solution for Combined Environmental Resistance, Field Repairability and Kevlar® Termination

Reinforced Cable/Backshell Assemblies

Reinforced, extruded cable is an ideal packaging option for rugged application environments, and Glenair can extrude fiber optic cable for most high-performance applications. But while the cable is the backbone of this packaging solution, Glenair's ruggedized backshell is the component which gives the assembly its real functionality. The backshell allows for the convenient termination of cable shielding and/or the Kevlar® strength member. Unlike other backshell designs,

Glenair provides a complete fiber optic interconnect solution: a composite junction box, conduit, fittings, fiber optic connectors and termini. The box doubles as environmentally controlled storage for additional fiber optic cable.



Glenair's assembly uses a simple, easy to use banding technology to terminate cable shielding and the Kevlar material used in fiber cable extrusions. The Glenair Band-It® technology is fully tested and proven to meet pull strength requirements and is the quickest and most reliable way to terminate these materials. The Glenair backshell also provides additional strain-relief and environmental protection of the cable to connector transition with it's unique Flex-Nut style fitting. And unlike overmolded solutions, the reinforced extruded cable/backshell package allows maintenance technicians to open the cable for field service.

Backshells are selected for functionality (strain-relief, shield termination, and so on) and for material compatibility with the chosen connector.

Glenair Terminated and Optically Tested Receptacle/Pigtail Assemblies Are Ready When You Are

Inside-the-Box

The packaging and layout of a fiber optic interconnect assembly can vary widely depending on the application environment. Fiber optics deployed in military avionics, for example, may take the form of a Mil-Spec receptacle and simplex pigtail connector assembly when fiber is used to interconnect the optical transmitter/receiver inside an equipment enclosure to the outside world. When fiber leads are used within equipment enclosures or other protected environments, the interconnect assembly generally contains a wall mount or jam nut mount receptacle connector with simplex fiber leads. The receptacle connector is used to penetrate the enclosure and mate to the external environmental plug connector. The simplex leads within the protected enclosure commonly route to the transceiver optical device, and are terminated to common commercial connectors such as ST, FC, SC, LC (or other) connectors at the "B" end. Glenair *ASAP* Receptacle/Pigtail Fiber Optic Assemblies are ideal for applications of this type, and are available with accelerated lead-times.

Because Sometimes Strain-Relief and Exact Fiber Alignment are a Requirement—Even Inside the Box

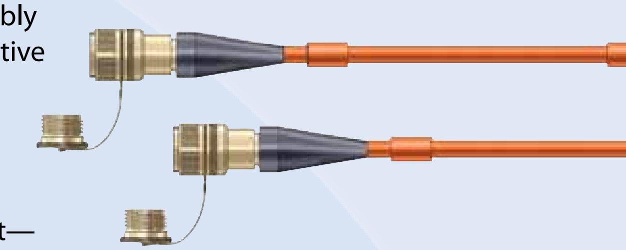
The Glenair FiberCon® Backshell Assembly

Glenair can supply receptacle/pigtail assemblies with a FiberCon® Backshell that protects fiber terminations and insures exact alignment of the fiber optic termini. The grommeted backshell design prevents micro-bending of the fibers while providing optimum strain relief to the overall cable. The unique design is available only from Glenair and is available as a component part of this ASAP cable assembly.

The Perfect Amount of Mechanical Protection for Fiber Media in Non-Environmental Applications

Protective Conduit

The use of a short length of conduit and a low-profile connector/conduit adapter is recommended in applications where a heat or abrasion source within the box may damage the fiber media. In most cases, analysis of the available space is critical to insure the additional interconnect hardware does not interfere with the electronics package inside the box. The packaging of a pigtail assembly with a protective length of conduit is appropriate for all types of equipment—such as radar units, cameras, shipboard consoles, antennas and so on—in which the routing of the fiber cable within the equipment enclosure may expose the media to damage. This Glenair *ASAP* Fiber Optic Pigtail Assembly is well suited whenever the prevention of damage to the fiber media inside the box is a design requirement.



Custom Fiber Optic Cable Harness Designer's Guide

In addition to our wide range of ASAP Fiber Optic Cable Assemblies, Glenair's expert technical engineering staff can work with you to design special purpose fiber optic cable harnesses. This Designer's Guide is a useful first step in the "build-to-print" cable harness specification process. Contact your local Glenair Sales Engineer or the Factory at 818-247-6000 to get started on your cable harness project.

Originator: ____________________

Phone Number: ____________________

Title of Assembly ____________________

Project/Program ____________________

Working Environment:

☐ Shipboard
☐ Airframe
☐ Avionics
☐ Secure Communications
☐ Ground Support/Soldier System
☐ Armored Vehicle
☐ Rail/Mass Transit
☐ Space
☐ Missile Defense
☐ Telecommunications
☐ Industrial
☐ Downhole or Surface Use
☐ Other

Basic Harness/Assembly Description:

☐ Open Wire Harness
☐ Repairable/Jacketed
☐ Overmolded (MIL-M-24041 Materials)
☐ Metal/Fabric Overbraided
☐ Conduit

Optical Fiber Requirements:

☐ Number of F/O Lines________
☐ Single-Mode
☐ Multi-Mode
☐ Acceptable Optical dB Loss
  ☐ < .5 dB
  ☐ < 1.0 dB

Special Considerations:

☐ Space-Grade
☐ RoHS Compliant Materials
☐ Extreme Temperature Tolerance
☐ UL94-VO Flammability
☐ UV Resistance
☐ Field Repairability
☐ Crush/Abrasion Resistance

Alternative Wire Protection Media:

☐ High Flexibility Convoluted Tubing
☐ EMI/EMP Metal-Core Conduit
☐ Molded Shrink Boots
☐ Junction Boxes and Cable Bays

Cable Specifications

Fiber Size (Multimode)

☐ 50/125 µm
☐ 62.5/125 µm
☐ 100/140 µm
☐ Other

Fiber Size (Singlemode)

☐ 9/125 µm
☐ Other

Temperature Requirements:

Operating: - °C_____ +°C
Storage: - °C_____ +°C

Optical Performance:

☐ < .5 dB
☐ <1.0 dB

Is Return Loss (Back Reflection) a Concern?

☐ Yes ☐ No
If Yes, Specify Desired Performance Value: _______ dB

Operating System Wavelength

☐ 850 nm ☐ 1310 nm ☐ 1550 nm

Application Specifications

Cable Installation

☐ Internal-to-Equipment

Strain relief:

☐ Not Applicable
☐ Light Duty
☐ Medium Duty
☐ Heavy Duty
☐ Gorilla Proof

Level of Environmental Protection

☐ Not Applicable
☐ Moisture Resistance
☐ Full Water Immersion
☐ Chemical/Caustic Fluid Resistance
☐ Extreme Corrosion Resistance
☐ Intense Atomic Radiation

Assembly Length Requirements

☐ Less than 10 Meters
☐ 10 to 150 Meters
☐ More than 150 Meters

Special Considerations

☐ Weight Reduction Required
☐ Field Repairability Required
☐ Size or Shape Restraints as Specified:

List the non-Glenair connectors used in this project, including connector interface designators, if known:

____
____
____
____

List jacket/sheath or other wire/fiber protection materials such as conduit, including material type and brand:

____
____
____
____

Fiber Optic Termination Assembly

Connector:

☐ Jam Nut or ☐ Square Flange or ☐ Plug
☐ Pin ☐ Skt ☐ Genderless ☐ Contact Qty____

MIL-DTL-38999 Style____________________
Eye-Beam™ ____________________
Series 80 Mighty Mouse ____________________
GHD High Density ____________________
MIL-PRF-28876 ____________________
Next Generation (NGCON)____________________
GFOCA Hermaphroditic ____________________
Custom Connector ____________________
Termini Part No. ____________________
Dust Cover: ☐ Yes ☐ No

Fiber Optic Breakout Assembly

A Connector:

☐ Jam Nut or ☐ Square Flange or ☐ Plug
☐ Pin ☐ Skt ☐ Genderless ☐ Contact Qty____

MIL-DTL-38999 Style____________________
Eye-Beam™ ____________________
Series 80 Mighty Mouse ____________________
GHD High Density ____________________
MIL-PRF-28876 Style ____________________
Next Generation (NGCON)____________________
GFOCA Hermaphroditic ____________________
Custom Connector ____________________
Termini Part No. ____________________
Dust Cover: ☐ Yes ☐ No

B Connector:

ST Connector ____________________
FC Connector____________________
SC Connector ____________________
SMA Connector ____________________
LC Connector____________________
Other ____________________

"Fly-By-Light" with the Joint Strike Fighter

One of the most significant Glenair Fiber Optic success stories is the F-35 Joint Strike Fighter (JSF) in development for the US Air Force, Navy and Marine Corps, as well as the UK Royal Navy. Led by Lockheed Martin, with international partners that include Northrop Grumman, BAE Systems, General Electric, Rolls-Royce, Hamilton Sundstrand, Vision Systems, Harris Advanced Avionic Systems, Honeywell, Moog and others, the JSF is being built in three forms: conventional take-off, carrier take-off, and short take-off and vertical landing. These fighter jets feature some of the world's most sophisticated and complicated systems for avionics, communications, navigation, targeting, countermeasures, and helmet display.

Glenair has considerable interconnect content designed into the JSF, including many backshells, connectors and cable assemblies. But most relevant to this story is Glenair's High-Reliability Fiber Optic Technology serving the new JSF. Fighter plane conditions are severe, and Glenair Fiber Optic products are well suited for the circumstances. Temperature shifts of +125°C in deserts to -65°C at 30,000 feet within only a few minutes, call for high-reliability solutions. Weight limits and tight spaces for components within the wing, tail and cockpit dictate small, lightweight and compact packaging. Glenair MIL-DTL-38999 style tight-tolerance fiber optic connectors in lightweight, but extremely rugged, composite thermoplastic are a perfect match for these temperature and restricted space requirements. Electromagnetic compatibility was specified because placement and routing put electronics near magnetic interference generators such as engines and high-frequency computer equipment. Glenair Fiber Optic technology, immune from electromagnetic interference, is ideal for these EMI environments. Reliability is also crucial. As the JSF is a single-seat aircraft, the flawless performance of the interconnect system is vitally important to help the pilot carry out his or her mission.

Early in the JSF program, fiber optic interconnection was handled by modifying MIL-DTL-38999 electrical connectors for use with fiber optic contacts. Higher bandwidth and tighter tolerance requirements drove Glenair to develop specific MIL-DTL-38999 style fiber optic connectors with tighter dimensional control of connector keys and keyways and other dimensional stability needs of fiber. The Glenair MIL-DTL-38999 style connector established true positioning of cavities with extremely accurate termini retention clip location.

The JSF uses Glenair MIL-DTL-38999 style tight-tolerance fiber optic connectors (well over 100 part numbers in this connector family are available for immediate shipment from our Same Day Inventory program), and Glenair MIL-Qualified 29504/4 and /5 termini (these MIL-Qualified termini and their COTS equivalent part numbers are also available from our Same Day Inventory program). Glenair-built fiber optic cables connect critical systems throughout the Joint Strike Fighter.

To keep these fiber cable assemblies and other fiber lines running at top performance, regular testing is required. The standard way to test for contamination or scratches on fiber end faces and termini is to use a complicated test harness. This testing process can be time-consuming and expensive. Thanks to Glenair's Test Probes, Adaptors, Calibrators, and Handheld Inspection Systems, all in use on JSF, evaluation of fiber and termini condition can be handled on the plane instead of in the lab or back at the factory. Cables are tested and cleaned in place, saving hours of removal and reinstallation time.

Glenair is proud to have been chosen to "light up" the Joint Strike Fighter with our extensive family of fiber optic connectors, termini, cables, and test equipment.

Many front-line fighter aircraft are now integrating fiber optic media into their avionic, flight control and computer systems. The advantages include EMI immunity and of course reduced size and weight. The ability to more easily accommodate future bandwidth requirements as well as the ability to incorporate redundant fibers for improved safety and reliability are important additional consideration.

Glenair is the only manufacturer of tactical fiber optic interconnect systems to commit resources to produce such a broad spectrum of connection systems, backshell accessories and assembly tooling. The high-reliability interconnect systems we produced for the Joint Strike Fighter exactly meet the requirements of the U.S. Air Force, Navy, and Marines as well as the U.K. Royal Navy. They also demonstrate Glenair's capability to "over-serve" our customers with outstanding product designs, customer service and product availability.

Living Life Backwards

I'd like to begin 2011 with a question for all our *QwikConnect* readers: What is the single most important ingredient in any human relationship? This isn't a trick question, but few people get it. The answer is trust. Trust is the foundation, the single most important ingredient in human interaction. Trust is like the air we breathe. When it's there we hardly notice it. But when it's missing, we all start struggling, gasping and heading for the exits.

At Glenair, we talk a lot about win/win relationships. The win/win is an honest, trustworthy, fair, long-term deal, viewed in any direction. The needs and aspirations of all parties are considered and honored. The win/lose? Short-term self-interest dominates, and before you know it, grabbing, dishonesty and breach-of-trust creep in. In a win/lose deal somebody always winds up unhappy.

"Win/Win" deals, based as they are on honest and fair dealing, leave us in high standing with our associates: trusted, valued, and well positioned for tackling the next problem or opportunity. And as any good business manager knows, it's the next deal, and the next, and the next that translate to real success.

The 19th century Danish philosopher Soren Kierkegaard said,

"A life can only be understood backwards, but it must be lived forwards."

Kierkegaard's observation is one of humanity's most important. Most businesses leaders, it seems to me, rarely pause to consider life or business "backwards." They often succumb to the temptation to take advantage of the other guy, to grab that prize right now, to disregard any long-term consequences. It feels natural, it feeds our competitive juices, but does it build trust? Kierkegaard understood that it's only at the end of the road that we get to view the totality of our life-actions and enjoy (or regret) the results.

Herb Kelleher of Southwest Airlines got it right when he said,

"Put your people first. If you treat them right, they'll treat the customers right. The customers will then come back, and come back, and that will make the shareholders happy."

This is a business philosophy worth emulating, and certainly one which will build that most precious of all business commodities: trust.

Chris Toomey

QwikConnect

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