Rugged Fiber Optic CONNECTORS

Five key reasons OEMs choose Glenair fiber optics

1 Massive factory capacity and capability

WHY CHOOSE GLENAIR FIBER OPTICS?

Glenair's Southern California facility houses—under one roof—the largest and most professionally staffed mission-critical fiber optic interconnect manufacturing and assembly operation in the world.

Glenair qualified MIL-PRF-28876 fiber optic interconnect system

MASSIVE CNC MACHINING CAPACITY

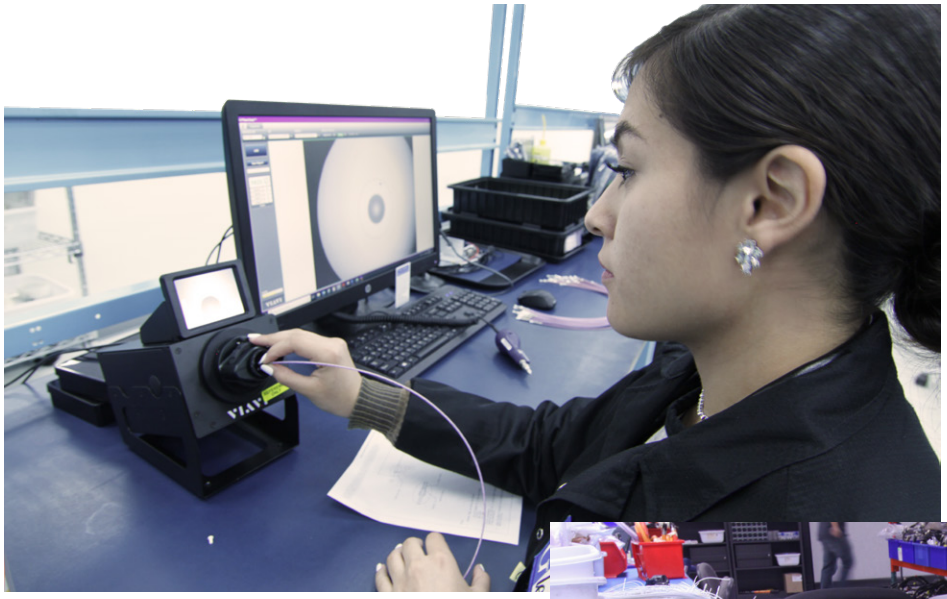
The high-reliability interconnect industry's largest precision metal turning operation.

PRECISION POLISHING, TERMINATION, AND ASSEMBLY

Glenair harsh-environment fiber optic connectors, cables, and termini are precision-polished and terminated by trained and certified professionals.

1. Unmatched Factory Capacity and Capability

Glenair delivers the fastest, highest-quality turnaround on production orders in the high-rel interconnect industry



INSPECTION AND TEST

Each and every fiber optic circuit is 100% tested and inspected prior to shipment.

SMALL-VOLUME, HIGH-TOUCH

Glenair's fiber optic team can accommodate both large volume orders as well as the many small-volume requirements common in mil-aero and harsh-industrial markets.

MASSIVE INVENTORY

Glenair's ability to respond quickly to customer requirements is uniquely met by our massive inventory of both component stock as well as ready-to-ship fiber optic interconnects, termini, and cables.

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2 F/O systems optimized for harsh environments

WHY CHOOSE GLENAIR FIBER OPTICS?

Glenair fiber optic interconnects carrying digitized video, voice, and data are broadly deployed in harsh application environments including aircraft avionics, military ground systems, shipboard weapon platforms, sub-sea sensors, satellite communications, and other mission-critical platforms. Highly engineered fiber optic termini, tight-tolerance connectors, and turnkey cable assemblies are optimized by Glenair to meet each environment's unique requirements and deliver reliable, repeatable, low-data loss performance.

Glenair High Density (GHD) fiber optic connection system

Military AEROSPACE

- **SuperNine MIL-DTL-38999 type with M29504 termini**
- **Glenair High Density (GHD) with keyed genderless termini**

- Low mass
- Dynamic vibration and shock resistance
- Extreme temperature resistance
- Environmentally sealed
- Corrosion resistance
- Flammability, toxicity, low-smoke
- Indirect lightning strike
- Ease-of-maintenance
- Uncompromised reliability

Commercial AEROSPACE

- **Series 806 Mil-Aero micro miniature with size #20HD termini**
- **ARINC 801 series genderless termini for D38999 type and other commercial aerospace grade connectors**

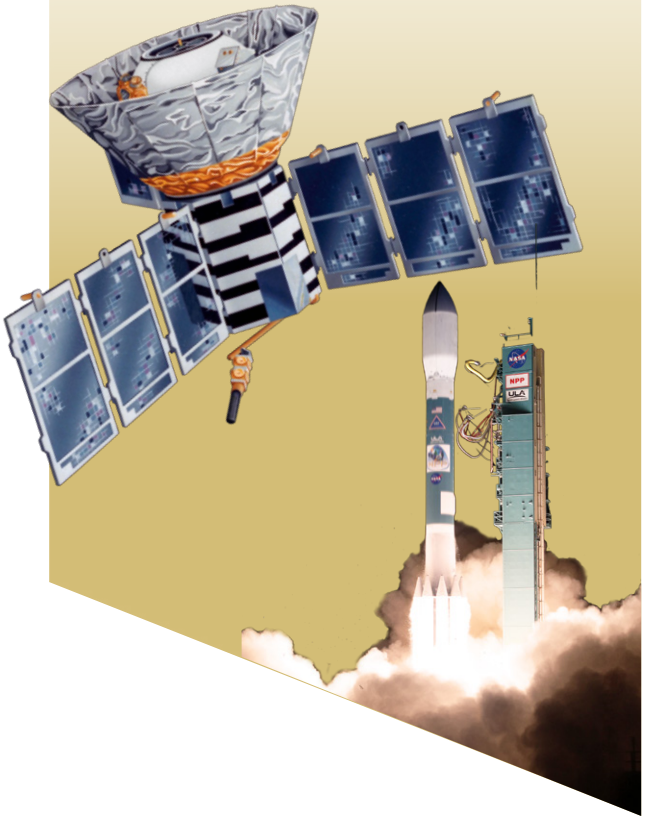
- Dynamic vibration and shock resistance
- Extreme temperature resistance
- Environmentally sealed
- Pressurized and non-pressurized zones
- Corrosion-resistance
- Flammability, toxicity, low-smoke
- Indirect lightning strike
- Ease-of-maintenance
- Uncompromised reliability

2. Land, Sea, Air, and Space Performance

High-performance, low-dB loss F/O interconnects optimized for rugged environmental applications—military and commercial

SPACE and Satellites

- **Glenair signature ruggedized MT ferrule-equipped connectors**
- **Eye-Beam™ POWER expanded-beam for Free Space Optical applications**



- Low mass
- High channel density
- Dynamic vibration and shock resistance
- Temperature Extremes
- Outgassing certifications
- Radiation hardened / tested
- Non-magnetic
- Flight heritage
- Uncompromised reliability

NAVAL, Marine/Subsea

- **MIL-PRF-28876 QPL shipboard fiber optic connectors**
- **SeaKing 700 Fiber high-pressure 10K PSI open-face rated subsea**

- High channel density
- Dynamic vibration and shock resistance
- Environmentally sealed
- Pressure resistance
- Corrosion resistance
- Flammability, toxicity, low-smoke
- Ease-of-maintenance
- Uncompromised reliability

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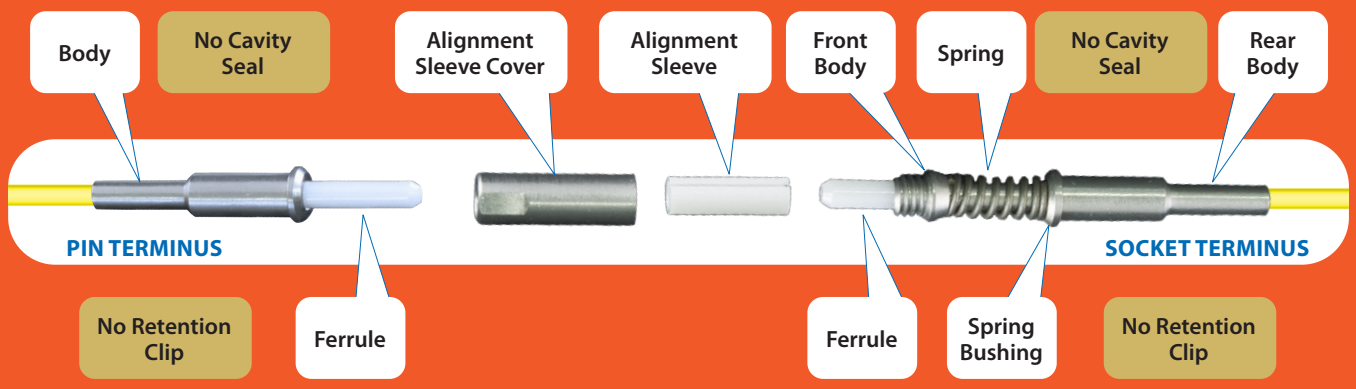
3 Low-loss and low maintenance termini

Butt-joint fiber optic termini and connector designs can be broken into two major categories. Rear-release termini are typically designed for use with connector housings that were originally conceived as electrical connectors – such as the MIL-DTL-38999 Series III – with contact retention and environmental sealing integral to the connector insert design. Front-release termini, on the other hand, integrate environmental O-ring sealing features and termini retention clips directly into the terminus body itself, allowing for higher density (more termini per connector). Certain Glenair front-release fiber optic connectors (Glenair High Density, GHD) also offer easier keying for APC polish applications in a front-release design.

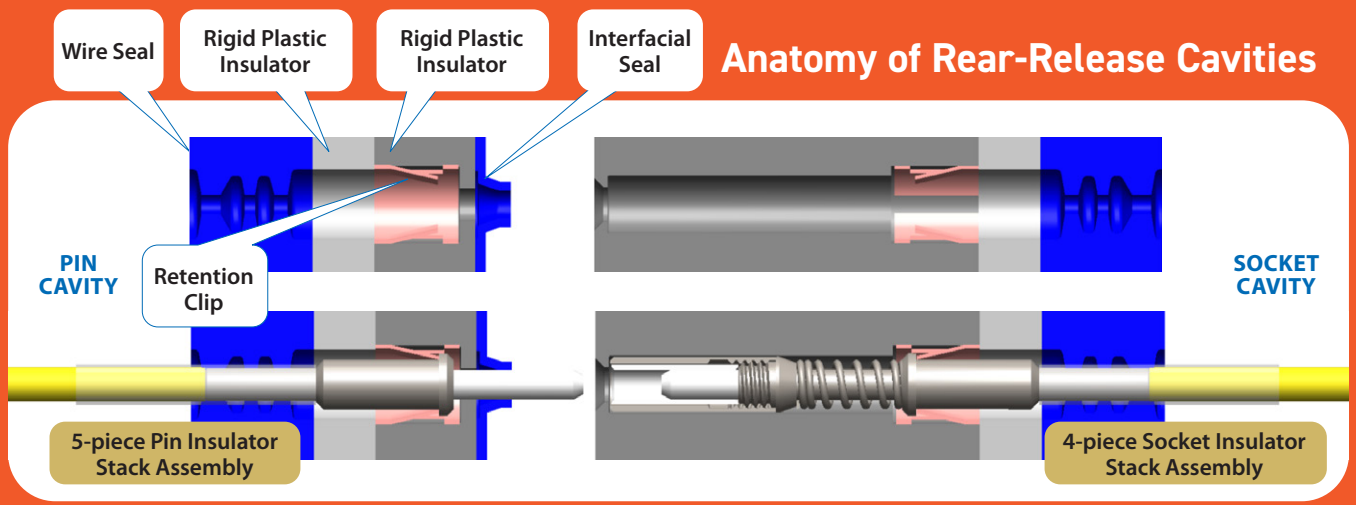
MIL-DTL-38999 type with qualified M29504 fiber optic termini

Anatomy of Rear-Release Optical Termini



M29504/04 Pin and M29504/05 Socket Termini for US Navy Avionics Applications

Anatomy of Rear-Release Cavities

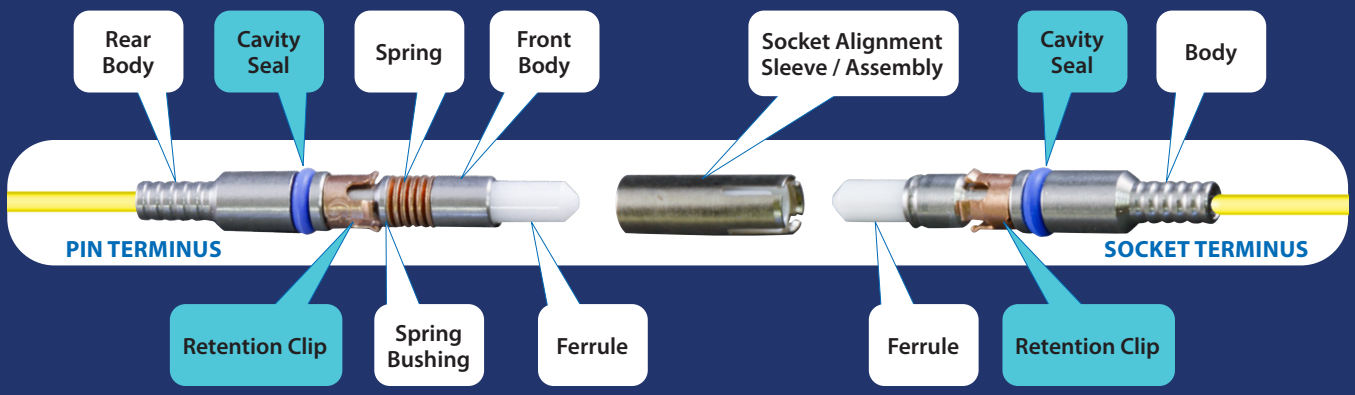


D38999 Series III Size 16 Pin and Socket Cavities for US Navy Avionics Applications

3. Innovative Termini Designs

Low-dB loss front-release, rear-release, and expanded-beam termini deliver reliable, low-maintenance performance

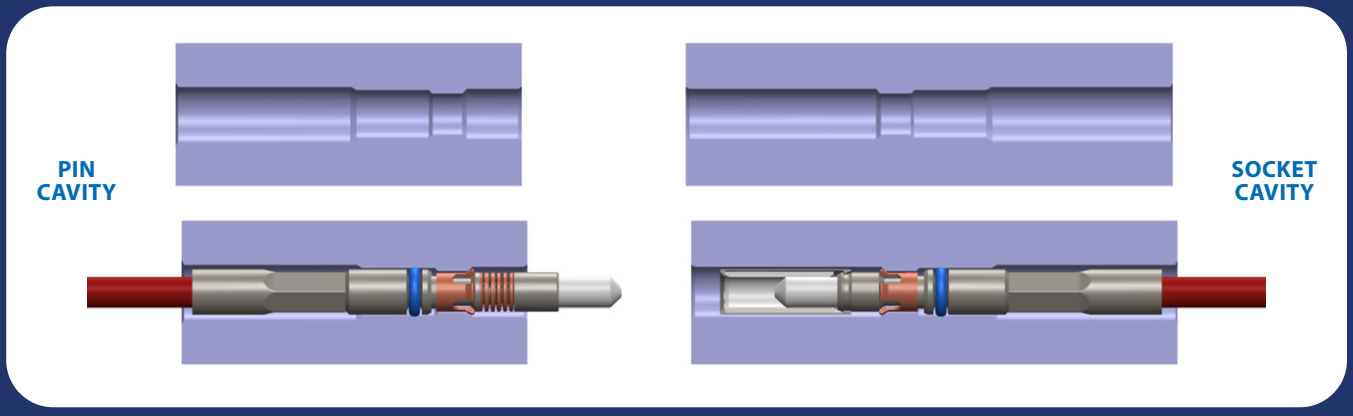
Anatomy of Front-Release Optical Termini



M29504/14 Pin and M29504/15 Socket Termini for US Navy Shipboard Applications

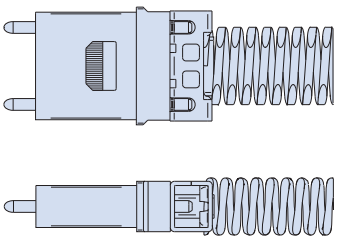
One-Piece Pin and Socket Inserts

Anatomy of Front-Release Cavities

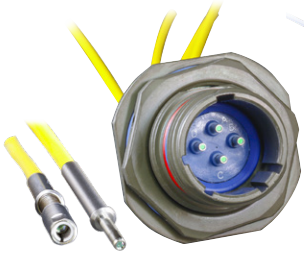


M28876 Pin and Socket Cavities for US Navy Shipboard Applications

OTHER GLENAIR SIGNATURE LOW dB LOSS TERMINI DESIGNS AND APPLICATIONS



Glenair signature ruggedized packaging for MT ferrules



Innovative GRIN-lens expanded beam termini

Eye-Beam Power drop-in size #8 termini for FSO applications

Sr. 806 micro form-factor (size #20HD) optical termini

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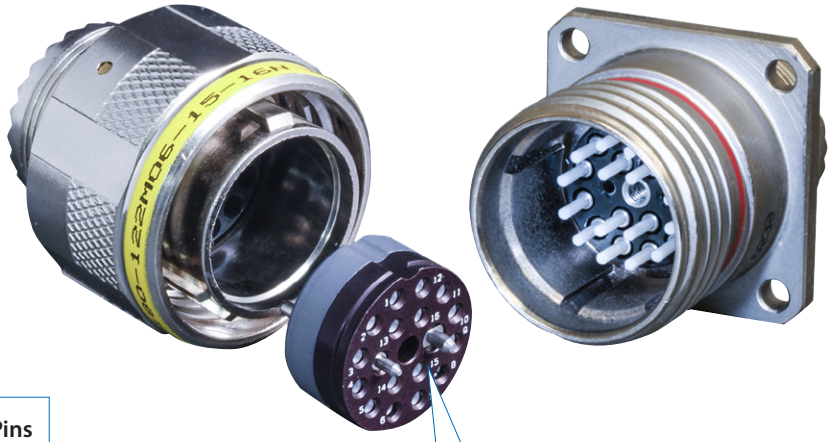
4 Next-gen connector package designs

In addition to standard environmental stress factors (moisture and dust ingress), there are two mechanical stress factors that are particularly important to consider when designing butt-joint (or physical contact) fiber optic connectors: vibration and shock resistance. This is because the weight of vibration and shock is felt exactly where "repeatable and reliable performance" is most readily compromised—at the fiber optic termini mating interface. The effects of vibration in a cable can best be visualized as a wave on a rope, with the highest concentration of stress occurring at the end point or termination. Over the last 40 years of fiber optic interconnect system design and manufacture, Glenair has mastered the art of building both circular and rectangular fiber optic connectors and insert assemblies housing butt-joint termini that are capable of resisting the highest levels of military and aerospace application vibration and shock.


Series 806 Mil-Aero micro miniature with size #20HD termini

SPOTLIGHT ON GLENAIR GHD HIGH VIBRATION AND SHOCK CONNECTOR AND INSERT PACKAGING OPTIMIZED FOR RELIABLE AND REPEATABLE LOW dB LOSS PERFORMANCE

GHD's shell-to-shell bottoming enables mating insert cavities to "square up" to each other in a repeatable manner, ensures consistent spring force at working height, and prevents movement between mating connectors during harsh shock and vibration exposure. The connector interface is sealed with a piston-style O-ring seal for robust environmental protection.



Removable Alignment Sleeve Retainer with Guide Pins

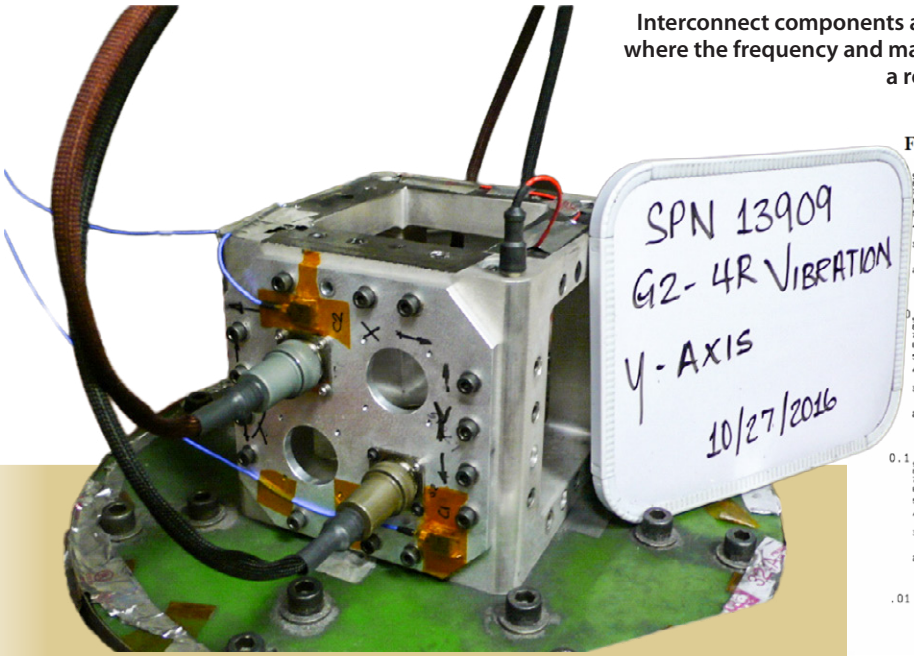
Guide pins facilitate repeatable optical performance by ensuring alignment between mating cavities. Threaded-coupling connectors without guide pins can "sweep" relative to each other when torqued. Misaligned cavities will force the split ceramic alignment sleeve to work harder to bring mating termini into alignment. Stressed alignment sleeves can expand (and possibly break), resulting in high optical loss.

SUMMARY OF GHD SERIES CONNECTOR PACKAGE DESIGN ELEMENTS

- Low mass
- Dynamic vibration and shock resistance
- Extreme temperature resistance
- Environmental sealing
- Corrosion resistance
- Flammability, toxicity, low-smoke rated
- Removable alignment sleeve for ease-of-maintenance
- Uncompromised reliability

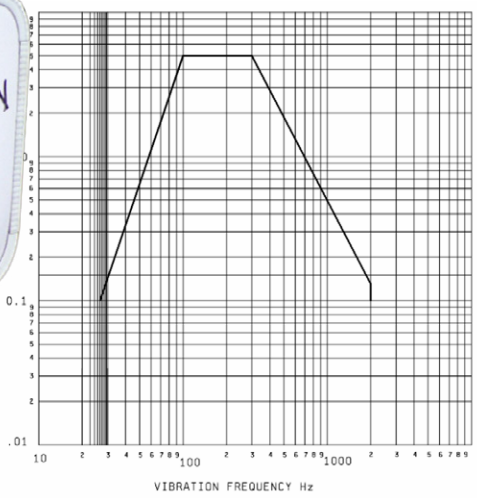
4. Next-Gen Connector Package Designs

Connector shells and coupling mechanisms optimized for resistance to vibration, shock, and environmental stress factors

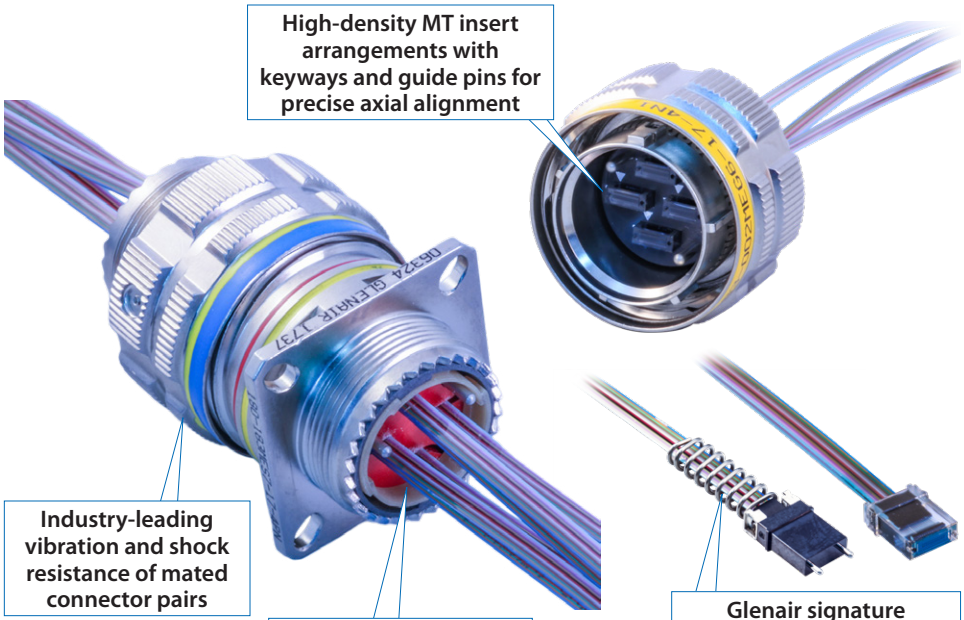


Interconnect components are aggresively tested for *random vibration,* where the frequency and magnitude vary with time—like a car riding on a rough, bumpy road.

Figure 11: Random Vibration (Series I, III and IV)



SPOTLIGHT ON GLENAIR PACKAGING OF BOTH PRIZM® MT AND MT ELITE MCX FERRULES IN RUGGEDIZED MILITARY-GRADE CIRCULAR, RECTANGULAR, AND BACKPLANE CONNECTORS



- **Easy-to-use, harsh environment, super high-density PRIZM® MT expanded-beam fiber optic assemblies in Glenair ruggedized I/O and backplane connector packaging**
- **Glenair is qualified by US Conec to terminate 1 and 2 row PRIZM® MT and MXC® ferrules for ribbon and round cable fiber**
- **Reliable, repeatable optical performance**
- **Outstanding stability under shock and vibration conditions**
- **Outstanding sealing against debris contamination**

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5 Turnkey / ruggedized F/O cables and harnesses

Glenair manufactures every popular mission-critical fiber optic interconnect system including MIL-DTL-38999 type, MIL-DTL-64266 NGCON, MIL-PRF-28876, and ARINC 801. Our fiber optic cable assembly team can integrate these ruggedized, military grade fiber optic technologies into turnkey cable and harness assemblies–terminated, tested, and ready for immediate use. Examples shown below range from inside-the-box pigtail assemblies to harsh environmental aerospace cables, junction boxes, and hybrid optical / electrical solutions.

Hybrid environmental overmolded fiber optic / electrical cable assembly, MIL-DTL-38999 type with 29504/4 and /5 QPL termini

Hybrid optical / electrical assembly for weight reduction in a high-speed datalink application

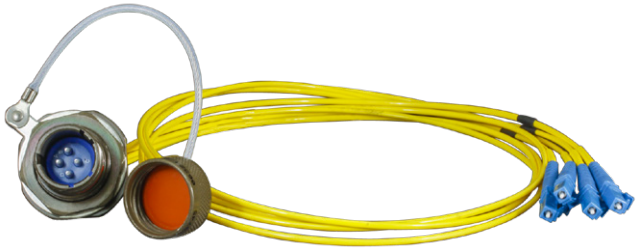
Harsh environment overmolded MIL-DTL-38999 Series III type composite

High-density Next-Generation (NGCON) fiber optic harness assembly

Cable reels and field-deployment technologies for both Glenair GFOCA and Eye-Beam™ GMA fiber optic systems

Specialized MT ribbon fiber low-profile molded breakout capabilities

GFOCA I/O-to-board assembly with overbraiding for mechanical protection



Inside-the-box MIL-DTL-38999 type I/O connector to board cable harness

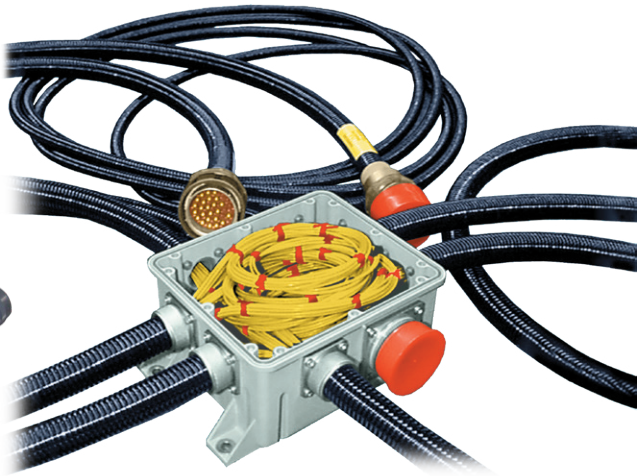
5. Turnkey Fiber Optic Cables and Harnesses

Glenair factory-terminated cable assemblies save time, money, and improve reliability of fiber optic interconnect systems

Hybrid MIL-DTL-38999 Series III type fiber optic / electrical cable junction box

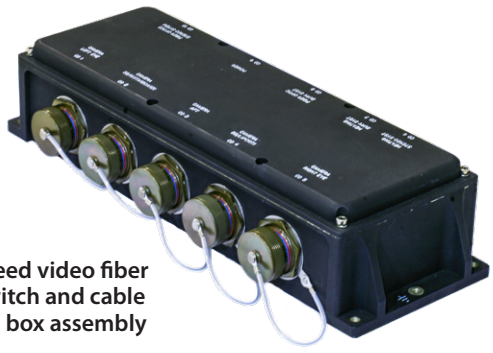
Harsh environment repairable MIL-DTL-38999 Series III type with FiberCon backshell to prevent fiber media damage

Field-deployable hermaphroditic GFOCA fiber optic cable assembly



Fiber optic multibranch assembly with flexible conduit wire protection and integrated cable storage bay

Point-to-point fiber optic cable with integrated strain relief



High-speed video fiber optic switch and cable junction box assembly

Turnkey Optical Flex circuit asembly with rugged MT ferrule terminations