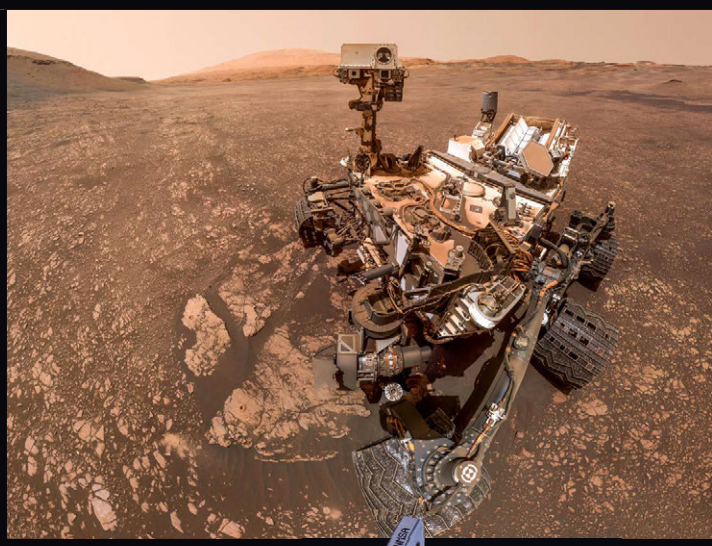
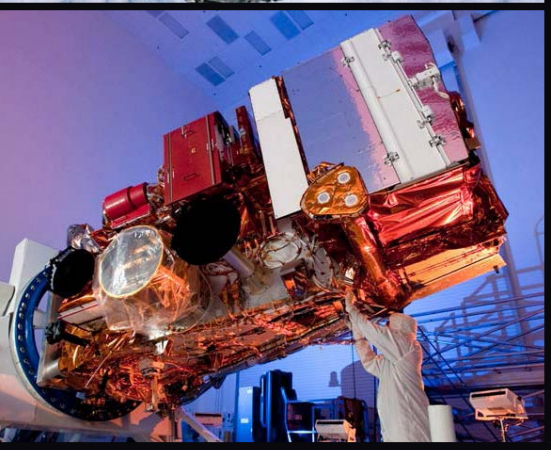
MISSION-CRITICAL
INTERCONNECT
SOLUTIONS

Glenair®





Glenair
SIGNATURE SERIES

Space-Grade Interconnect Solutions

Proven, Rugged, Flight-Heritage Technologies

Glenair®

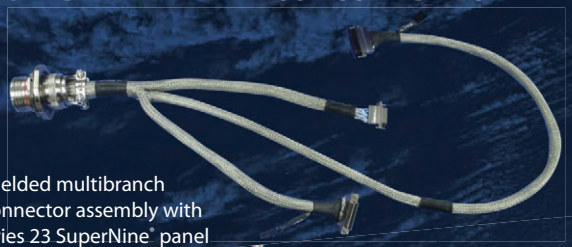
PROVEN
FLIGHT HERITAGE

Space-Grade Solutions

NASA · ESA · JAXA · Commercial

Complex space-grade cable assemblies (shown: Glenair-made "Golden Umbilical")

SPACE-GRADE WIRE HARNESS ASSEMBLIES



EMI/RFI shielded multibranch Micro-D connector assembly with Glenair Series 23 SuperNine® panel mount I/O connector

Multibranch Micro-D / Mighty Mouse cable assembly with ArmorLite™ lightweight EMI shield overbraiding

HOLD-DOWN RELEASE MECHANISMS (HDRMs)

Light Duty
Up to 75 lb release payload

Medium Duty
Up to 4,000 lb release payload

Heavy Duty
Up to 20,000 lb release payload

HD STACKER™

High-density (.0625" pitch) board-to-board stacking connector with solder-free press-fit (compliant pin) board mounting

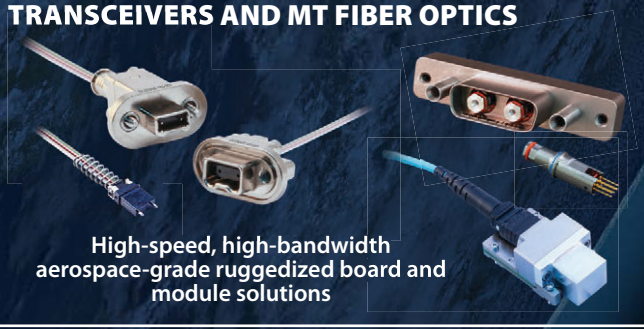
LATCHING MICROSTRIPS

Latching MicroStrips™: cable-to-cable and cable-to-board reduced size- and weight Micro-D TwistPin connectors

CERTIFIED ECSS-E-ST-50-12C SPACEWIRE CABLES

ESA, NASA, JAXA, and RKA approved SpaceWire cables for both laboratory test and space flight applications

RADIATION-TOLERANT RUGGED PHOTONIC TRANSCEIVERS AND MT FIBER OPTICS



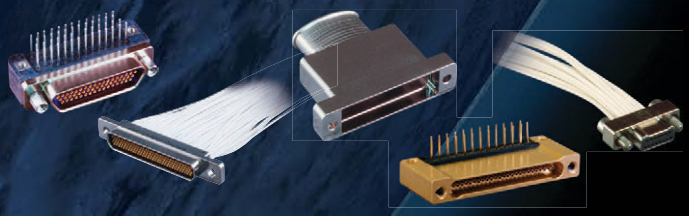
High-speed, high-bandwidth aerospace-grade ruggedized board and module solutions

EMI/RFI FILTER CONNECTORS

MIL-DTL-38999 type, Series 80 Mighty Mouse, and other circulars

HiPer-D and Micro-Crimp filtered rectangulars

SPACE-GRADE 83513 MICRO-D AND 32139 NANO



ESA and NASA screened connectors and backshells available as discrete components or wired pigtail assemblies

SERIES 28 HIPER-D M24308 INTERMATEABLE

Qualified MIL-DTL-24308 Class K Space-Grade Hermetic, environmental, filter, Sav-Con®s and cordsets

LIGHTWEIGHT MIGHTY MOUSE AND SERIES 79 MICRO-CRIMP™

Small, lightweight, high-density ideally suited for space programs

Approved for manned space flight, ideal for guidepin and rack-and-panel applications

SAV-CON® CONNECTOR SAVERS

Available for every military and commercial circular and rectangular connector series

ULTRA-LIGHTWEIGHT CONDUIT AND BRAID

Factory-terminated and user-installable conduit systems

Weight-saving microfilament EMI braided shielding solutions

ASSISTED-RELEASE, AND LANYARD QUICK-DISCONNECTS

Blind-mate D38999 type feedthrough with kick-off assist

Lanyard-release quick-disconnects

SPACE-QUALIFIED HERMETIC RECEPTACLES

Glass-to-metal and CODE RED encapsulant hermetic solutions for high-pressure / low-leakage space applications

Glenair®

SPACE-GRADE

Complex Cable Assemblies

Commander Ed White on the first American spacewalk, 1965 with Glenair-manufactured "Golden Umbilical" cable

We like to begin our presentation of Glenair's proven-performance space-grade products with the golden umbilical life support cable used by Commander Ed White in the first American space walk in 1965. This was a complex cable assembly with an exacting set of performance requirements. Even though this application is now over 50 years old, it still reflects Glenair's design and fabrication expertise and that we have been a go-to supplier for the space industry for over 5 decades. Today we continue to fabricate high-performance cables for space, from rugged Viton® overmolded designs to ultra-lightweight SpaceWire jumpers for the high-speed space data transmission protocol. Other notable space cable applications include:

- Dozens of robotic spacecraft, including orbiters, landers, and rovers, have been launched to Mars since the 1960s. Glenair cables have ridden along on several, helping to fulfill navigation, data and communication requirements.

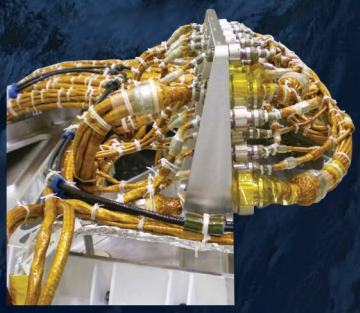
- Complex interconnect cable assemblies made by Glenair have also traveled to and from orbit dozens of times on the Space Shuttle, as well as numerous space-launch vehicles. Glenair-made interconnect harnesses also served on all twelve manned Gemini capsules.

PROVEN PERFORMANCE IN SPACE

- The "Golden Umbilical" life-support cable
- JPL Mars probes (orbiters, landers, and the Curiosity rover)
- AIRS satellite
- Gravity Probe mission
- Space Shuttle
- Titan II launch vehicles
- ESA-certified engineering and production staff (Glenair Space Systems, Salem)

COMPLEX MULTIBRANCH AND OVERMOLDED CABLE AND FLEX CIRCUIT ASSEMBLIES

Multibranch wire harness for a space lab application

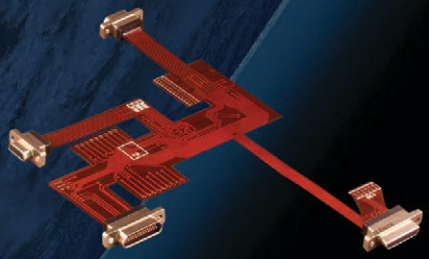


Complex Mighty Mouse cable harness for a Mars rover application

ESA and NASA screened Micro-D/Nano cable assembly

Space-grade Micro-D flex assemby with NASA EEE-INST-002 screening

Hybrid flex/rigid flex multibranch Micro-D flex assembly with discrete RF circuits



Micro-D subminiature multibranch flex assembly

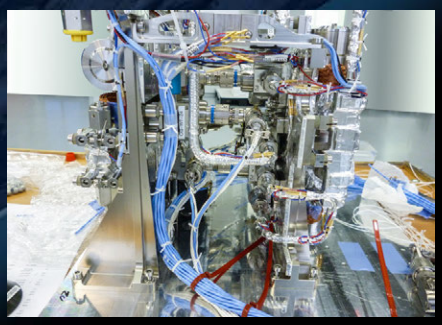
SPACE-GRADE HARNESS FABRICATION AND CLEAN-ROOM INTEGRATION (GSS - SALEM, GERMANY)

Glenair Space Systems, Salem Germany: a turnkey cable harness design and fabrication operation, from documentation to harness prototypes, production, precision machining, and clean-room based satellite integration. ESA-certified assembly staff.

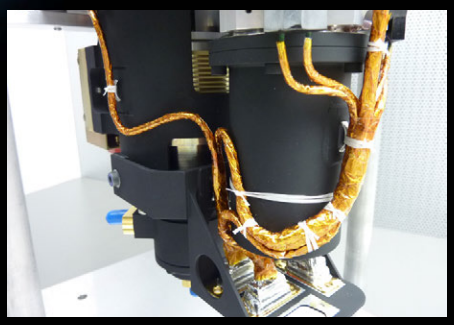
Hand assembly work performed by ESA-certified assembly staff

Form, fit, and function of prototype harnesses using GSS-produced fixtures

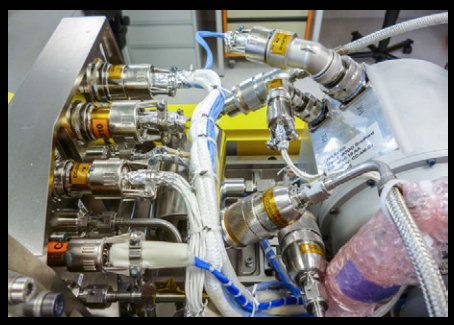
Cleanroom integration of flat set harnesses into satellite test racks



Complex integration and assembly of flight-grade wire harnesses



Harness integration into space payload electromechanical devices



EMI shielded and open-wire bundle assemblies ready for flight

Glenair®

Artist concept of NASA's Juno spacecraft, exploring Jupiter. Credit NASA/JPL-Caltech

NON-PYROTECHNIC

Hold Down and Release Mechanisms

High-reliability, non-explosive (split-spool) HDRMs, separation nuts, and pin pullers/pushers for dependable stowage and release of deployable space systems

Glenair pyrotechnic-free release mechanisms offer quick release time, low shock, relatively low power input, and virtually no temperature sensitivity. HDRM Series includes separation nuts, pin pushers, and pin pullers—direct wired or connectorized—with a broad range of preload carrying capacity.

- **Pyrotechnic-free alternative (low-shock fuse-wire) for single-event release of deployable space systems—electrical initiation up to 5 amps**
- **User-serviceable and refurbishable units**
- **Redundant or non-redundant actuation circuit**
- **Not susceptible to transient and noise (EMI/EMP/ESD/RFI) inputs**
- **Extended temperature ranges: -150°C to +150°C**

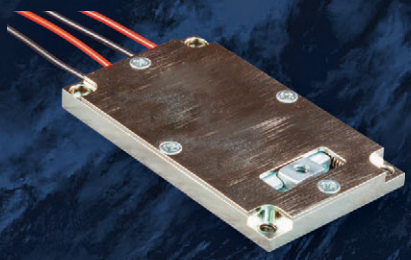
NON-PYROTECHNIC

Hold Down and Release Mechanisms

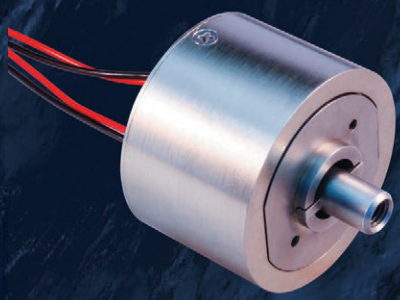
ITAR and non-ITAR controlled solutions with flight heritage

HDRM HOLD DOWN RELEASE MECHANISM™

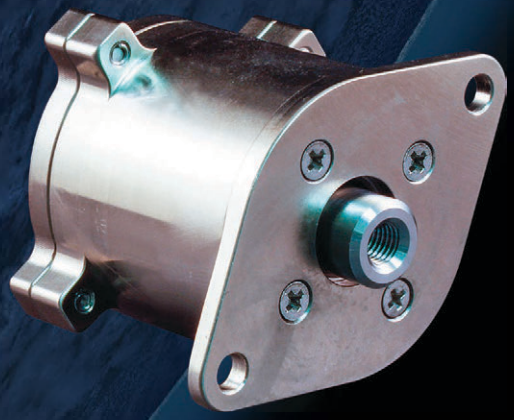
HDRM DUTY CLASSES



Light-Duty HDRM
Redundant circuit,
5 – 75 lb release preload



Medium-Duty HDRM
Redundant circuit,
300 – 4000 lb release preload

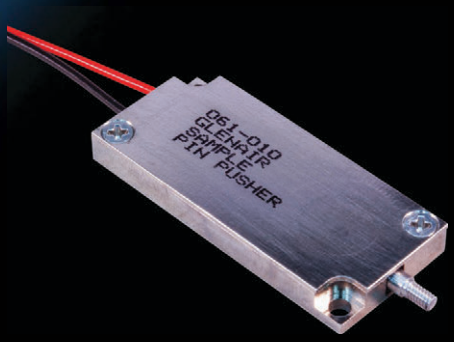


Heavy-Duty HDRM
Redundant circuit,
5000 – 20,000 lb release preload

HDRM RELEASE TYPES

Separation nut

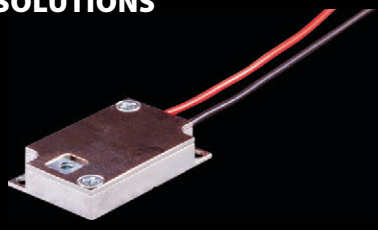
Pin puller



Pin pusher

NORTH AMERICAN AND EUROPEAN (NON-ITAR-CONTROLLED) HDRM SOLUTIONS

Glenair® SPACE SYSTEMS



Glenair is pleased to offer both our North American and European customers access to our innovative hold-down release mechanism technologies. These non-pyrotechnic space mechanisms are ideally suited for satellite, payload fairing, antenna array, solar array, and boom and mast deployment. Independently and locally engineered and certified for use in NASA, ESA, and private exoatmospheric appliations, these flight-heritage, proven HDRM technologies are now available to our European partners without US Defense or Commerce department restrictions.

Glenair®

PhoneSat 2.5 CubeSats at
NASA Ames Research Center

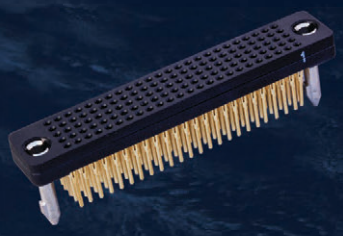
HD STACKER™

High-density, solder-free, PCIe-ready board-to-board stackable connectors

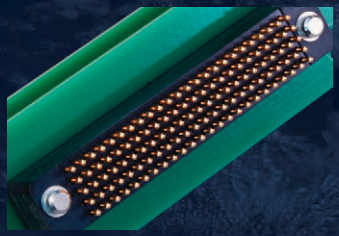
Mission-critical board-to-board connector applications demand fail-safe signal integrity as well as rugged and reliable harsh-environment performance. The HD Stacker™ brings Glenair innovation to stacking board-to-board connectors with several significant design improvements: Ultra high-density .0625" center-to-center Chevron Contact System provides 55% more contacts per connector size, or a 31% size reduction for the same number of contacts as compared to current industry solutions. Polarized connector bodies and available polarized guide pins prevent accidental mismating. The solder-free press-fit compliant pin contacts are removable, repairable, and available in custom lengths. HD Stacker connectors may also be ordered with pre-wired cable or flex jumper terminations. High-speed signal integrity test reports are available upon request. Choose HD Stacker for the ultimate in high-density, rugged board-to-board stackable connector performance.

- High-density .0625" pitch Chevron Contact System
- PCIe 3.0 capable
- Performance up to 10.5Gbs
- Polarized insulator and hardware options
- Solder free "eye of the needle" compliant tail for press fit installation
- High-temp PPS insulator meets NASA outgassing requirements
- Available wired / flex jumpers
- Available between-board spacers up to 1 inch

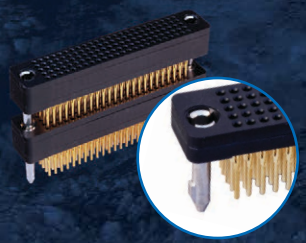
HD STACKER™ FOR MISSION-CRITICAL BOARD-TO-BOARD APPLICATIONS



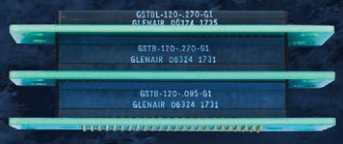
Solder-free press-fit (compliant pin) board mounting



.0625" pitch contact spacing: highest available density



Polarized shells and keyed guide pin hardware prevent mis-mating



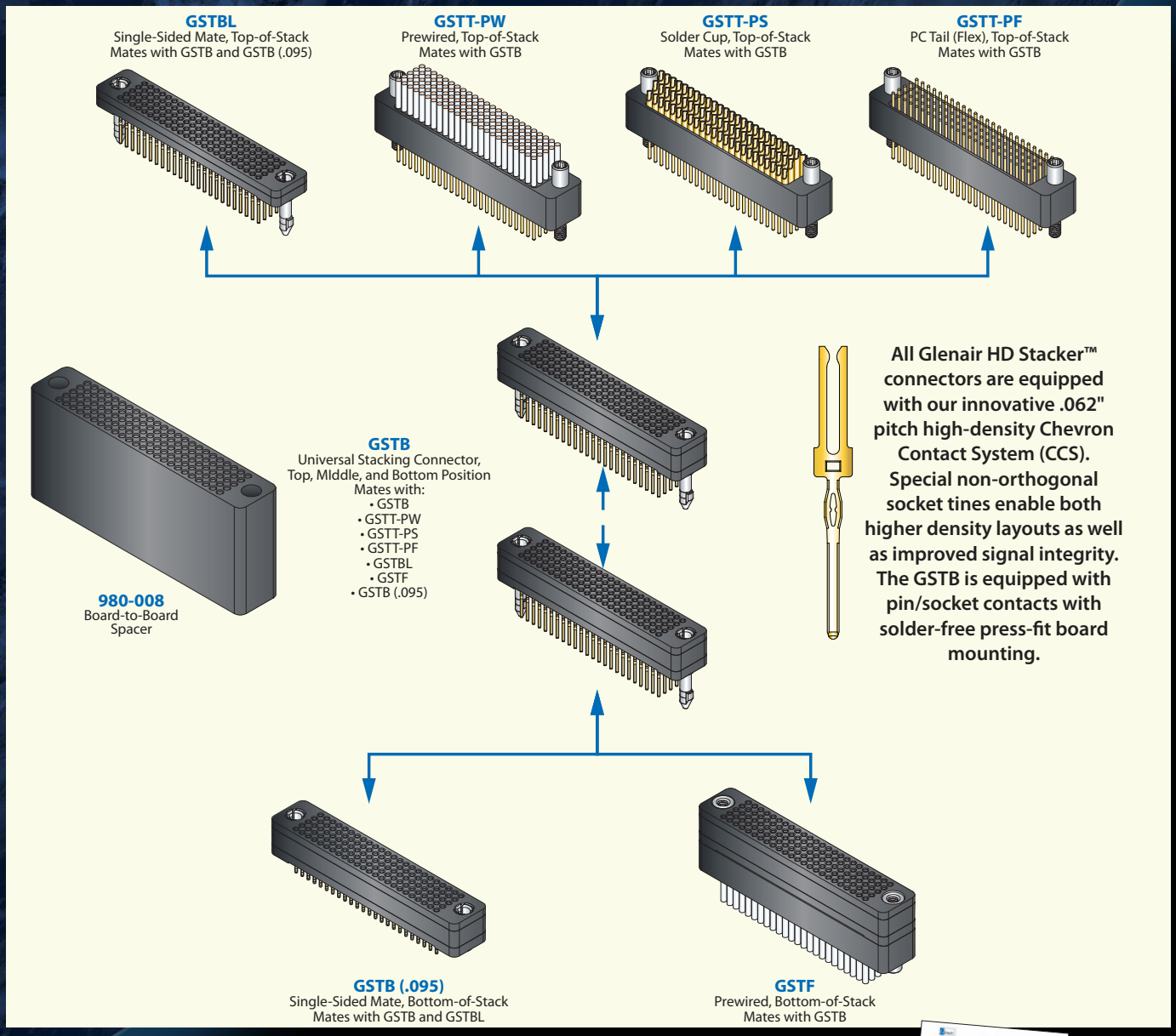
Controlled signal integrity for differential applications (PCIe Rev 3 capable)

.0625" PITCH COMPLIANT PIN

High-Density Stacker™

Rugged board-to-board stackable connectors

HD STACKER™ POSITION AND MATING COMPATIBILITY GUIDE

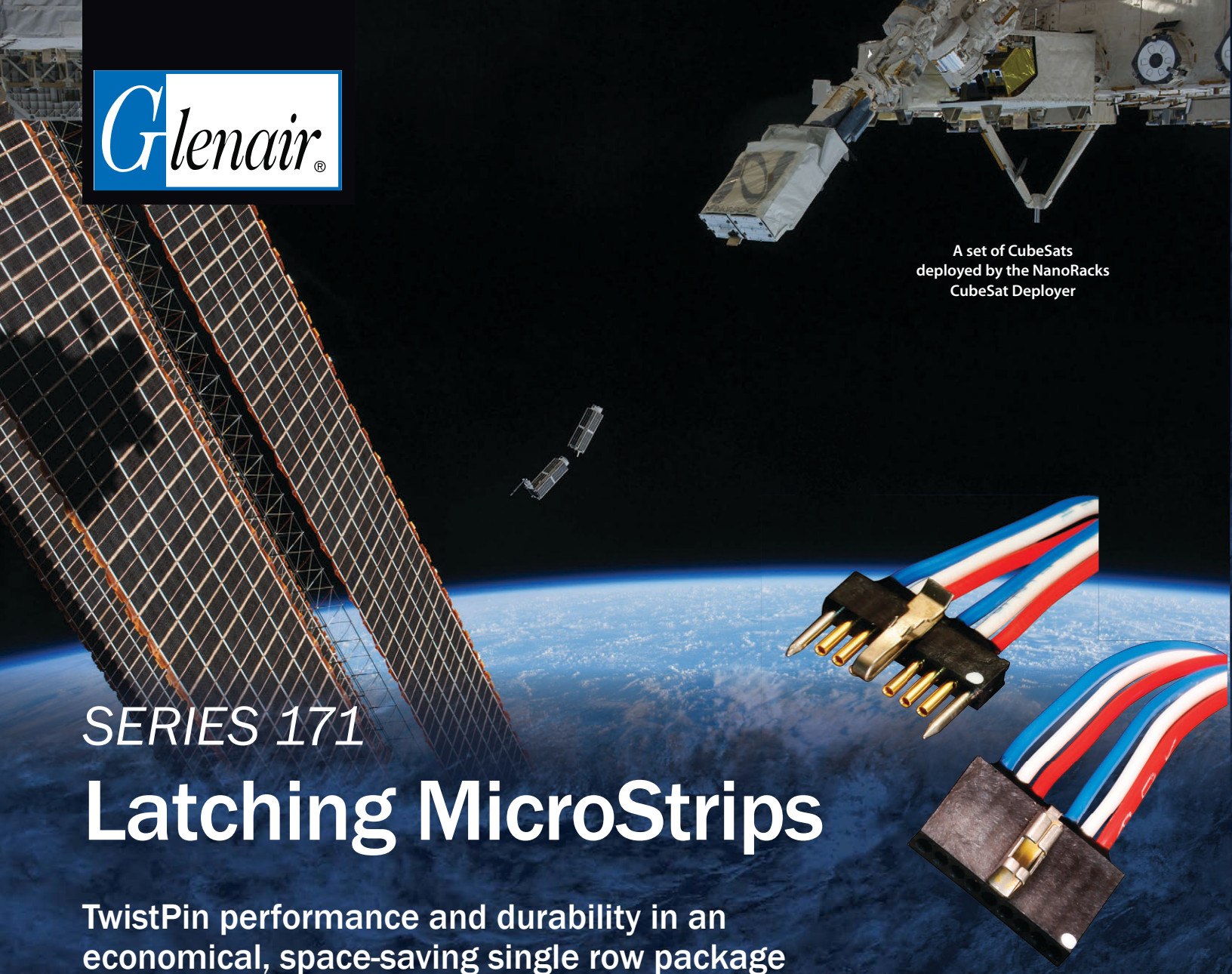


QUALIFICATION TESTING / HIGH-SPEED PERFORMANCE

Stacker connectors were qualified in accordance with MIL-DTL-55302G testing for:

- Contact engagement/separation
- Contact retention
- DWV
- Electrical resistance
- Mechanical vibration and shock
- Insulation resistance
- Thermal shock
- Contact resistance
- Humidity

High-frequency electrical performace tests were performed for: Insertion loss, return loss, crosstalk, and time domain performance metrics including impedance and eye pattern. Complete test reports are available at **www.Glenair.com/technical_information_test_reports**



A set of CubeSats deployed by the NanoRacks CubeSat Deployer

SERIES 171

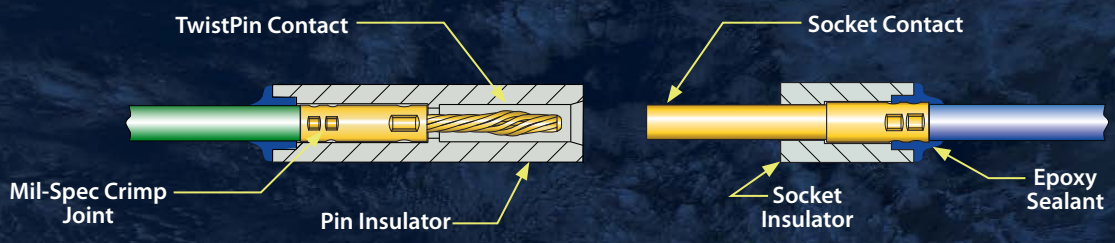
Latching MicroStrips

TwistPin performance and durability in an economical, space-saving single row package

Series 171 MicroStrips are made for high-reliability wire-to-board and wire-to-wire applications. These high-density strip connectors are typically used in ruggedized 3 Amp signal applications, where higher-performance contacts, precision machined shells and space-grade dielectrics offer significant advantages compared to commercial-grade headers and jumpers. Glenair's rugged, high force TwistPin contact accepts up to #24 gage wire, the current rating is 3 Amps, the voltage rating is 600 Vac, and the temperature rating is -55C to +150C. The Series 171 Latching MicroStrip connector meets all applicable requirements of MIL-DTL-83513. Choose solder cup, pre-wired, or printed circuit board versions. A stainless steel latch provides secure coupling.

- **High-reliability TwistPin contact system**
- **#24-30 AWG wire size**
- **.050" pitch contact spacing**
- **Solder cup, pre-wired or PCB header terminations**
- **3 Amps, +150C, 600 Vac**

LATCHING MICROSTRIP CROSS-SECTIONAL VIEW



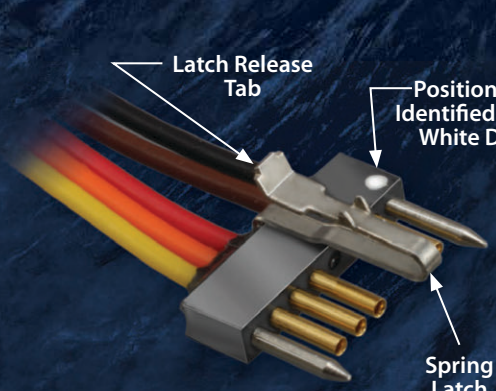
SERIES 171

Latching MicroStrips

Superior TwistPin contact performance

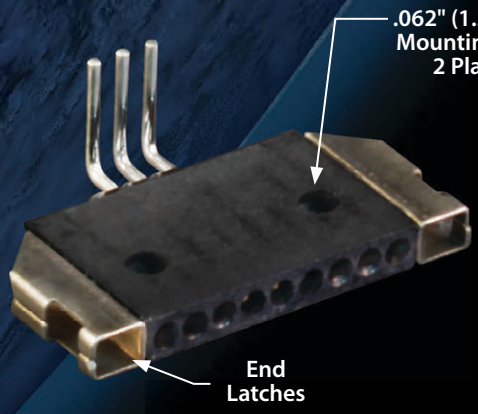
ABOUT SPRING LATCHES, GUIDE PINS AND MOUNTING HOLES

Optional stainless steel latch clips provide secure mating when subjected to shock and vibration. A single center latch is suitable for most applications. Dual end latches are also available. The spring latch is always installed on the socket strip. The latch receiver is installed on the pin strip. To unmate the connectors, simply press the release tab while pulling the connectors apart. MicroStrips are available with stainless steel guide pins. A single guide pin provides circuit polarization. A guide pin on each end helps to align connectors when mating and prevents damage to contacts. For most applications the preferred configuration is a single center latch with no guide pins. Mounting holes are now available. Attach strips to circuit boards with size 0-80 screws (customer-supplied).



Socket strip with center latch

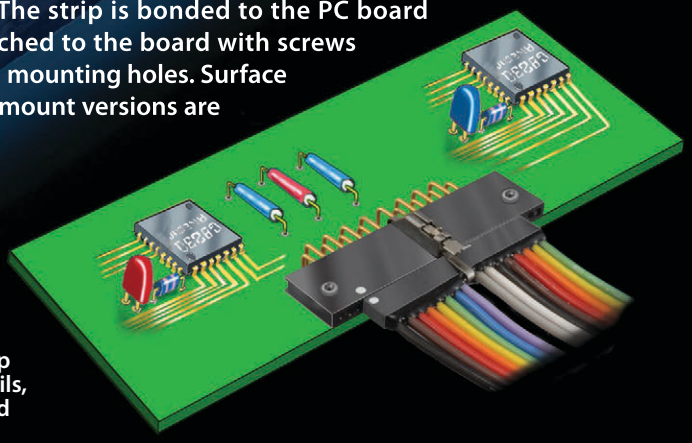
Pin strip with center latch and guide pins at both ends



Right Angle PCB Header with End Latches and Mounting Holes.

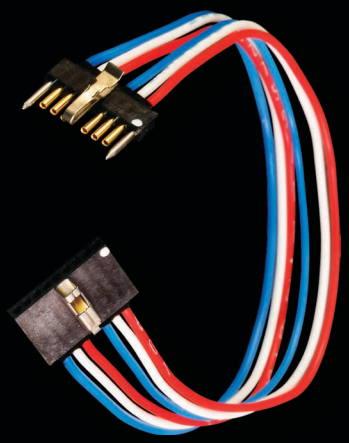
ABOUT BOARD MOUNT STRIPS

Space customers typically use MicroStrips for high reliability board-to-wire I/O applications. The pin strip is usually configured with right angle thru-hole PC tails. The strip is bonded to the PC board with epoxy, or attached to the board with screws installed in optional mounting holes. Surface mount and vertical mount versions are also available.

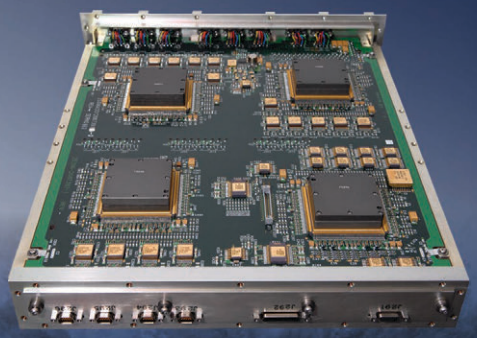


Right angle pin strip with staggered PC tails, mounting holes and center latch

SINGLE ROW BACK-TO-BACK MICROSTRIPS



.050" pitch single row surface mount back-to-back microstrip



Physical layer SpaceWire router aboard the James Webb Space Telescope (NASA)

SpaceWire Cable Assemblies

Flight- and lab-grade SpaceWire qualified cable assemblies for IEEE 1355 space network node interconnection of routers, switches, recorders, transceivers, and other physical layer devices

The success of any space mission begins with reliable data transmission and Glenair Spacewire cables, built to meet the strict standards set forth by ECSS-E-ST-50-12C make this a reality. Our Spacewire cables offer bidirectional, high speed data transmission rates up to 400 Mbits/s while significantly reducing cross talk, skew, and signal attenuation. By incorporating a serial, point-to-point cable, with low voltage differential signaling (LVDS) reduced costs are realized through an easily integrated data transmission cable. These features allow Spacewire cables to be incorporated across various satellite data transmission programs without the expense of costly design customization.

Glenair Spacewire assemblies begin with a high performance cable built with expanded polytetraflouroethylene (ePTFE) insulation. This material allows for low-loss transmission of LVDS signals, maximizing data-rates while allowing for the implementation of standard hardware protocols, thus eliminating the need for design customization and long lead time cable projects.

TYPICAL USES INCLUDE

- EGSE applications
- Radar sensor systems
- Hi-resolution camera equipment
- Sensor, mass-memory unit, and telemetry subsystem interconnections

APPROVED FOR USE BY:

- ESA
- NASA
- JAXA
- RKA

CONNECTOR/CABLE

- **Laboratory and space-grade versions available**
- **Qualified MIL-DTL-83513 Micro-D connectors**
- **Gold-plated copper alloy TwistPin contacts**
- **Basic cable, 4 twisted pair cables and a ground**
- **Epoxy resin potting**
- **EMI banding backshell**

PERFORMANCE

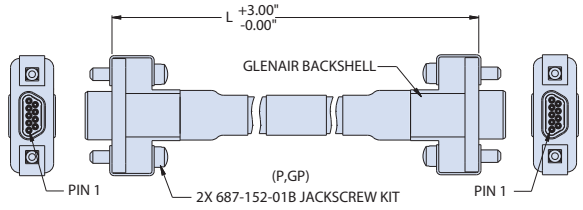
- **3 Amps**
- **Temperature tolerance -200° to 180° C**
- **100 Ω impedance shielded signal pair**
- **Very low skew, signal attenuation and crosstalk**
- **65dB minimum attenuation shielding effectiveness**
- **Low magnetic permeability IAW EIA-364-54**

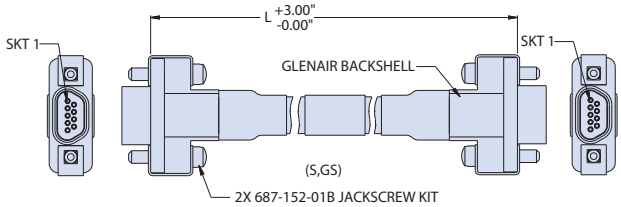
POINT-TO-POINT AND SINGLE-ENDED

SpaceWire cable assemblies

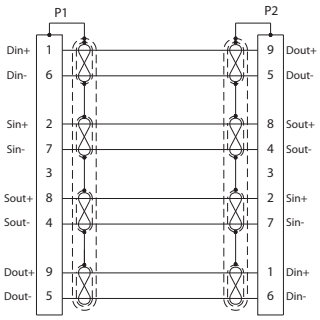
Technical specifications / how-to-order

How To Order SpaceWire Cable Assembly													
Sample Part Number	**GSWM**	**2**	**L**	**-9**	**GP**	**-6**	**F**	**B**	**-16**	**S**	**-A**	**G**
Product Series	**GSWM** Glenair SpaceWire Micro-D											
Shell Plating	**2** - Electroless Nickel **5** - Gold											
Insulator Material	**L** - LCP											
Shell Size	**9**											
Connector Type	**P** - Single-Ended Pin (Plug) **S** - Single-Ended Socket (Receptacle) **GP** - Pin (Plug) Connector Both Ends **GS** - Socket (Receptacle) Both Ends											
Wire Gauge	**6** - 26 AWG **8** - 28 AWG **0** - 30 AWG (30 AWG–Lab Only)											
Cable Type	**F** - Flight Grade **L** - Lab Grade											
Termination Option	**B** - Backshell											
Cable Length In Inches	**16** - 16 inches (12 inches minimum)											
Hardware	**S** - Male Slotted Jackscrew **P** - Female Jackpost											
Wiring Schedule Type	**-A** - as per ECSS-E-ST-50-12C Rev 1 figure 5-4 **-AL** - as per ECSS-E-ST-50-12C Rev 1 figure 5-5											
Ground Spring Option	**N** - No Ground Spring **G** - Ground Spring Installed											

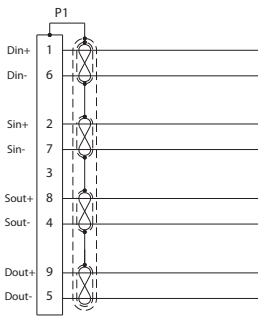




BACK TO BACK WIRING
CABLE ASSY TYPE **-A**
ECSS-E-ST-50-12C REV 1, FIGURE 5-4

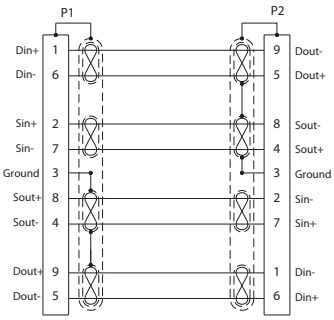


SINGLE ENDED WIRING
CABLE ASSY TYPE **-A**
ECSS-E-ST-50-12C REV 1, FIGURE 5-4

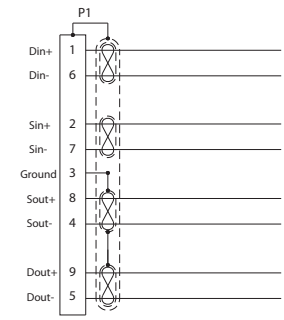


NOTE: Inner shields are tied to one another and connector shell.

BACK TO BACK WIRING
CABLE ASSY TYPE **-AL**
ECSS-E-ST-50-12C REV 1, FIGURE 5-5



SINGLE ENDED WIRING
CABLE ASSY TYPE **-AL**
ECSS-E-ST-50-12C REV 1, FIGURE 5-5



NOTE: Inner shields of Din and Sin pairs are Isolated from one another.
Inner shileds of Sout and Dout are connected and tied to pin 3.

NOTES:

1. Flight grade (cable Type F) assemblies to be screened IAW NASA EEE-INST-002, Table 2. Level 1 with 100% thermal vacuum outgassing (24 hours/+125°C/10^{-6} torr). Reference Glenair Mod Code 429C.
2. Operating temperature -55°C to +125°C
3. Electrical performance:
   Dielectric withstanding voltage: 600 VAC.
   Insulation resistance: 5000 megohms @500 VDC.

MATERIALS/FINISH:

- Shells/backshells - aluminum alloy/electroless nickel.
- Insulators - high grade rigid dielectric/N.A.
- Contacts - copper alloy, gold plated.
- Hardware - stainless steel/passivated.

RUGGEDIZED

Ultra high-density MT Ferrule fiber optic connection system—with SuperNine® circular or Series 79 rectangular packaging

Proven-performance MT ferrules in MIL-DTL-38999 advanced-performance connectors or in precision-machined Series 79 rectangulars—only from Glenair

The MT Ferrule High-Density Advantage

24 fibers

3 fibers

Up to 24 fibers in a single compact, lightweight ferrule (7mm x 3mm / .276" x .118") **—same real estate as three size #16 termini side by side**

SuperNine with MT

- **Ruggedized "better than QPL" SuperNine® MIL-DTL-38999 Series III type interconnect packaging**
- **Singlemode and multimode fiber**
- **Low insertion loss**
- **Environmental sealing: IP67 mated, IP68 available at interface**
- **RoHS-compliant finishes available**
- **MT ferrules sold separately**
- **MT assembly tool, P/N 182-062 also available and sold separately**

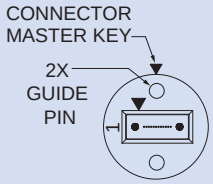
ULTRA HIGH-DENSITY

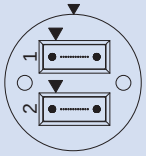
SuperNine® Connector with MT Ferrule

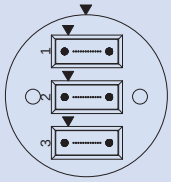
Signature fiber optic connection system

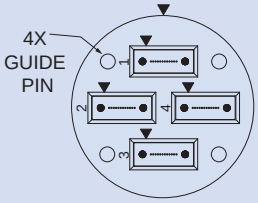
SUPERNINE® MT CONNECTOR SIZES AND INSERT ARRANGEMENTS

SuperNine® MT MIL-DTL-38999 Series III type connectors with plug-and-play MT ferrule accommodation







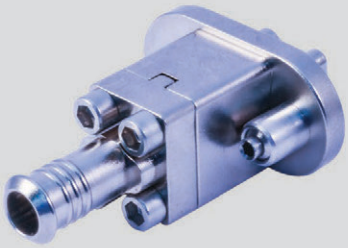


Shell Size 11	Shell Size 13	Shell Size 15	Shell Size 17
Insert Arrangement -1	Insert Arrangement -2	Insert Arrangement -3	Insert Arrangement -4
Up to 24 fibers (1 MT ferrule)	Up to 48 fibers (2 MT ferrules)	Up to 72 fibers (3 MT ferrules)	Up to 96 fibers (4 MT ferrules)

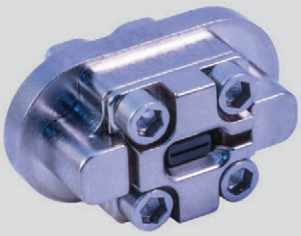
SERIES 79 WITH MT

Series 79 MT fiber optic connector is the world's smallest ruggedized MT connector solution with robust resistance to vibration and shock. Series 79 MT delivers superior low insertion-loss performance (up to 500 mating cycles) compared to commercial solutions. Connectors are supplied in single (consult factory for dual and quad) MT configurations with retaining plate and optional banding porch on plugs, and ultra low-profile retaining plate on receptacles.

SERIES 79 PRECISION-MACHINED SPACE-GRADE MT FERRULE-EQUIPPED CONNECTORS



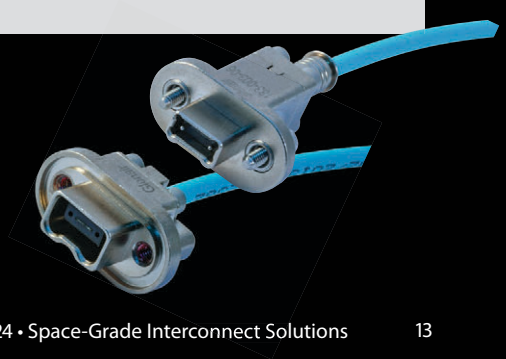
-06 plug, with retaining plate for EMI shield termination and strain relief of ribbon or round fiber cable



-S7 receptacle with standard retaining plate

-S7 receptacle with conductive EMI gasket

- **Ruggedized small form-factor, high-density MT fiber optic solution**
- **Temperature tolerance from -40°C to +85°C**
- **Optimized for use with parallel optic transceivers in ribbon or round cable applications**
- **Low insertion loss performance in high vibration and shock environments**



RUGGEDIZED

PCB-Mount photonics: connectorized, high-density, board-mount transceivers built for rugged vibration and shock, up to 25Gbps per channel

Crew aboard the Orion spacecraft mockup

Glenair PCB mount transceivers are ruggedized harsh-environment equivalents to SFP transceivers but with mechanical design suited to the harsh temperature and vibration environments found in free space, satellite, RF and other military and aerospace applications. Selected components have been subjected to Gamma, proton, and heavy ion radiation testing (consult factory).

PCB mount optical transceivers support optional Digital Monitoring Interface (DMI) features in accordance with SFF 8472. The Transceiver is comprised of a transmitter section and a receiver section that reside on a common package and interface with a host board through a high-speed electrical connector. Parallel optical transceivers leverage new MT fiber optic datalink technology for unprecedented bandwidth and throughput.

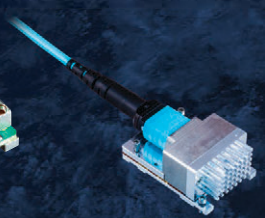
- **Radiation tolerant (consult factory), smallest footprint available**
- **Jet fighter and space launch shock and vibration tested**
- **No soldering required**
- **CML 100 Ohm differential input and output**
- **-40°C to +85°C operating temperature range**

RUGGEDIZED PCB-MOUNT MODULES FOR ETHERNET, HIGH-SPEED VIDEO, AND STORAGE

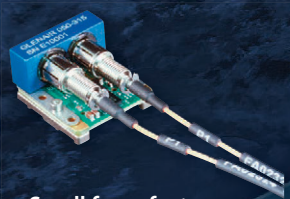
EMI shielded and radiation-tolerant transceivers

Dual transceivers, quad transmitters, quad receivers

Bi-directional transceivers



Parallel optical transceivers



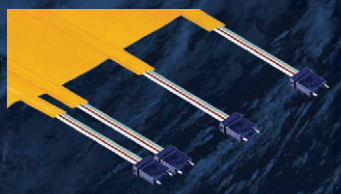
Small form-factor, high-vibration high-temperature tolerant

PARALLEL OPTICS

PCB-Mount Transceivers and Compatible High-Density MT Fiber Optic Connectors

MT HIGH-DENSITY FIBER OPTIC DATALINKS AND RUGGEDIZED OPTOELECTRONICS

Glenair is the only global source for high-reliability parallel optics modules that also manufactures a complete range of ruggedized MT fiber optic connectors for use in space photonic communications. All our parallel optics transceiver technologies are available in both hermetic and non-hermetic configurations. Glenair is currently and uniquely also positioned to provide PhotonicFlex backplanes with seamless integration of fiber optic media, MT interconnect technology, and high-performance radiation-tolerant and other optoelectronic transceivers.



PhotonicFlex with ribbonized MT terminations

Ruggedized small form-factor MT fiber optic connectors

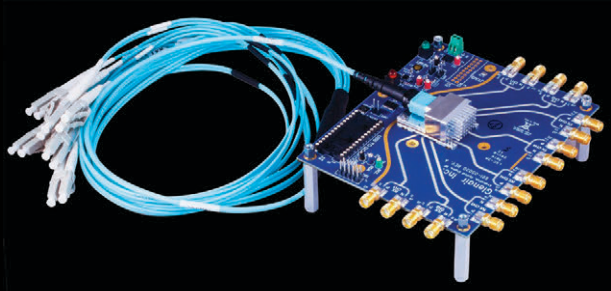
Multi-channel circular ruggedized fiber optic MT connectors

MIL-DTL-38999 Series III Fiber Optic Datalinks with MT Terminations	
Test Description	**Tested Performance / Specifications**
Optical Insertion Loss, Multimode	-0.3 dB typical (50/125)
Optical Insertion Loss, Singlemode	-0.3 dB typical (9/125)
Optical Back Reflection, Singlemode	Better than -30 dB - PC Polish
Mechanical Shock (Operational)	75G half sine, 10ms duration, 3X both directions each axis per TAI-155-14A
Mechanical Shock (Non-Operational	36-44G sawtooth, 10–12ms duration, 3X both directions each axis per MIL-STD-8010F, Method 516.5
Vibration	Figure 514.5C-8 (36Grms), 1 hr. exposure each axis per MIL-STD-810F, Method 514.5, Procedure 1
Mating Durability	500 cycles per TIA-455-21A
Thermal Cycling	5 cycles, -40°C (at step 1) to +85°C (at step 3) with 1 hr. exposure per EIA-364-32F, Condition VIII, Method A
Temperature Life	85°C for 336 hours per TIA-455-4C
Humidity	90% – 95% RH, 96 hr. exposure per TIA-455-5C, Method A, Test ConditionA

Glenair parallel optic transceivers deliver up to 25Gbps per channel high-speed data in free space optics (FSO) applications. Heat tolerant and compatible with conduction cooling for space applications, the transceivers are supplied as discrete printed circuit board mount devices, or with turnkey MTP jumpers or ruggedized MT fiber optic interconnections.

- **4 x 14 to 4 x 25 Gbps per fiber**
- **Compatible with MTP optical connector**
- **Supports 12-fiber ribbon cable**
- **SiGe and GaAs optoelectronic ICs**
- **Hermetic opto-electronic hybrid**
- **Up to 100 Gbps**
- **Conduction-cooling for space applications**
- **46 Grms, 650G shock**
- **-40°C to +85°C case temp**
- **Heavy ion radiation-tested**

Convection cooling (left) and conduction cooling (right) designs as well as custom heat dissipation designs are available.
050-346 parallel optical transceiver, 4 X 10 – 14 Gbps
0500-3007 parallel optical transceiver, 0.1 – 25 Gbps



Available evaluation boards: 050-346 parallel optic transceiver with MT-to-39029 fiber optic terminations

RUGGEDIZED

RF-over-Fiber low-noise PCB-mounted transmitters, receivers, and transceivers

The Hubble Space Telescope

Radio Frequency over Fiber (RFoF) communication systems integrate wireless radio frequency (RF) transmissions and fiber optic datalinks into a single system. The technology allows designers to far exceed the distance and data-rate capabilities of conventional copper coax wire media used i n legacy RF data-link applications. RF-over-Fiber is an analog conversion process that modulates the laser-generated light within the conversion unit with the RF signal for transmission over optical fiber. RF-over-Fiber is an antenna signal distribution technology ideally suited for mobile and fixed-earth installations such as secure command centers, reduced footprint airframe applications, naval vessels, phased-array antenna installations and more.

The benefits of RF-over-Fiber include lower transmission loss (attenuation) as well as reduced sensitivity to electromagnetic noise. The usual range of fiber optic benefits, including immunity to EMI/EMP, unlimited transmission distances, lighter weight, and improved security also apply. Glenair low-noise, shielded RF-over-Fiber solutions have a useful RF bandwidth from 2 MHz to 3.5 GHz can be embedded inside the box, such as with the PCB-mount transceivers highlighted on this spread, or incorporated into stand-alone copper-to-fiber media converters for outside-the-box environmental applications. Higher-frequency units, up to 40 GHz, are currently under development.

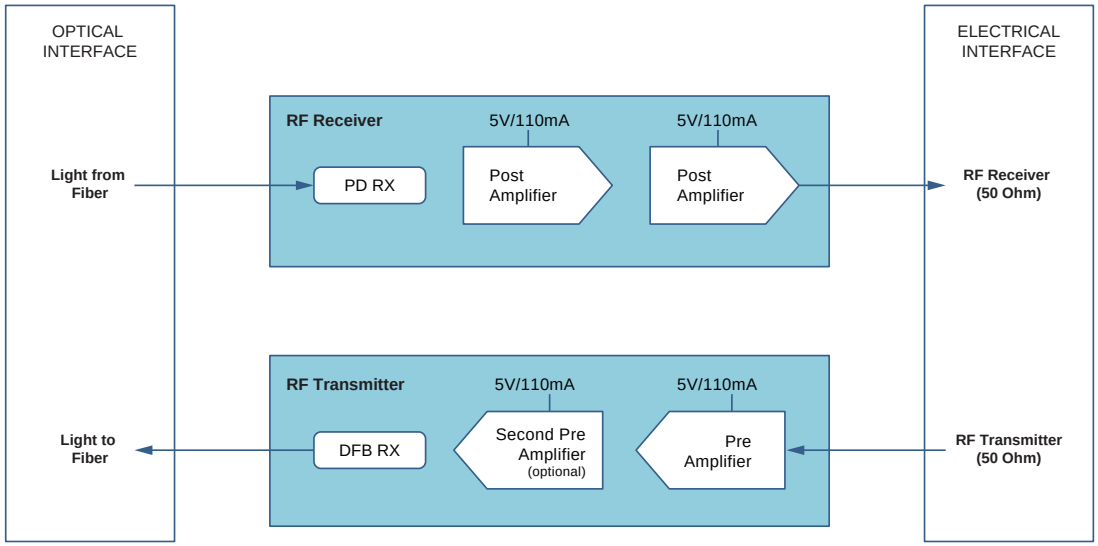
Glenair RF-over-Fiber transmitters, receivers, and transceivers are ruggedized for military and aerospace applications that demand high temperature as well as vibration and shock tolerance. Consult factory for radiation tolerance.

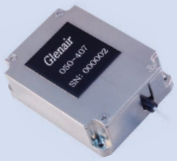
- **2MHz – 3.5 GHz antenna signal distribution**
- **New high-frequency 20 and 40 GHz units in development**
- **High-vibration PCB mount solution**
- **-40°C to +85°C operating case temperature**
- **High Spurious Free Dynamic Range (SFDR) link**
- **APC fiber optic contact standard**
- **Integrated high-speed PIN photo diode and low-noise RF amplifiers**

RUGGEDIZED

RF-over-Fiber PCB-Mount Transmitters, Receivers, and Transceivers

EXAMPLE FUNCTIONAL BLOCK DIAGRAM FOR GLENAIR 050-400 RF-OVER-FIBER TRANSCEIVER



RF-over-Fiber PCB-Mount Component Selection Guide		
	**050-400**	PCB Mount RF-over-Fiber Transceiver 20MHz to 3.5 GHz
	**050-404**	PCB Mount RF-over-Fiber Transmitter 2 MHz – 3.5 GHz
	**050-405**	PCB Mount RF-over-Fiber Receiver 2 MHz – 3.5 GHz
	**050-406**	PCB Mount RF-over-Fiber Transmitter 2 MHz – 3.5 GHz Low-Noise configuration
	**050-407**	PCB Mount RF-over-Fiber Receiver 2 MHz – 3.5 GHz Low-Noise configuration

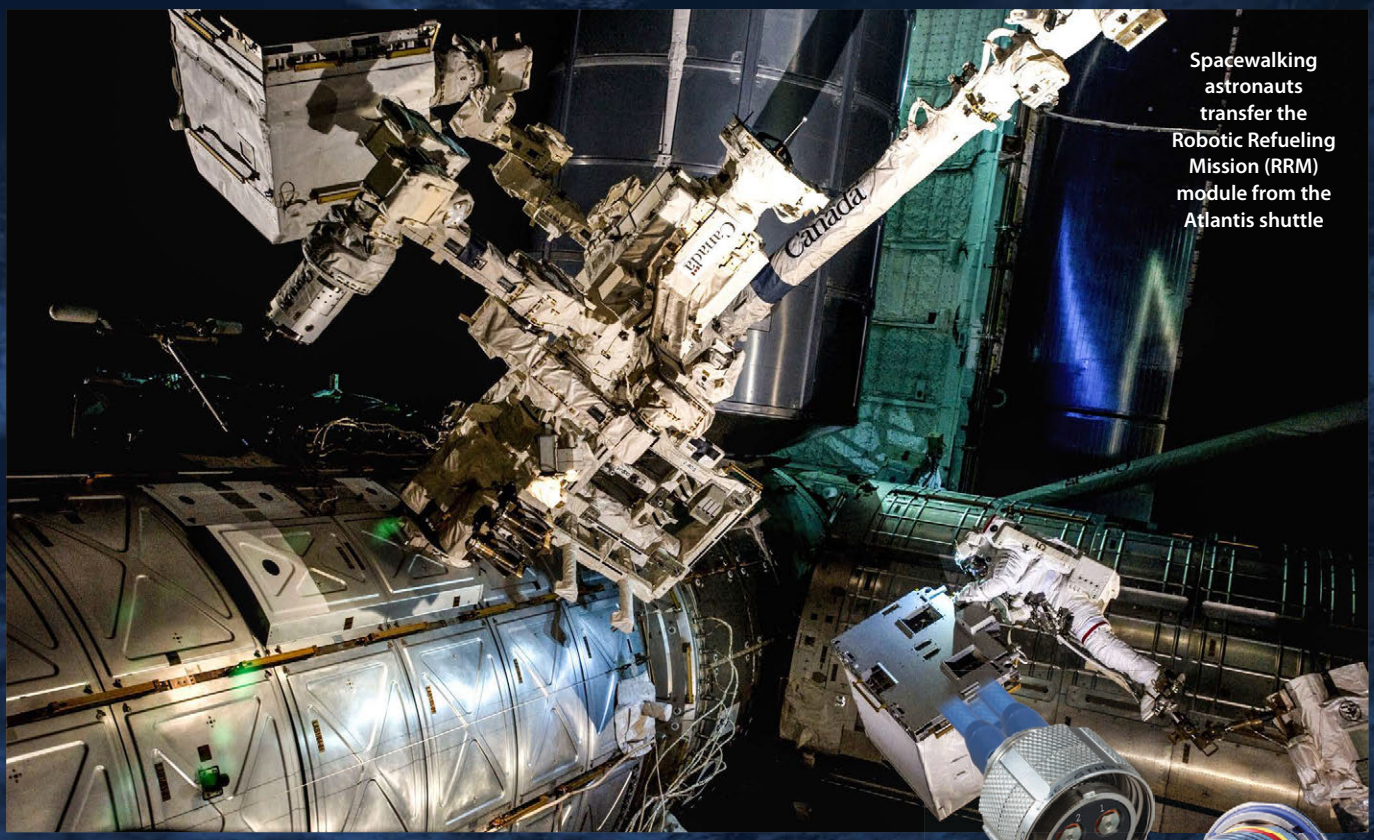
APPLICATIONS

- **Ground terminal and intra-facility links for secure shelters**
- **Electronic Warfare (EW) systems**
- **Phased-Array antenna systems**
- **Naval vessels**
- **Reduced-footprint airframe applications**
- **Satellite communications (SATCOM)**
- **Mobile command, control, and communications vehicles**

Glenair®

RUGGEDIZED

Size #8 photonic transmitter and receiver contacts and connectors for Ethernet, video and high-speed data



Spacewalking astronauts transfer the Robotic Refueling Mission (RRM) module from the Atlantis shuttle

Size 8 photonic contacts transmit and receive differential CML or LVPECL electrical signals over Multimode fiber optic cable. Transmitters consist of a laser driver or LED driver with a temperature compensation circuit to maintain optical power over the entire operating temperature range, and a 850nm VCSEL laser or a 1300nm LED. Receivers consist of a PIN Photo Detector, a Transimpedance Amplifier with automatic gain control circuit, and a Limiting Amplifier. Differential output data signals are LVPECL or CML compatible. The transmitter has a Tx Disable pin to turn off transmitter output. These optoelectronic contacts may be readily incorporated into space-grade caliber connector packages including MIL-DTL-38999, ARINC 801, as well as low-profile rectangular connector designs.

Patented photonic contacts integrate into small form-factor Glenair connectors including ultraminiature circular Mighty Mouse and signature rectangulars. Selected part numbers have been designed and tested for radiation tolerance (consult factory).

Opto-electronic receptacle connectors are populated with size #8 contacts, and ready for immediate assembly in I/O to circuit board applications

- **Fast and Gigabit Ethernet, DVI, HDMI video capable transmitter and receiver-equipped contacts**
- **ARINC 664, 801, 803, 804 and 818 standard compliant**
- **Link distances up to 550 meters, multimode**
- **Single, 3.3 V power supply**
- **Wave-solderable termination with RoHS-compliant solders**
- **For use in ARINC 600 and other size #8 cavity-equipped connectors**
- **Current offerings include 1.25mm ARINC 801 and 2.5mm ELIO® solutions**

RUGGEDIZED

Photonic Contacts and Connectors for Ethernet, Video and High-Speed Data

050-301 SIZE 8 CAVITY OPTO-ELECTRONIC CONTACTS, 100MBPS TO 5GBPS, MMF, 3.3V

050-301
Radiation Tolerant

- Front-release, front-insert, front-removable Size #8 OE converter designed for ARINC 600
- ARINC 664, 801, 803, 804, and 818 Standard Compliant
- Data rates from 100Mbps to 5.00Gbps
- Supports Fast and Gigabit Ethernet, AFDX, 1x/2x Fibre Channel, DVI, DHMI, SFPDP, Serial Rapid I/O (sRIO)
- 100 ohms differential CML inputs with Tx Fault and Tx Disable
- Link distances up to 550 meters with multimode 50/125µm or 62.5/125 µm fiber
- Single 3.3V power supply
- ARINC 801 1.25mm ceramic fiber ferrule
- Solutions available in 38999 style connectors
- -40°C to +85°C Operating Case Temperature
- Evaluation fixtures available

050-307 SIZE 8 CAVITY OPTO-ELECTRONIC CONTACTS, 100MBPS TO 5GBPS, MMF, 3.3V

050-307
Radiation Tolerant

- Front-release, front-insert, front-removable Size #8 OE converter designed for ARINC 600
- ARINC 664, 801, 803, 804, and 818 Standard Compliant
- Data rates from 100Mbps to 5 Gbps
- Supports Fast and Gigabit Ethernet, AFDX, 1x/2x Fibre Channel, DVI, DHMI, SFPDP, Serial Rapid I/O (sRIO)
- 100 ohms differential CML inputs with Tx Fault and Tx Disable
- Link distances up to 550 meters with multimode 50/125µm or 62.5/125 µm fiber
- Single 3.3V power supply
- ELIO 2.5mm ceramic fiber ferrule
- Solutions available in 38999 style connectors
- Mates with ELIO 2.5mm Termini
- -40°C to +85°C Operating Case Temperature
- Evaluation fixtures available
- Compatible with Souriau ELIO AQ6S Quadrax Adapter

050-367 SIZE 8 CAVITY OPTO-ELECTRONIC CONTACTS, 3G-SDI AND HD-SDI, MMF, 3.3V

050-367
(patented)

- SMPTE EG 34:2004 Compliant to Pathological Conditions CASE 1, CASE 2 and CASE 3.
- SMPTE ST 297:2015 (3G-SDI & HD-SDI)
- SMPTE 424 Compliant (3G-SDI)
- SMPTE 292 Compliant (HD-SDI)
- SFP Compatible Electrical Input signal levels
- 850nm VCSEL support 3G-SDI & HD-SDI
- Industry standard CML input and outputs that make for simple integration on customer host PCB
- Front-release, front-insert, front-removable
- Fits size 8 quadrax cavity for ARINC 600
- Solutions available in 38999 style connectors
- -40°C to +85°C Operating Case Temperature
- Evaluation fixtures available

050-399 SIZE 8 CAVITY OPTO-ELECTRONIC CONTACTS, DC TO 1 MBPS, MMF, 3.3V

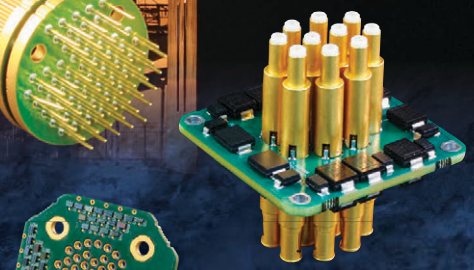
050-399
(patented)

- Front-release, front-insert, front-removable Size #8 OE converter designed for ARINC 600
- ARINC 664, 801, 803, 804, and 818 Standard Compliant
- Data rates from DC to 1 Mbps
- Supports RS232, RS422, and RS485 data rates
- DC coupled transmitter and receiver
- Link distances up to 2Km
- Single 3.3V power supply
- ARINC 801 1.25mm ceramic fiber ferrule
- Solutions available in 38999 style connectors
- -40°C to +85°C Operating Case Temperature
- Evaluation fixtures available

Launching ESA's MetOp-B weather satellite

SPACE-GRADE

EMI/EMP Filter Connectors



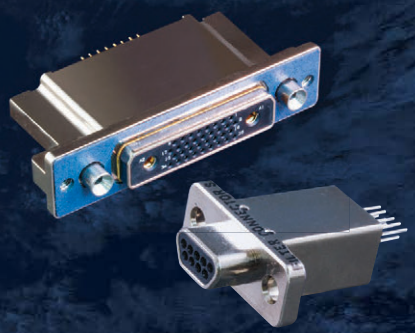
All diode-equipped EMP inserts and planar array EMI filter inserts produced in-house

Glenair manufactures a full range of filter connectors for use in EMC/EMP management of electronic systems and interconnect cabling. All connectors are designed in accordance with applicable connector specifications, and are designed to mate with plugs with the same insert configuration and opposite contact gender. Planar filter arrays and TVS diodes may be integrated into both standard catalog as well as build-to-order configurations. Glenair's state-of-the-art diode burn-in process tests leaded and surface mount diodes with leakage current monitored throughout the entire test procedure ensuring field reliability.

- **Planar, multilayer ceramic capacitive filters, with and without transient voltage suppression diodes**
- **Space-grade plating and outgassing processing**
- **C and Pi electrical configurations**
- **PC tail, crimp or solder cup termination**
- **35 – 240,000 pF capacitance**
- **Fast and reliable diode burn-in and test services**
- **Turnkey in-house manufacturing of all filter connector elements and processes**

Table I: Capacitor Array Code / Capacitance Range

Class	Pi - Circuit (pF)	C - Circuit (pF)
X	160,000 - 240,000	80,000 - 120,000
Y	80,000 - 120,000	40,000 - 60,000
Z	60,000 - 90,000	30,000 - 45,000
A	38,000 - 56,000	19,000 - 28,000
B	32,000 - 45,000	16,000 - 22,500
C	18,000 - 33,000	9,000 - 16,500
D	8,000 - 12,000	4,000 - 6,000
E	3,300 - 5,000	1,650 - 2,500
F	800 - 1,300	400 - 650
G	400 - 600	200 - 300
J	70-120	35-60

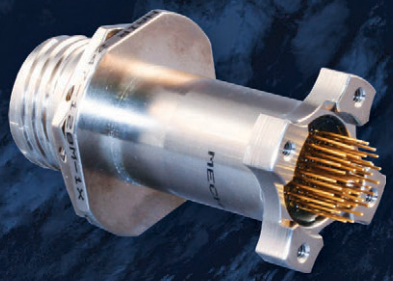


Planar filter arrays and TVS diodes may also be incorporated into rectangular connector packaging such as the Micro-D and Series 79 Micro-Crimp devices shown here.

SPACE-GRADE

EMI/EMP Filter connectors

Innovative desigins · total vertical integration



Extended-shell
PC-tail cylindrical filter
with threaded standoff

Special-purpose
filter connector cable
adapter (Sav-Con®)

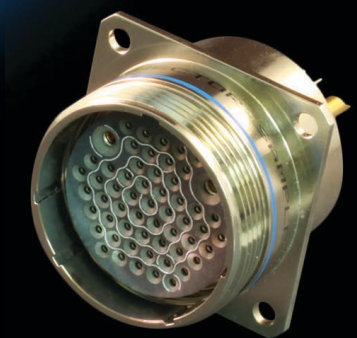
Custom reduced-length
sidecar filter connector design

Series 80 Mighty Mouse
PC-tail filter receptacle

Series 80 Mighty Mouse
solder-cup filter receptacle
with integrated banding porch

MIL-DTL-38999 type
crimp-contact termination
filter receptacle

MIL-DTL-38999 Series
III type EMP TVS diode-
equipped filter connector



MIL-DTL-83723 type filter
connector, gold-plated for atomic
oxygen corrosion resistance

Quick-disconnect circular with
solder-free contact filter array

Glenair®

JAXA Kibo Laboratory module from the International Space Station

Certified SpaceWire cables for both laboratory/test applications and flight applications

SPACE GRADE
NASA
ESA, JAXA
SCREENED

SERIES MWDM

Micro-D Connectors

Standard

Hermetic

EMI Filter

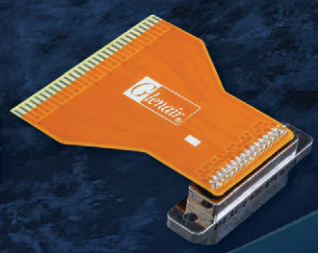
- High density Micro TwistPin contacts set on .050" centers
- 9 to 130 contact arrangements
- Pigtail, PCB, solder cup, and flex terminations
- Single row, multi-row, low profile and high density insert arrangements
- QPL and commercial versions
- Same-day availability on all part numbers
- Qualified for use in ESA, NASA, JAXA applications

TwistPin equipped MIL-DTL-83513 Micro-D connectors offer outstanding mating performance, durability and minimal contact resistance

MasterLatch™

Surface Mount

Rear Panel Mount



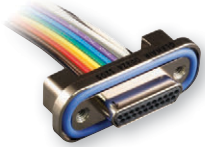
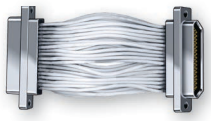
Flex Circuit

MIL-DTL-83513 AND COMMERCIAL

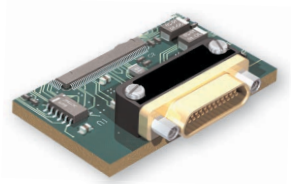
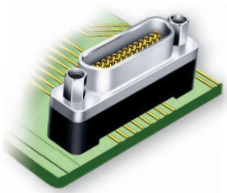
Micro-D Connectors

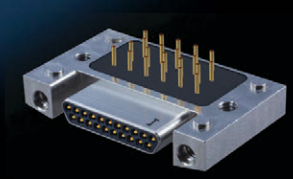
Mission-critical mating performance

Metal Shell Micro-D for Harnessing Applications

					
GRPM Solder Cup	GRPM Insulated Wire	GRPM Uninsulated Wire	MWDM Solder Cup	MWDM Insulated Wire	MWDM Back-To-Backs
					
Shielded Cable Assembly	MWDM Uninsulated Wire	GMDR Insulated Wire	GMDE Environmental	GSWM SpaceWire	GMLM MasterLatch

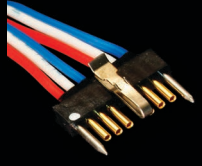
Micro-Ds for Printed Circuit Board

			
GRPM-CBS	GRPM-CBR	MWDM-BS	MWDM-BR
			
MWDM-CBR	MWDM-CBS	90° Surface Mount	GMR7580
			
GMR7590	GMR7580C	GMR7590C	Right Angle Filter

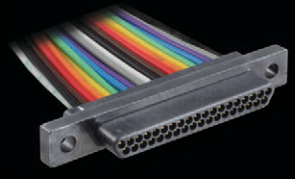


WellMaster™ 260

Sav-Con®

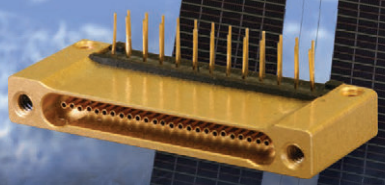


Latching MicroStrip



Low Profile

The International Space Station



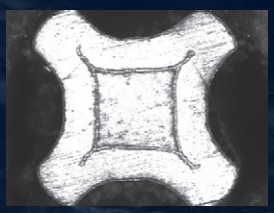
SERIES 89

Nanominiature Connectors

MIL-DTL-32139 qualified connectors for mission-critical board-to-wire applications—simply the smallest and lightest mil-spec connector in the business

- 1 Amp current rating
- .025 Inch (0.64 mm) contact spacing
- #30 And #32 gage wire accommodation
- Single and double row
- Metal shell, aluminum, titanium or stainless steel
- TwistPin contact system
- Gold alloy contact, unplated
- Thru-hole and surface-mount PCB versions

THE NANO TWISTPIN ADVANTAGE



Transverse cross-section of a TwistPin contact crimped to solid wire

- Gas-Tight Crimp Joint
- Better Shock and Vibration Performance
- Corrosion Proof Contact Alloy

SERIES 89

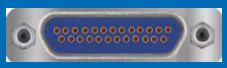
Nanominiature Connectors

The smallest and lightest mil-spec connector

Series 89 Nanominiature Connector Performance Summary	
Contact Spacing	.025" (0.64mm) Contact Centers
Wire Accommodation	#30-#32 AWG
Current Rating	1 AMP Max
DWV	250 VAC RMS Sea Level
Insulation Resistance	5000 Megohms Minimum
Operating Temperature	-55° C. to +125° C.
Contact Resistance	71 Millivolt Drop Maximum
Shock, Vibration	100g's, 20 g's
Durability	200 Mating Cycles
Corrosion Resistance	48 Hours Salt Spray
Mating Force	5 Ounce Max, 0.4 Ounce Min

How Small Are They?

D-Subminiature Connector
25 Contacts
on 0.109 Inch Spacing



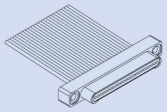
Micro-D Connector
25 Contacts
on 0.050 Inch Spacing

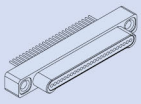
Nano Connector
25 Contacts
on 0.025 Inch Spacing

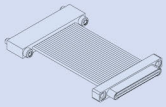
Also available: space-grade Nano circulars

SERIES 89 NANOMINIATURE PRODUCT SELECTION GUIDE

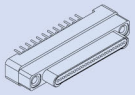
Pre-Wired Single Row Connectors

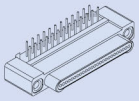

Insulated Wire

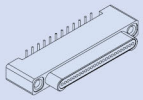

Uninsulated Wire

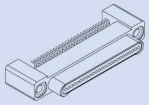

Back-to-Back Cables

Pre-Wired PCB Connectors

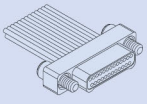

Thru-Hole Vertical

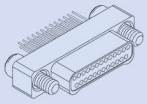

Thru-Hole 90°

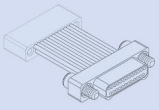

SMT Vertical


SMT 90°

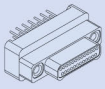
Pre-Wired Double Row Connectors

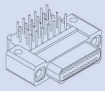

Insulated Wire

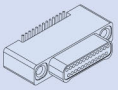

Uninsulated Wire

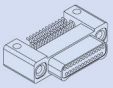

Back-to-Back Cables

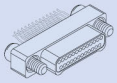
Double Row PCB Connectors


Thru-Hole Vertical

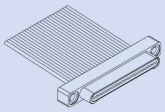

Thru-Hole 90°

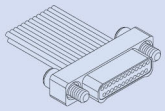

SMT Vertical


SMT 90°


SMT Straddler

Pre-Wired MIL-DTL-32139 Connectors

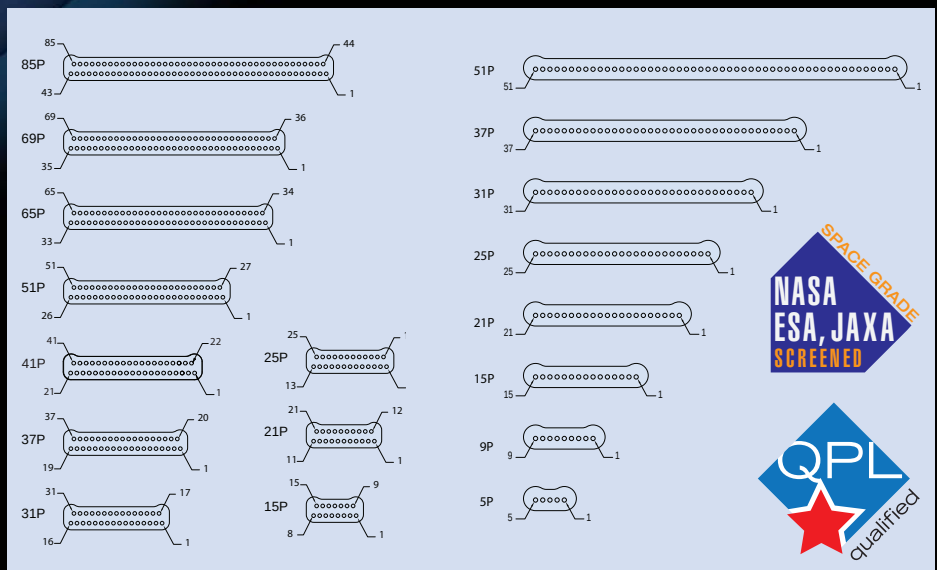

Single Row, Insulated Wire


Double Row, Insulated Wire

NANOMINIATURE CONTACT ARRANGEMENTS

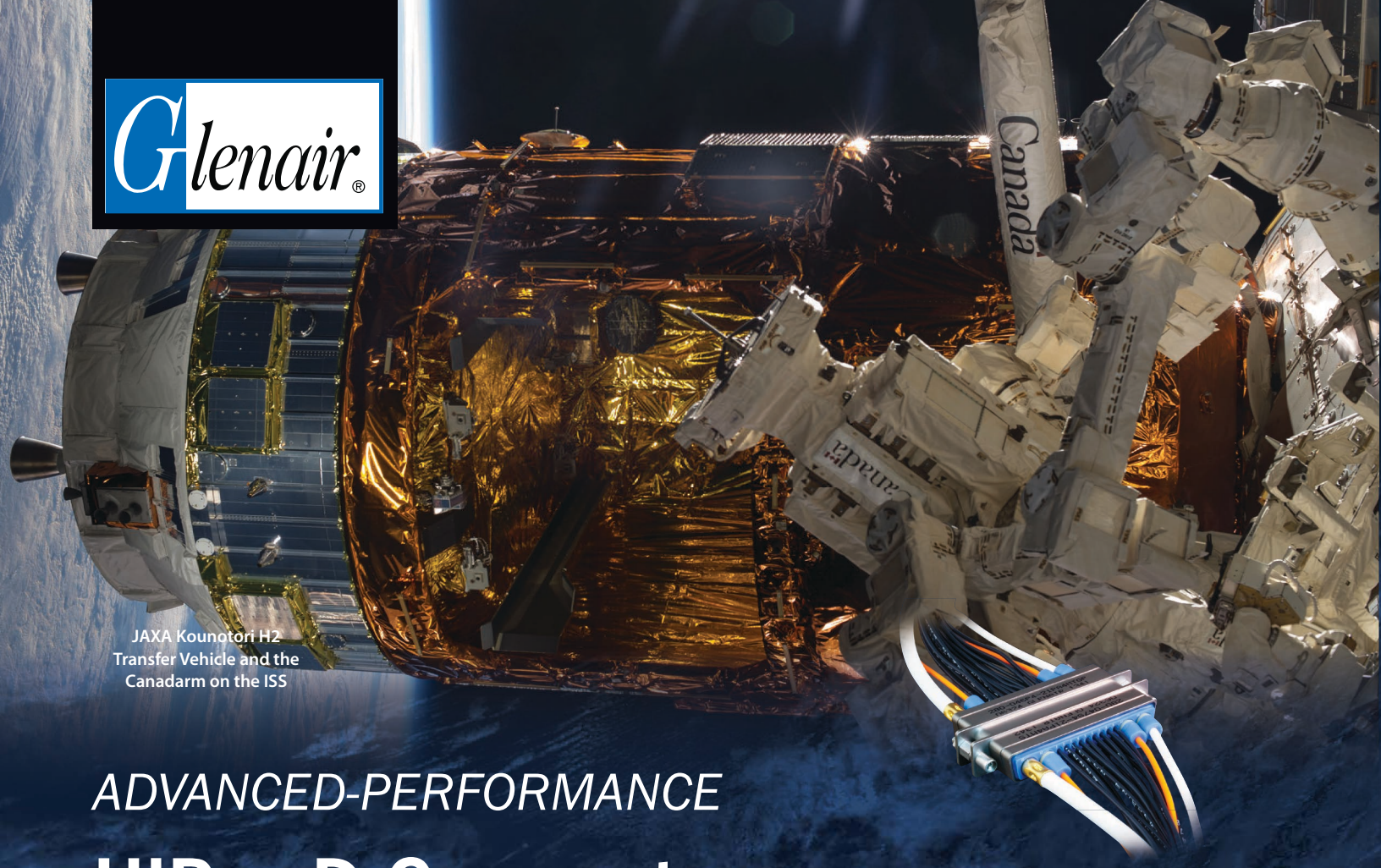
Single Row Mating Face of Pin (Plug) Connector

Double Row Mating Face of Pin (Plug) Connector



SPACE GRADE
NASA
ESA, JAXA
SCREENED

QPL
qualified



JAXA Kounotori H2 Transfer Vehicle and the Canadarm on the ISS

ADVANCED-PERFORMANCE

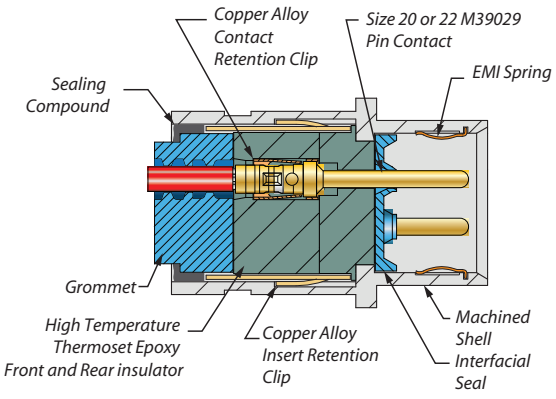
HiPer-D Connectors

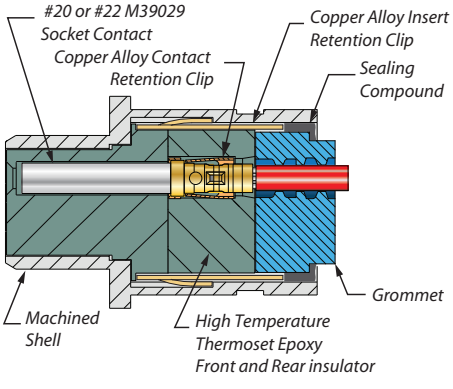
Space-grade M24308 intermateable

The HiPer-D connector is a M24308-type D-Subminiature connector with superior design features. Unlike standard M24308 connectors with stamped steel shells, the HiPer-D connector features a one-piece machined shell, 200°C continuous operating temperature rating and enhanced, mated shell EMI/RFI protection via an integrated ground spring. Aerospace grade fluorosilicone grommets and face seals (JAXA / NASA outgassing available) provide environmental protection. The HiPer-D is intermateable, intermountable and interchangeable with standard M24308 D-Sub connectors.

- **Advanced temperature, vibration and EMC/ electrical performance**
- **11 standard and 20 combo insert arrangements**
- **High temperature epoxy insulators**
- **Watertight sealing**
- **Rugged machined one-piece shell**

STANDARD AND HIGH DENSITY HiPer-D® - CUTAWAY

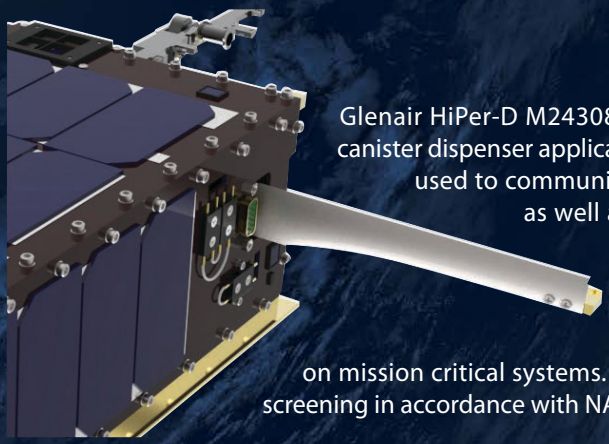




SERIES 28

HiPer-D Space Grade Connectors

Product features and specifications



Glenair HiPer-D M24308 D-sub connectors are ideally suited for CubeSat or NanoSat canister dispenser applications where rack and panel or connectorized wire assemblies are used to communicate with HDRMs, pin pullers, pin pushers, door status sensors, as well as system communications and testing prior to deployment of satellite equipment. Standardized usage of M24308 connectors on hardware interfaces simplifies interconnection and communication. Glenair HiPer-D space grade M24308 D-sub connectors eliminate potential interconnect electrical problems on mission critical systems. Connectors are supplied with NASA/ESA/JAXA outgassing and screening in accordance with NASA EEE-INST-0002.

HiPer-D High-Performance D-Sub vs. MIL-STD-24308		
Specification / Feature	**M24308**	**HiPer-D**
Temperature	-55°C to +125°C	-65°C to +200°C
Insulator	Thermoplastic	Thermoset Epoxy
Shell	Steel (Brass)	Aluminum (SST)
Voltage	1000 VAC	1000 VAC
Grounding	Dimples in shell (not in Mil-Spec)	Nickel-plated Copper Alloy EMI spring
Environmental	No	Yes
Vibration, sine	20 g	60 g
Vibration, random	N/A	43 g
Shock	50 g	300 g
Bolt-on backshells	No	Yes

HiPer-D M24308 Combo-Ds for power, signal, and RF applications

- **Size #8 power and 50 ohm or 75 ohm RF contacts**
- **Mixed layouts with #8's and #20's**
- **200°C continuous operating temperature**
- **20 tooled layouts**
- **Crimp and PC tail terminations**

High-Speed HiPer-D High-Performance M24308

Crimp contact non-environmental connectors with #8 contacts for high-speed data transmission

- **One-piece rugged machined aluminum shell**
- **Two to five size 8 Coax, Twinax, or Quadrax contacts**
- **Common ground plane (no insulators)**
- **Available in straight and right angle PCB versions**
- **Non scoop-proof solution. For scoop-proof rectangular connector requirements, see Series 792**

Glenair®

Mars Curiosity rover self portrait. The MAHLI camera on Curiosity's robotic arm took multiple images that were stitched together into this selfie.

SERIES 80 MIGHTY MOUSE

Reducing the Size and Weight of Electrical Wire Interconnect Systems

SPACE GRADE
NASA
ESA, JAXA
SCREENED

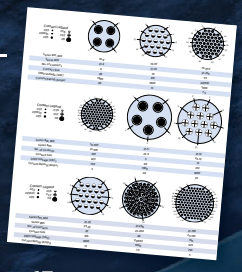
The industry standard ultraminiature interconnect—from low earth orbit to Mars

Mighty Mouse vs. 38999: less than half the size and weight.

- 8 coupling styles and 67 contact arrangements from 1 – 130 contacts
- MIL-DTL-38999 caliber performance
- Size #23, #22, #20, #20HD, #16, #12, #8 signal, power, fiber optic and shielded contacts
- Discrete connectors and turnkey cable assemblies
- Space-grade bakeout processing available

FULL RANGE OF SUPPORTED CONTACTS, 67 CONTACT ARRANGEMENTS

Signal | Power | Shielded | Fiber Optic | Pneumatic



67 arrangements, from 1–130 contacts

SERIES 80 ULTRAMINIATURE

Mighty Mouse Connectors and Cables

Connector series overview

CHOOSE FROM 8 DIFFERENT COUPLING DESIGNS

Series 800
UN thread

Series 801
double-start ACME thread

Series 802
AquaMouse UNEF thread

Series 803
bayonet coupling

Series 804
quick-disconnect

Series 824
locking quick-disconnect

Series 805
triple-start thread, size #23
contact layouts

Series 806
modified triple-start, size #22HD
and #20HD layouts

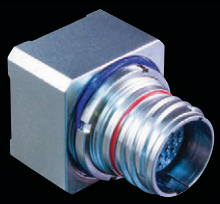
AVAILABLE MIGHTY MOUSE CONNECTOR CLASSES

IP67
environmental

Glass-to-metal seal
hermetic

CODE RED
encapsulant-seal hermetic

EMI/RFI
Filter



EMP Transient Voltage
Suppression

Bulkhead feed-thrus and
penetrators

Sav-Con®
connector savers

High-pressure subsea /
submersible

High-speed
Ethernet

Single- and multimode
fiber optic

AVAILABLE COTS SPECIAL-PURPOSE DESIGNS AND PACKAGING

Low-profile COBRA

Mouse Bud

Double-standoff PC tail

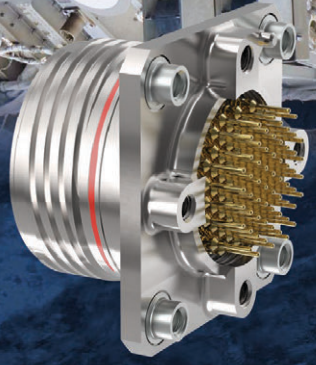
COTS flex jumpers

Special feed-thrus

Glenair®

Astronauts work in tandem to remove debris and lubricate the starboard Solar Alpha Rotary Joint on the STS-126 mission

SPACE GRADE
NASA
ESA, JAXA
SCREENED



Series 806 Mil-Aero Connectors

Innovative design meets key performance benchmarks for harsh vibration, shock, and environmental settings—as well as high-altitude unpressurized zones with aggressive voltage ratings and altitude immersion standards

- Next-generation small form factor aerospace-grade circular connector
- Designed for general use in harsh application environments such as aircraft, industrial robotics and more
- Upgraded environmental, electrical and mechanical performance
- Integrated anti-decoupling technology
- Higher density 20HD and 22HD contact arrangements
- Glass hermetic, lightweight aluminum hermetic, and filtered versions
- +200° C temperature rating

SAVE SIZE AND WEIGHT WITH SERIES 806 CONNECTORS

Series 806 Mil-Aero
Smallest Size
.500 In. Mating Threads
3 #20 Contacts or 7 #22 contacts

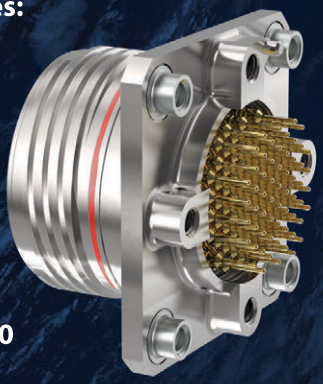
MIL-DTL-38999
Smallest Size
.625 In. Mating Threads
3 #20 Contacts or 6 #22 contacts

Series 806 Mil-Aero Ultraminiature Circular Connectors

for harsh space applications IAW MIL-DTL-38999

SERIES 806 MIL-AERO

SERIES 806 MIL-AERO: FEATURES / SPECIFICATIONS



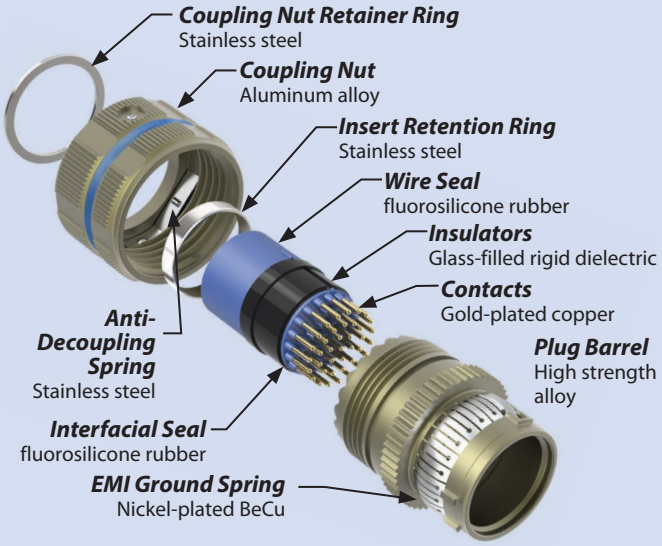
- **Supported wire sizes:**
  #20HD contacts
  20–24 AWG
  #22HD contacts
  22–28AWG
- **Dielectric withstanding voltage**
  #20HD layouts: 1800 Vac
  #22HD layouts: 1300 Vac
- **Reduced pitch triple-start modified anti-decoupling stub ACME mating threads**
- **"Triple ripple" wire sealing grommet (75,000 ft. rated)**
- **Integral Nano-Band shield termination platform**
- **EMI shielding effectiveness per D38999M para. 4.5.28 (65 dB min. leakage attenuation @ 10GHz)**
- **10,000 amp indirect lightning strike**
- **MIL-S-901 Grade A high impact shock**

AVAILABLE LIGHTWEIGHT ALUMINUM "CODE RED" HERMETICS

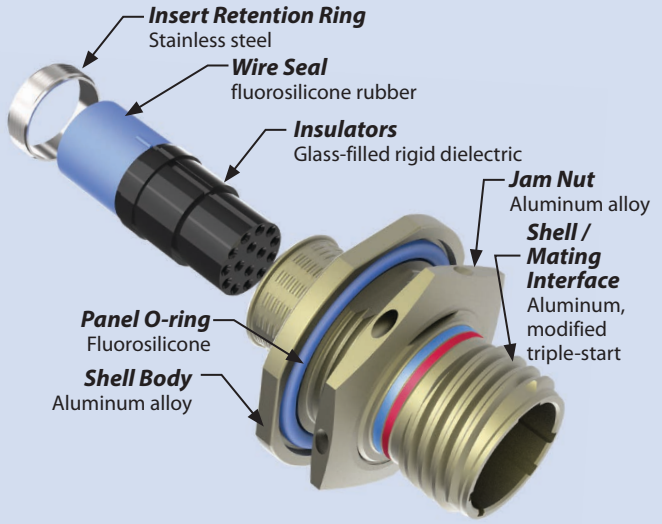
CODE RED is a lightweight encapsulant sealing and assembly process with 50% package-weight savings compared to glass-to-metal seal Kovar/stainless steel solutions. Non-outgassing CODE RED (IAW NASA/ESA) provides durable hermetic sealing with $1X10^{-7}$ leak rate performance. Gold-plated copper contacts deliver outstanding low-resistance current carrying capacity.

CODE RED

SERIES 806 MIL-AERO PLUG



SERIES 806 MIL-AERO RECEPTACLE



SMALLER AND LIGHTER WITH EQUAL D38999 PERFORMANCE?

High-Density Layouts
Twice as many contacts in a smaller package

"Top Hat" Insulator
High voltage rating, foolproof alignment

Triple Ripple Wire Seal
Reliable 75,000 ft. altitude immersion

Glenair®

View from the Cupola of the International Space Station

HIGH PERFORMANCE

Series 791

The next-generation micro-miniature rectangular connector for demanding aerospace applications

Polarized / keyed shells prevent mis-mating and allow designers to specify identical layouts side-by-side without risk of circuit damage

Sometimes the simplest ideas are the best ideas. The Series 791 is a simple idea. Let's create a brand new class of connector – the micro-miniature rectangular. Let's combine the versatility of the Series 790 Micro-D type connector with the rugged features of our popular HiPer-D M24308 type connector. Let's add a unique dual lobe shell and let's recess the pins to eliminate the possibility of scooping damage. Let's add high speed datalink capability.

Originally designed for NASA's Orion project, the 791 is qualified for manned space flight. The 791's small size and blind mate capability make it a perfect choice for 2U and 3U electronics modules. Space applications include radars, satcom, exoatmospheric vehicles, flight avionics, power distribution units, and satellite instrumentation.

- **Next-generation small form factor aerospace-grade rectangular connector approved for manned space flight**
- **Scoop-proof recessed pin contacts**
- **37 arrangements; 12 shell sizes; size 23, 16, 12 and 8 contacts**
- **Environmental**
- **EMI shielded**
- **Guide pins for blind mate modules**

Prevent mis-mating with Mod Code 555 special keying option

SERIES 791 MICRO-CRIMP

Next-generation micro-miniature rectangular

for demanding aerospace applications

SPACE GRADE
NASA
ESA, JAXA
SCREENED

SERIES
791
SEVEN
NINETY-ONE

Save Size and Weight with Series 791 Connectors

The Next Generation Micro-miniature rectangular Connector for Demanding Aerospace / Space Flight Applications

About The Series 791

The Series 791 is an aerospace-grade micro-miniature rectangular connector with EMI protection and environmental sealing. Originally developed for NASA's Orion capsule, The 791 is qualified for manned space flight and is ideal for radars, weapons systems and avionics gear.

The Series 791 is available either with crimp pins or with printed circuit terminals. Machined aluminum alloy shells feature dual lobes for polarization. Contact sizes range from size 8 to size 23 in 37 arrangements. Pin contacts are recessed to prevent scooping damage while mating. Crimp contacts conform to M39029 requirements and are rear release.

An optional ground spring reduces susceptibility to EMI problems. Fluorosilicone face seals and wire grommets prevent moisture and contamination. Panel mount versions are available with an O-ring, or for improved panel bonding, a metal spring.

Board mount versions include straight or right angle terminals. Right angle PCB connectors feature an aluminum shroud covering the terminals.

Hardware options include screwlocks, jackscrews or guide pins for blind mate applications.

M-17P17 with size 16 contacts

- **Coax, twinax, quadrax and Ochito octaxial contacts**
- **Rugged aluminum shell with dual polarizing lobes**
- **Straight and right angle printed circuit board mounting**

Shell size A – the smallest 791

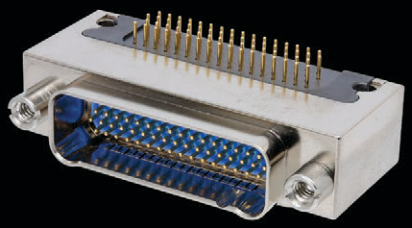
- **-65°C to +150°C**
- **Panel mount versions with O-ring or EMI spring**

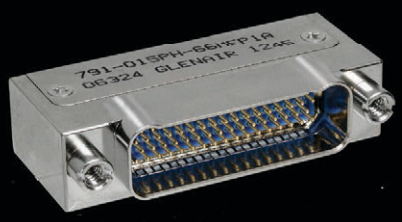
Series 791 with MT ferrules

- **Ruggedized small form-factor, high-density MT fiber optic solution**
- **Optimized for use with parallel optic transceivers in ribbon or round cable applications**

Integral backshell cable connector

- **Available with integral oval band porch or backshell accommodation**
- **Superior EMI shell-to-shell performance compared to M24308**
- **SAE AS39029 crimp-and-poke contacts**





Series 791 with MT ferrules

- **Epoxy sealed board-mount configurations, straight and 90°, with and without panel mount sealing**
- **Internal ground spring**
- **Fully shrouded shells for superior EMC performance compared to M24308**

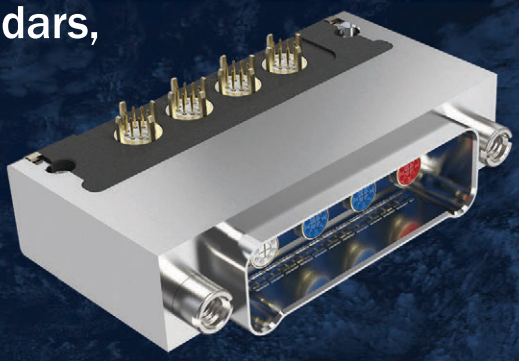
Glenair®

SERIES 792™ SEVEN NINETY-TWO

The next-generation micro miniature rectangular connector with El Ochito contacts for high-speed aerospace applications

The robotics workstation inside the ISS cupola

The Series 792 connector brings high-speed data-rate performance to the Glenair Series 79 rectangular family. Size 8 cavities accept standard Quadrax or El Ochito® shielded octaxial contacts making it a perfect choice for radars, weapons systems, mission computers and displays, communications gear, and more.



El Ochito®

- High-speed Ethernet, USB 3.0, HDMI, and DisplayPort
- PCB-mount and cable connectors
- Scoop-proof interface
- 12 arrangements and 6 shell sizes
- Precision-machined dual-lobe polarized shells
- Environmentally sealed
- Integrated EMI shielding and grounding
- Blind mating

HIGH-SPEED

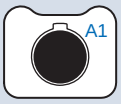
Series 792

The next-generation micro miniature rectangular for high-speed aerospace applications

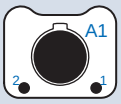
DESCRIPTION	REQUIREMENT	PROCEDURE / NOTES
Operating temperature	-65° to +175°C	EIA-364-32 Test Condition IV
Current rating	1.5 Amps (datalink contacts) 5 Amps (Size #23 contacts)	Datalink contacts tested: El Ochito® White
DWV (sea level)	750 VAC (Size #23 contacts) 1000 VAC (datalink contacts)	EIA-364-20
Insulation resistance	5000 MΩ minimum	EIA-364-21
Contact resistance, 25°C	55 millivolt maximum	EIA-364-06, 1.0 A test current, #24 AWG wire

DESCRIPTION	REQUIREMENT	PROCEDURE / NOTES
Shell-to-shell resistance	2.5 millivolt maximum	EIA-364-83
Shielding effectiveness	Frequency / Attenuation dB 100 / 75 1000 / 50 3000 / 44 6000 / 38 10000 / 35	EIA-364-66
Ingress protection	IP67 rating	IEC-60529

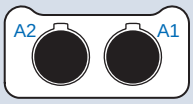
Insert Arrangements



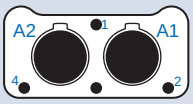
A-1W1 • A-1G1*
1 #8



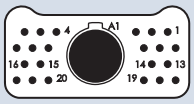
A-3W1
1 #8 / 2 #23



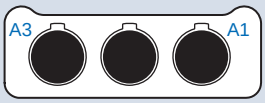
B-2W2 • B-2G2*
2 #8



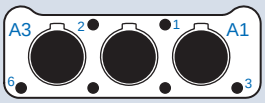
B-6W2
2 #8 / 4 #23



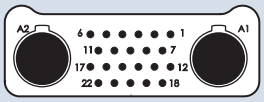
B-23W1
1 #8 / 22 #23



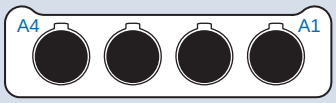
C-3W3 • C-3G3*
3 #8



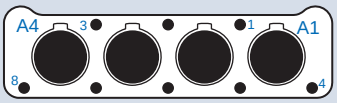
C-9W3
3 #8 / 6 #23



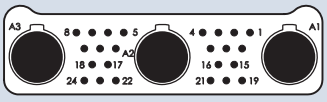
C-24W2
2 #8 / 22 #23



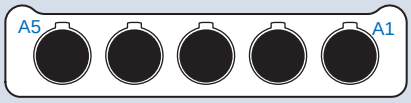
D-4W4 • D-4G4*
4 #8



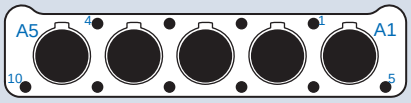
D-12W4
4 #8 / 8 #23



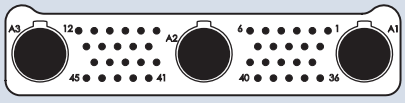
D-27W3
3 #8 / 24 #23



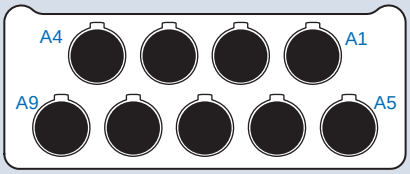
E-5W5 • E-5G5*
5 #8



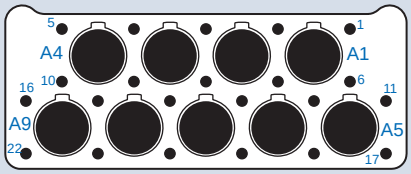
E-15W5
5 #8 / 10#23



E-48W3
3 #8 / 45#23



F-9W9 • F-9G9*
9 #8



F-31W9
9 #8 / 22#23

Contact Key

Size #8

Size #23

*** Grounded aluminum insert**

Glenair

Glenair Sav-Con®s protected the umbilical connectors on every Space Shuttle mission

SAV-CON

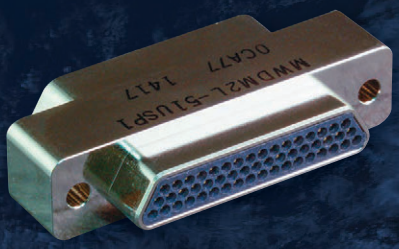
FLIGHT-PROVEN

Connector Savers and Bulkhead Feed-Thrus

The smart solution for preventing contact damage and extending the service life of cable assemblies and box and panel-mount receptacles

- Sav-Con®s for every Military Standard connector—circular and rectangular
- Hundreds of successful space launch and space flight applications
- Glenair Sav-Con®s on board every Space Shuttle mission flown
- Bulkhead feed-thrus for environmental, filter and hermetic applications
- Pin/pin, pin/socket, and socket/socket versions
- Traditional plug-receptacle savers, as well as in-line versions and gender changers
- Available EMI/EMP filter savers and adapters
- Optional locking mechanism

Series changers and gender changers available in both Sav-Con® and bulkhead feed-thru configurations



circular and rectangular configurations available including hermetic and EMI/RFI filter configurations

HIGH-PERFORMANCE CONNECTOR GO-BETWEENS

Sav-Con® Connector Savers and Bulkhead Feed-Thrus

SPACE GRADE
NASA
ESA, JAXA
SCREENED

Each Glenair Sav-Con® Connector Saver meets the military specification performance requirements of its mating connector. Glenair manufactures and supplies a Sav-Con® connector saver for every military standard connector currently in use including:

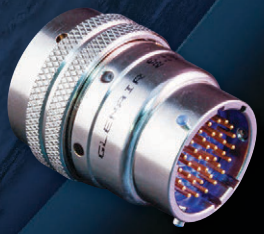
- MIL-DTL-26482 Series I and II
- MIL-DTL-28840
- MIL-DTL-38999 Series I, II and III
- MIL-DTL-83723
- LN 29729 (SJT)
- PATT 105 and PATT 602
- MIL-DTL-5015
- Series 801 and 805 Mighty Mouse
- Series 89 Nanominiature
- M24308 D-Subminiature
- MIL-DTL-83513 Micro-D Subminiature
- Series 28 HiPer-D M24308 intermateable
- Series 79 Micro-Crimp

Comprehensive materials, plating, and polarization options available

TRADITIONAL PLUG-RECEPTACLE SAV-CON® CONNECTOR SAVERS

MIL-DTL-38999 series III type

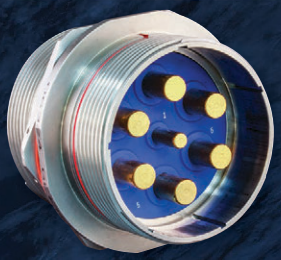
Series 89 Nanominiature rectangular



MIL-DTL-38999 series II bayonet-coupling saver

Series 80 Mighty Mouse Sav-Con®

BULKHEAD FEED-THRUS



Special high-voltage power bulkhead feed-thru

Special wide panel accommodation Mighty Mouse bulkhead feed-thru

MIL-DTL-5015 bulkhead feed-thru

Special non-cadmium plating classes

SPECIAL-PURPOSE ADAPTERS AND SAVERS

EMI/RFI filter Sav-Con® adapter (D38999 Series III type shown)

Rectangular EMI/RFI filter Sav-Con adapter (MIL-DTL-83513 type shown)

Power distribution connector savers (MIL-D-5015 type shown)

Liftoff: a Delta V Launch Vehicle

POLYMER AND METAL-CORE

Conduit Systems

The flexible, lightweight alternative to standard jacketed cables

Conduit wire protection systems for space applications must be able to withstand extreme environments—from immersion in harsh chemicals, to temperature extremes and numerous flex cycles—without breakdown or failure. Glenair conduit systems are rigorously engineered to meet the exacting specifications of NASA, ESA and JAXA space programs, and have been successfully implemented in numerous space programs—from launch vehicles to the International Space Station and the Gravity Probe mission.

Lightweight, flexible polymer-core materials are available in a wide variety of materials to suit any application: Annular material choices include: Kynar, PVDF and G-FLEX Siltem, helical choices include ETFE, FEP, PFA, PTFE, and PEEK plus AS81914 /1 – 11 qualified materials and configurations.

Metal-core versions are specified for extreme crush resistance and optimal EMI shielding. The helically-wound metal conduit provides extremely high levels of EMI protection across all radiation fields and frequencies. Stainless steel versions are often specified for environments subject to the temperature extremes of space.

- **Hermetically sealed, flexible metal-core conduit for interconnect applications**
- **Lightweight, flexible helical and annular polymer-core materials and easy to install fittings, transitions and adapters**
- **Turnkey, factory-terminated assemblies for landing gear and other rugged aerospace applications**

METAL AND POLYMER CORE

Conduit Systems

Turnkey factory-terminated assemblies or user-installable systems

CONDUIT SYSTEMS

SERIES 72 CONVOLUTED TUBING PRODUCT SELECTION GUIDE

Convoluted Tubing

Factory Terminated Assemblies

Sentry system

Easy-to-Install Guardian system

SERIES 74 CONVOLUTED TUBING PRODUCT SELECTION GUIDE

Helical Convoluted Tubing

Factory Terminated Assemblies

Swivel-joint circular connector backshell

Easy Assembly Hat Trick System

Super Durable Internal Braid System

Ultra Lightweight Composite Hummer Nut System

SERIES 75 METAL-CORE HELICALLY-WOUND CONDUIT PRODUCT SELECTION GUIDE

Metal-Core Helical-Wound Conduit

Turnkey Factory Terminated Assemblies

Low-Profile RP Plus System

Heavy-Duty Environmental Metal System

Heavy-Duty Hybrid Composite/ Aluminum

Reduce package size, weight, and labor with turnkey factory assemblies

- **Glenair can design, build, terminate—and even pre-wire—turnkey conduit wire routing solutions.**
- **Certified factory assemblers and calibrated tooling create better-performing systems.**
- **Simple point-to-point or complex multi-branch.**

Glenair®

Delta II Lifts Off Carrying NPP, a JPL CubeSat Experiment

AmberStrand® is ultra-lightweight microfilament metal clad EMI/RFI composite braiding. Glenair offers AmberStrand® users direct factory overbraiding services for point-to-point and multi-branch interconnect assemblies.

LIGHTWEIGHT

AmberStrand®

Composite metal-clad EMI/RFI expandable braided shielding

The smart way to reduce launch and flight weights in aerospace systems

For many applications, the cable shield is the most important element in controlling EMI. Unfortunately, metal shielding—especially when applied in multiple layers—can be extremely heavy. The opportunity to provide robust EMI shielding at a fraction of the weight is the principal advantage of composite thermoplastic EMI/RFI braid made from AmberStrand® material. Transfer impedance test reports demonstrate the effectiveness of the material compared to conventional metal solutions. So get smart! Reduce weight and save money with AmberStrand®

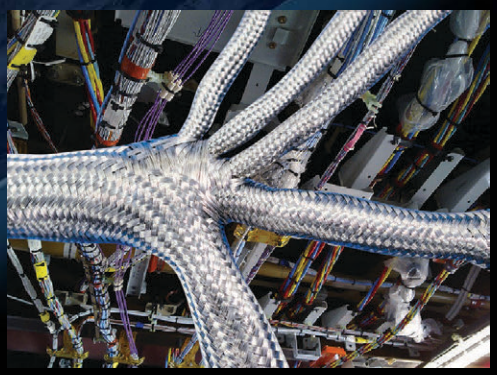
- **Metal-clad EMI/RFI Shielding with a lightweight composite thermoplastic base material**
- **Highly conductive surface plating**
- **Reduce shielding weight up to 80% and more**
- **Reduce operation costs by permanently reducing launch and aircraft all-up weights**
- **Superior high frequency shielding compared to tinned and/or nickel plated copper**
- **Tensile strength: 590,000 psi (min)**

LIGHTWEIGHT, FLEXIBLE

AmberStrand® Composite Braid for EMI/RFI Shielding Applications

The lightest weight EMI/RFI braid in the industry

103-026 AmberStrand® 100% Lightweight Composite Thermoplastic Nickel Plated EMI/RFI Braid		
Tensile Strength	590,000 psi (min)	ATP196 MOD
Operating Temperature	-80°C to +220°C	85% shielding effectiveness, 1000 hrs
Specific Gravity	1.45% (max)	ISO 1183
Thermal Cycling	No adverse effects in visual inspection or resistance after 50 cycles	-65°C to +200°C In accordance with ANSI/EIA-364-75-1997
Lightning Current	Glenair qualification test report 040607AMB	In accordance with ANSI/EIA-364-75-1997
Surface Transfer Impedance	Glenair qualification test report 040607AMB	IEC 96.1 A.5.5.3 method 2
Vertical Flammability	Self-extinguishing ≤ 2 sec. Burn length 0.1 in. max - Dripping 0.0 sec	14CFR part 25.853 (A) AMDT25-116 Appendix F Part I (a) (1) (ii)
Fungus Resistance Testing	28 day incubation test: No fungus growth	Mil-Std 810F, Method 508.5
Mass Loss And CVCM	1.0% max mass loss; .10% max CVCM	ASTM E595
Flex Test 50,000 Cycles	No tearing or visible damage	90° to 120° bend
Salt Spray 500 hrs.	DC Resistance IAW AS85049 .5 milliohms; no visible evidence of base metal on braid	ASTM B 117-03 Sodium Chloride 5%
Salt Fog SO_2	No damage or adverse effects	ASTM G 85 Annex 4 200 hrs.
JP-8 (Mil-T-83133) Military Jet Aircraft Fuel (70°C)	No fraying, DC resistance within limits (AS85049 paragraph 4.6.3)	Mil-STD 810F Method 504 (Modified)
Skydrol Military Jet Aircraft Fuel (90°C)	No fraying, DC resistance within limits (AS85049 paragraph 4.6.3)	Mil-STD 810F Method 504 (Modified)
Hydraulic Fluid Mil-H-5606 (70°C)	No fraying, DC resistance within limits (AS85049 paragraph 4.6.3)	Mil-STD 810F Method 504 (Modified)
Silicate Ester Based Coolanol 25R (70°C)	No fraying, DC resistance within limits (AS85049 paragraph 4.6.3)	Mil-STD 810F Method 504 (Modified)
Polyalphaolefin Mil-C-87252 (70°C)	No fraying, DC resistance within limits (AS85049 paragraph 4.6.3)	Mil-STD 810F Method 504 (Modified)
Lubricating Oil Mil-L-23699 8 hrs. @ 150°C, followed by 72 hrs. @ 65°C	No fraying, DC resistance within limits (AS85049 paragraph 4.6.3)	Mil-STD 810F Method 504 (Modified)
Isopropyl Alcohol 8 hrs. @ 50°C followed by 72 hrs. @ 65°C	No fraying, DC resistance within limits (AS85049 paragraph 4.6.3)	Mil-STD 810F Method 504 (Modified)
Cleaner Fluid Mil-C-85570 8 hrs. @ 23°C followed by 72 hrs. @ 65°C	No fraying, DC resistance within limits (AS85049 paragraph 4.6.3)	Mil-STD 810F Method 504 (Modified)
De-icer Fluid AMS-1432 8 hrs. @ 23°C followed by 72 hrs. @ 65°C	No fraying, DC resistance within limits (AS85049 paragraph 4.6.3)	Mil-STD 810F Method 504 (Modified)
Fire Extinguishing foam 8 hrs. @ 23°C followed by 72 hrs. @ 65°C	No fraying, DC resistance within limits (AS85049 paragraph 4.6.3)	Mil-STD 810F Method 504 (Modified)
R-134 Refrigerant 8 hrs. @ 23°C followed by 72 hrs. @ 65°C	No fraying, DC resistance within limits (AS85049 paragraph 4.6.3)	Mil-STD 810F Method 504 (Modified)

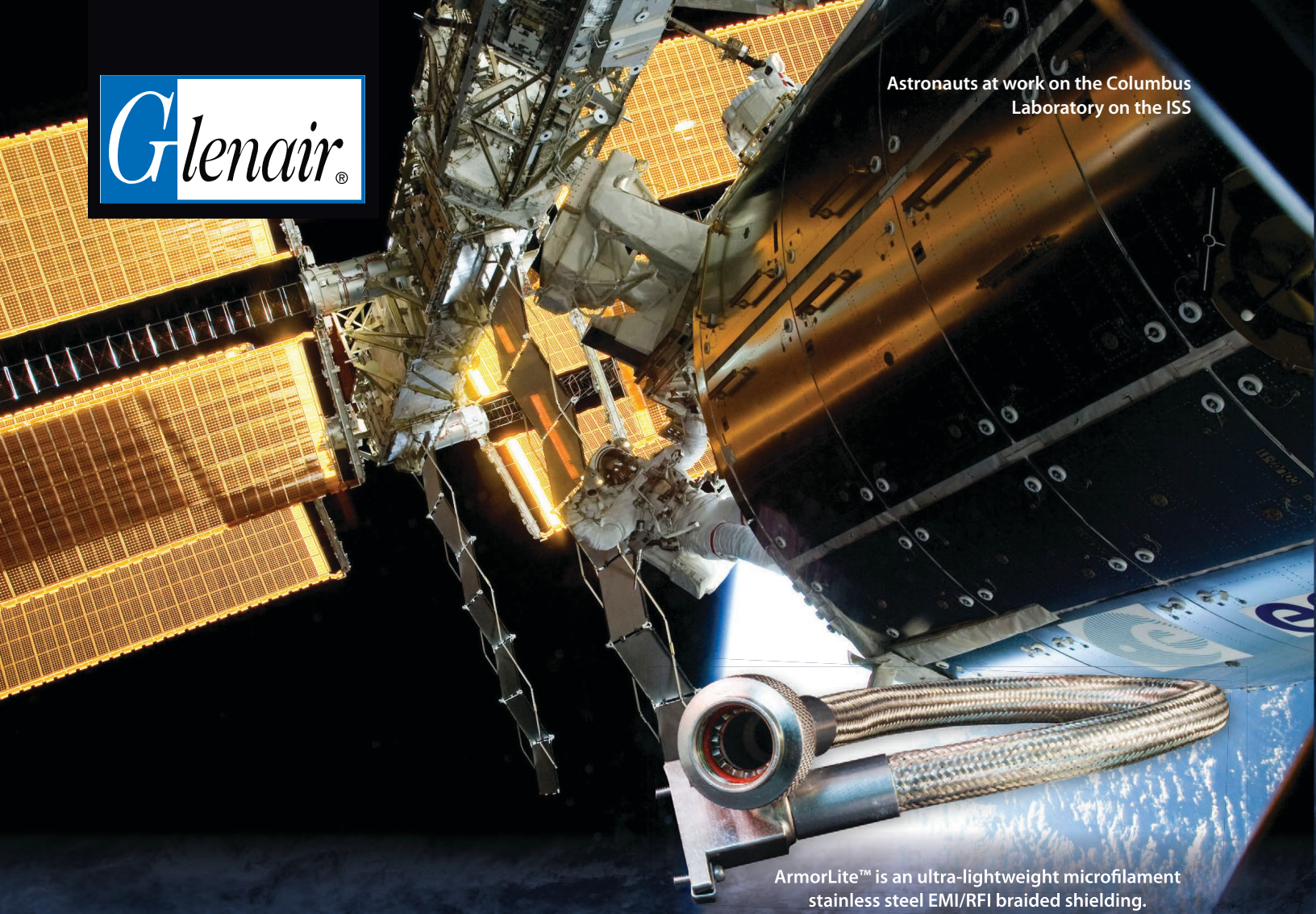


Up to 88% weight savings vs. NiCu

AmberStrand® 100% vs. nickel-coated copper			
Braid Dia.	AmberStrand® 100% 103-026	Nickel-Copper 100-003	% Weight Savings/ Foot
.062	.6	1.9	68%
.125	1.0	4.8	79%
.250	1.8	16.1	88%
.375	2.3	18.5	87%
.500	3.7	22.3	83%
.625	4.4	27.7	84%
.750	5.2	34.3	85%
1.000	8.0	35.0	77%

AmberStrand® 75% vs. nickel-coated copper			
Braid Dia.	AmberStrand® 75/25% NiCu 103-027	Nickel-Copper 100-003	% Weight Savings/ Foot
.062	.9	1.9	52%
.125	1.5	4.8	68%
.250	2.4	16.1	85%
.375	3.9	18.5	79%
.500	5.4	22.3	76%
.625	6.4	27.7	77%
.750	7.2	34.3	79%
1.000	11.0	35.0	69%

Glenair®



Astronauts at work on the Columbus Laboratory on the ISS

ArmorLite™ is an ultra-lightweight microfilament stainless steel EMI/RFI braided shielding. Available as tubular sleeving as well as direct factory overbraiding for point-to-point and multi-branch interconnect assemblies.

LIGHTWEIGHT

ARMORLITE™

Microfilament nickel-clad expandable stainless steel EMI/RFI braided shielding

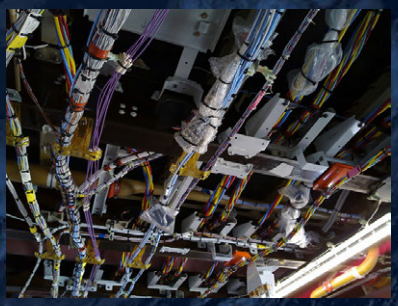
Save weight and money every time you fly! All-Up-Weight (AUW) has met its match: ArmorLite™ microfilament stainless steel braid saves pounds compared to standard QQ-B-575/A-A-59569 EMI/RFI shielding. ArmorLite™ is an expandable, flexible, high-strength, conductive stainless steel microfilament braid material designed for use as EMI/RFI shielding in high-performance wire interconnect systems. The principal benefit of ArmorLite™ is its extreme light weight compared to conventional nickel/copper shielding. By way of comparison, 100 feet of 5/8 inch ArmorLite™ is more than four pounds lighter than standard 575 A-A-59569 shielding. Plus, ArmorLite™ offers superior temperature tolerance compared to other lightweight tubular braided shielding including microfilament composite technologies.

- **Ultra-lightweight EMI/RFI braided sleeving for high-temperature applications -80°C to +260°C**
- **Microfilament stainless steel: *70% lighter* than NiCu A-A-59569/QQB575**
- **Outstanding EMI/RFI shielding and conductivity**
- **Aerospace environment qualified**
- **Superior flexibility and "windowing" resistance: 90 to 95% optical coverage**
- **70,000 psi (min.) tensile strength**
- **Best performing metallic braid during lightning tests (IAW ANSI/EIA-364-75-1997 Waveform 5B)**

LIGHTWEIGHT, FLEXIBLE

ArmorLite™ Microfilament Braid for EMI/RFI Shielding Applications

ARMORLITE™ AIRCRAFT UTILIZATION ANALYSIS COMPARED TO STANDARD A-A-59569 Ni/Cu BRAID



ArmorLite™ lightweight EMI/RFI braided shielding is ideally suited for weight reduction efforts in Electrical Wire Interconnect Systems

Length and Weight of NiCu Braid in Typical Commercial Aircraft			
Diameter (in)	Weight (Lb/ft)	Length (in)	weight (Lb)
0 - 0.25	0.02	12564.8	21.08
0.25 - 0.5	0.05	5259.3	21.17
0.5 - 0.75	0.07	1212.6	7.12
0.75 - 1.0	0.14	1437.4	16.88
1.0 - 1.5	0.18	467	7.05
		Total weight	**73.3**

Weight Savings Using ArmorLite™ (Equivalent Lengths)				
Diameter (in)	Weight (Lb/ft)	Length (in)	Length in feet	weight (Lb)
0 - 0.25	.00507	12564.8	1047.07	5.309
0.25 - 0.5	.0097	5259.3	438.28	4.251
0.5 - 0.75	.0178	1212.6	101.05	1.737
0.75 - 1.0	.0256	1437.4	119.78	3.063
1.0 - 1.5	.0368	467	38.92	1.434
		Total weight		**15.794**

Using ArmorLite™ in place of standard nickel-copper braid saves 54.6 pounds per system—up to 78% weight savings!

DESCRIPTION	REQUIREMENT	PROCEDURE	REPORT
Operating Temperature	-80°C to +260°C	(85% Shielding effectiveness 1000 hours)	ARM-103
Braid Resistivity test, Pre and Post	Test pre/post–5 cycles–minimal disparity per spec.	EIA-364-32D IAW AS85049	ARM-110/1
Surface Transfer Impedance	Glenair Qual. Test Plan ATP-194	Line injection IEC96-1 A.5.5.3 30KHz - 2.5 GHz mod	ARM-104
Shield Effectiveness Test, Pre and Post	Glenair Qual. Test Plan ATP-194	Line injection IEC96-1 A.5.5.3 30KHz - 2.5 GHz mod	ARM-104
Tensile/ Pull Strength	220 lbs. (min.). No anomalies within 8% - 10% of pre test for variable sizes	Glenair ATP- 183. 0 lbs. to 90 lbs, to 150 lbs, to 220lbs @ speed of 0.25 inches/min	ARM-105
Lightning Current Test	Glenair Qual. Test Plan 191/ DC resistance/ voltage criteria per DO-160F Level for 3 sizes up to 30Ka.	ANSI/EIA-364-75-1977 Wave Form 5B SAE/ARP5416 Section 6.3 Waveform 1, 3 (1, 10MHz) and 5A	ARM-110 ARM-112
Vertical Flammability	Self extinguishing ≤ 2 sec. Burn length 0.1 inch. max. Dripping 0.0 seconds.	14 CFR part 25.853 (a) AMdT25-116 Appendix F Part I (a) (1) (ii)	ARM-101
Mass Loss and Collected Volatile Condensable Materials	Total Mass Loss (TML) ≤1.0% Collected Volatile Condensable Matl.(CVCM) ≤.1%	ASTM E-595	ARM-102
Salt Spray Test	DC Resistance IAW AS85049 .5 milliohm. No evidence of base metal on braid	ASTM B117-09 Sodium Chloride 5% 500 Hrs	ARM-100
Vibration Resistance	EAI Test Report 33247. DO160 section 8 Cat. R Vib. Curves E1	DO-160F RTCA/DO-160F, Section 9, Fig. 8-4. Curve E1. - 3 sizes – 3 hours on each axis.	ARM-111
Thermal Shock Cycling test and Resistivity	No adverse effects in visual inspection or resistance after 50 cycles	EIA-364-32D, Table 3 Test condition V -75°C to +215°C	ARM-113
Abrasion and Plating test	DC Resistance IAW AS 85049. Glenair internal QTR-003	ATP 180 20 continuous @ 6 cycles/min. over 3 arms with .030 radiused edges	ARM-107
Fluid Immersion Test	Broad material compatibility	Customer/AS4373D method 601 Mod	ARM-106
Flex Test	2 Cycles: starting 0° over vertical ctr. line across to 180° cycle. Total cycles of 25633	Glenair ATP 179	ARM-112

NASA's STEREO
(Solar TErrestrial RElations Observatory),
artist's concept

SuperNine®

Blind-Mate Connectors

Rack-and-Panel Sealed, Assisted Kick-off and Feed-Through Blind-Mate to D38999

Blind-mate, fixed and float-mount interconnects for non-ITAR commercial as well as military/defense applications

Application: Glenair Series 253 blind-mate connectors are designed for use in commercial rack-and-panel instrumentation applications, satellite deployment, scientific payloads, interstage, UAV, and munitions release, and more.

- **Available in most symmetrical MIL-STD-1560 insert arrangements with contacts sizes from #23 to #8**
- **Selected materials offer low outgassing properties and high resistance to both corrosion and stress corrosion cracking**
- **NASA outgassing bake-out process available**
- **Designed to withstand the rigors of launch and flight—including shock, vibration, thermal vacuum, acceleration, and temperature extremes**
- **Standard accessory threads and teeth per MIL-DTL-38999 accommodate a wide range of backshell accessories**
- **Crimp-removable contacts standard. PC tails, dual-flange standoffs, hermetically sealed, and custom blind-mate configurations available**

SPACE-GRADE BLIND MATE

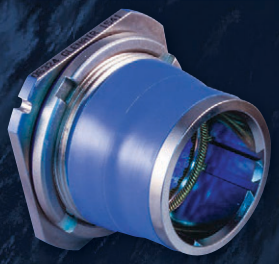
SuperNine®

Float-mount and adjustable separation force connectors

MIL-DTL-38999 Series III type, environmental, crimp contact

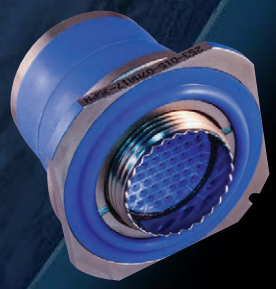
CRITICAL MECHANICAL FEATURES OF BLIND-MATE AND ADJUSTABLE SEPARATION FORCE (ZEF) CONNECTORS

Roll-off nose: allows for the smooth disconnection of blind mate plugs and receptacles.

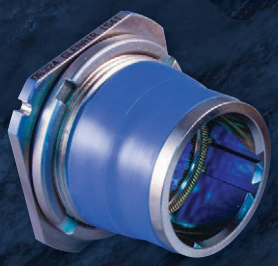


Float mounting: allows for coplanar movement of the receptacle during mating, preventing contact and shell damage.

Misalignment accommodation: Radial, axial, and angular misalignment during mating is accounted for with integral wave springs.



Sealing: Misalignment accommodation makes environmental sealing difficult. The problem is solved with auxiliary external seals.



EMI shielding: Glenair incorporates ground springs in receptacle connectors and grounding fingers in special coupling nut-equipped plugs to optimize 360° shell-to-shell continuity.

Assisted separation force: Adjustable kick-off style with spring-loaded posts and an adjustment ring to calibrate separation force. A second style uses **wave springs** on the shell body.

Available non-ITAR environmental blind-mate and adjustable separation force solutions		
Basic Part No.	**Description**	**Mates With**
253-014	Fixed jam-nut mount plug with roll-on/roll-off nose and Accessory threads	253-015
253-015	Floating jam-nut mount receptacle with misalignment accommodation and optional sealing	253-014
253-016	Fixed wall mount plug with spring assist (zero separation force)	253-017
253-017	Floating wall mount receptacle with adjustable separation force and misalignment accommodation	253-016
253-018-07	Blind-mate feed-thru, jam-nut mount plug with B-side D38999 type receptacle mating interface and assisted kick-off (spring force)	253-019
253-018-G6	Blind-mate in-line feed-thru with B-side D38999 type plug mating interface and assisted kick-off (spring force)	253-019
253-019	Floating jam-nut mount receptacle with misalignment accommodation and optional sealing	253-018
253-031	Blind-mate jam-nut mount plug with kick-off spring and accessory threads	253-032
253-032	Floating jam-nut mount receptacle with misalignment accommodation	253-031
253-033	Float mount feed-thru, jam nut mount receptacle to 38999 type Series III plug mating interface	253-019
253-025	Locking circuit and test mate connector	253-016

Launch of a Japanese H-IIA rocket with the Global Precipitation Measurement (GPM) Core Observatory onboard, from the Tanegashima Space Center

SPACE-RATED

Lanyard-Release Quick-Disconnect Connectors

For mission-critical disengagement and release of launch and payload systems

Mil-standard 1760 lanyard-release connectors were originally developed for carriage stores management applications including weapons, pods, and drop tanks. Incorporating a common electrical interface as well as interfacing signals and pin and circuit assignments, lanyard-release connectors of this type are broadly employed for reliable, jam-free mating and disengagement. Space-rated versions of 1760 class cylindrical connectors take advantage of the technology's legacy in harsh-duty aircraft applications to ensure reliable and predictable performance in space. From fail-safe application in space station and space telescope deployment to rack-and-panel research equipment interconnection, these rugged axial-pull lanyard connectors deliver proven performance in accordance with all applicable NASA, ESA, and JAXA standards. Available in a wide range of connector packaging, from MIL-DTL-38999 SuperNine® to AS81703* and special small form-factor designs, these proven-performance interconnection devices may be equipped with standard signal or power contacts as well as shielded high-speed coax, twinax, and quadrax.

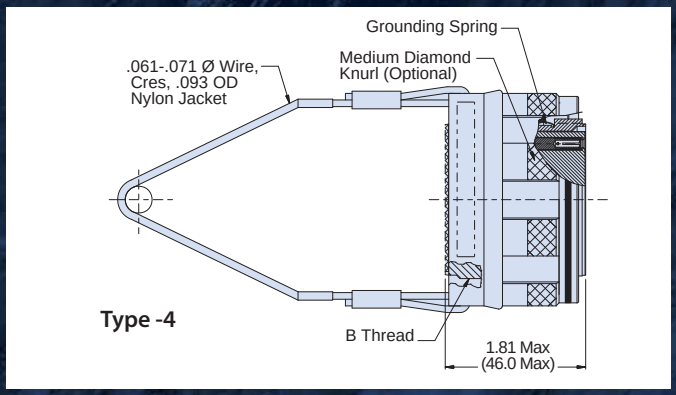
AS81703 space-grade lanyard release push pull mated pair with special order band and boot platform

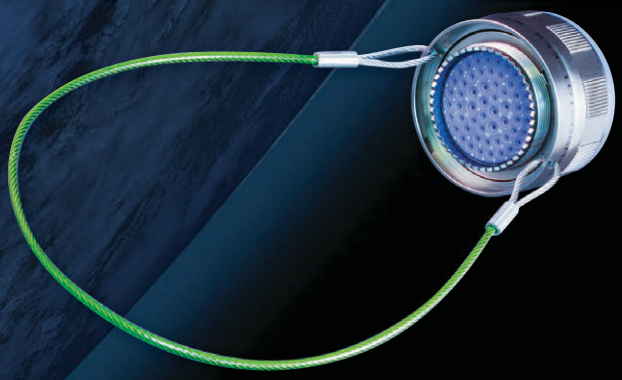
- **Jam-free, push on/pull off technology**
- **Reliable fail-safe axial pull lanyard equipped coupling**
- **Instant disengagement for critical quick-release systems**
- **Manufactured IAW MIL-STD-1760**
- **Special umbilical buffers and go-betweens also available**
- **Blind-mate rack-and-panel versions available**
- **Qualified for military and space application**
- **Outgas processing IAW NASA, ESA and JAXA**

SPACE-GRADE

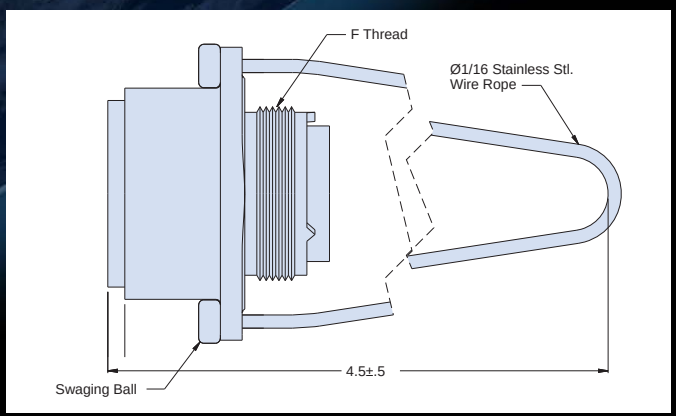
Lanyard-Release Quick-Disconnect Connectors

How To Order SuperNine® 233-216 MIL-DTL-38999 Type								
Sample Part Number	**233-216**	**-G6**	**ME**	**25-35**	**S**	**A**	**E**	**-4**
Series / Basic Part No.	**233-216** = Lanyard Release Plug							
Connector Style	**G6** = Plug with EMI Spring							
Finish	**ZL** = Cres, Electrodeposited Nickel **Z1** = Cres, Passivated **ME** = Al Alloy, Eletroless Nickel							
Size and Arrangement	Per MIL-STD-1560 plus high density							
Contact Type	**P** = Pin **S** = Socket; 500 cycles							
Alternate Key Position	**A**, **B**, **C**, **D**, **E**, **N** = Normal (Per MIL-DTL-38999 Series III)							
Lanyard Length Code	See Lanyard Length Table							
Connector Type	**4** = Type 4 (shown below, no accessory threads) **6** = Type 6 (not shown, includes accessory threads)							





How To Order 253-020 AS81703* Type Push-Pull Lanyard Release							
Sample Part Number	**253-020**	**-08**	**ME**	**25-35**	**S**	**N**	**812**
Series / Basic Part No.	**253-020** = AS81703 Type						
Connector Style	**08** = Push-Pull Layard-Release Plug						
Finish	**ZL** = Cres, Electrodeposited Nickel **Z1** = Cres, Passivated **ME** = Al Alloy, Eletroless Nickel						
Size and Arrangement	Per AS81703						
Contact Type	**P** = Pin **S** = Socket						
Alternate Key Position	**N**, **W**, **X**, **Y**, **B**, **C**						
Lanyard Ring Mod Code	**812** = Lanyard ring rotated 90° from master keyway **Omit** for standard ring						



*The MIL-C-81703 standard was superseded by SAE-AS81703 10-December 2010 per Navair

Glenair®

At the International Space Station, the SpaceX Dragon commercial cargo craft is grappled by the Canadarm2 robotic arm

Best-of-Class Hermetic Seal Connector Design

Resolve gas, moisture and particle ingress problems with advanced-performance glass- and encapsulant-sealed hermetic connectors

- Superior pressure resistance to 32,000+ PSI
- Higher resistance to extreme operating temperatures to 260°+ C
- Superior mechanical strength
- No material breakdown or aging over time
- Helium leak rate <1X10^{-7} cc/sec to 1X10^{-10}

CODE RED

LIGHTWEIGHT HERMETIC SEALING

Lightweight hermetic encapsulant sealing solution with 1X10^{-7} leak rate performance. Available today in Mighty Mouse 806 Mil-Aero, M24308/9 D-Sub and D38999/23

Aluminum shell CODE RED hermetic connectors and copper contacts reduce weight and improve electrical performance compared to heavier-duty glass-to-metal seal hermetic solutions

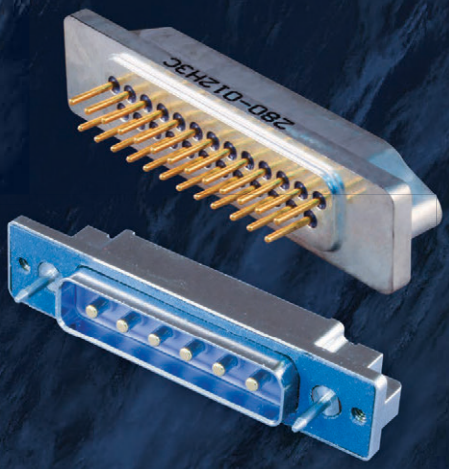
ADVANCED PERFORMANCE

Glass-Sealed Hermetic Connectors

GLASS-SEALED Hermetic CONNECTORS

UNIQUE HERMETIC OFFERINGS AND CATALOG (COTS) SOLUTIONS

Coax, Triax, Quadrax and hybrid-contact layouts

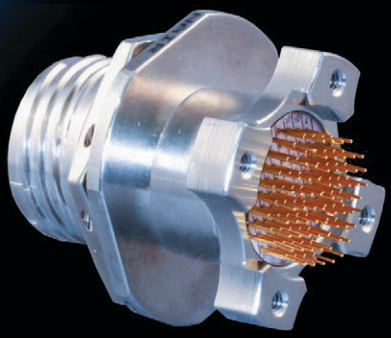


Rectangular hermetics including Series 28 HiPer-D and Series 79

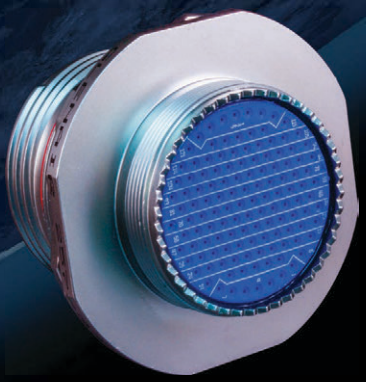
El Ochito high-speed octaxial contacts in a lightweight CODE-RED sealed bulkhead feed-thru

Triax hermetic

Hermetic Sav-Con Feed-thrus and Gender Changers



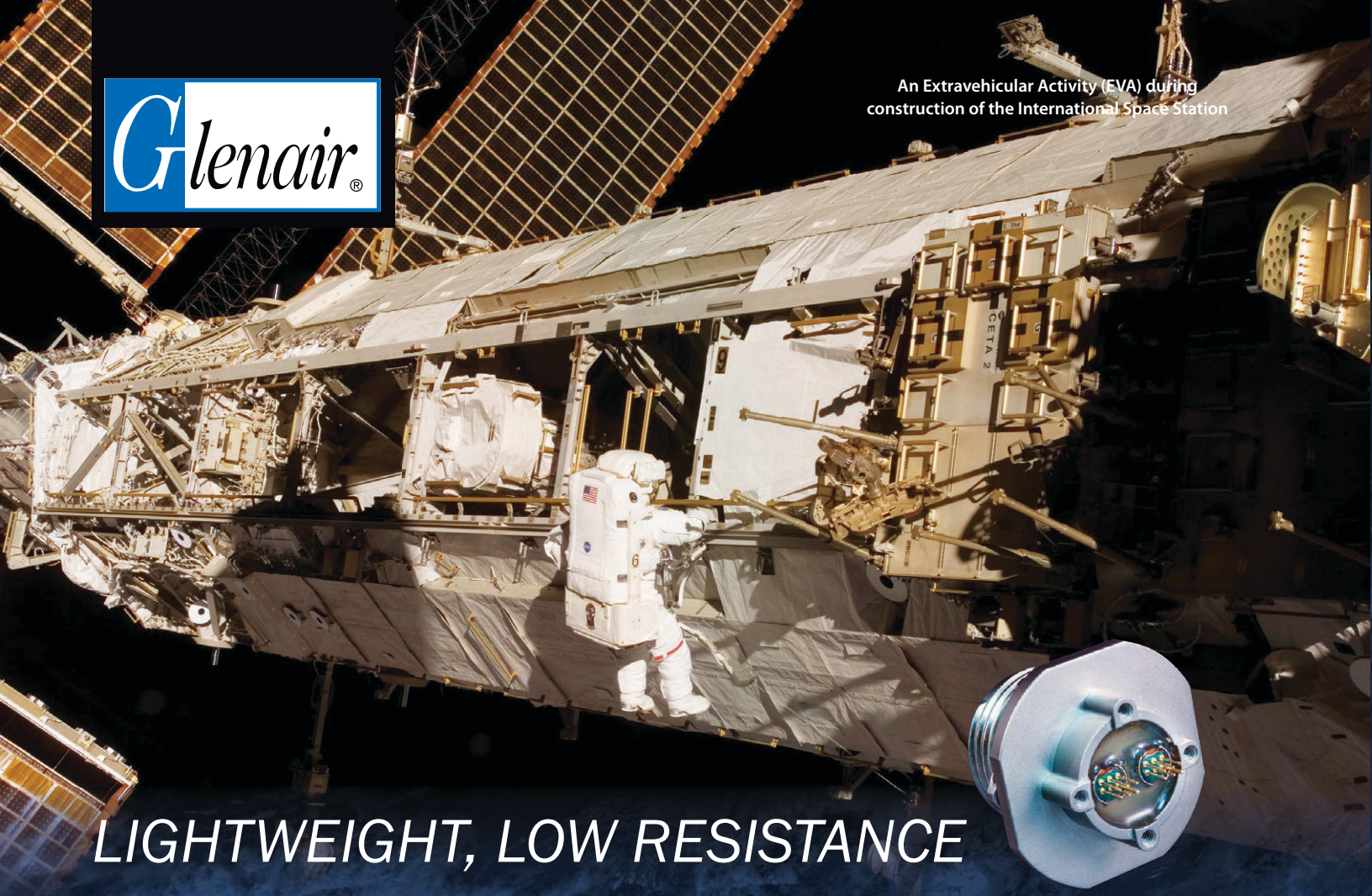
Dual-flange PC tail hermetic



Hermetic with crimp-removable contacts

Hermetic bulkhead penetrators

Hermetic receptacles with integrated band porch



An Extravehicular Activity (EVA) during construction of the International Space Station

LIGHTWEIGHT, LOW RESISTANCE

CODE RED

"Mission-Critical" hermetic sealing with better than 1X10^{-7} leak-rate performance

Hermetically-sealed interconnects used in vacuum or high-altitude applications prevent moisture and other contaminants from damaging sensitive electronic equipment. Glass-to-metal hermetic sealing has been the gold standard in the aerospace and petrochemical industries for decades due to the strength and long-term durability of the materials used. But glass-to-metal seal hermetics come with a big price tag in both weight and electrical resistance.

CODE RED is an innovative sealing encapsulant and application process—invented by Glenair—that provides durable hermetic sealing in a lightweight aluminum package. CODE RED allows for the use of conventional gold-plated copper alloy contacts, significantly improving electrical performance. CODE RED hermetic connectors are available now in Glenair SuperNine® (D38999 Series III type metal and composite), Series 80 Mighty Mouse, and M24308 D-Sub; and deliver reliable, life-of-system 1X10^{-7} max leak-rate hermetic sealing. Special non-magnetic (zero residual magnetism) versions are also available, consult factory.

- **Full hermetic sealing, better than 1X10^{-7} in a lightweight aluminum shell with low electrical resistance gold-plated copper contacts**
- **Meets NASA outgassing requirements, as well as aerospace temperature and corrosion resistance standards**
- **Operating temperature -65°C to +200°C**
- **Available today in Mighty Mouse 806 Mil-Aero, M24308/9 D-Sub and D38999/23 glass-to-metal seal hermetics**
- **Significant weight savings—up to +50%**
- **Order-of-magnitude improvement in current carrying capacity and electrical resistance compared to Kovar/ Inconel solutions**

LIGHTWEIGHT, LOW RESISTANCE

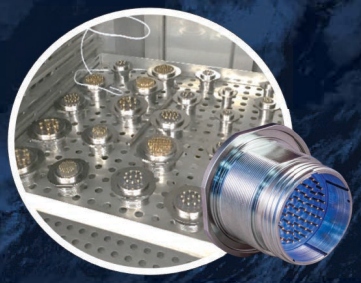
Code Red Hermetic Connectors

"Mission-Critical" hermetic sealing solution

CODE RED

SPACE GRADE
NASA
ESA, JAXA
SCREENED

CODE RED LIGHTWEIGHT HERMETIC CONNECTOR TESTING AND VALIDATION



Connectors utilizing CODE RED hermetic encapsulant sealing went through a grueling qualification test and validation process to prove material durability and hermeticity. Validation testing including 100 cycles of thermal shock IAW EIA-364-32 Test Condition A -65°C to +200°C while maintaining hermeticity followed by 1000 hours of thermal aging at 200°C. Additional tests included:

- DWV, DWV at altitude
- IR, IR at temperature
- Highly Accelerated Life Testing (HALT)
- Insert and contact retention
- Mating durability
- Random vibration at temperature IAW MIL-DTL-38999
- Hermetic seal at 30 psi

The entire qualification test cycle was repeated successfully a second time with new parts to validate complete reliability.

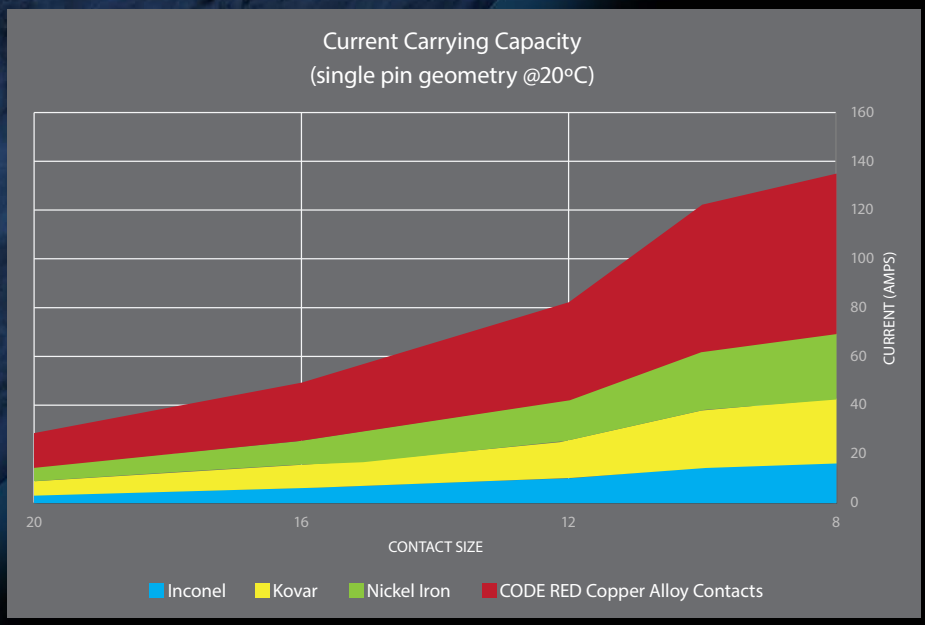
CODE RED USES PROVEN-PERFORMANCE CONNECTOR AND CONTACT MATERIALS

CODE RED Materials / Finish	
Sealing Adhesive	Proprietary Glenair compound
Contacts*	Gold-plated berylliu m copper alloy per ASTM B 197 or equivalent
Insulator	Rigid plastic
Seals	Blended fluorosilicone/ silicone elastomer
Receptacle Shell and Jam Nut*	Aluminum alloy 6061-T6 per ASTM B 221
Finish*	Electroless nickel per ASTM B 733

*zero residual magnetism materials also available

Percentage Weight Savings CODE RED vs. Glass-to-Metal MIL-DTL-38999 Sr. III	
Shell Size/Insert Arr.	**Weight Reduction**
9-35	52%
11-98	47%
13-35	47%
15-97	42%
19-32	40%
21-11	32%
23-21	28%
25-08	43%

Graph illustrates Current Carrying Capacity of CODE RED copper alloy contacts compared to the Inconel, Kovar, and nickel iron contacts used in conventional glass-to-metal seal hermetics.



APPLICATION NOTES: CODE RED is a viable drop-in solution for conventional glass-to-metal seal hermetic connectors with the following exceptions:

1. Fuel Cells: Although CODE RED exhibits outstanding resistance to caustic chemicals and fuels, its use in fuel tanks/fuel cell applications is not recommended.

2. Cryogenics: CODE RED has been tested and qualified to -65°C IAW MIL-DTL-38999

3. Sustained High-Operating Temperatures: CODE RED has been tested and qualified to +200°C IAW MIL-DTL-38999

4. High Radiation: Exposure to no more than 6 Megarads of radiation

5. Deep Subsea: CODE RED is ideally suited for aerospace and downhole applications that do not exceed 3 BAR (50 psi) atmospheric pressure differential.

6. Space Life Support Systems: Requires additional qualification testing not yet performed by Glenair.

Glenair®

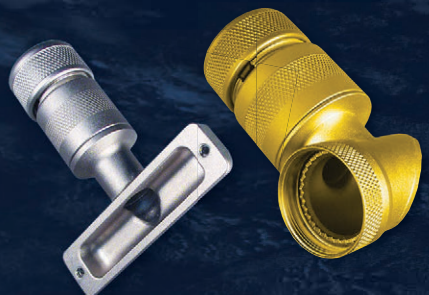
A view of the earth from the International Space Station cupola (a Glenair backshell is visible to the left of the window)

CIRCULAR AND RECTANGULAR

Backshells and Connector Accessories

Corrosion resistance, weight reduction, environmental durability and design innovation

At Glenair, we understand the highly-specialized mechanical, electrical and optical performance requirements for data, video, and control communications in exoatmospheric vehicles. Space-rated interconnect cabling components including backshells require specialized materials processing and precise mating interfaces. During launch, spacecraft and their payloads are shaken violently and battered with intense sound waves as well as extremes in shock, vibration, temperature, and corrosion, potentially damaging to mission-critical systems. Size and weight reduction are additional key requirements. All are Glenair strengths.



The Glenair Qwik-Clamp connector accessories shown here are used on the International Space Station. The gold plated circular part is extremely resistant to space corrosion and radiation. Both styles are designed with smooth surfaces to eliminate potential damage to space suits.

SPACE GRADE NASA ESA, JAXA SCREENED

CLASS G IAW SPACE GRADE

- High-performance connector accessories for every environmental, mechanical and electromagnetic shielding requirements
- NASA, ESA, and JAXA screened and qualified to AS85049, SSQ 21635, 21636, 22698 and 22681 and other standards
- Modern designs for bus applications, line cards, instrument panels, and non-circular bundles
- Lightweight composite materials available
- Removable-entry solutions with split shells and integrated banding platforms

SPACE-GRADE INNOVATIONS

Circular and rectangular backshells and connector accessories

COMPOSITE DESIGN INNOVATION RADICALLY REDUCES INTERCONNECT SYSTEM WEIGHT

Band-in-a-Can backshell

Swing-Arm with banding insert

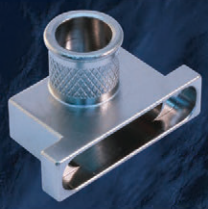
Mighty Mouse composite

Isolated conductive ground path

SPACE-GRADE MICRO-D AND D-SUBMINIATURE BACKSHELLS AND ACCESSORY HARDWARE

Single, dual, and triple entry

Angled entry

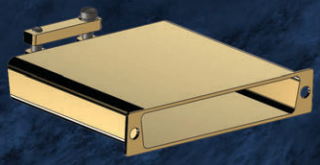


Side entry

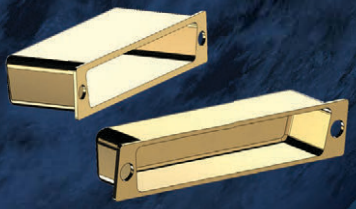
Elliptical entry

Composite split shell

ESCC TYPE FOR MIL-DTL-24308 D-SUB ESA APPLICATIONS IAW ESCC 3401/072

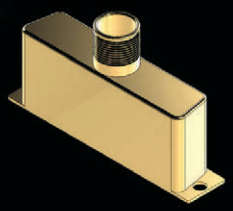


Strain Relief IAW ESCC 3401/072, Type Variants 05, 06, 07, 08, 09, and 72

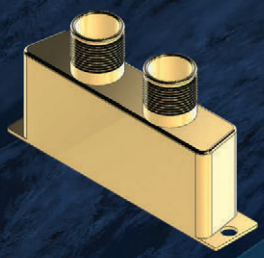


Shorting Cans IAW ESCC 3401/072, Type Variants 10, 11, 12, 13, 14, 73 / 61, 62, 63, 64, 65, 80

90° EMI/RFI Banding Backshell IAW ESCC 3401/072, Type Variants 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, and 76



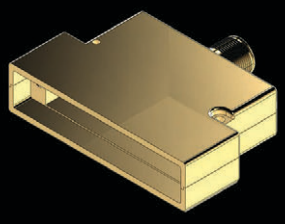
Straight EMI/RFI Banding IAW ESCC 3401/072, Type Variants 35, 36, 37, 38, 39 and 77



Dual Entry IAW ESCC 3401/072, 40 Type Variant

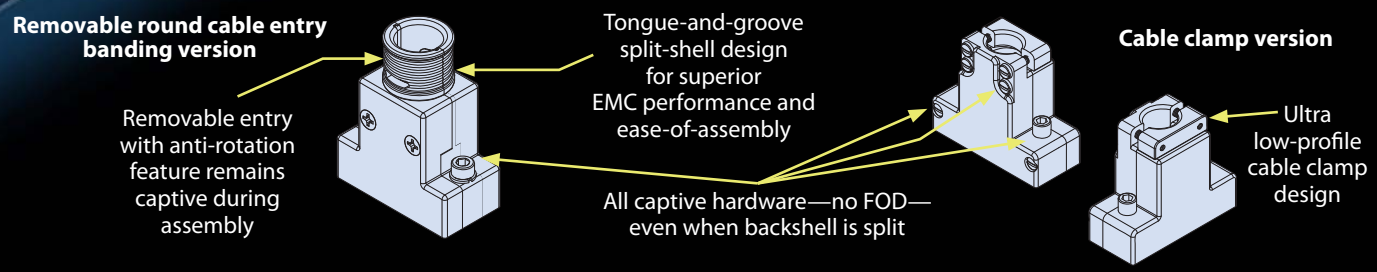
Elliptical Entry IAW ESCC3401/072, Type Variants 46, 47, 48, 49, 50, and 78

45° Elliptical IAW ESCC3401/072, Type Variants 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, and 79



Straight IAW ESCC 3401/072, Type Variants 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 74, and 75

NEW REMOVABLE-ENTRY AND CABLE CLAMP BACKSHELLS: 557-625 AND 557-653



Reference Applications

Brief history of Glenair space-grade design-ins

Atmospheric Infrared Sounder (AIRS)

Glenair-built cables provide signal and power interconnection on a broad range of space applications including The **Atmospheric Infrared Sounder (AIRS)** instrument aboard the Aqua Earth-observing satellite, JPL Mars Probes, the Space Shuttle, and the AIRS satellite. Several notable space applications include:

The **Gravity Probe**, confirmed two key predictions of Einstein's general theory of relativity in 2011 by monitoring the orientations of ultra-sensitive gyroscopes relative to a distant guide star. Glenair-built cables are on board.

Gravity Probe

Titan II space-launch vehicles, with Glenair-made interconnect harnesses, propelled all twelve manned Gemini capsules.

Hermetic connectors are ideal for high-pressure/low-leakage applications in air, sea and space environments. Made of stainless steel (CRES) with glass insulators fused to the connector shell, and suitable contacts meeting a leak rate of 1 X 10^{-6} cubic centimeters of Helium per second, these mounted receptacle connectors and bulkhead feed thrus prevent gases from travelling through apertures or penetrations created for the routing of interconnect cabling. Glenair hermetics have protected a range of space programs including:

The **X-38** program implemented to design and build a spacecraft capable of flying itself and the Space Station crew back to Earth in an orbital emergency.

The X-38

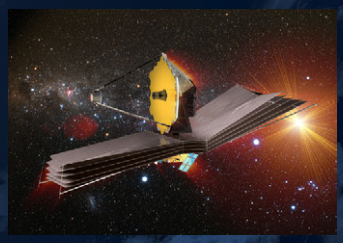
Pegasus rockets, the winged space booster vehicles used in an expendable launch system developed by private industry.

MetOp-A, Europe's polar-orbiting satellite dedicated to operational meteorology.

A well designed interconnect system will include a complement of grounding and shielding technologies to insure EMC. ***EMI filter connectors*** are an effective method to achieve electro-magnetic compatibility. Glenair is extremely well versed in supplying filter connector products optimized for use in space-grade applications, providing products compliant to EEE-INST-002, Table 2G, the recognized standard for space grade filters. Glenair MIL-DTL-38999, Series 80 Mighty Mouse, Series 28 HiPer-D, and Series 79 Micro-Crimp filter connectors are currently qualified and used by Ball Aerospace, Boeing Space, NASA/JPL, Orbital Sciences, Sierra Nevada Corp., and others. Notable Glenair Filtered connector space applications include:

MetOp-A

Skynet, for the United Kingdom Ministry of Defence, to provide strategic communication services to the three branches of the British Armed Forces and to NATO forces engaged on coalition tasks.



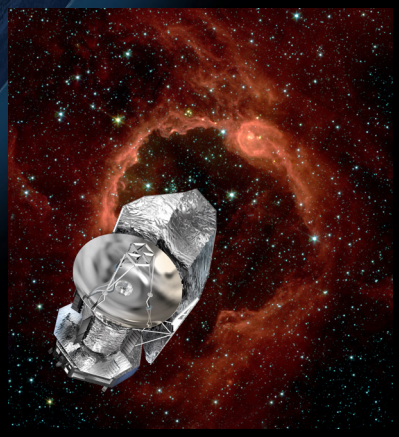
JWST

The **James Webb Space Telescope (JWST)** is a large, infrared-optimized space telescope. JWST is designed to find the first galaxies that formed in the early Universe, connecting the Big Bang to our own Milky Way Galaxy.

Micro-D connectors, including environmentals, hermetics, filters, and flex assemblies are commonly used in space applications for their high-performance and small size. The precision-machined shell of the Micro-D, with its robust mating retention forces, makes for an ideal connector for rocket and space vehicle applications that are subject to high levels of vibration and shock. The Micro-D is easily customized with package and mounting modification to fit virtually any integration challenge. A short list of Glenair Micro-D space applications would include the James Webb Space Telescope, SkyNet 5 military satellite, ALMA space telescope, JPL Mars Probe, Mars Curiosity Rover, AIRS satellite, and others. Several notable space applications that use Glenair Micro-D connectors include:

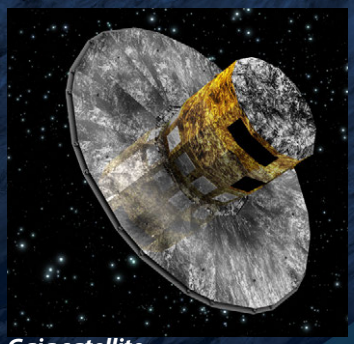
Skynet

The **Herschel Space Observatory**, from the European Space Agency, made several scientific discoveries in its operational phase from 2009 – 2013, including a previously unknown and unexpected step in the star formation process, and the presence of molecular oxygen in space.



Herschel Space Observatory

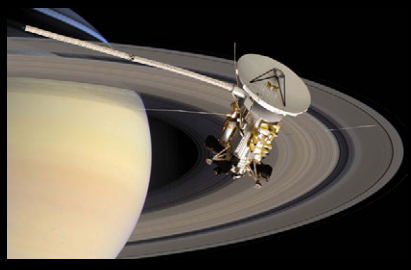
The European Space Agency also developed and built the **Gaia** satellite. Launched in 2013, its mission is to construct the largest and most precise map to date of the Milky Way. Its 2016 data release included positions and magnitudes for 1.1 billion stars



Gaia satellite

Cassini–Huygens was a joint NASA/ESA/ASI robotic spacecraft mission studying Saturn and its moons. Cassini executed several risky passes through Saturn's inner rings before completing its mission by burning up in atmospheric entry—but the data it returned will be analyzed for years to come.

CrIS is an advanced atmospheric sounding instrument aboard the United States Suomi National Polar Partnership (NPP) Polar-orbiting Operational Environmental Satellite. It produces high-resolution pressure, temperature, and moisture profiles from space, enabling more accurate predictions of severe weather events.



Cassini-Huygens

Glenair M32139 Class S Nanominiature connectors are DSCC approved for space programs. Glenair Nanominiature connectors, cable assemblies and flex circuit assemblies are currently in use on the several space-based telescopes,

CrIS NPOESS Satellite

including the **Large Synoptic Survey Telescope (LSST)**, **James Webb Space Telescope**, and others.

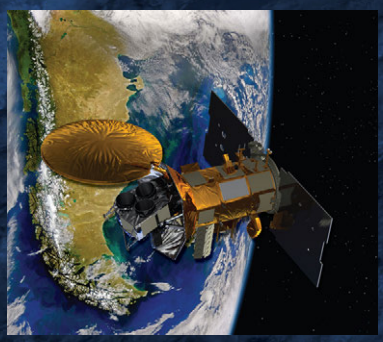
The ***Series 79*** connector is a Glenair original design. It features crimp, rear-release size #23 contacts on 0.075" spacing, as well as size #12 and #16 power and coaxial crimp contacts available in 29 insert arrangements for data and power transmission. The Series 79 Micro-Crimp is ideally suited for blind-mate rack and panel and/or module-to-chassis applications; and is currently qualified for use by Orion, Ball Aerospace, Honeywell Space, and LMCO Denver.

Glenair ***Series 80 Mighty Mouse*** connector and cable assemblies were developed as a smaller and lighter alternative to MIL-DTL-38999, offering virtually equal performance with up to 71% (weight) and 52% (size) savings for similar contact layouts. Mighty Mouse is well established in hundreds of safety-critical military, medical, industrial and geo-physical and space applications. Some space applications for this reduced form factor connector include:

NASA's **Mars Exploration Rover (MER)** Mission, an ongoing robotic mission to explore the Martian surface and geology. The Opportunity rover is continuing her winter exploration of "Perseverance Valley" on the west rim of Endeavour Crater.

Mars Curiosity Rover's latest selfie, January 2020

The Mars Science Laboratory **Curiosity** landed in Mars' Gale Crater in 2012. This rover is over five times as heavy and carries over ten times the weight in scientific instruments as previous rovers. Within weeks, Curiosity discovered an ancient steambed where water once flowed, and evidence of a lake that could have supported microbial life in the distant past. Curiosity's original 2-year mission has been extended indefinitely, and it's still returning valuable data more than 5 years after landing.



Aquarius Satellite

Aquarius was a satellite mission to measure global Sea Surface Salinity. It provided the global view of salinity variability needed for climate studies.

Glenair ***Sav-Con® Connector Savers*** protect deliverable connectors subject to repeated mating and unmating cycles, especially from repetitive qualification test cycles. Sav-Con® Connector Savers prevent costly repair or replacement of cable plugs and receptacle connectors by absorbing connect and disconnect abuse and by reducing mating cycles during testing to the absolute minimum.

A virtual "Who's Who" of space programs use Glenair Sav-Cons including Boeing Satellite Systems, the Delta IV launch vehicle, Voyager, Galileo, Magellan, Cassini, and others—both during fabrication testing and in operation.

A NASA LEO (Low Earth Orbit) Satellite

One of the most dramatic applications of our Sav-Con connectors is on the **Space Shuttle Orbiter** where they provided protection for the umbilical connectors from liftoff to touchdown on every mission.

For many space applications, the cable shield is the most important element in controlling EMI and radiation damage. Unfortunately, metal shielding—especially when applied in multiple layers—can be extremely heavy. ***AmberStrand*** composite thermoplastic braid, and ***ArmorLite*** microfilament stainless steel braid provide robust EMI shielding at a fraction of the weight of conventional shielding. Glenair lightweight braid technologies are currently qualified for use by EADS Astrium, Honeywell Space, Orbital Sciences, and Ball Aerospace. These unique products notably served on:

The **Cassini-Huygens** Program, an international science mission to the Saturnian system.

Mars Pathfinder, which delivered an instrumented lander and a free-ranging robotic rover to the surface of the red planet.

Ariane 5

The Glenair ***Qwik-Clamp backshell*** is used on the **International Space Station**. This gold plated part is extremely resistant to space corrosion and radiation and is designed with all smooth surfaces to eliminate potential damage to space suits.

Other circular backshell and connector accessory space applications include:

The European Space Agency's **Ariane 5**, which launches satellites and other craft into geostationary transfer orbit (GTO), medium and low Earth orbits, Sun-synchronous orbits (SSO) and Earth-escape trajectories

SEA Launch was a spacecraft launch service using a mobile sea platform for equatorial launches of commercial payloads.

As with circular backshells and accessories, Glenair has the rectangular interconnect world well covered. We supply everything from miniaturized backshells for Micro-D connectors to larger rack-and-panel connector accessories. Glenair rectangular accessories are used on dozens of space programs including the International Space Station, MetOps, Herschel Space Observatory, James Webb telescope, and others.

Space-grade Qwik-Clamp backshell designed for the International Space Station

Recent / Notable Space-Grade Application Wins for Glenair

Glenair is the exclusive interconnect connector and cable supplier to the Sierra Nevada Dream Chaser reusable crewed suborbital and orbital space plane. The Dream Chaser electrical wire interconnect system incorporates Glenair Micro-D subminiature connectors, EMI filter connectors, flex circuitry, lightweight microfilament braid, metal and composite backshells, and other technologies.

The Glenair Series 28 HiPer-D High-Performance MIL-24308 Intermateable

Glenair's qualified MIL-DTL-24308 Class K space-grade hermetic, and our recently-introduced Series 28 HiPer-D connector series have become the go-to standard for mission-critical space applications and are now qualified for use by Ball Aerospace, LMCO Denver, Orbital Sciences, and others.

Gold-plated space-grade Series 28 HiPer-D connectors

GLENAIR GLENDALE:

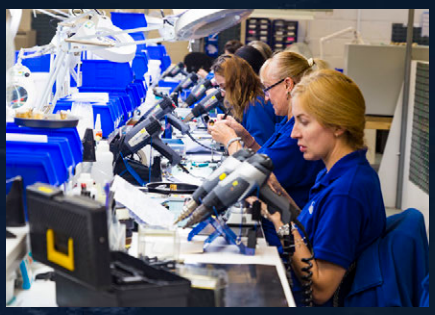
Complete vertical integration of manufacturing resources—at home in Southern California since 1956

Glenair operates the largest high-reliability interconnect manufacturing operation in the United States, allowing us to fully support our broad range of military, defense, and security customers.

Glenair SoCal's most important asset: highly technical staff, fully empowered with all the right facilities and operation resources.

SAME-DAY SHIPMENT STOCKING

Immediate availability for high-demand connectors and tooling.

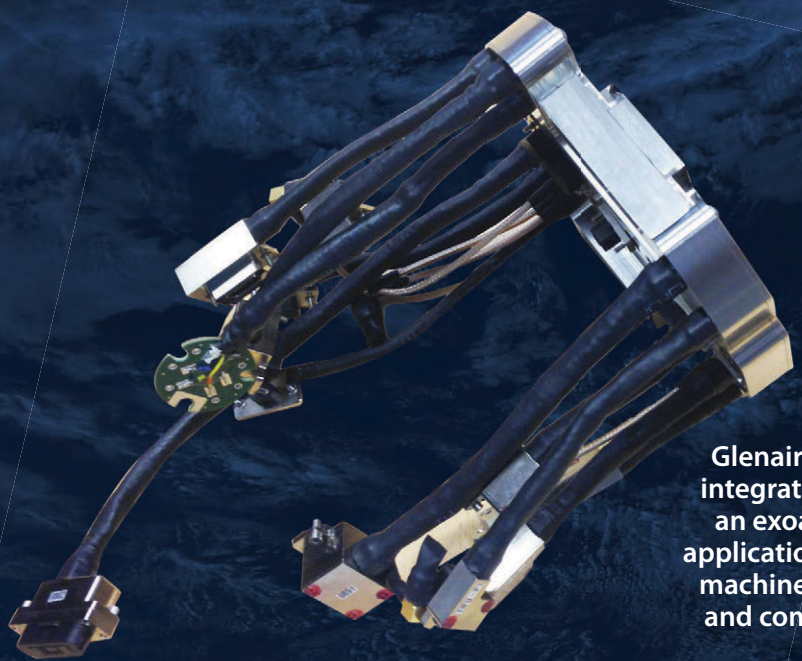


HARNESS ASSEMBLIES

for Micro-D, Nanominiature, and fiber optic connectors and cable assemblies.

IN-HOUSE TESTING CAPABILITIES

Glenair UK operates an independently accredited BS9000:CECC:IECQ test lab for internal and third-party product development / design verification and connector qualification including pure air standards.



Glenair UK complex integrated system for an exoatmospheric application with custom machined connectors and complex cabling

GLENAIR UK:

Mission-critical connectors and assemblies for UK and European markets with a special focus on micro and nanominiature flexi assemblies

GLENAIR ITALIA:

Manufacturing harsh-environment military, nuclear, and aerospace interconnect tehnologies for power, high-speed Ethernet, and hermetic seal applications.

HIGH-CAPACITY CNC MACHINING CENTERS

allow Glenair BLQ to provide lightning-fast turnaround on small and custom orders as well as large production runs, all with superior surface finishes and better part quality.

ADVANCED HERMETIC SEAL AND CONNECTOR PLATING CAPABILITIES

Space-compliant gold and nickel plating performed in-house. Hermetic seal connector fabrication with performance levels to 1 X 10^{-7} helium leak rates.

TOTAL VERTICAL INTEGRATION
includes In-house rubber and thermoplastic injection molding.

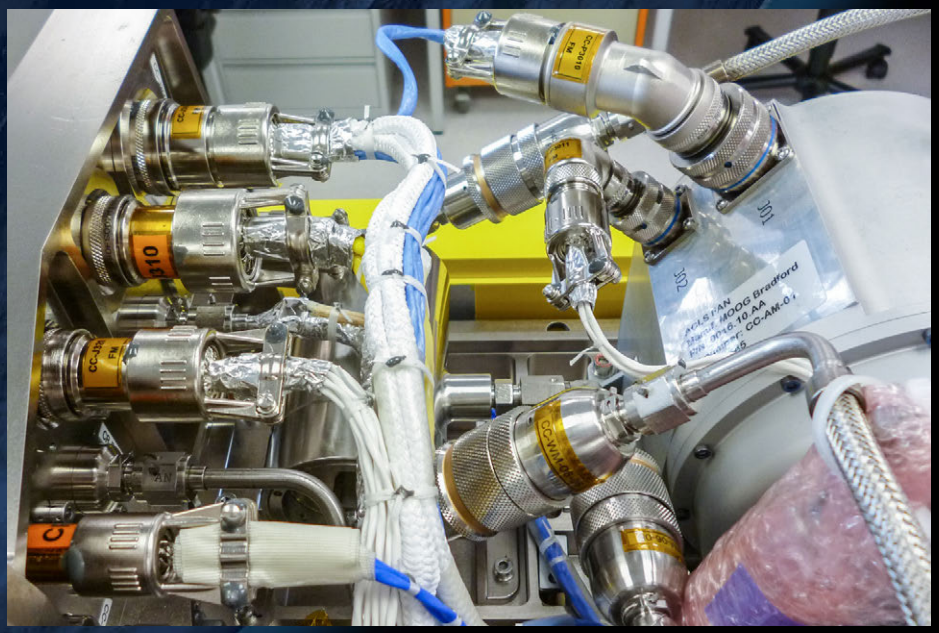
IN-HOUSE TEST LAB
with capabilities for both high-voltage as well as high-speed signal product qualification. Credentials include ISO 17025 and others.

Glenair®
SPACE SYSTEMS

GLENAIR SPACE SYSTEMS, SALEM:
Facility includes a 600 m^2 production floor, 300 m^2 ISO 8 and ISO 6 clean rooms, an ISO 5 flow chamber (certified to ESD Standard 61340-5-1), with ample accommodation for large mock-up and integration projects.

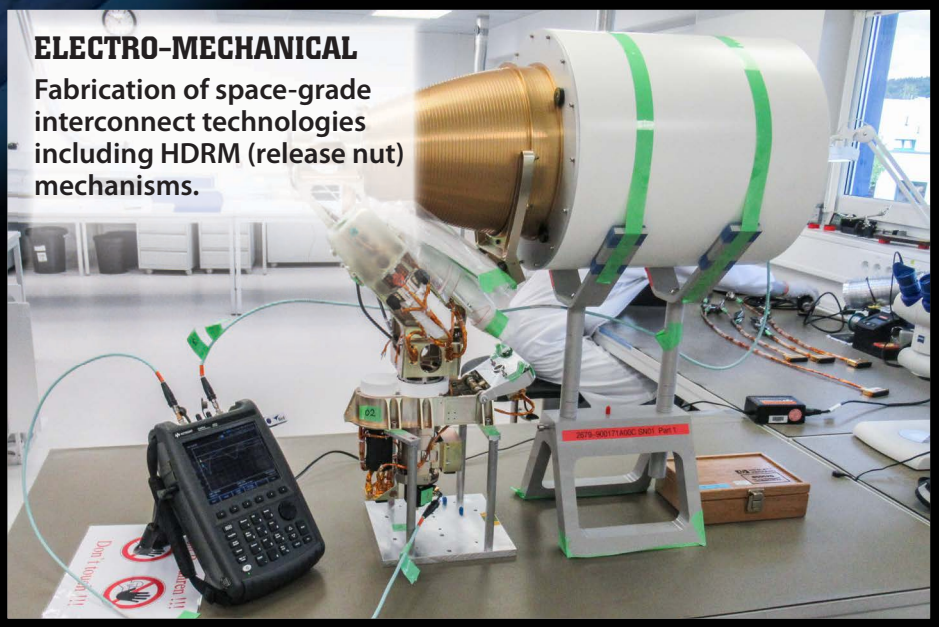
CLEAN ROOM ASSEMBLY

with both environmental filtering and electrostatic discharge protection.



SPACE-GRADE HARNESS FABRICATION AND INTEGRATION

In-house or at customer facility.



ELECTRO-MECHANICAL

Fabrication of space-grade interconnect technologies including HDRM (release nut) mechanisms.

MISSION-CRITICAL

INTERCONNECT SOLUTIONS

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