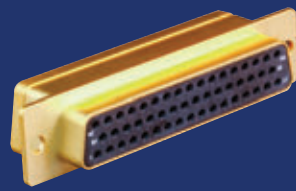


MISSION-CRITICAL
INTERCONNECT
SOLUTIONS



Glenair
SIGNATURE SERIES

Space-Grade Interconnect Solutions

For Launch Vehicle and Satellite Applications

JUNE 2024

Glenair
SIGNATURE SERIES

Space-Grade Solutions



SIGNATURE MIL-STAR
HOOKUP WIRE AND CABLE



NASA · ESA · JAXA · CSA · Commercial
Launch Vehicles · Satellites · Landers and Rovers

TURNKEY INTERCONNECT ASSEMBLIES



Shielded Wire Harnesses
and Complex Cables



Flex and Rigid Flex Circuit
Assemblies



High-Frequency RF / Microwave
Assemblies



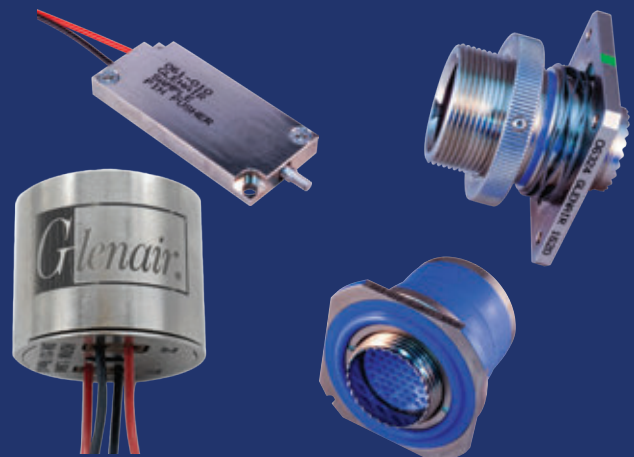
High Speed Datalink
Interconnect Assemblies

FIBER OPTIC INTERCONNECTS



Military-grade PC termini type plus ultra high-density MT Elite®
and PRIZM® MT solutions

HDRMS AND OTHER SPACE MECHANISMS



US- and EU-made Hold-Down
and Release Mechanisms

Assisted Separation Force
Blind-Mate Connectors

SPACE-GRADE CYLINDRICAL CONNECTORS



SuperNine® "Better Than QPL"
MIL-DTL-38999 Series III

Planar Array EMI / RFI
Filter Connectors

Glass and Encapsulant
Hermetic Seal Connectors

Sav-Con® Connector Saver
Go-Betweens

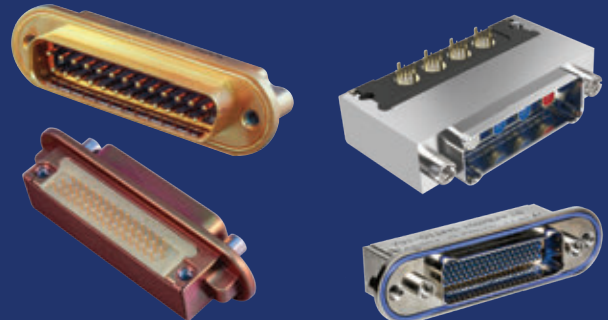
MICRO MINIATURE CIRCULAR CONNECTORS



Series 806 Mil-Aero
Micro Miniature D38999

Series 80 Mighty Mouse
High-Density

SIGNATURE RECTANGULAR CONNECTORS



HiPer-D® High-Performance
M24308

Series 79 Micro-Crimp
Hi-Rel Signal, RF, High-Speed

MICRO AND NANO MINIATURE RECTANGULAR CONNECTORS



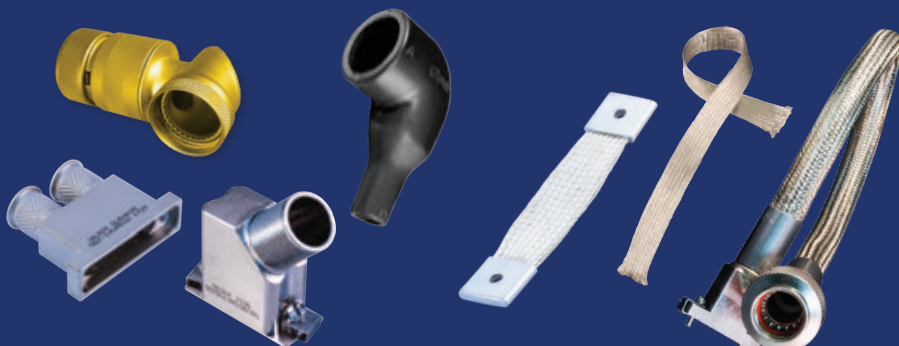
HD Stacker™ High-Density
Board-to-Board

MIL-DTL-83513 Micro-D
Connectors and Assemblies

Latching MicroStrips™
Lightweight, High-Density

QPL and Glenair Signature
Nano Connectors

BACKSHELLS AND ACCESSORIES LIGHTWEIGHT SHIELDING



EMI Shield Termination Backshells for
Satellite Wire Harnesses

EMI/RFI Braided Wire Shielding
and Ground Straps

REFERENCE APPLICATIONS AND FACTORY TOURS





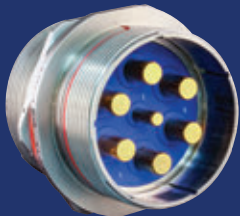
Glenair Signature Interconnects for Launch Vehicle and Satellite Applications

MISSION-CRITICAL TECHNOLOGY

Connectors, cables, and wiring play crucial roles in the functionality of the satellite launch vehicle in communication systems, power distribution, data transmission, guidance and control.

Electrical Power Distribution

Power interconnects distribute electrical power from the primary power source (e.g. batteries, fuel cells) to various subsystems, components, and payloads on board the launch vehicle, including propulsion systems, avionics sensors, communication equipment, and other electrical devices throughout the rocket.



High-voltage power bulkhead feed-thrus



HiPer-D combs with hybrid signal and power



PowerPlay™ high-power in MIL-DTL-38999 Series III packaging



Blind-mate, Assisted Separation Force power interconnects



TurboFlex™ ultra-flexible power distribution cable

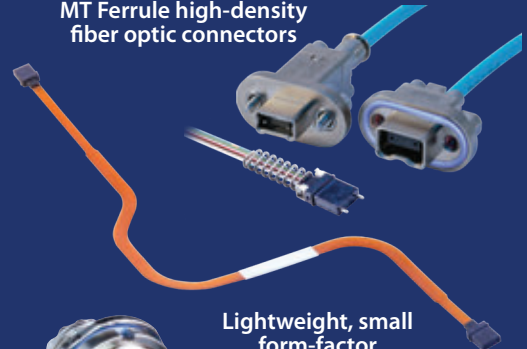


THE ULTRA FLEXIBLE RUGGED POWER CABLE

High-Speed Optical / Electrical Data Transmission

High-speed interconnects are used to transmit data in applications where low latency and high bandwidth are critical—such as between on-board computers, sensors, and data processing units.

MT Ferrule high-density fiber optic connectors



Lightweight, small form-factor Optical Flex jumpers



Mighty Mouse micro miniature fiber optic interconnects



VITA 66.1 and 66.4 optical backplane connectors



El Ochito high-speed octaxial for 10GbE



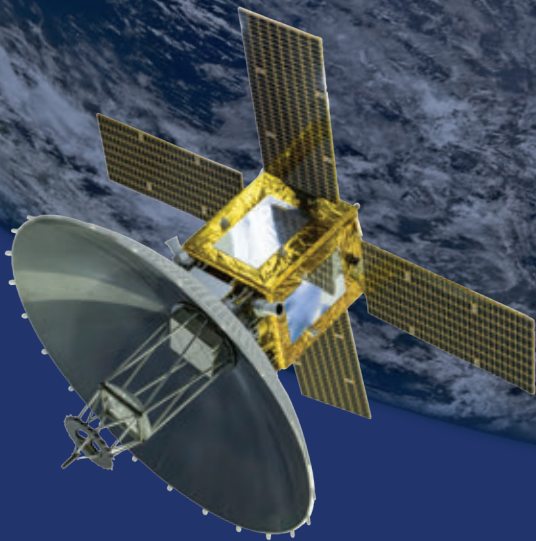
VersaLink 28 Gb/s differential twinax



GMMD modular high-speed Micro-D RF / 10GbE connector



High-Speed Protocol Cables



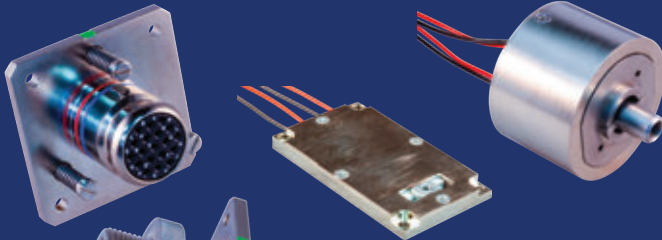
RF (Radio Frequency) Interconnection

RF interconnects are used for wireless communication, telemetry, tracking, and command operations between the satellite and mission control.

RF I/O-to-board ganged cable assemblies with Glenair Signature connectors, contacts, and cable

Electromechanical Actuation

Hold-Down and Release Mechanisms, and other electromechanical devices used in satellite, solar panel, and antenna deployment.



US- and EU-made HDRMs for satellite release and solar panel deployment

Blind-mate assisted release force interconnects

AS81703 type lanyard-release connectors



Size #8, #12, and #16 coaxial and concentric twinax contacts for multi-pin aerospace-grade connectors



G-Link^{RF}

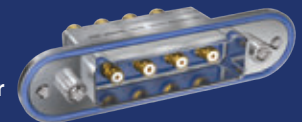


26.5 GHz G-Link RF contacts with integral female SMA adapter for easy cable attachment



Series 806 RF multipin circular

Series 795RF multipin rectangular



Low-Speed Analog Data Bus Transmission

Electrical signal interconnects carry analog and low-speed databus control signals, telemetry data, and other command and communications on and about satellite systems.



Glass and Encapsulant Hermetic Seal Connectors

Planar Array EMI / RFI Filter Connectors

Series 806 Mil-Aero Micro Miniature D38999

50 Ohm coax jumper assemblies with low-loss cable and precision-grade connectors



Lightweight ESD bonds and high-conductivity ground straps



RF Connector adapters and protective covers, precision-grade

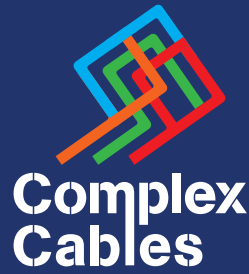


MIL★STAR
HIGH-PERFORMANCE HOOKUP WIRE AND CABLE

BLUMARK **RF**
COAX CABLES



SPACE - GRADE
WIRE HARNESS
CABLE
ASSEMBLIES



Space-Grade Wire Harnesses
and Complex Multibranch
Cable Assemblies Built
with Glenair Signature Wire
and Cable



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

MIL-STAR
HIGH-PERFORMANCE HOOKUP WIRE AND CABLE

AEROSPACE-GRADE
SuperFlex
PCB/FLEX CIRCUIT ASSEMBLIES

BLUMARK **RF**
COAX CABLES

SpeedLine
High-Speed Protocol Cables

Glenair's Complex Cable Group is laser-focused on producing turnkey assemblies built from signature Glenair interconnect components including small form-factor connectors, lightweight shielding, and Glenair MIL-STAR™, SuperFlex™, BluMark RF™, and SpeedLine™ wire and cable products.



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

**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)
- Current-day Low Earth Orbit satellite networks

TURNKEY

Space-Grade Wire Harnesses

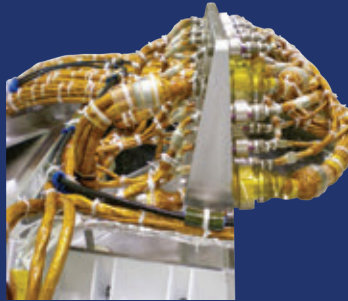


A Technical Readiness Level 9 Glenair Capability
Assemblies Built with Glenair Signature Wire and Interconnects

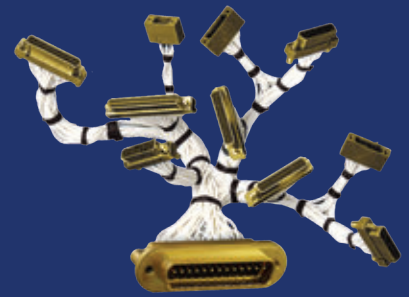
COMPLEX MULTIBRANCH CABLE ASSEMBLIES WITH GLENAIR SIGNATURE WIRE AND INTERCONNECTS



Multibranch wire harness with Glenair Micro-D connectors



Complex Mighty Mouse cable harness for a Mars rover application



Splice-free Micro-D and Nano cable assemblies



Lightweight microfilament ArmorLite™ EMI/RFI shielded assemblies with Glenair Signature SuperNine, Micro-D, and Nano connectors



Mylar tape-wrapped assembly with Glenair Micro-D connectors

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

Glenair's space systems business unit in Salem, Germany specializes in the fabrication of complex space-grade harness assemblies built from Glenair Signature interconnect components including Micro-D, Mighty Mouse, and other small form-factor interconnects.



Hand assembly work performed by ESA-certified assembly staff



Harness integration into space payload electromechanical devices



EMI shielded and open-wire bundle assemblies ready for flight

MIL-STAR™

GS22759 AEROSPACE-GRADE WIRE



MIL-STAR High-Performance Hookup Wire and Cable Glenair has branded its GS22759 high-temperature aerospace-grade wire, and GS27500 multi-conductor cables for aerospace applications, under the MIL-STAR brand. These discrete wires and cables are built in accordance with SAE specifications with a "GS" leadoff in place of both the base specification and the part number for individual slash sheets.

MIL-STAR is a high-performance, better-than-QPL discrete wire and cable specification unique to Glenair. The brand covers both protected (inside-the-box) hookup wire, high-durability open-loom wiring, and multi-conductor shielded and jacketed M27500-type cable.

M22759 single-ended hook-up wires are the industry standard for inside-the-box mil-aero environments and are optimized for size, weight, high-temperature resistance, and low flame propagation. The hundred-plus variants of AS22759 are organized by conductor material and plating, insulation type, wire gage, and single- or dual-wall.

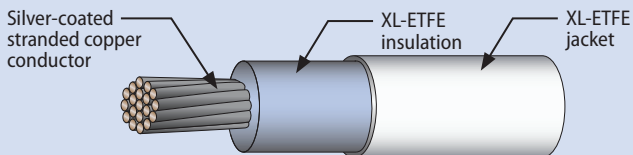
MIL-STAR™ 22759 OPEN WIRE LOOM AND (PROTECTED) HOOKUP WIRES

AS22759 high-temp single-conductor 600V military and aerospace-grade wire, standard and crosslinked, lightweight single-wall and rugged dual-wall configurations.

Crosslinked (XL) ETFE samples

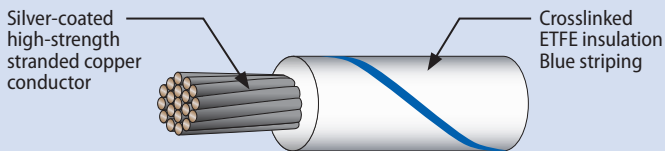
GS22759-43-22-9

- Silver-coated copper core, std. weight dual wall XL-ETFE insulation/jacket. High-temp, radiation- and fire-resistant.



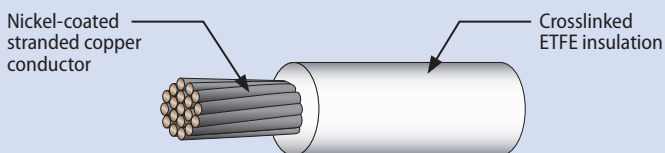
GS22759-33-24-96

- Silver-coated copper core with XL-ETFE insulation (blue striping). High-temp, low flammability.



GS22759-45-12-9 (Light weight)

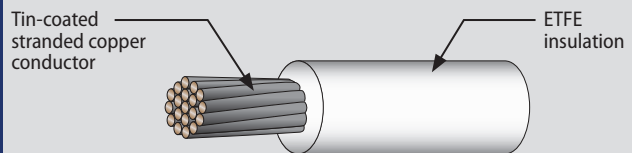
- Nickel coated copper core with XL-ETFE insulation. High-temp (200°C), fire and chemical resistant.



Conventional Fluoropolymer samples (ETFE, PTFE)

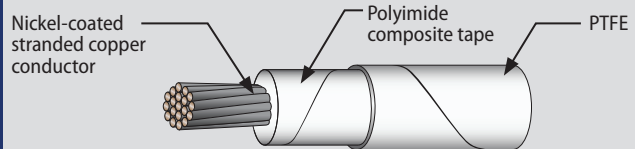
GS22759-16-8-9

- Tin-coated copper core with extruded ETFE insulation. Radiation-resistant and temperature tolerant to 150°C.



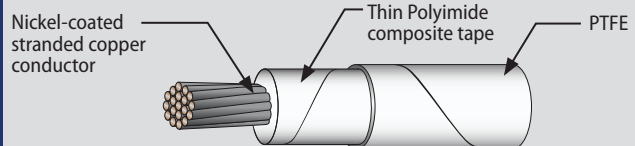
GS22759-87-20-9 (Standard weight)

- Nickel-coated copper, PTFE/Polyimide tape-wrapped. High-temp (260°C), fire and chemical-resistant, low smoke.



GS22759-92-20-9 (Light weight)

- Nickel-coated copper, PTFE/thin-wall Polyimide tape-wrapped. High-temp (260°C), fire and chemical-resistant, low smoke.



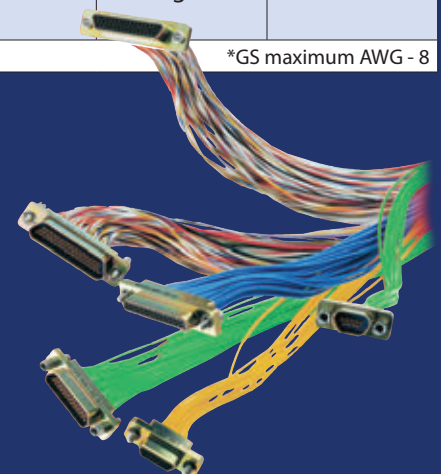
How-to-Order GS22759 Wire: MIL-STAR part numbers are easy to understand. Glenair part number structure simply replaces the MS with GS and uses a dash separator instead of a slash. The dash number (-33 for example) provides the basis for the construction including insulation type, conductor coating, voltage rating, temperature rating, and insulation thickness. Variables in the part number cover wire size, jacket color, and optional striping.

AS22759 Slash Sheet	Glenair Commercial Part No.	Temperature Rating	Conductor	Plating	Conductor Code	Weight	Conductor AWG Range
SAE AS22759/16-19, ETFE							
M22759/16	GS22759-16*	150°C	Copper	Tin	TCC	Medium	24-00
M22759/17	GS22759-17	150°C	High-Strength Copper Alloy	Silver	SCA	Medium	26-20
M22759/18	GS22759-18	150°C	Copper	Tin	TCC	Light	26-10
M22759/19	GS22759-19	150°C	High-Strength Copper Alloy	Silver	SCA	Light	26-20
SAE AS22759/32-35, XL-ETFE							
M22759/32	GS22759-32	150°C	Copper	Tin	TCC	Light	30-12
M22759/33	GS22759-33	200°C	High-Strength Copper Alloy	Silver	SCA	Light	30-20
M22759/34	GS22759-34*	150°C	Copper	Tin	TCC	Normal (Dual Wall)	24-00
M22759/35	GS22759-35	200°C	High-Strength Copper Alloy	Silver	SCA	Normal (Dual Wall)	26-20
SAE AS22759/41-46, XL-ETFE							
M22759/41	GS22759-41*	200°C	Copper	Nickel	NCC	Normal (Dual Wall)	26-00
M22759/42	GS22759-42	200°C	High-Strength Copper Alloy	Nickel	NCA	Normal (Dual Wall)	26-20
M22759/43	GS22759-43*	200°C	Copper	Silver	SCC	Normal (Dual Wall)	26-00
M22759/44	GS22759-44	200°C	Copper	Silver	SCC	Light	26-12
M22759/45	GS22759-45	200°C	Copper	Nickel	NCC	Light	28-12
M22759/46	GS22759-46	200°C	High-Strength Copper Alloy	Nickel	NCA	Light	28-20

*GS maximum AWG - 8

Interconnect Wire Assemblies: Glenair utilizes massive quantities of our own GS22759 and GS27500 wire and cable in point-to-point and complex cable assemblies. MIL-STAR wire and cable is part of a complete ecosystem of EWIS offerings from Glenair, ranging from bulk wire and cable to terminated, shielded, and overmolded assemblies built with Glenair signature connectors and accessories

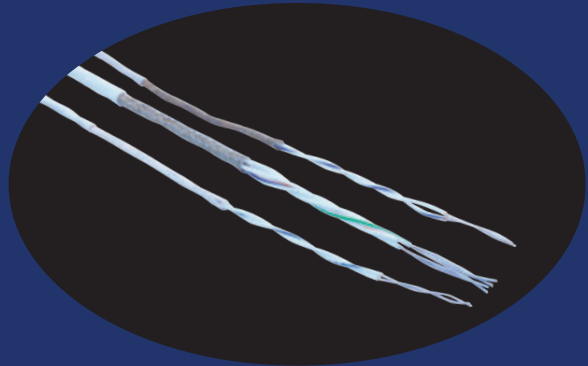
From our signature 'Better-than-QPL' SuperNine series to Micro-Ds, Mighty Mouse, HiPer-D, Series 79 and others—MIL-STAR wire and cable is employed by Glenair in the delivery of value-added aerospace-grade interconnect assemblies with industry-leading speed-of-delivery.



MIL-STAR™

GS27500 MULTI-CONDUCTOR CABLE

Glenair MIL-STAR multi-conductor 27500 type cables are built from in-house manufactured GS22759 hookup wire, available with industry qualification as well as Glenair GS signature part numbering. GS27500 constructions for shielded and unshielded cable are:



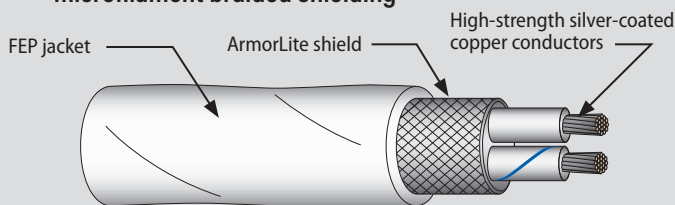
Made and tested IAW ANSI/NEMA WC 27500
1-15 22759 primary hook-up wires
Insulation types including crosslinked ETFE
Industry-standard and Glenair signature shielding materials
Standard and signature jacket compounds

MIL-STAR™ 27500 MULTI-CONDUCTOR CABLES

ANSI/NEMA WC 27500 and Glenair signature multi-conductor cables. Each series supports M22759-16 thru -46 wire types with wire count, gauge, shield, and jacket options as allowed.

968-001-24SC2AR09

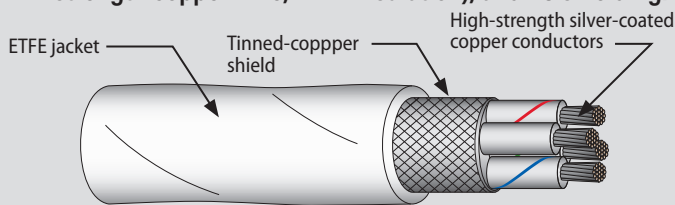
- 27500 type with ArmorLite or AmberStrand lightweight microfilament braided shielding



MIL-STAR GS27500 cables may be specified with signature braided shielding including ArmorLite, ArmorLite CF, and AmberStrand. The ability to supply 27500 type cable in accordance with the ANSI/NEMA standard but optimized for SWaP with lighter weight ArmorLite and AmberStrand shielding is a unique Glenair-only capability.

GS27500-22TF4T14

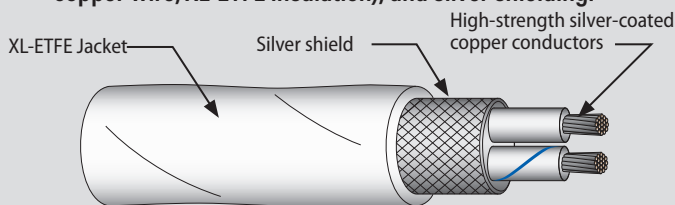
- 27500 type with GS22759-17 wire (silver-plated high-strength copper wire, ETFE insulation), and TC shielding.



This configuration of multi-conductor GS27500 cable is built with GS22759 dash 17 inner wires: silver-plated high-strength copper wire with ETFE insulation. The cable is equipped with an overall tinned-copper EMI/RFI shield and standard fluoropolymer ETFE outer jacket. The superior mechanical properties of high-strength conductors contribute to the overall safety, reliability, and mechanical strength of the cable.

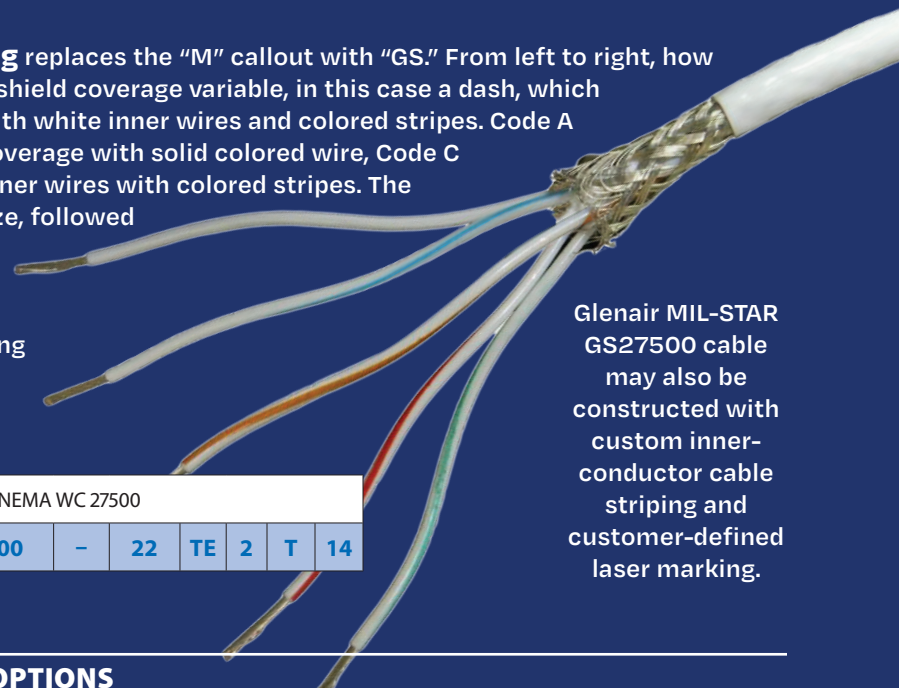
GS27500-24SC2S23

- 27500 type with GS22759-33 wire (silver-plated high-strength copper wire, XL-ETFE insulation), and silver shielding.



This cross-linked configuration of multi-conductor GS27500 cable is built with GS22759 type dash 33 inner wires: silver-plated high-strength copper wire with cross-linked XL-ETFE insulation. Cable is equipped with an overall silver-plated EMI/RFI shield and cross-linked XL-ETFE outer jacket. This multi-conductor 27500 type cable delivers far superior thermal stability, enhanced chemical resistance, mechanical strength, and electrical properties compared to non-crosslinked versions.

MIL-STAR GS27500 cable part numbering replaces the “M” callout with “GS.” From left to right, how to order variables begin with the color code and shield coverage variable, in this case a dash, which indicates default 85% overall shield coverage, with white inner wires and colored stripes. Code A used in this position would denote 85% shield coverage with solid colored wire, Code C would denote 90% shield coverage with white inner wires with colored stripes. The next variable, 22 in our example, is conductor size, followed by the base wire specification (TE) indicating GS22759-16 wire is to be used in this cable buildup. Final variables include the number of inner wire conductors (2), type of overall shielding (T, for Tinned Copper), and finally jacketing material (14, indicating extruded ETFE in white).



Glenair MIL-STAR GS27500 cable may also be constructed with custom inner-conductor cable striping and customer-defined laser marking.

Multi-conductor M27500 type IAW ANSI/NEMA WC 27500

MIL-STAR Cable Sample Part Number	GS27500	-	22	TE	2	T	14
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BETTER-THAN-QPL MIL-STAR SHIELDING OPTIONS

Glenair signature braided cable shield solutions include single and double layers of metal-clad composite microfilament AmberStrand®, microfilament nickel-clad stainless steel ArmorLite™, and ArmorLite™ CF corrosion-resistant.

MIL-STAR GS27500 Shielding Options

Single Shield Code	Double Shield Code	Shield Description
AM	AS	AmberStrand®, Round
AR	AL	ArmorLite™, Round
AC	AF	ArmorLite™ CF, Round
U	U	Unshielded

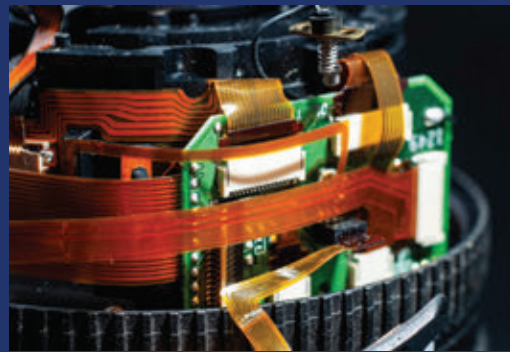


AEROSPACE-GRADE

SuperFlex™

PCB/FLEX CIRCUIT ASSEMBLIES

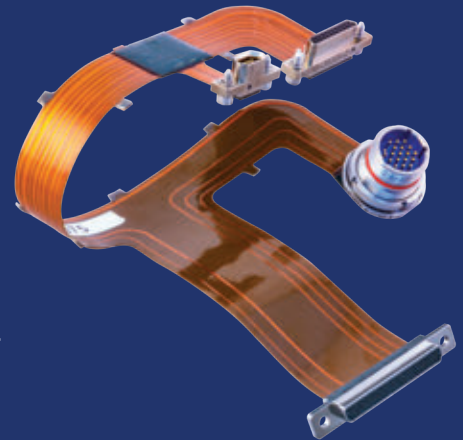
Turnkey connectorized flex, rigid flex, and rigid PCB assemblies incorporating Glenair's broad range of innovative small form-factor circular and rectangular PC-tail connector solutions for optimized ease-of-assembly and SWaP



Flex circuits—metallic layers of traces, usually copper, bonded to a dielectric layer, like polyimide—are used to interconnect embedded electronic packages, displays, backplanes, and other PCB components. Flex and rigid-flex circuits are frequently superior to conventional wiring as they can be easily routed in three dimensions, are lighter and smaller than discrete wires, and

offer virtually unlimited flex cycles in articulated applications. Flex and rigid-flex circuits are commonly deployed within avionic LRUs and other complex electronic systems, as well as between articulating components, such as disk drive, robotic arms, and other electro-mechanical devices.

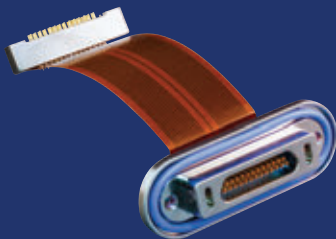
Compared with conventional wiring, compact flexible printed circuit assemblies reduce system complexity and assembly time as well as enhance reliability. Due to their low mass and high circuit density, flex circuit assemblies are less susceptible to impact and vibration damage than conventional wire harness assemblies, making them an ideal choice in satellite applications such as articulated solar arrays, sensors, and antenna.



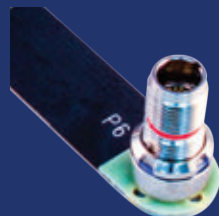
IPC 6012/6013 Class I, II, III,
Types 1–4 Certified Production

Glenair recommends commercial customers specify IPC-6012/6013 standards of workmanship, which are fully supported by Glenair. Military customers may alternatively cite specifications IAW MIL-PRF-31032.

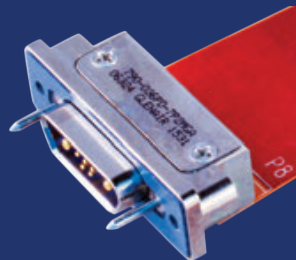
GLENAIR SIGNATURE PC-TAIL CONNECTOR TYPES AVAILABLE IN TURNKEY FLEX ASSEMBLIES



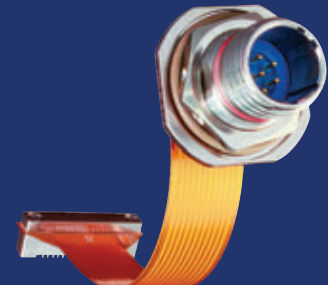
Series MWD Micro-D and spring-contact AlphaLink



Series 88 SuperFly

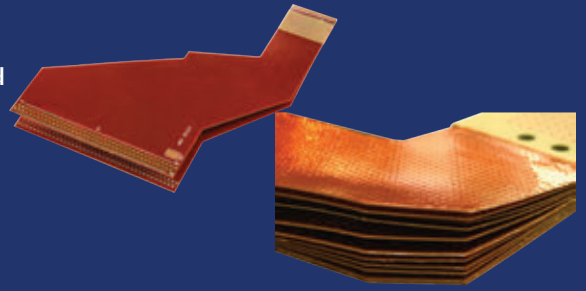


Series 79 Micro-Crimp



SuperNine MIL-DTL-38999 type flexi with board connector

Glenair SuperFlex turnkey connectorized flex, rigid flex, and rigid PCB assemblies begin with our signature flex circuit fabrication and innovation. All SuperFlex assemblies are optimized with ground planes and shields, strain relief features, mounting points for improved resistance to vibration and shock, and are available in multi-layer and double-sided configurations. All terminations backpotted for compliance with conformal coating processes. Optical and electrical solutions available. Special long-length assemblies up to 12 feet.



MULTIBRANCH SUPERFLEX ASSEMBLIES WITH GLENAIR SIGNATURE CONNECTORS

Aerospace-grade Micro-D flex assembly with NASA EEE-INST-002 screening

High-shock matched-impedance Mighty Mouse assembly with flex circuit

Aerospace-grade Series 28 HiPer-D to Series 80 Mighty Mouse I/O jumper: a tight space-constrained rectangular-to-circular solution

Dual-gang series 20 Super-Twin™ I/O connector to AlphaLink SL PCB connector

Hybrid flex/rigid flex multibranch Micro-D and Series 23 SuperNine flex assembly with discrete RF circuits

Stacked Micro-D I/O connectors with flex jumper to rigid PCB assembly

Flex circuitry is lighter, lower profile, and more flexible than cable bundles

















Special long-length HiPer-D assembly with clock-spring design element

High vibration and shock resistant rigid flex assembly with Glenair Mighty Mouse, Micro-D, and RF connections

BLUMARK COAX CABLES



BluMark RF Low-Loss 50 Ohm Coax Cables are available in size categories including 047, 086, 160, 200, 235, 300, and 450 and are suitable for both flight- and test-grade equipment. Vibration-stable, hand-formable designs are intended for non-environmental applications.

047	 26.5 GHz Vibration-Stable Silver-Plated Copper Braid .047 (1.2) Diameter	 70 GHz FEP Jacket Silver-Plated Copper Braid .047 (1.2) Diameter
	 40 GHz FEP Jacket Tape + Braid Shield .104 (2.6) Diameter	 40 GHz ETFE Jacket Tape + Braid Shield .097 (2.5) Diameter
086	 40 GHz FEP Jacket Triple Shield .161 (4.1) Diameter	 18 GHz FEP Jacket Tape + Braid Shield .163 (4.1) Diameter
	 18 GHz ETFE Jacket Tape + Braid Shield .163 (4.1) Diameter	 18 GHz ETFE Jacket Triple Shield .145 (3.7) Diameter
160	 40 GHz Low Phase Change FEP Jacket .157 (4.0) Diameter	 40 GHz Low Phase Change ETFE Jacket .157 (4.0) Diameter
	 26.5 GHz FEP Jacket Triple Shield .204 (5.2) Diameter	 26.5 GHz ETFE Jacket Triple Shield .187 (4.7) Diameter
200	 18 GHz FEP Jacket Triple Shield .235 (6.0) Diameter	 18 GHz ETFE Jacket Triple Shield .205 (5.2) Diameter
235	 18 GHz FEP Jacket Triple Shield .310 (7.9) Diameter	 10 GHz FEP Jacket Triple Shield .448 (6.0) Diameter
300		
450		

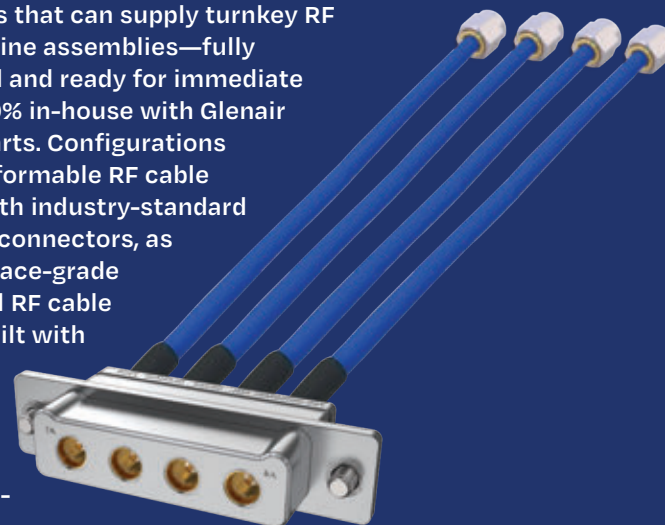
BluMark RF high-frequency, low-loss cables are

suitable for aerospace applications and test equipment. Jacket options include FEP and radiation-resistant space-grade ETFE. Triple-shielded high-performance cables have expanded PTFE dielectric core for low loss up to 40 GHz. Application selection is based on attenuation (loss budget), and compatibility with a particular RF / microwave connector type and size, as well as flexibility, EMI screening, weight considerations, temperature tolerance, and altitude.

Temperature changes can cause phase shift in coax cables with PTFE dielectric cores. Low Phase Change Fluoropolymer (LPCF) cables are available from Glenair that replace the PTFE core with a fluoropolymer material yielding improved phase stability over a wide temperature range. Consult factory.

RF Cable Assemblies

Glenair is one of just a few interconnect manufacturers that can supply turnkey RF transmission line assemblies—fully connectorized and ready for immediate use—built 100% in-house with Glenair component parts. Configurations include hand-formable RF cable assemblies with industry-standard single-line RF connectors, as well as aerospace-grade environmental RF cable assemblies built with BluMark RF low-loss cable, and Glenair signature high-frequency connectors for rugged multi-port shell configurations.



GLENAIR BLUMARK RF™ COAX ECOSYSTEM OF LOW-LOSS CABLES, COMPATIBLE CONNECTORS, AND SIGNATURE SERIES MULTI-PIN HOUSINGS

Glenair high-frequency RF technologies—low-loss cables, shielded contacts, and signature connector housings—are typically used in line replaceable units and chassis that are part of an RF communications chain. Examples of common application environments include fighter jet radar, RF/microwave signal processing, various forms of GPS navigation, jamming systems, and more. Glenair turnkey RF assemblies for space applications—again, built from our complete ecosystem of low-loss RF interconnect cables, contacts, and connectors—are optimized for compatibility with size #8, #12, and #16 drop-in contacts for use in environmentally sealed and shielded circular and rectangular connector housings.

Accurate specification of RF assemblies depends on a thorough understanding of these key variables:

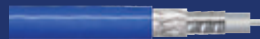
- Operating environment (temp, moisture, etc.)
- Operational frequency range
- Insertion Loss budget
- VSWR requirement

962-025-086



- 50 ohm size 086 (.104" diameter)
40 GHz max. frequency low-attenuation cable
- -65 to +165 °C rated operating temperature
- FEP jacket, PFA dielectric, solid SPC center conductor
- Double-shielded: Tape/braid shield layers

962-025-047

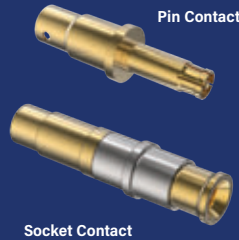


- 50 ohm size 047 (.056" diameter)
70 GHz max. frequency low-attenuation cable
- -65 to +165 °C rated operating temperature
- FEP jacket, PFA dielectric, solid SPC center conductor
- Double-shielded: Tape/braid shield layers



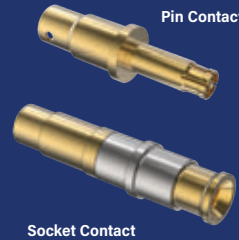
Size 8 for use with
-086 cable
18 GHz BMB interface
50 Ohm
Solder termination

Snap-in, rear release
pin and socket coax
contacts, spring-loaded.



Size 12 for use with
-086 cable
40 GHz SMPM interface
50 Ohm
Solder termination

Snap-in, rear release
pin and socket coax
contacts, spring-loaded.



Size 12 for use with
-047 cable
40 GHz SMPM interface
50 Ohm
Solder termination

Snap-in, rear release
pin and socket coax
contacts, spring-loaded.



Size 16 for use with
-047 cable
65 GHz SMPS interface
50 Ohm
Solder termination

Snap-in, rear release
pin and socket coax
contacts, spring-loaded.



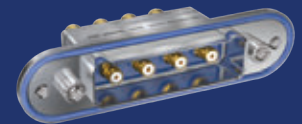
Series 23 SuperNine
"better-than-QPL"
MIL-DTL-38999 Series III
type connector



Series 80 Mighty Mouse
reduced size and weight
aerospace-grade
connector



Series 806 Mil-Aero
micro miniature circular
with performance
IAW D38999



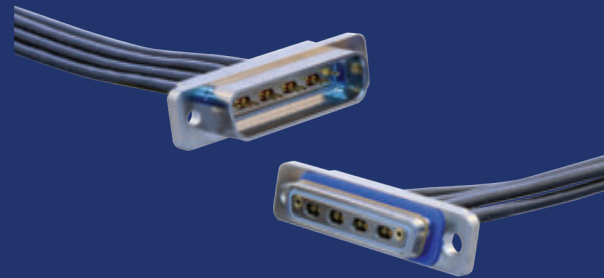
Series 795 RF
precision-machined
aerospace-grade
coax connector

SpeedLine™

High-Speed Protocol Cables

Glenair supplies a wide range of high-speed shielded twisted pair cabling for use with El Ochito®, VersaLink™, SpeedMaster™, and other of our shielded high-speed connector and contact technologies. High flexibility and high-density reduced-weight cable designs are a specialty. Glenair offers turnkey Cat 8 Ethernet, SuperSpeed USB 3.0, HDMI, SATA, and other solutions for today's most mission-critical application platforms.

Glenair SpeedLine cables are optimized for signal integrity, weight savings, flexibility, and durability. In addition, these aerospace and space-grade cables have been optimized for ease of termination and across-the-board compatibility with our broad range of high-speed contact modules and connectors.



SpeedLine™ high-speed cable assemblies such as this VersaLink cordset for DisplayPort 2.0 and USB 4 are supplied as turnkey tested solutions, ready for immediate use

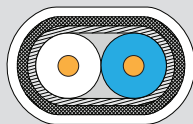
- Cat 8 Ethernet, SuperSpeed USB 3.0, HDMI, SATA, and other solutions for mission-critical applications
- Individual foil shielding around each data pair for reduced crosstalk and attenuation
- Up to 200°C high-temperature-rated cable
- Skydrol resistant, RoHS compliant versions
- Ethernet versions meet ANSI/TIA 568-C.2 Category 6A requirement up to 262 feet/80 meters
- Low-skew SuperSpeed USB data pairs have individual braided shields
- LSZH jacketing options including Duraelectric Light and polyurethane



SpeedLine™ high-speed protocol cables: shielded differential data-pair cables for high-datarate Ethernet, USB, SATA, PCIe, DisplayPort, and HDMI protocols

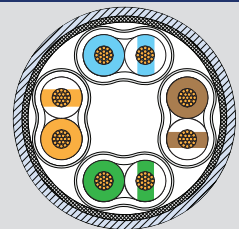
963-069-26

- 100 Ohm #26 AWG flat pair shielded cable for use with VersaLink™ connectors
- Performance up to 18 GHz
- -65 to +200 °C rated operating temperature
- FEP jacket, FEP insulation
- Dual shields: Aluminized Kapton tape and #44 AWG silver-plated copper



963-066-24

- 100 Ohm #24 AWG 4-pair shielded cable for use with El Ochito contacts
- Performance up to 10 Gigabit Ethernet
- -65 to +200 °C rated operating temperature
- FEP jacket, FEP insulation with PTFE tape wrap
- Outer shield: #40 AWG silver-plated copper

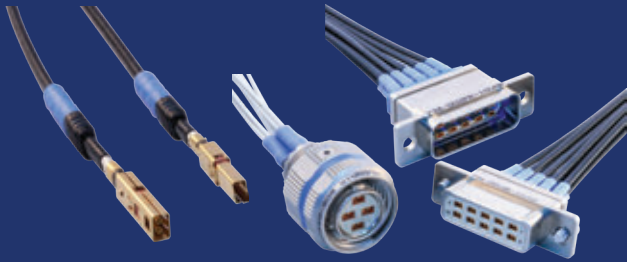


Glenair signature SpeedLine high-speed protocol cables are designed for direct application and use with VersaLink™, SpeedMaster™, El Ochito®, and other of our lightweight, small form-factor high-speed protocol connectors.

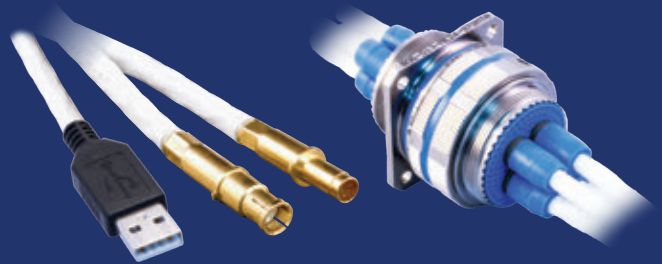
Glenair Signature SpeedLine™ Cables, Shielded Contacts, and Connectors: a complete ecosystem of interconnect technologies for high-speed protocol applications in rugged aerospace-grade systems

Glenair supplies a complete ecosystem of military/aerospace-grade interconnect technology in support of every popular high-speed protocol. Downselect typically begins with protocol identification in accordance with application data rate requirements and standards. For each high-speed protocol, Glenair can supply an exactly-designed, tested, and qualified SpeedLine™ differential data cable, shielded high-speed contact insert, and a signature range of ruggedized, environmentally-sealed connector housings.

SPEEDLINE HIGH-SPEED PROTOCOL CABLE ASSEMBLIES



Glenair SpeedLine high-speed cable assemblies for VersaLink™ include factory-terminated pigtails and double-ended jumpers as well as turnkey Series 806 Mil-Aero and Series 794 Micro-Crimp high-density solutions



Glenair SpeedLine high-speed cable assemblies for El Ochito® include single- and double-ended jumpers, commercial protocol connector jumpers, and integrated Series 806 Mil-Aero, SuperNine®, and Series 792 Micro-Crimp

SPEEDLINE-COMPATIBLE HIGH-SPEED DIFFERENTIAL-PAIR SHIELDED CONTACTS



Size #8 differential twinax contacts

Size #8 quadrax contacts

Size #8 El Ochito octaxial

Size #8 SpeedMaster octaxial

VersaLink differential twinax

SPEEDLINE COMPATIBLE GLENAIR SIGNATURE HIGH-SPEED CONNECTORS



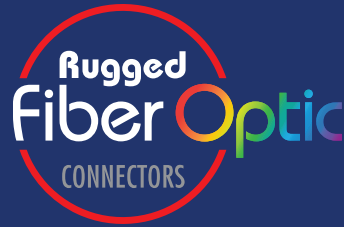
Series 806 Mil-Aero high-speed El Ochito micro miniature

SuperNine MIL-DTL-38999 "Better than QPL" high-speed El Ochito

Speed-Master™ modular 10G+ Ethernet (shown in SuperNine® packaging)

Series 792 Micro-Crimp precision-machined high-speed El Ochito

RADIATION-
TOLERANT
SPACE-GRADE
FIBER OPTICS



Space-Grade Fiber Optic
Datalinks Including PRIZM
MT and MCX Ferrules
Plus Eye-Beam™ Power
Expanded-Beam for FSO



Glenair is pleased to introduce Eye-Beam Power, the world's first ruggedized, high-optical power terminus for multi-pin connectors, optimized for FSO applications.

EYE-BEAM POWER

- Rugged Size #8 drop-in expanded-beam optical contact
- Compatible with 1064nm polarization-maintaining fiber with a 0.5 dB typical insertion loss
- Low temperature rise at peak power

EYE-BEAM POWER: RUGGED HIGH-POWER FIBER OPTICS FOR FSO APPLICATIONS



SuperNine "better than QPL"
MIL-DTL-38999 Series III



Series 806 Mil-Aero
microminiature circular



Series 792 high-performance
micro rectangular

SPACE-GRADE Fiber Optic Connectors and Cables



Glenair US and UK are qualified by US Conec to terminate 1 and 2 row PRIZM[®] MT and ferrules for ribbon and round cable fiber

Signature high-density and high-power fiber optic connection systems

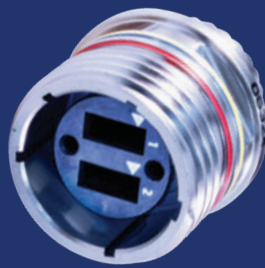
ABOUT MT FERRULE FIBER OPTICS

PRIZM[®] MT is a monolithic optical fiber ferrule that integrates microlenses and mechanical alignment features into a single component. The design provides low insertion loss and return loss for up to 32 fibers and is optimally resistant to debris contamination. Glenair supplies the PRIZM MT ferrule in factory-terminated cable assemblies for both inside-the-box as well as environmental point-to-point applications. Ruggedized aerospace-grade I/O and backplane connectors are also available for use with standard MT Elite[®] physical contact (PC) ferrules. MT Elite compatible connectors and ferrule kits are ordered separately for complete convenience in the implementation of both singlemode and multimode fiber optic datalinks.

SUPERNINE MT CONNECTOR CONFIGURATIONS



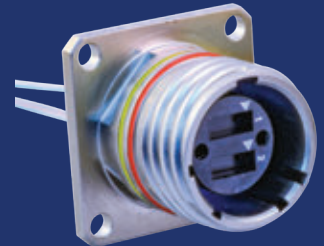
Cable Plug



In-Line Receptacle

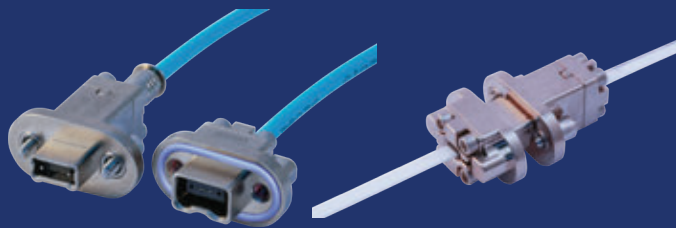


Jam-Nut Receptacle



Panel-Mount Receptacles

SERIES 79 MT CONNECTOR CONFIGURATIONS



Plugs and receptacles with integrated banding porch, retaining plates, or EMI gasket for ribbon or round fiber media supporting both MT Elite[®] and PRIZM[®] MT ferrules.

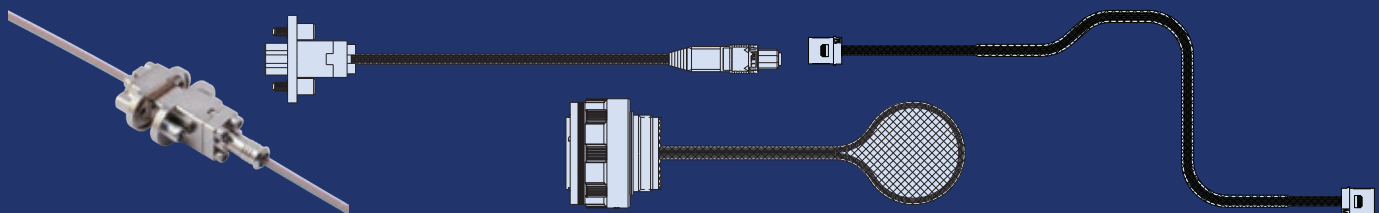
VITA 66 STYLE MT CONNECTORS



VITA 66.1 and 66.4 format. Discrete backplane connectors and MT ferrule assemblies.

CATALOG FAST-TURNAROUND "ASAP" MT OPTICAL FLEX JUMPERS AND CABLE ASSEMBLIES

Glenair supplies—as a commercial off-the-shelf product—point-to-point optical flex jumpers with MT Elite and PRIZM MT optical ferrules. Available configurations include simple MT-to-MTP jumpers in straight or curved profiles, circular and rectangular I/O connectors with MT optical fiber pigtails, as well as special optical loop assemblies. A complete range of multimode and singlemode fiber in popular sizes, plus radiation-hardened fiber for earth orbit applications. Series 79- and SuperNine-to-MT ribbon fiber breakout cable assemblies available.



LIGHT, MEDIUM,
AND HEAVY-DUTY
PRELOAD
RETENTION AND
RELEASE



Non-Pyrotechnic Hold Down
and Release Mechanisms—
US- and EU-made IAW local
standards and market
requirements

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



High-reliability, non-explosive (split-spool)
HDRMs, separation nuts, and pin pullers/
pushers for dependable preload retention
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
pullers—direct wired or
connectorized—with a
broad range of preload
carrying capacity. HDRM
EU Series designed for
ESA applications
and standards.

- Pyrotechnic-free alternative (low-shock fuse-wire) for single-event release of deployable space systems—electrical initiation up to 5 amps
- Single-event device, user-serviceable and refurbishable
- 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



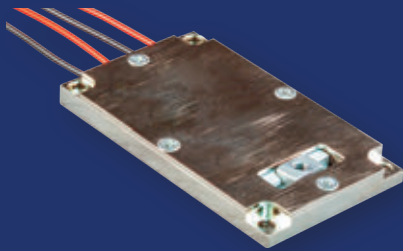
NON-PYROTECHNIC

Hold Down and Release Mechanisms

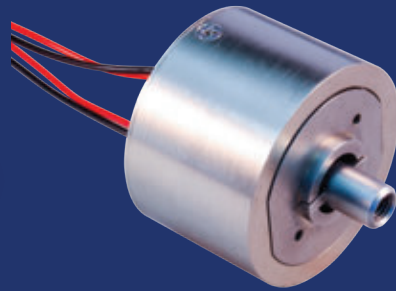


Separation nut, pin puller, and pin pusher configurations with flight heritage

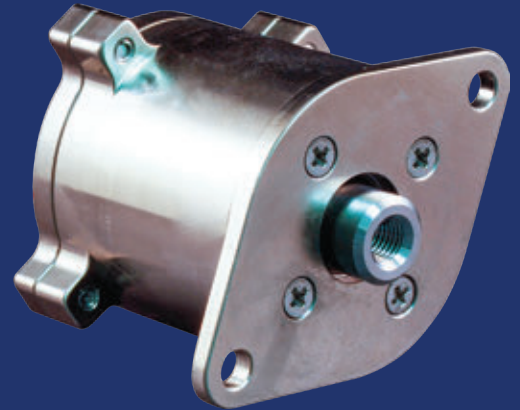
HDRM DUTY CLASSES



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



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

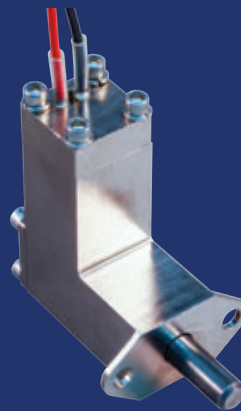


Heavy-Duty HDRM
Redundant circuit,
5000 – 20,000 lb release preload

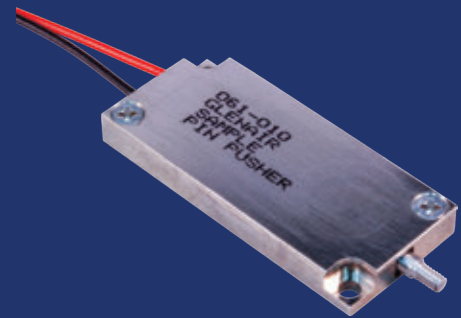
HDRM RELEASE TYPES



Separation nut



Pin puller



Pin pusher

EUROPEAN-MADE HDRM SOLUTIONS IAW ECSS-E-ST-33-01C SPACE MECHANISM STANDARD



Medium-Duty HDRM
Redundant circuit,
1.5 kN release preload



Medium-Duty HDRM
Redundant circuit,
11 kN release preload



Medium-Duty HDRM
Redundant circuit,
18 kN release preload

INTERSTAGE
AND SATELLITE
DEPLOYMENT
ADJUSTABLE
SEPARATION FORCE
CONNECTORS

 **SuperNine**[®] Space Mechanisms

**Blind-Mate, Float-Mount, and Assisted
Release Connectors with Adjustable
Separation Force and Misalignment Feature**

Titan rocket launch from Vandenberg AFB
Photo courtesy 30th Space Wing



Available feed-thru
configurations

Blind-mate, fixed, and float-mount interconnects for commercial launch, satellite, and 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
- Crimp-removable contacts standard. PC tails, dual-flange standoffs, hermetically sealed, and custom blind-mate configurations available



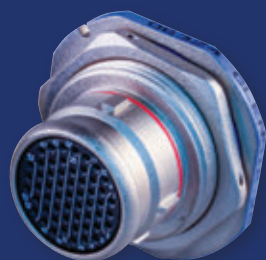
Dead-Face connectors for isolation
and disconnection of electrical
signals prior to connector separation

SPACE-GRADE BLIND MATE SuperNine float-mount and adjustable separation force connectors

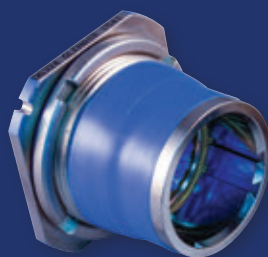


MIL-DTL-38999 Series III type, environmental, crimp contact

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



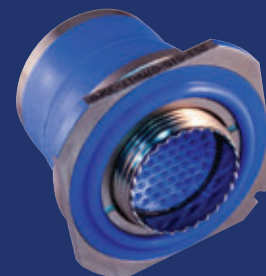
Roll-off nose: allows for the smooth disconnection of blind mate plugs and receptacles.



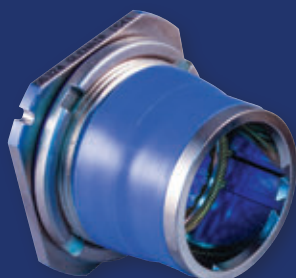
Float mounting: allows for coplanar movement of the receptacle during mating, preventing contact and shell damage.



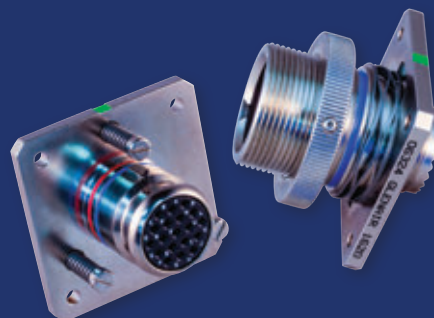
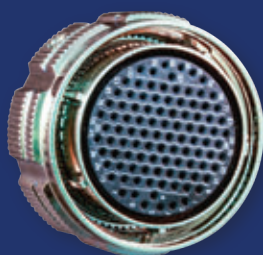
Misalignment accommodation: Radial, axial, and angular misalignment during mating is accounted for with integral wave springs.



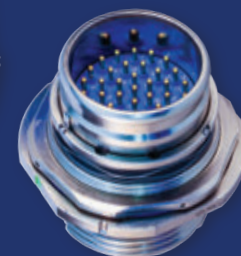
Sealing: Misalignment accommodation makes environmental sealing difficult. The problem is solved with auxiliary external seals.



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

INDUSTRY'S
BROADEST RANGE
"BETTER-THAN-
QPL" D38999
CONNECTORS

SuperNine® Environmental
Connectors

The advanced-performance MIL-DTL-38999
Series III type connector for space applications

The Mars Science Laboratory launch
NASA/Scott Andrews/Canon



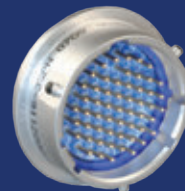
Wide range of signature PC tail designs
including dual standoffs for superior
resistance to vibration and shock

SuperNine® is a "Better-than-QPL"
MIL-DTL-38999 series connector
with outstanding durability, sealing,
ease of shield termination, broad
range of PC tail configurations,
environmental and hermetic
bulkhead feed-throughs, connector
savers, as well as off-the-shelf EMI/
EMP filter connectors and more—all
with Glenair's legendary service,
support, and product availability

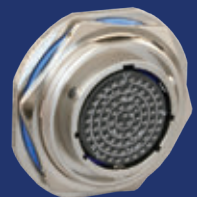
**ALSO AVAILABLE: D38999
SERIES I AND SERIES II
BAYONET-LOCK CONNECTORS**



D38999
Series I



D38999
Series II



D38999 Series I (scoop-proof) and Series
II (low-profile) bayonet-lock connectors in
Class G space-grade configurations

SERIES 23

SuperNine®

MIL-DTL-38999 Series III Type

Advanced performance aerospace / defense connectors

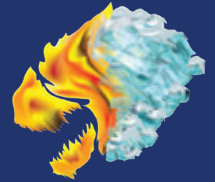


SUPERNINE THERMAREX HIGH-TEMPERATURE AND CRYOGENIC INTERCONNECT SOLUTIONS



ThermaRex versions of SuperNine are designed for use in high-temp, ultra high-temp, high-temp hermetic, and cryogenic applications

- Service ratings from -195° to +300°C
- Vibration-resistant threaded coupling
- High-temperature ceramic insulators and silicone seals
- Durable stainless steel construction
- Also available in Series 806 Mil-Aero, EN2997, and Series 79 Micro-Crimp
- Environmental versions utilize Glenair Crown Ring contacts
- ThermaRex hermetics: 1×10^{-7} leak-rate performance at 300°C
- Dynamic cryogenic design withstands high vibration at -150°C
- ThermaRex Cryogenic equipped with ultra low-temperature Duralectric K environmental seals

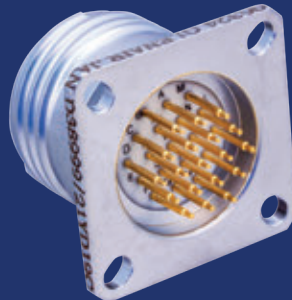


ThermaRex™

ADVANCED-PERFORMANCE ENVIRONMENTAL, HERMETIC, PC TAIL, AND HIGH-VOLTAGE POWER



Anti-decoupling, high vibration ratcheting coupling nut IAW Bell Helicopter 299-100-B29 vibration testing

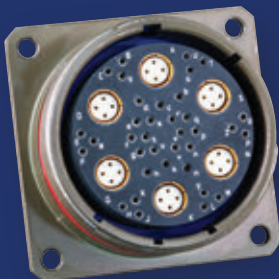


Glass-to-metal sealed and lightweight CODE RED encapsulant sealing hermetic derivatives



SuperNine PowerPlay high-voltage connectors with temperature-tolerant Crown Ring contacts

HIGH-SPEED AND RF DESIGNS FOR SENSORS AND SATELLITE UPLINK DATA COMMS



Industry-standard Quadrax-equipped layouts for signal and high-speed data



Ultra-light weight Octaxial contacts for 10Gb data transfer per contact



High-frequency RF designs for satcom communications

COTS AND CUSTOM
ENVIRONMENTAL
AND HERMETIC
EMI/RFI FILTER
CONNECTORS



EMI/RFI Filter Connectors
and EMP Suppression:
Planar Array Power, Signal,
and TVS Solutions

The Minotaur 1 rocket carrying the NFire satellite
Photo: NASA



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

Planar filter array and TVS diode connectors diodes in standard catalog as well as build-to-order configurations

- 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 designs · 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

SPACE - GRADE
HERMETIC
SEALING
CONNECTOR
SOLUTIONS

GLASS-SEALED
Hermetic Best-of-Class Hermetic Seal
CONNECTORS Connector Designs

The spaceX Dragon capsule grappled by the Canadarm 2 at the ISS
Photo: NASA



Resolve gas, moisture and particle ingress problems with conventional glass-sealed hermetic or advanced **CODE RED** lightweight encapsulant-sealed designs



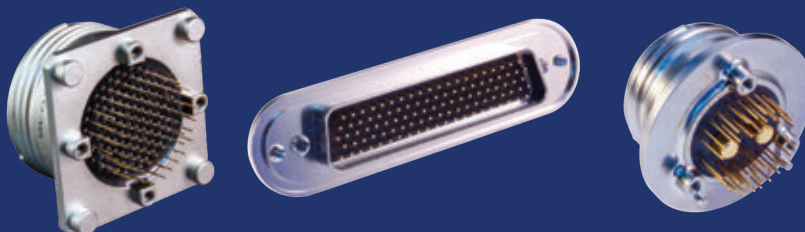
ALL SOLUTIONS DELIVER

- 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 <math> < 1 \times 10^{-7}</math> cc/sec to 1×10^{-10}

CODE RED

LIGHTWEIGHT HERMETIC SEALING

Lightweight hermetic encapsulant sealing solution with 1×10^{-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

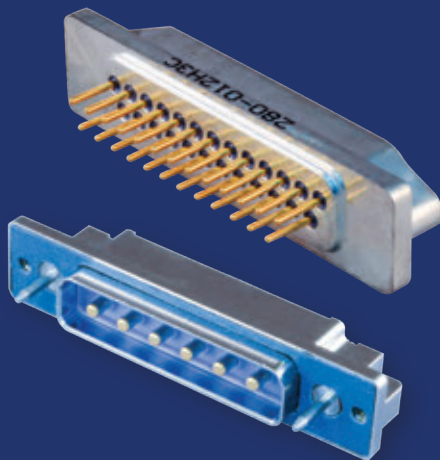


Thousands of same-day-availability part numbers

UNIQUE HERMETIC OFFERINGS AND CATALOG (COTS) SOLUTIONS



Coax, Triax, QuadraX and hybrid-contact layouts



Rectangular hermetics including Series 28 HiPer-D and Series 79



E1 Ocho high-speed octaxial contacts in a lightweight CODE-RED sealed bulkhead feed-thru



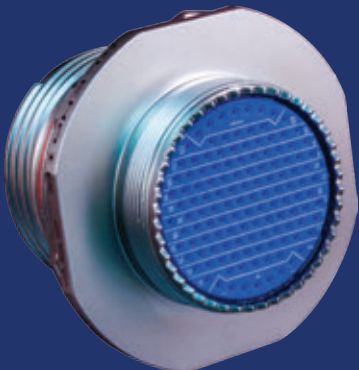
Triax hermetic



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

CIRCULAR AND
RECTANGULAR
FLIGHT-GRADE
AND GROUND TEST
APPLICATIONS



Flight-Proven Connector Savers
and Bulkhead Feed-Thrus

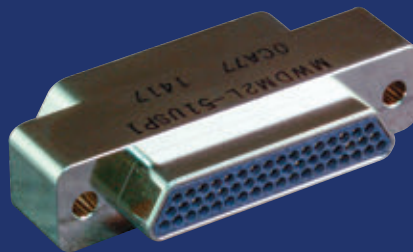


Glenair SAV-CON® protected umbilical connectors
on every Space Shuttle Mission
Photo: NASA/George Shelton

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



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

- Sav-Con®s for every Military Standard connector—circular and rectangular
- Hundreds of successful space launch and space flight applications
- 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

HIGH-PERFORMANCE CONNECTOR GO-BETWEENS

Sav-Con® Connector Savers and Bulkhead Feed-Thrus

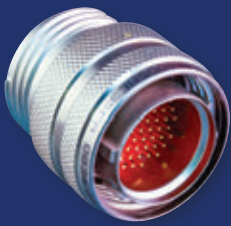


Each Glenair Sav-Con® Connector Saver meets the military specification performance requirements of its mating connector. Glenair manufactures and supplies a Sav-Con® connector saver for every military standard connector currently in use including:

- 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

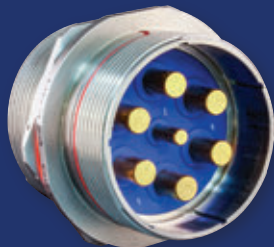


MIL-DTL-38999 series II bayonet-coupling saver



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

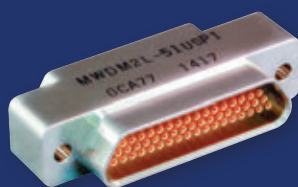


Special non-cadmium plating classes

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)



TRL 9
PROVEN FLIGHT
HERITAGE MICRO
MINIATURE
CONNECTOR

SERIES
806
MIL-AERO

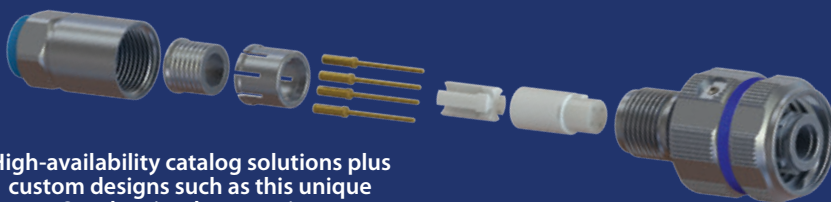
Advanced performance,
reduced size and weight
connector series IAW
MIL-DTL-38999



The twin Van Allen Probes studying the Earth's radiation belts
Credit: JHU/APL, NASA

Series 806 offers significant size and weight savings while meeting all key performance benchmarks of MIL-DTL-38999 Series III for a broad range of space flight applications including sensors, telemetry, power, and system databus.

SIZE AND WEIGHT SAVING SOLUTIONS: CATALOG OR CUSTOM



High-availability catalog solutions plus custom designs such as this unique Quadrax implementation

- Next-generation small form factor aerospace-grade circular connector
- Designed for harsh application and high-altitude environments
- Robust and reliable anti-decoupling technology
- High density 20HD, 22HD, RF, and high-speed contact arrangements
- Lightweight hermetic and filter versions
- +200°C temperature rating
- Improved ramp angle on mating interface for better vibration and shock resistance

Series 806 Mil-Aero Micro Miniature Circular Connectors



for space-grade applications

SERIES 806 MIL-AERO: FEATURES / SPECIFICATIONS

- High-density #20HD and #22HD arrangements for reduced size and weight
- 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
- +200°C operating temperature
- “Triple ripple” wire sealing grommet (75,000 ft. rated)
- Snap in, rear release crimp contacts
- Metal contact retention clips
- 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

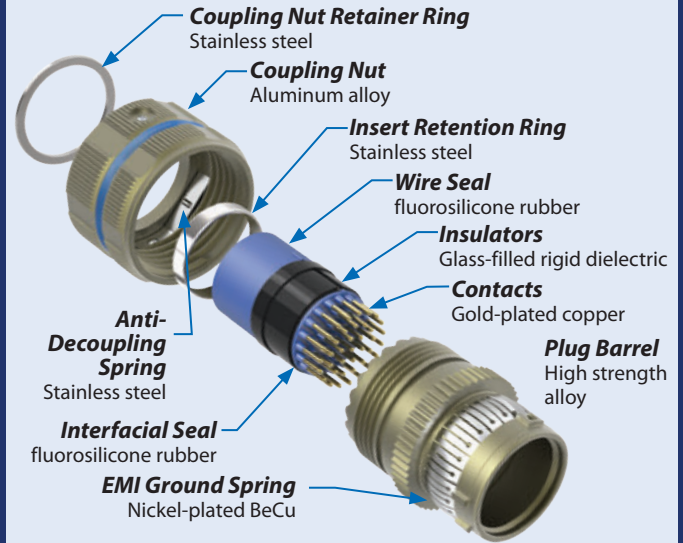
AVAILABLE LIGHTWEIGHT ALUMINUM “CODE RED” HERMETICS

CODE RED is a lightweight encapsulant sealing and application process with 50% package-weight savings compared to glass-to-metal seal Kovar/stainless steel solutions.

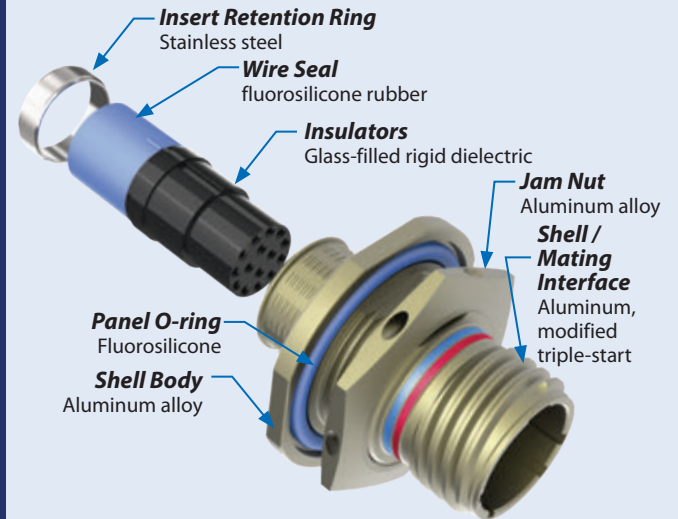
Non-outgassing CODE RED (IAW NASA/ESA) provides durable hermetic sealing with better than 1×10^{-7} leak rate performance. Gold-plated copper contacts deliver outstanding low-resistance current carrying capacity.



SERIES 806 MIL-AERO PLUG

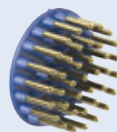


SERIES 806 MIL-AERO RECEPTACLE



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

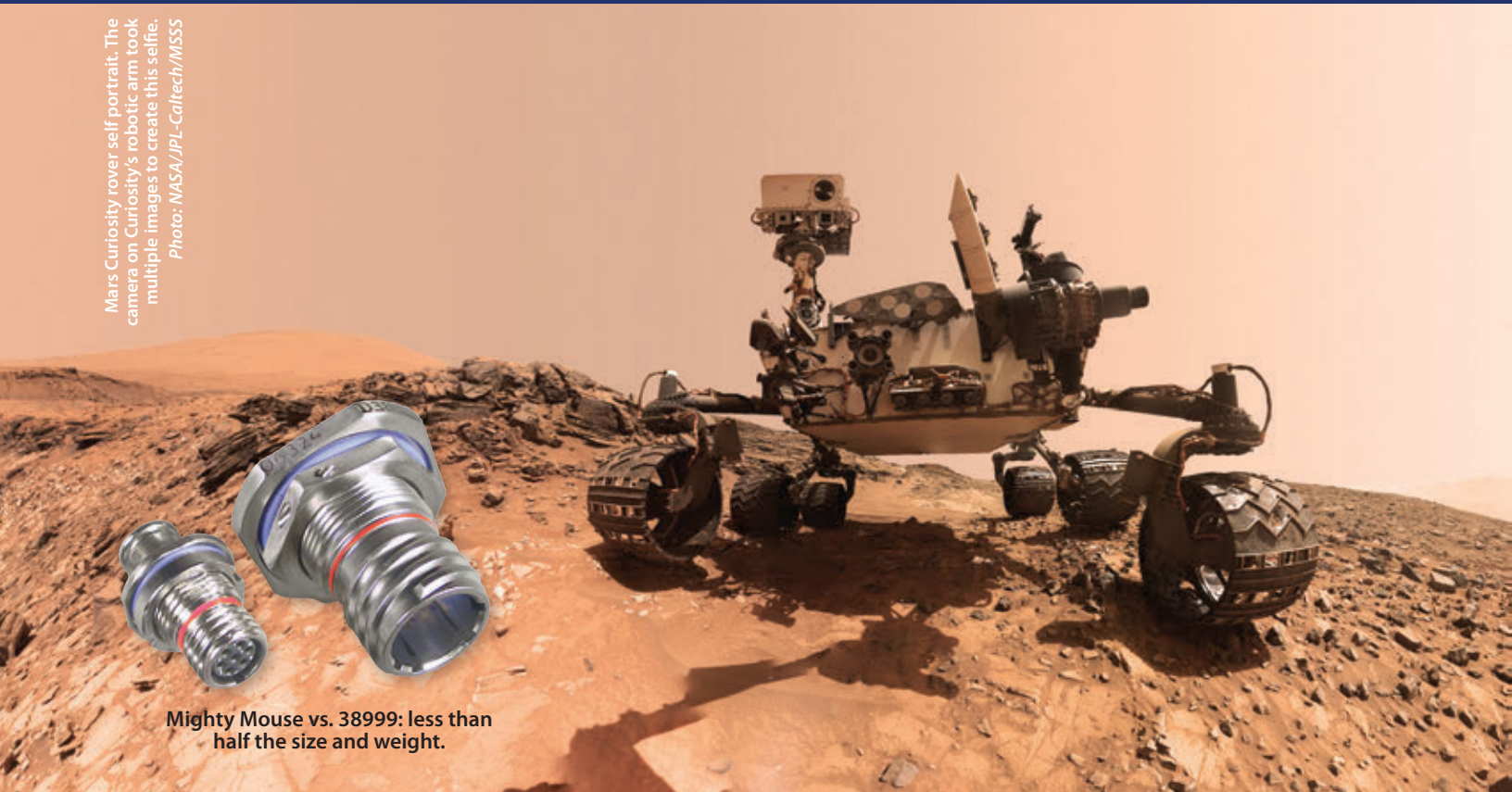


INDUSTRY - LEADING
MINIATURIZATION,
PERFORMANCE, AND
AVAILABILITY



Mighty Mouse micro
miniature connector series
for optimized SWaP

Mars Curiosity rover self portrait. The camera on Curiosity's robotic arm took multiple images to create this selfie. Photo: NASA/JPL-Caltech/MSSS

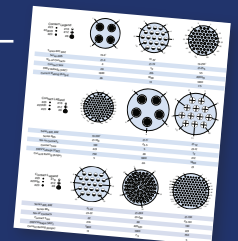


Mighty Mouse vs. 38999: less than half the size and weight.

Mighty Mouse Connectors: Reducing the Size and Weight of Space-Grade Wiring Systems

- 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, RF, and high-speed contacts
- Discrete connectors and turnkey cable assemblies

FULL RANGE OF SUPPORTED CONTACTS, 67 CONTACT ARRANGEMENTS



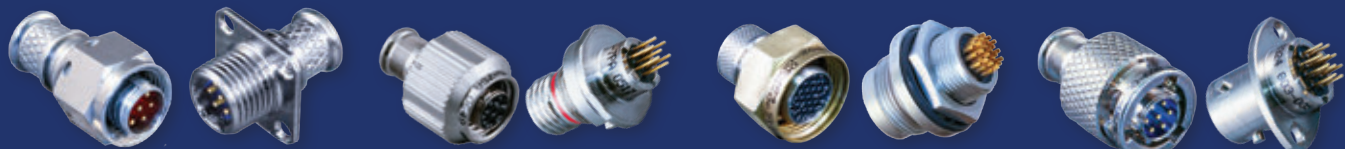
67 arrangements,
from 1–130 contacts

SERIES 80 MICRO MINIATURE Mighty Mouse Connectors and Cables

Awesome performance, itty-bitty package



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
Lightweight hermetic

EMI/RFI
Filter

EMP Transient Voltage
Suppression



Bulkhead feed-thrus and
penetrators

Sav-Con[®]
connector savers

High-frequency
RF / Microwave

High-speed
Ethernet

Single- and multimode
fiber optic

AVAILABLE COTS SPECIAL-PURPOSE DESIGNS AND PACKAGING



High-density flex jumpers

Double-standoff PC tail

Special feed-thrus

Shielded cable assemblies

HIGH-PERFORMANCE
STANDARD,
HIGH-DENSITY,
POWER, AND
HIGH-SPEED



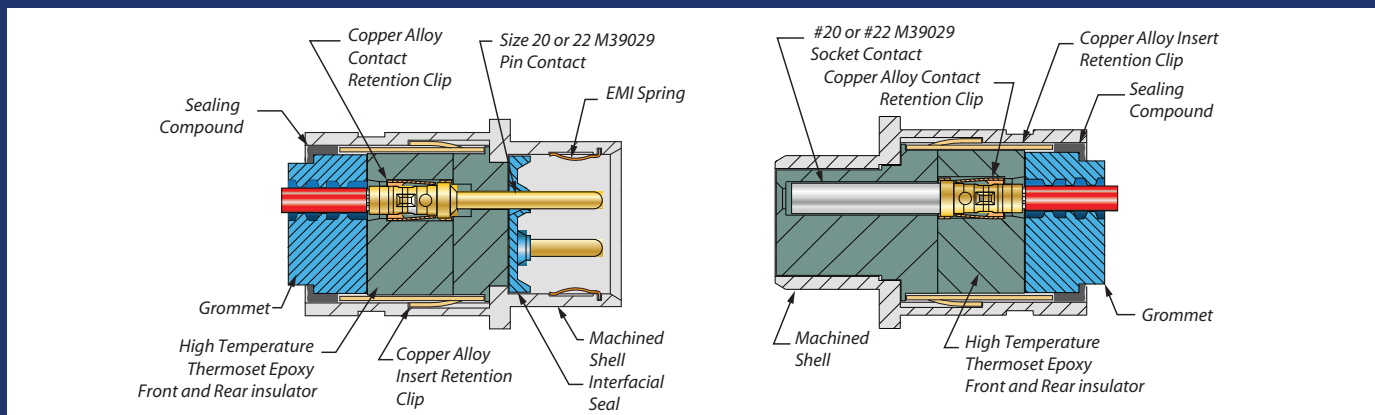
Advanced-Performance HiPer-D Connectors—Aerospace-Grade M24308 Intermateable



HiPer-D: the advanced-performance M24308 intermateable with one-piece precision-machined shells and enhanced shielding, sealing, and high temperature and vibration tolerance

- 200° continuous operating temperature
- Integrated ground spring for EMI/RFI protection
- 11 standard and 20 combo insert arrangements
- High-temp insulators
- Fluorosilicone seals (NASA outgassing available)
- Rugged machined shells

STANDARD AND HIGH DENSITY HiPer-D® - CUTAWAY



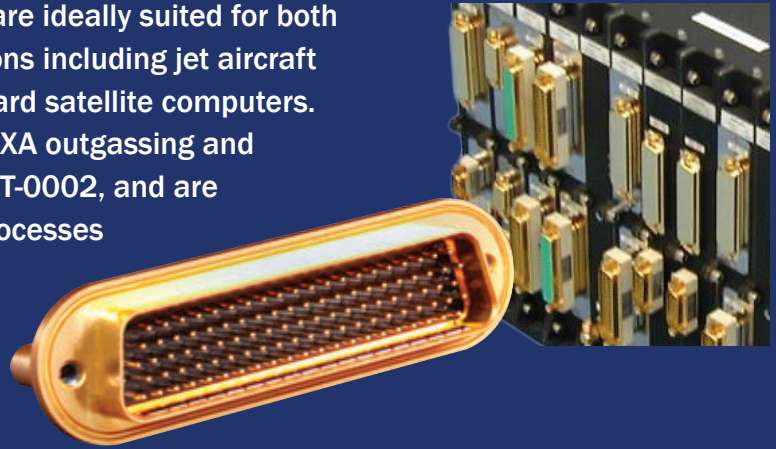
SERIES 28

HiPer-D Aerospace-Grade M24308 Connectors



Precision-machined · shielded · sealed

Glenair HiPer-D M24308 D-sub connectors are ideally suited for both high-altitude and exoatmospheric applications including jet aircraft avionic systems and military defense on-board satellite computers. Connectors are supplied with NASA/ESA/JAXA outgassing and screening in accordance with NASA EEE-INST-0002, and are fabricated with materials and production processes designed to eliminate the broad range of electrical, mechanical, and environmental failure modes endemic in stamped-and-formed connector packaging.



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



HIGHEST
RELIABILITY
MINIATURE
CRIMP-CONTACT
RECTANGULAR

SERIES™
791

Precision-machined
micro-miniature rectangular
connector for demanding
aerospace applications



View from the Cupola of the International
Space Station
Photo: NASA

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

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

- 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

Next-generation micro-miniature rectangular for demanding space applications



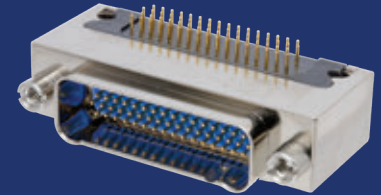
FEATURES OF SERIES 791 COMPARED TO MICRO AND D-SUBMINIATURE CONNECTORS



Higher-density crimp-contact insert arrangements



High-density power and mixed power-and-signal arrangements



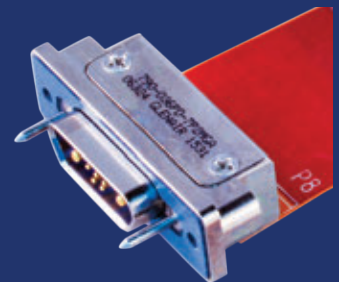
Fully-shrouded straight and right-angle PC tail configurations



Panel-mount design with O-ring sealing



Scoop-proof mating interface



Float-mount designs for rack-and-panel applications



Rugged-construction dual polarization lobes



Special keying option prevents mis-mating



Integrated banding porch for shield termination



Rear-end backshell accommodation



COTS-configuration with rugged MT fiber optic ferrule



Panel-mount version with available EMI ground spring

10GB ETHERNET,
USB 3.0, HDMI
HIGH-SPEED
DATALINK
CONNECTOR

SERIES™
792

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

The robotics workstation
inside the ISS cupola
Photo: NASA

SpeedLine
High-Speed Protocol Cables™

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
- Industry-leading SpeedLine high-speed data link cable assemblies
- PCB-mount and cable
- Scoop-proof interface
- 12 arrangements, 6 shell sizes, from 1 to 9 way
- Precision-machined dual-lobe polarized shells
- Integrated EMI shielding and grounding
- Blind mate environmental

HIGH-SPEED Series 792



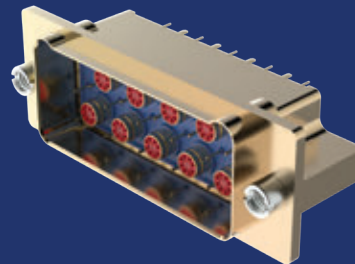
The next-generation micro miniature rectangular for high-speed aerospace applications

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	EIA-364-66
	100	75	
	1000	50	
	3000	44	
	6000	38	
10000	35		
Ingress protection	IP67 rating	IEC-60529	



Twinax, Quadrax and El Ochito®
Connectors are available in three configurations: twinax for a single high-speed wire pair, quadrax for two data pairs, and El Ochito® for four.



Up to 9 data ports

The Series 792 Size F with nine ports is the largest connector in the series and is the only two row version. Sizes A – E, with one to five ports, are single row.



PCB Connectors

Series 792 PCB connectors have straight or right angle PC tails. Contacts are non-removable and are epoxy sealed.



Panel Mount

Panel mount connectors have O-ring and threaded mounting holes for easy installation and are available with guide pins and float mounts.



Cable Connectors

High-speed shielded contacts snap into Series 792 cable connectors and are easily removed with a standard plastic tool.



El Ochito® Contacts and Jumpers

El Ochito® octaxial contacts and jumpers supplied for Ethernet, SuperSpeed USB, HDMI, DisplayPort, SATA and other multi-gigabit protocols.

El Ochito® octaxial contacts are intended for harsh environment military and aerospace data networks, and provide up to 50% total weight savings and 20 times faster data rates compared to legacy quadrax-based solutions.



El Ochito®
White
GbE
10GbE



El Ochito®
Blue
USB 3.0



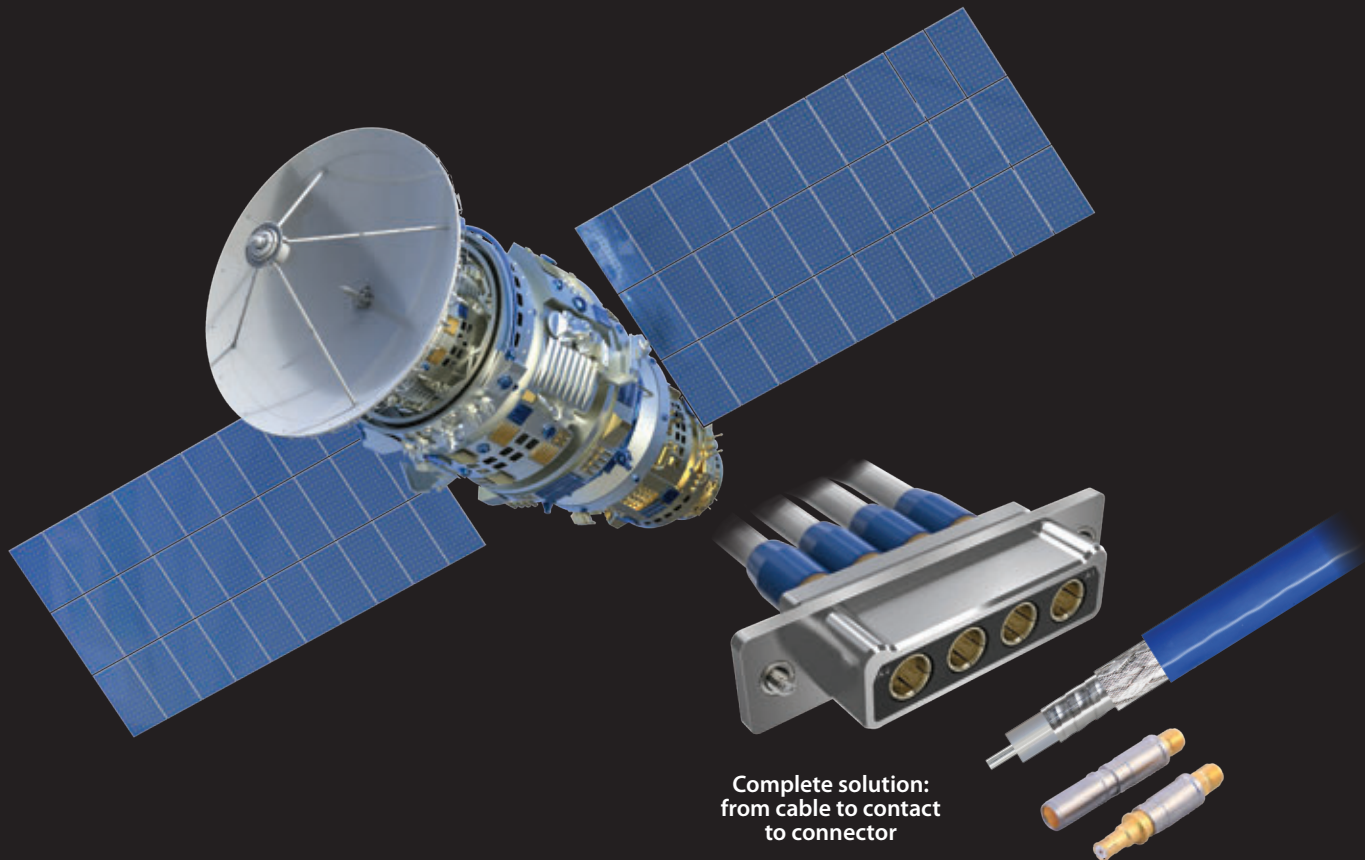
El Ochito®
Red
HDMI, SATA,
DisplayPort

- Snap-in, rear release octaxial contact for use with aerospace-grade high-speed cable
- Environmentally protected
- Support for all major high-speed datalink protocols
- Significant size and weight savings compared to quadrax

FLIGHT-GRADE
MULTI-PORT
HIGH-FREQUENCY
RECTANGULAR
COAX CONNECTOR

SERIES
795
RF

Precision-machined, scoop-proof aerospace-grade Coax connector for RF, Microwave, and mmWave applications



Complete solution:
from cable to contact
to connector

Series 795 RF connectors have up to nine cavities for conventional size #8 RF contacts as well as Glenair innovative G-LinkRF BMB-to-SMA contacts. The scoop-proof dual-lobed shell protects the mating interface from mechanical abuse and hostile environments. Series 795 connectors are optimized for use with Glenair Series 852 high-frequency contacts. Contacts snap into connector body and are removable. These contacts accept high performance low-loss flexible cable.

- Two to nine ports for size #8 BMB-type coax contacts
- Single and double row insert arrangements
- Scoop-proof mating interface
- Precision-machined aluminum shell with lobed polarization
- Environmentally sealed
- EMI grounding fingers for optimal shielding performance
- Fully shrouded PCB terminal-to-board back end

HIGH-PERFORMANCE

Series 795 RF



Multi-port micro miniature rectangular with drop-in support for high-frequency RF contacts and cable

The Series 795 RF accepts a range of drop-in 50 and 75 Ohm contacts that enable RF transmission system designers to reduce the size, weight, and space requirements compared to conventional single-line coax connectors and adapters. Innovative G-LinkRF contacts save assembly time and labor.



For use with BluMarkRF cable
962-025-086

#8

Series 795
Series 806 RF

G-Link^{RF}



50 Ohm
26.5 GHz
852-256
852-157

852-071 Pin




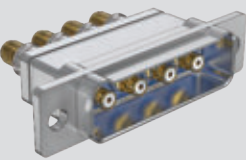

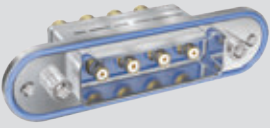

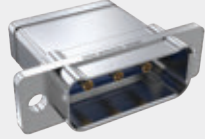



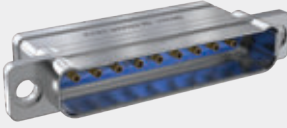
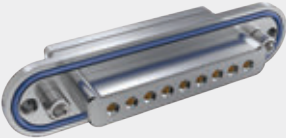
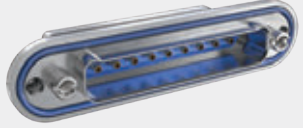
852-152 Socket



Size 8 for use with
-086 cable
18 GHz BMB interface
50 Ohm
Solder termination

Snap-in, rear release
pin and socket coax
contacts, spring-loaded.

Series 795 RF Connector Selection Guide

Cable Plugs, Socket Contacts	Cable Receptacles, Pin Contacts	Panel Mount Plugs, Socket Contacts	Panel Mount Receptacles, Pin Contacts
 795-001S (#8 BMB Contacts)	 795-002P (#8 BMB Contacts)	 795-003S (#8 BMB Contacts)	 795-004P (#8 BMB Contacts)
 795-005S (#12 SMPM Contacts)	 795-006P (#12 SMPM Contacts)	 795-007S (#12 SMPM Contacts)	 795-008P (#12 SMPM Contacts)
 795-009S (#16 SMPS Contacts)	 795-010P (#16 SMPS Contacts)	 795-011S (#16 SMPS Contacts)	 795-012P (#16 SMPS Contacts)



BLUMARK
COAX CABLES **RF**

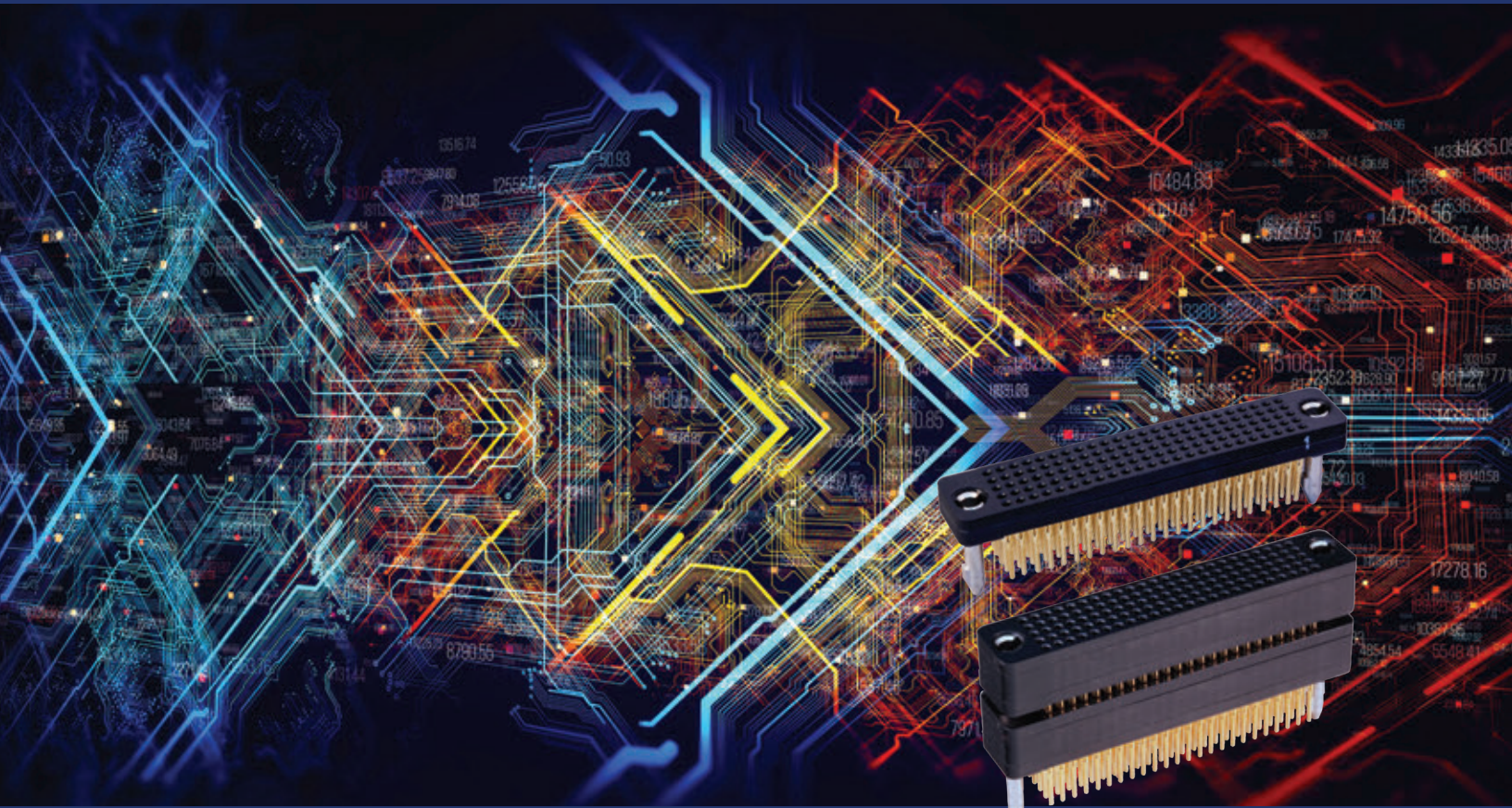
Series 962 BluMark RF 50 Ohm Coax Cables are available in seven size categories: 047, 086, 160, 200, 235, 300 and 450. These low attenuation cables are suitable for aerospace applications and test equipment. Jacket options include FEP and radiation-resistant space-grade ETFE. Triple-shielded high performance cables have expanded PTFE dielectric core for low loss up to 40 GHz.

- Low attenuation
- FEP and ETFE jackets
- Low Phase Change cables
- Seven size categories
- Compatible with standard RF/ Microwave connectors

COMPLETE
ECOSYSTEM
TOP, MIDDLE,
AND BOTTOM-OF-
STACK



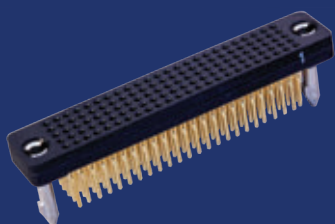
High-density, solder-free, compliant pin board-to-board stackable connectors



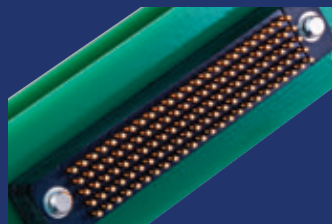
High-density, PCIe 3.0-ready board-to-board stackable connectors with solder-free compliant pin contacts.

- High-density .0625" pitch Chevron Contact System
- Performance up to 10.5Gbs
- Polarized insulator and hardware options
- High-temp PPS insulator meets NASA outgassing requirements
- Available wired / flex jumpers

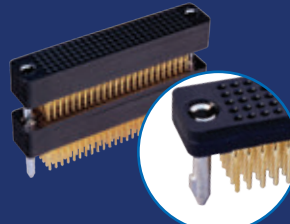
HD STACKER™ FOR MISSION-CRITICAL BOARD-TO-BOARD APPLICATIONS



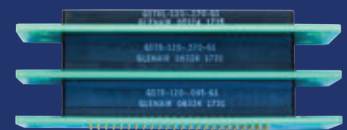
Solder-free press-fit (compliant pin) board mounting



.0625" pitch contact spacing: highest available density



Polarized shells and keyed guide pin hardware prevent mis-mating



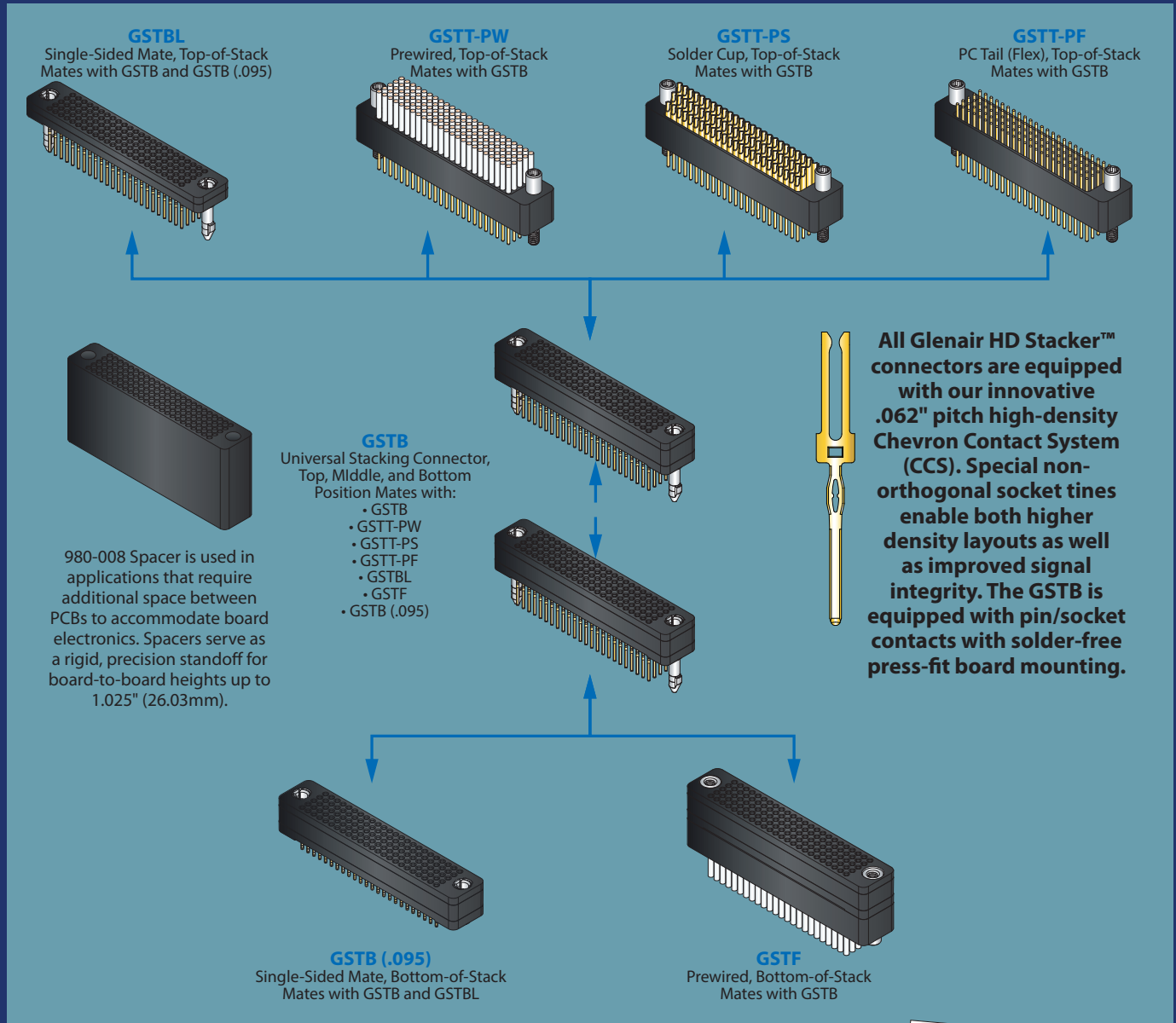
Controlled signal integrity for differential applications (PCIe Rev 3 capable)

.0625" PITCH "EYE OF THE NEEDLE" CONTACT 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 performance 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/test-reports-and-technical-information



MICRO-D
SUBMINIATURES
FLIGHT-GRADE
AND LAB-GRADE
SOLUTIONS

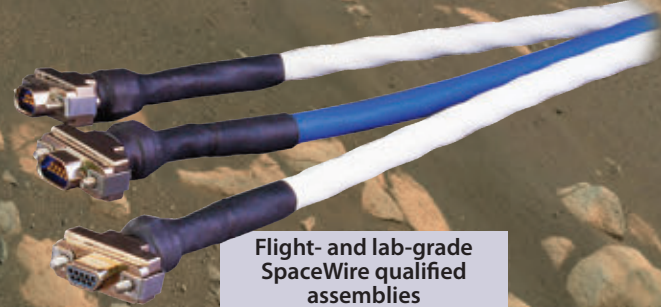


MIL-DTL-83513 and
Glenair Signature
Micro-D Connectors
and Splice-Free Cable
Assemblies

The Mars Perseverance Rover and the
Ingenuity helicopter
Photo: NASA/JPL-Caltech/MSSS



MIL★STAR
HIGH-PERFORMANCE HOOKUP WIRE AND CABLE



Flight- and lab-grade
SpaceWire qualified
assemblies

TwistPin equipped MIL-DTL-83513 Micro-D connectors and cables offer outstanding mating performance, durability, low contact resistance, and same-day availability

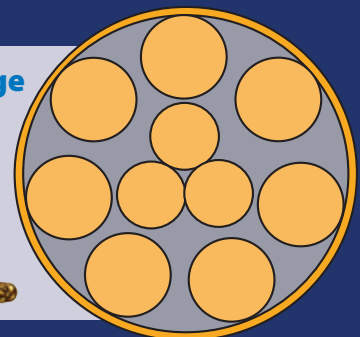
- High density TwistPin contacts on .050" centers
- Turnkey multibranch and complex cable assemblies
- 9 to 130 contact arrangements
- Single row, multi-row, low profile and high density insert arrangements
- QPL and commercial versions



Splice-free Micro-D and Nano
cable assemblies

The Micro TwistPin Advantage

Seven strands of TwistPin BeCu wire make direct contact with the machined socket, assuring low resistance, plenty of contact wipe, and superior shock and vibration performance.



MIL-DTL-83513 AND COMMERCIAL Micro-D Connectors



Mission-critical mating performance
industry-leading selection and availability

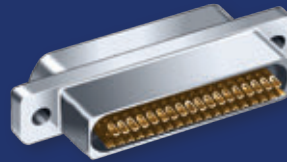
MATERIAL CLASSES AND QUALIFICATIONS



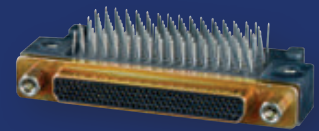
Environmental



Hermetic



EMI / RFI Filter

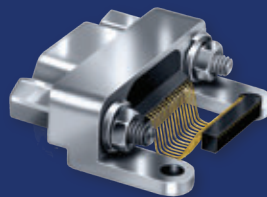


Space-Grade

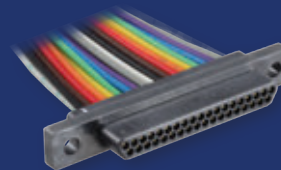
TERMINATION STYLES



Flex



PCB



Pigtail

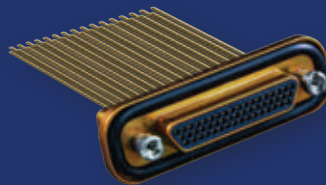


Solder

WIRED / CABLED CONFIGURATIONS



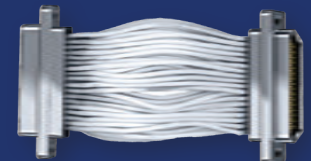
Shielded



Uninsulated



Insulated



Back-to-Back

PCB DESIGNS



Vertical



Horizontal

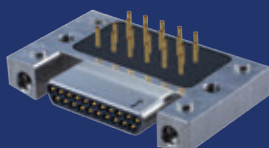


Surface-Mount



Shrouded

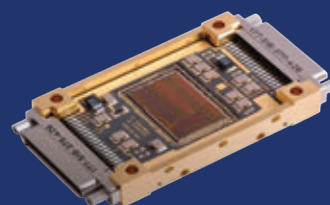
SPECIAL-PURPOSE DESIGNS



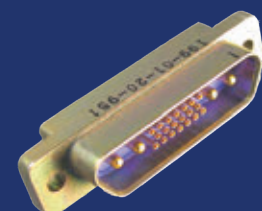
High-Temperature



Sav-Con®



With NASA outgas screening

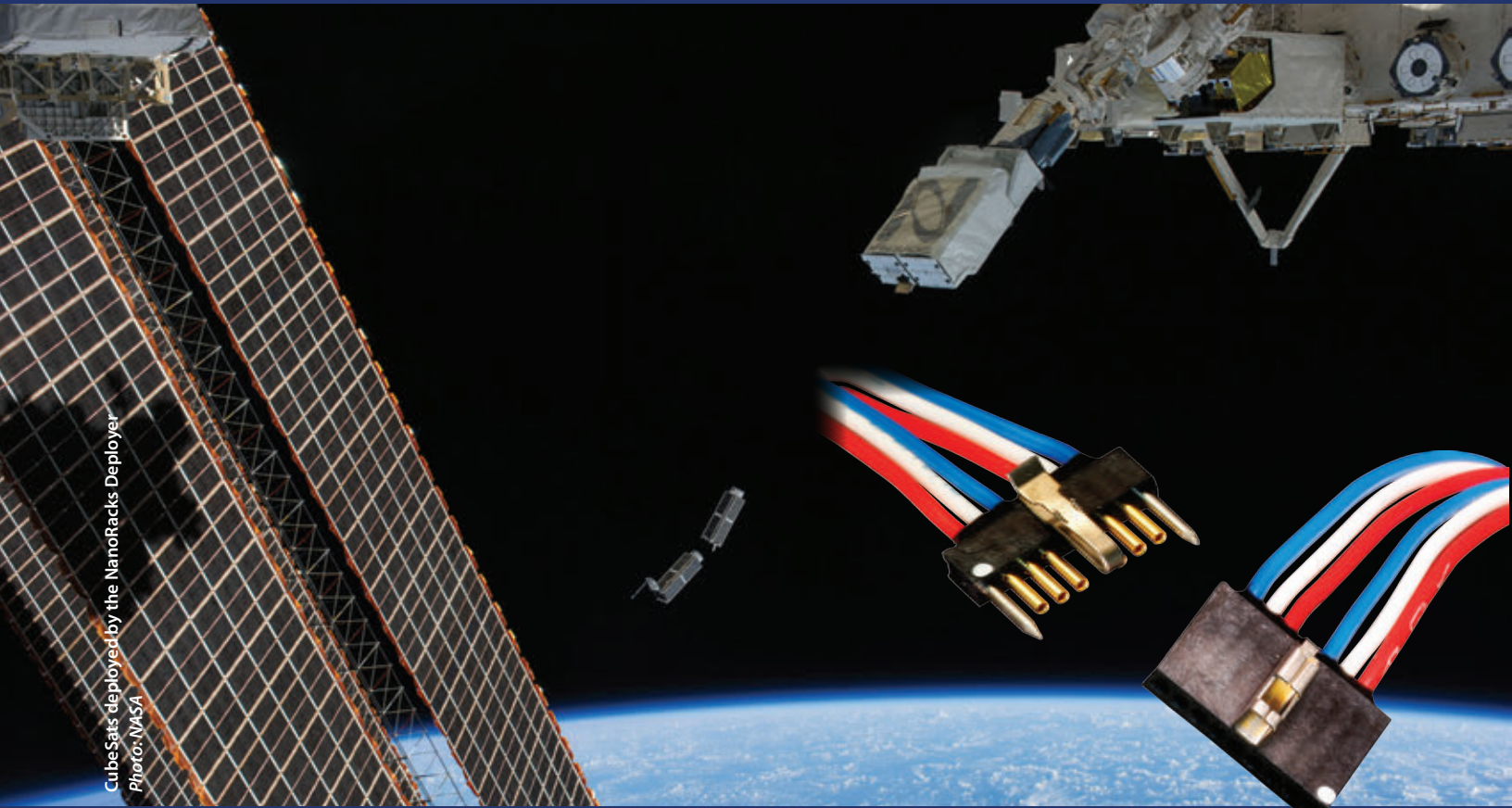


Combo

HIGH-DENSITY
STRIP
CONNECTORS
FOR 3 AMP SIGNAL
APPLICATIONS



High-Reliability
Wire-to-Board
and Wire-to-Wire
MicroStrips

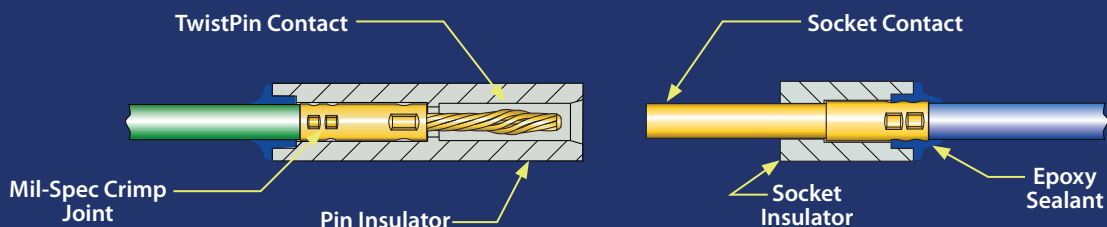


CubeSats deployed by the NanoRacks Deployer
Photo: NASA

TwistPin performance and durability in an economical, space-saving single-row package IAW MIL-DTL-83513

- High-reliability TwistPin contact system
- #24-30 AWG wire size
- .050" pitch contact spacing
- Solder cup, pre-wired or PCB header terminations
- 3 Amps, -55 to +150C, 600 Vac

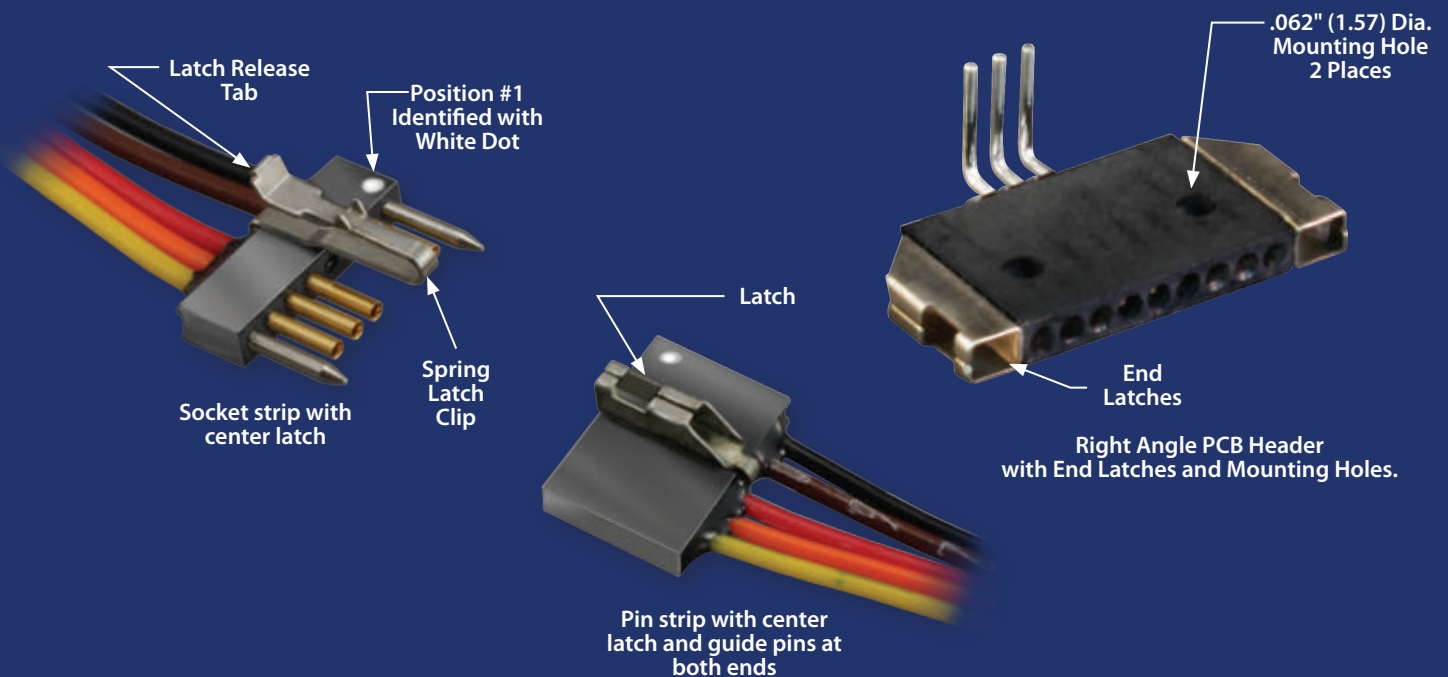
LATCHING MICROSTRIP CROSS-SECTIONAL VIEW





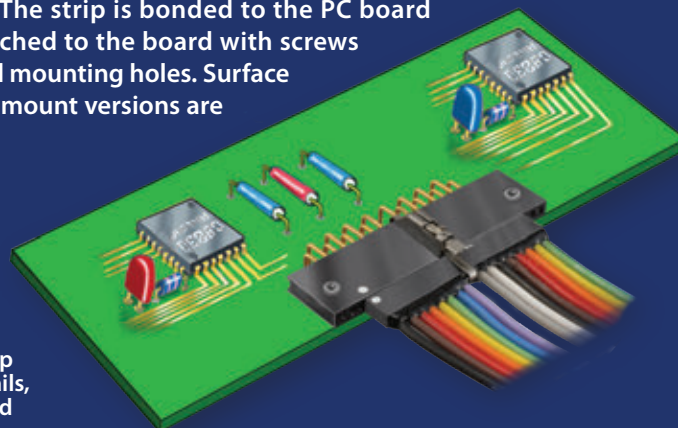
ABOUT SPRING LATCHES, GUIDE PINS AND MOUNTING HOLES

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).



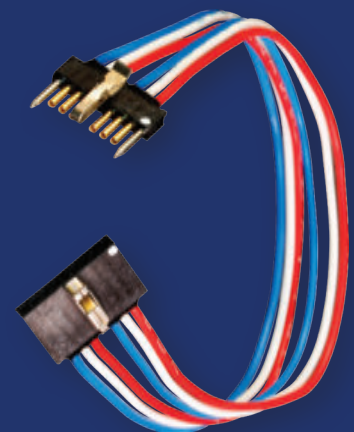
ABOUT BOARD MOUNT STRIPS

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

NANO CONNECTORS
CIRCULAR AND
RECTANGULAR
CONFIGURATIONS



MIL-DTL-32139 QPL and Glenair Signature
Nano miniature connector designs



MIL★STAR
HIGH-PERFORMANCE HOOKUP WIRE AND CABLE

Turnkey solutions from
shielded cable assemblies
to discrete wire-to-board
interconnects

The M32139 Nano is the smallest and lightest mil-spec connector in the business. 1 Amp contacts are set on .025" centers and terminated to 30 AWG wire or PCB tails. Glenair supplies both standard QPL designs as well as a broader range of signature offerings.

- 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

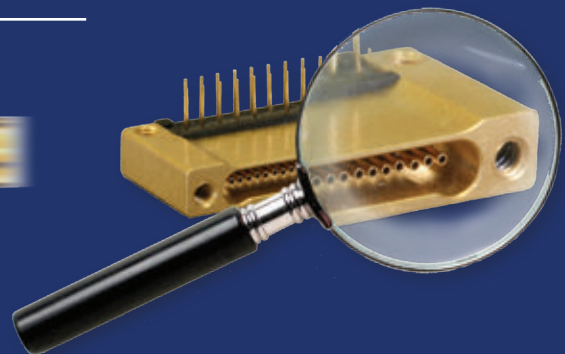
THE NANO TWISTPIN ADVANTAGE



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

Nano miniature Connectors



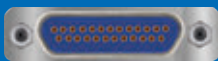
Nano high density · single- and dual-row · cable and PCB

Series 89 Nano miniature Connector Performance	
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

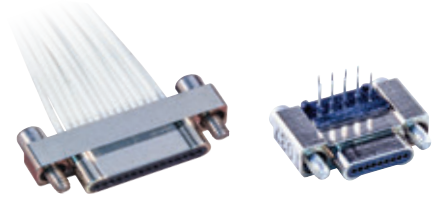


Also available: aerospace-grade Nano circulars

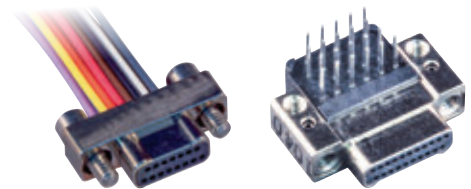
Nano Circular Connectors and Accessories



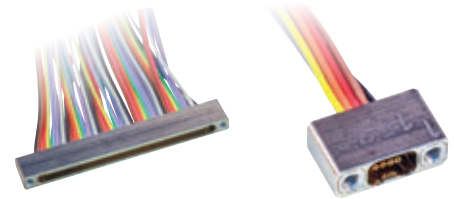
Nano Rectangular Single-Row Connectors and Accessories



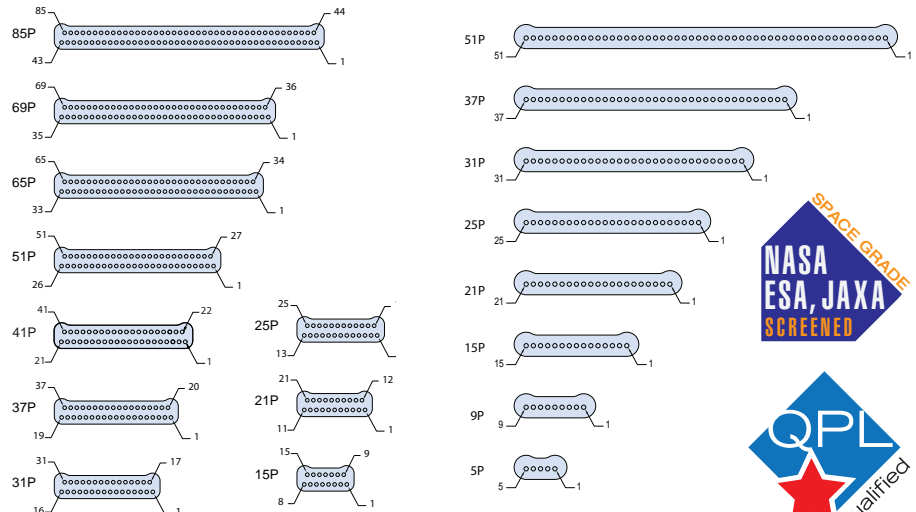
Nano Rectangular Dual-Row Connectors and Accessories



MIL-DTL-32139 Qualified Connectors and Accessories



NANO MINIATURE CONTACT ARRANGEMENTS



COMPOSITE AND
THIN-WALL
ALUMINUM
REDUCED WEIGHT
BACKSHELLS



EMI Shield Termination
Backshells for Satellite
Wire Harnesses

The International Space Station
Photo: NASA



Space-Grade Shrink Boots
GTS 4123: heat-shrinkable
fluoropolymer alloy shrink boots
for operating temperature range
-50°C to 175°C

Circular and rectangular backshells and connector accessories: corrosion resistance, weight reduction, environmental durability and design innovation



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.

- 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

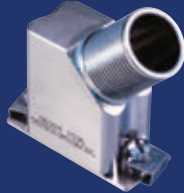


Isolated conductive ground path

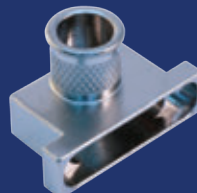
SPACE-GRADE MICRO-D AND D-SUBMINIATURE BACKSHELLS AND ACCESSORY HARDWARE



Single, dual, and triple entry



Angled entry



Side entry

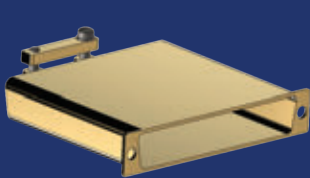


Elliptical entry

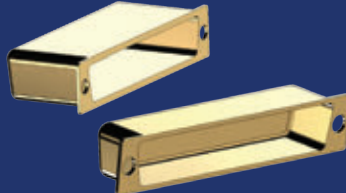


Composite split shell

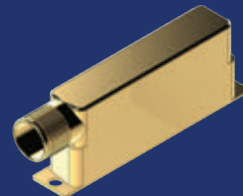
ESCC TYPE FOR MIL-DTL-24308 D-SUB ESA APPLICATIONS IAW ESCC 3401/072



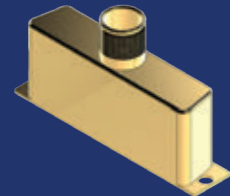
Strain Relief IAW ESCC 3401/072, Type Variants 05, 06, 07, 08, 09, and 72



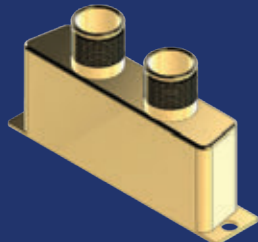
Shorting Cans IAW ESCC 3401/072, Type Variants 10, 11, 12, 13, 14, 73 / 61, 62, 63, 64, 65, 80



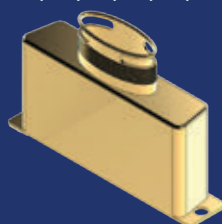
90° EMI/RFI Banding Backshell IAW ESCC 3401/072, Type Variants 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, and 76



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



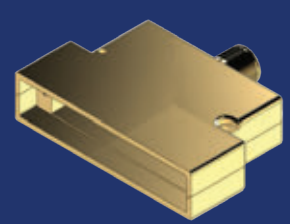
Dual Entry IAW ESCC 3401/072, 40 Type Variant



Elliptical Entry IAW ESCC 3401/072, Type Variants 46, 47, 48, 49, 50, and 78



45° Elliptical IAW ESCC 3401/072, Type Variants 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, and 79

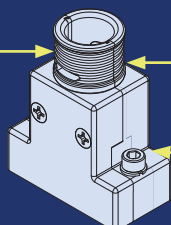


Straight IAW ESCC 3401/072, Type Variants 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 74, and 75

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

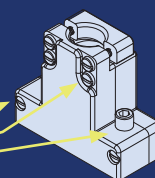
Removable round cable entry banding version

Removable entry with anti-rotation feature remains captive during assembly



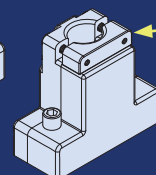
Tongue-and-groove split-shell design for superior EMC performance and ease-of-assembly

All captive hardware—no FOD—even when backshell is split



Cable clamp version

Ultra low-profile cable clamp design



WEIGHT-
SAVING
LIGHTWEIGHT
CABLE AND
CONDUIT
SHIELDING

ARMORLITE™

Microfilament nickel-clad flexible stainless steel EMI/RFI braided shielding, ESD bonding, and return path grounding

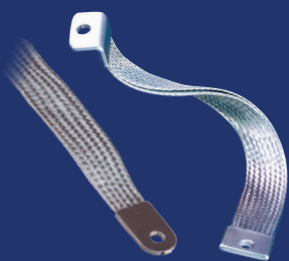
A Solar Array Wing of the ISS
Photo: NASA



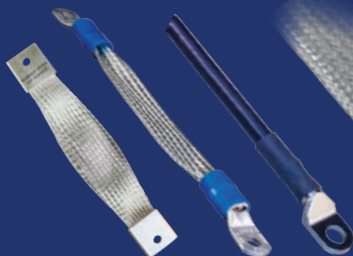
For most grounding and bonding applications, Glenair recommends short, wide ArmorLite strap configurations for best electrical performance.

ArmorLite™ is an expandable, flexible, high-strength, conductive stainless-steel microfilament braid material designed for EMI/RFI shielding in high-performance interconnect cables. ArmorLite™ material is also available for special applications in Glenair's line of ESD bond straps, ground straps, and flexible bus bars.

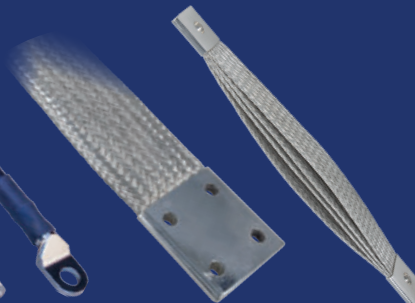
- Ultra-lightweight EMI/RFI overbraiding for EMC and solar radiation applications
- Microfilament stainless steel: 70% lighter than standard NiCu A-A-59569/QQB575
- Lightweight, flexible grounding and bonding straps
- ArmorLite™ CF for enhanced temperature and corrosion tolerance
- Superior flexibility and "windowing" resistance: 90 to 95% optical coverage
- 70,000 psi (min.) tensile strength
- Flight-grade solution with proven TRL 9 performance



Ultra flexible, lightweight ArmorLite microfilament ground straps and bonds



Flat and round cross-section straps, plus wire rope jumpers



High current AC and DC flexible busbars and shunts

LIGHTWEIGHT, FLEXIBLE

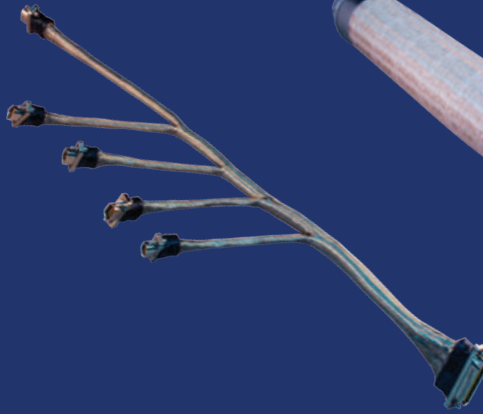
ArmorLite™ Microfilament Braid for EMI/RFI Shielding and Bonding Applications



ARMORLITE™ CABLE SHIELDING SOLUTIONS



Flight-grade factory overbraided circular connector assembly



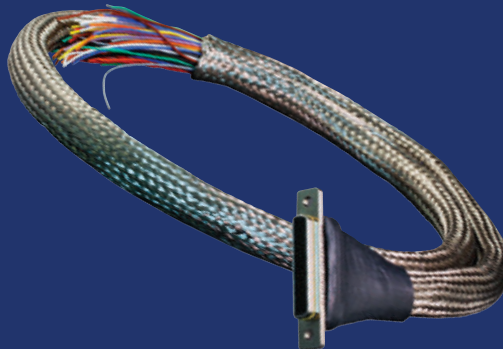
Multibranch overbraided rectangular connector assembly for a satellite applications



Overbraided conduit assemblies for launch vehicle applications



Factory overbraided point-to-point conduit assembly



Turnkey shielded pigtail assembly



Integrated shield sock

ALSO AVAILABLE FOR ADDITIONAL WEIGHT SAVINGS: AMBERSTRAND METAL-CLAD COMPOSITE BRAIDED SHIELDING



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%



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 1×10^{-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

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:



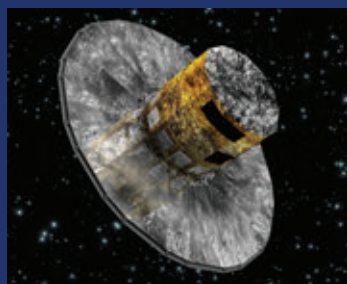
Skynet

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.

The **James Webb Space Telescope (JWST)** is a large, infrared-optimized space telescope. Launched in 2021, 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 and Perseverance Rovers, AIRS satellite, and others. Several notable space applications that use Glenair Micro-D connectors include:

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.



Gaia satellite

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

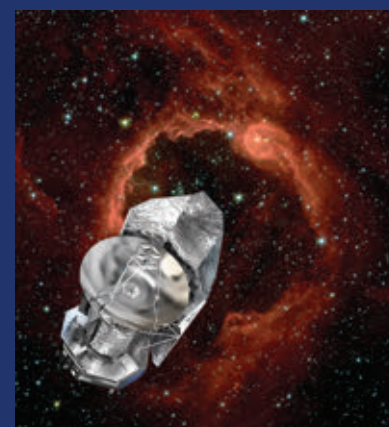
Cassini-Huygens was a joint NASA/ESA/ASI robotic spacecraft mission studying Saturn and its moons. Cassini executed several risky passes through Saturn's inner rings before completing its mission by burning up in atmospheric entry—but the data it returned will be analyzed for years to come.

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.

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



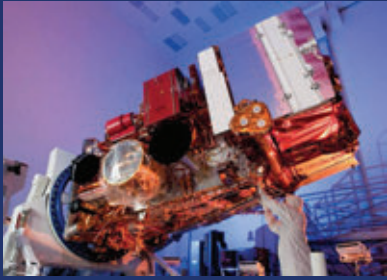
JWST



Herschel Space Observatory



Cassini-Huygens



CRIS NPOESS Satellite

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:

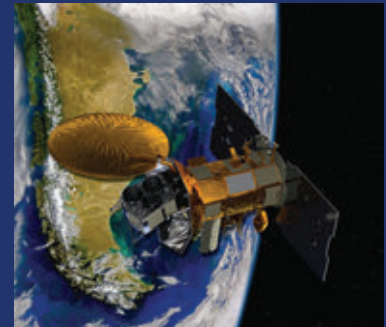
NASA's **Mars Exploration, Curiosity, and Perseverance Rovers**, ongoing robotic missions to explore the Martian surface and geology. The Perseverance rover marked its 2nd year of exploration in 2024 having collected 18 Martian samples, traveled over 9 miles, and transmitted over 200,000 images.



Mars Perseverance Rover looks at the Ingenuity helicopter, August 2022

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 streambed 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 10 years after landing.

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



Aquarius Satellite

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.

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.



A NASA LEO (Low Earth Orbit) Satellite

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. Glenair lightweight EMI/RFI braided shielding 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.



The International Space Station (ISS)

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. Glenair rectangular accessories are used on this and dozens of space programs including the International Space Station, MetOps, Herschel Space Observatory, James Webb telescope, and others.

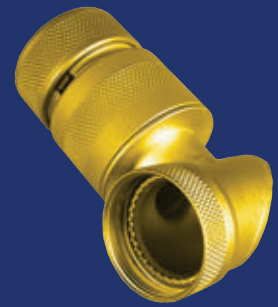
The Glenair **Series 28 HiPer-D** High-Performance MIL-24308 Intermateable and qualified MIL-DTL-24308 Class K space-grade hermetic connectors have become the go-to standard for mission-critical space applications and are now qualified for use by Ball Aerospace, LMCO Denver, Orbital Sciences, and others.

Complete Interconnect System Designs

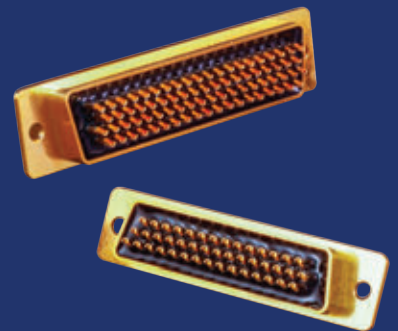
Glenair is the exclusive interconnect connector and cable supplier to the **Sierra Nevada Dream Chaser** reusable crewed suborbital and orbital space plane for Micro-D connectors, EMI filters, flex circuitry, lightweight microfilament braid, metal and composite backshells, and other technologies.

Hold-Down and Release Mechanism (HDRM) Flight Heritage

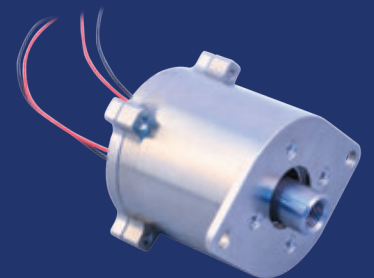
Glenair heavy-duty HDRMs were ESA-qualified for use on the **Euclid mission** to study dark matter and energy in deep space. Launched aboard a SpaceX Falcon 9 in 2023, the Euclid space telescope was deployed successfully by the Glenair HDRM device. The JAXA **Smart Lander for Investigating the Moon (SLIM)** is a small-scale exploration lander, again successfully deployed with Glenair non-pyrotechnic HDRM technology.



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



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



Glenair Heavy-Duty non-pyrotechnic HDRM



JAXA Smart Lander for Investigating Moon (SLIM)

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

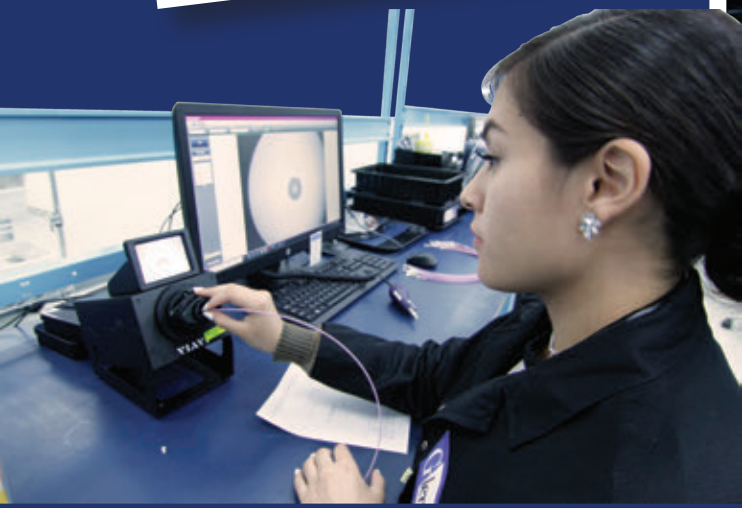


Glenair operates the largest high-reliability interconnect manufacturing operation in the United States, allowing us to fully support our broad range of land, sea, air, and space customers.





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.



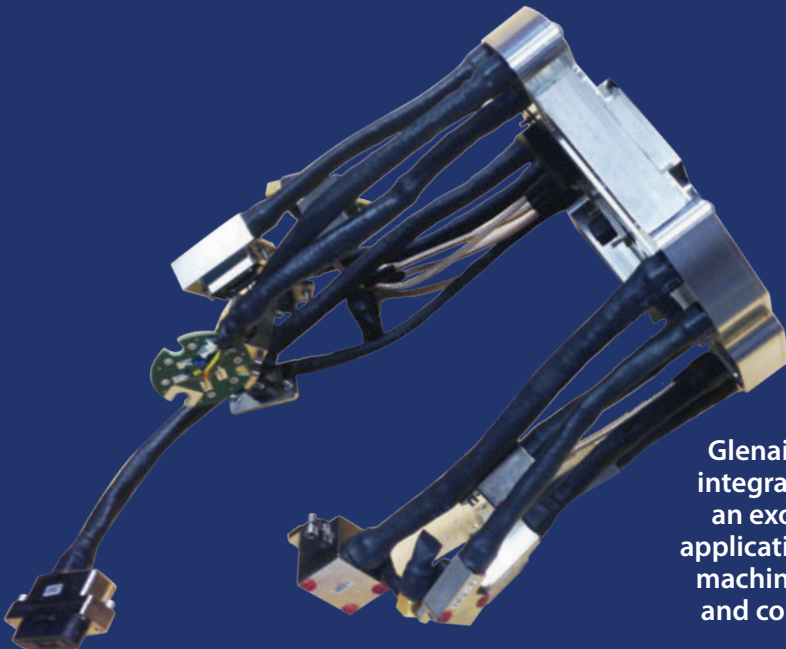
HARNESS ASSEMBLIES

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

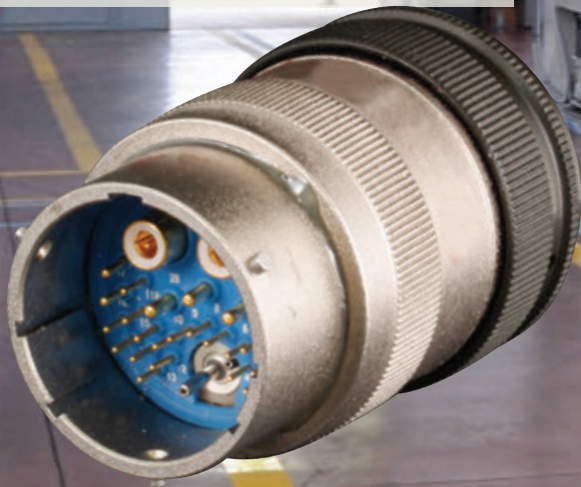




GLENAIR UK:
Mission-critical connectors
and assemblies for UK and
European markets with
a special focus on micro
and nanominiature flexi
assemblies

GLENAIR ITALIA:

Manufacturing harsh-environment military, nuclear, and aerospace interconnect technologies 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

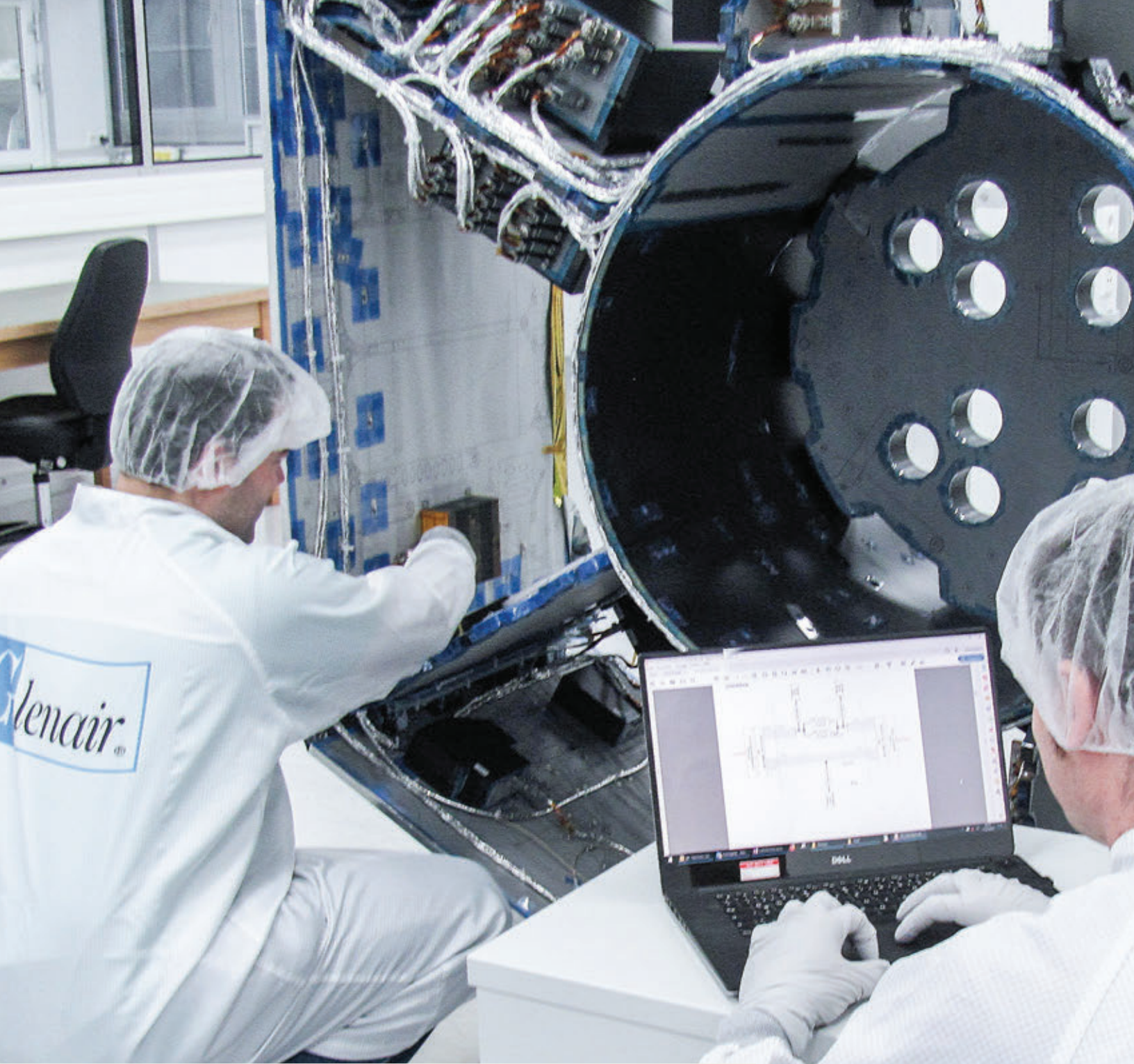
Space-compliant gold and nickel plating performed in-house. Hermetic seal connector fabrication with performance levels to 1×10^{-7} helium leak rates.



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.

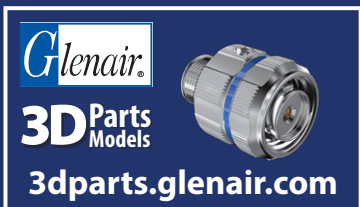


GLENAIR SALEM:

Our space systems business unit in Salem, Germany includes ample production space for precision machining and assembly, 300 m² ISO 8 and ISO 6 clean rooms, an ISO 5 flow chamber (certified to ESD Standard 61340-5-1), with accommodation for large mock-up and integration projects.



MISSION-CRITICAL INTERCONNECT SOLUTIONS



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