Space-Grade Interconnect Solutions

Proven, Rugged, Flight-Heritage Technologies
Space-Grade Solutions
NASA · ESA · JAXA · Commercial

**SPACE-GRDAE WIRE HARNESS ASSEMBLIES**

- EMI/RFI shielded multibranch Micro-D connector assembly with Glenair Series 23 SuperNine® panel mount I/O connector
- Multibranch Micro-D / Mighty Mouse cable assembly with ArmorLite™ lightweight EMI shield overbraiding

**HOLD-DOWN RELEASE MECHANISMS (HDRMs)**

- **Light Duty**
  - Up to 75 lb release payload
- **Medium Duty**
  - Up to 4,000 lb release payload
- **Heavy Duty**
  - Up to 20,000 lb release payload

**HD STACKER™**

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

**LATCHING MICROSTIPS**

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

© 2020 Glenair, Inc • 1211 Air Way, Glendale, CA 91201 • 818-247-6000 • www.Glenair.com • U.S. CAGE code 06324 • Space-Grade Interconnect Solutions
CERTIFIED ECSS-E-ST-50-12C SPACEWIRE CABLES

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

EMI/RFI FILTER CONNECTORS

- MIL-DTL-38999 type, Series 80 Mighty Mouse, and other circulars
- HiPer-D and Micro-Crimp filtered rectangulars

SERIES 28 HIPER-D M24308 INTERMATEABLE

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

SAV-CON® CONNECTOR SAVERS

- Available for every military and commercial circular and rectangular connector series

ASSISTED-RELEASE, AND LANYARD QUICK-DISCONNECTS

- Blind-mate D38999 type feedthrough with kick-off assist
- Lanyard-release quick-disconnects

RADIATION-TOLERANT RUGGED PHOTONIC TRANSCEIVERS AND MT FIBER OPTICS

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

SPACE-GRADE 83513 MICRO-D AND 32139 NANO

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

LIGHTWEIGHT MIGHTY MOUSE AND SERIES 79 MICRO-CRIMP™

- Small, lightweight, high-density ideally suited for space programs
- Approved for manned space flight, ideal for guidepin and rack-and-panel applications

ULTRA-LIGHTWEIGHT CONDUIT AND BRAID

- Factory-terminated and user-installable conduit systems
- Weight-saving microfilament EMI braided shielding solutions

SPACE-QUALIFIED HERMETIC RECEPTACLES

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

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

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

PROVEN PERFORMANCE IN SPACE

- The “Golden Umbilical” life-support cable
- JPL Mars probes (orbiters, landers, and the Curiosity rover)
- AIRS satellite
- Gravity Probe mission
- Space Shuttle
- Titan II launch vehicles
- ESA-certified engineering and production staff (Glenair Space Systems, Salem)
COMPLEX MULTIBRANCH AND OVERMOLDED CABLE AND FLEX CIRCUIT ASSEMBLIES

- Multibranch wire harness for a space lab application
- Complex Mighty Mouse cable harness for a Mars rover application
- ESA and NASA screened Micro-D/Nano cable assembly
- Space-grade Micro-D flex assembly with NASA EEE-INST-002 screening
- Hybrid flex/rigid flex multibranch Micro-D flex assembly with discrete RF circuits
- Micro-D subminiature multibranch flex assembly

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

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

- Hand assembly work performed by ESA-certified assembly staff
- Form, fit, and function of prototype harnesses using GSS-produced fixtures
- Cleanroom integration of flat set harnesses into satellite test racks
- Complex integration and assembly of flight-grade wire harnesses
- Harness integration into space payload electromechanical devices
- EMI shielded and open-wire bundle assemblies ready for flight
NON-PYROTECHNIC

Hold Down and Release Mechanisms

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

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

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

**NORTH AMERICAN AND EUROPEAN HDRM SOLUTIONS**

Glenair is pleased to offer both our North American and European customers access to our innovative hold-down release mechanism technologies. These non-pyrotechnic space mechanisms are ideally suited for satellite, payload fairing, antenna array, solar array, and boom and mast deployment. Glenair medium-duty HDRMs and pin pullers can ship to most customers without an export license, although light- and heavy-duty HDRMs do typically require one. Certain designs may be manufactured by Glenair Space Systems in Salem, Germany. Consult factory for complete information.
Mission-critical board-to-board connector applications demand fail-safe signal integrity as well as rugged and reliable harsh-environment performance. The HD Stacker™ brings Glenair innovation to stacking board-to-board connectors with several significant design improvements: Ultra high-density .0625" center-to-center Chevron Contact System provides 55% more contacts per connector size, or a 31% size reduction for the same number of contacts as compared to current industry solutions. Polarized connector bodies and available polarized guide pins prevent accidental mismating. The solder-free press-fit compliant pin contacts are removable, repairable, and available in custom lengths. HD Stacker connectors may also be ordered with pre-wired cable or flex jumper terminations. High-speed signal integrity test reports are available upon request. Choose HD Stacker for the ultimate in high-density, rugged board-to-board stackable connector performance.

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

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

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

.0625" pitch contact spacing: highest available density

Polarized shells and keyed guide pin hardware prevent mis-mating

Controlled signal integrity for differential applications (PCIe Rev 3 capable)
.0625" PITCH COMPLIANT PIN

High-Density Stacker™

Rugged board-to-board stackable connectors

HD STACKER™ POSITION AND MATING COMPATIBILITY GUIDE

GSTBL
Single-Sided Mate, Top-of-Stack
Mates with GSTB and GSTB (095)

GSTT-PW
Prewired, Top-of-Stack
Mates with GSTB

GSTT-PS
Solder Cup, Top-of-Stack
Mates with GSTB

GSTT-PF
PC Tail (Flex), Top-of-Stack
Mates with GSTB

GSTB
Universal Stacking Connector,
Top, Middle, and Bottom Position
Mates with:
• GSTB
• GSTT-PW
• GSTT-PS
• GSTT-PF
• GSTBL
• GSTF
• GSTB (095)

980-008
Board-to-Board Spacer

GSTB (095)
Single-Sided Mate, Bottom-of-Stack
Mates with GSTB and GSTBL

GSTF
Prewired, Bottom-of-Stack
Mates with GSTB

All Glenair HD Stacker™ connectors are equipped with our innovative .062" pitch high-density Chevron Contact System (CCS). Special non-orthogonal socket tines enable both higher density layouts as well as improved signal integrity. The GSTB is equipped with pin/socket contacts with solder-free press-fit board mounting.

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/technical_information_test_reports
SERIES 171
Latching MicroStrips

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

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

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

LATCHING MICROSTRIP CROSS-SECTIONAL VIEW

[Diagram showing Latching MicroStrips components including TwistPin Contact, Socket Contact, Mil-Spec Crimp Joint, Pin Insulator, Epoxy Sealant, and Socket Insulator]
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.

SINGLE ROW BACK-TO-BACK MICROSTRIPS

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

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

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

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

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

APPROVED FOR USE BY:
• ESA
• NASA
• JAXA
• RKA

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

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

Physical layer SpaceWire router aboard the James Webb Space Telescope (NASA)
**POINT-TO-POINT AND SINGLE-ENDED**

**SpaceWire cable assemblies**

**Technical specifications / how-to-order**

### How To Order SpaceWire Cable Assembly

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

### NOTES:

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

### MATERIALS/FINISH:

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

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

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

SuperNine with MT

- Ruggedized “better than QPL” SuperNine® MIL-DTL-38999 Series III type interconnect packaging
- Singlemode and multimode fiber
- Low insertion loss
- Environmental sealing: IP67 mated, IP68 available at interface
- RoHS-compliant finishes available
- MT ferrules sold separately
- MT assembly tool, P/N 182-062 also available and sold separately
ULTRA HIGH-DENSITY
SuperNine® Connector with MT Ferrule
Signature fiber optic connection system

SUPERNINE® MT CONNECTOR SIZES AND INSERT ARRANGEMENTS

<table>
<thead>
<tr>
<th>CONNECTOR MASTER KEY</th>
<th>GUIDE PIN</th>
<th>SHELL SIZE</th>
<th>INSERT ARRANGEMENTS</th>
<th>FIBERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>-06 plug, with retaining plate for EMI shield termination and strain relief of ribbon or round fiber cable</td>
<td>-S7 receptacle with standard retaining plate</td>
<td>-S7 receptacle with conductive EMI gasket</td>
<td>-6 plug, with retaining plate for EMI shield termination and strain relief of ribbon or round fiber cable</td>
<td>-S7 receptacle with standard retaining plate</td>
</tr>
</tbody>
</table>

SERIES 79 WITH MT

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

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

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

Dimensions in Inches (millimeters) are subject to change without notice.
Glenair PCB mount transceivers are ruggedized harsh-environment equivalents to SFP transceivers but with mechanical design suited to the harsh temperature and vibration environments found in free space, satellite, RF and other military and aerospace applications. Selected components have been subjected to Gamma, proton, and heavy ion radiation testing (consult factory).

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

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

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

Glenair, Inc • 1211 Air Way, Glendale, CA 91201 • 818-247-6000 • www.Glenair.com • U.S. CAGE code 06324
PARALLEL OPTICS
PCB-Mount Transceivers and Compatibl
High-Density MT Fiber Optic Connectors

MT HIGH-DENSITY FIBER OPTIC DATALINKS AND RUGGEDIZED OPTOELECTRONICS

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

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

- **4 x 14 to 4 x 25 Gbps per fiber**
- **Compatible with MTP optical connector**
- **Supports 12-fiber ribbon cable**
- **SiGe and GaAs optoelectronic ICs**
- **Hermetic opto-electronic hybrid**

### MIL-DTL-38999 Series III Fiber Optic Datalinks with MT Terminations

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

Convection cooling (left) and conduction cooling (right) designs as well as custom heat dissipation designs are available.

- **Available evaluation boards: 050-346 parallel optic transceiver with MT-to-39029 fiber optic terminations**
- **Convection cooling**
- **Conduction-cooling for space applications**
- **46 Grms, 650G shock**
- **-40°C to +85°C case temp**
- **Heavy ion radiation-tested**

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

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

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

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

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

RF-over-Fiber PCB-Mount Component Selection Guide

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>050-400</td>
<td>PCB Mount RF-over-Fiber Transceiver, 20MHz to 3.5 GHz</td>
</tr>
<tr>
<td>050-404</td>
<td>PCB Mount RF-over-Fiber Transmitter, 2 MHz – 3.5 GHz</td>
</tr>
<tr>
<td>050-405</td>
<td>PCB Mount RF-over-Fiber Receiver, 2 MHz – 3.5 GHz</td>
</tr>
<tr>
<td>050-406</td>
<td>PCB Mount RF-over-Fiber Transmitter, 2 MHz – 3.5 GHz, Low-Noise configuration</td>
</tr>
<tr>
<td>050-407</td>
<td>PCB Mount RF-over-Fiber Receiver, 2 MHz – 3.5 GHz, Low-Noise configuration</td>
</tr>
</tbody>
</table>
Spacewalking astronauts transfer the Robotic Refueling Mission (RRM) module from the Atlantis shuttle.

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

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

050-301 SIZE 8 CAVITY OPTO-ELECTRONIC CONTACTS, 100MBPS TO 5GBPS, MMF, 3.3V
- Front-release, front-insert, front-removable Size #8 OE converter designed for ARINC 600
- ARINC 664, 801, 803, 804, and 818 Standard Compliant
- Data rates from 100Mbps to 5.00Gbps
- Supports Fast and Gigabit Ethernet, AFDX, 1x2x Fibre Channel, DVI, DHMI, SFPDP, Serial Rapid I/O (sRlO)
- 100 ohms differential CML inputs with Tx Fault and Tx Disable
- Link distances up to 550 meters with multimode 50/125µm or 62.5/125 µm fiber
- Single 3.3V power supply
- ARINC 801 1.25mm ceramic fiber ferrule
- Solutions available in 38999 style connectors
- -40°C to +85°C Operating Case Temperature
- Evaluation fixtures available

050-307 SIZE 8 CAVITY OPTO-ELECTRONIC CONTACTS, 100MBPS TO 5GBPS, MMF, 3.3V
- Front-release, front-insert, front-removable Size #8 OE converter designed for ARINC 600
- ARINC 664, 801, 803, 804, and 818 Standard Compliant
- Data rates from 100Mbps to 5 Gbps
- Supports Fast and Gigabit Ethernet, AFDX, 1x2x Fibre Channel, DVI, DHMI, SFPDP, Serial Rapid I/O (sRlO)
- 100 ohms differential CML inputs with Tx Fault and Tx Disable
- Link distances up to 550 meters with multimode 50/125µm or 62.5/125 µm fiber
- Single 3.3V power supply
- ELIO 2.5mm ceramic fiber ferrule
- Solutions available in 38999 style connectors
- Mates with ELIO 2.5mm Termini
- -40°C to +85°C Operating Case Temperature
- Evaluation fixtures available
- Compatible with Souriau ELIO AQ6S Quadrax Adapter

050-367 SIZE 8 CAVITY OPTO-ELECTRONIC CONTACTS, 3G-SDI AND HD-SDI, MMF, 3.3V
- SMPTE EG 34:2004 Compliant to Pathological Conditions CASE 1, CASE 2 and CASE 3.
- SMPTE ST 297:2015 (3G-SDI & HD-SDI)
- SMPTE 424 Compliant (3G-SDI)
- SMPTE 292 Compliant (HD-SDI)
- SFP Compatible Electrical Input signal levels
- 850nm VCSEL support 3G-SDI & HD-SDI
- Industry standard CML input and outputs that make for simple integration on customer host PCB
- Front-release, front-insert, front-removable
- Fits size 8 quadraX cavity for ARINC 600
- Solutions available in 38999 style connectors
- -40°C to +85°C Operating Case Temperature
- Evaluation fixtures available

050-399 SIZE 8 CAVITY OPTO-ELECTRONIC CONTACTS, DC TO 1 MBPS, MMF, 3.3V
- Front-release, front-insert, front-removable Size #8 OE converter designed for ARINC 600
- ARINC 664, 801, 803, 804, and 818 Standard Compliant
- Data rates from DC to 1 Mbps
- Supports RS232, RS422, and RS485 data rates
- DC coupled transmitter and receiver
- Link distances up to 2Km
- Single 3.3V power supply
- ARINC 801 1.25mm ceramic fiber ferrule
- Solutions available in 38999 style connectors
- -40°C to +85°C Operating Case Temperature
- Evaluation fixtures available
Glenair manufactures a full range of filter connectors for use in EMC/EMP management of electronic systems and interconnect cabling. All connectors are designed in accordance with applicable connector specifications, and are designed to mate with plugs with the same insert configuration and opposite contact gender. Planar filter arrays and TVS diodes may be integrated into both standard catalog as well as build-to-order configurations. Glenair’s state-of-the-art diode burn-in process tests leaded and surface mount diodes with leakage current monitored throughout the entire test procedure ensuring field reliability.

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

### Table I: Capacitor Array Code / Capacitance Range

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

Micro-D Connectors

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

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

## Micro-D Connectors

Mission-critical mating performance

### Metal Shell Micro-D for Harnessing Applications

<table>
<thead>
<tr>
<th>GRPM Solder Cup</th>
<th>GRPM Insulated Wire</th>
<th>GRPM Uninsulated Wire</th>
<th>MWDM Solder Cup</th>
<th>MWDM Insulated Wire</th>
<th>MWDM Back-To-Backs</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRPM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulated Wire</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uninsulated Wire</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shielded Cable</td>
<td>MWDM</td>
<td>GMDR</td>
<td>GMDE Environmental</td>
<td>GSWM SpaceWire</td>
<td>GMLM MasterLatch</td>
</tr>
<tr>
<td>Assembly</td>
<td>Insulated Wire</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uninsulated Wire</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Micro-Ds for Printed Circuit Board

<table>
<thead>
<tr>
<th>GRPM-CBS</th>
<th>GRPM-CBR</th>
<th>MWDM-BS</th>
<th>MWDM-BR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MWDM-CBR</th>
<th>MWDM-CBS</th>
<th>90° Surface Mount</th>
<th>GMR7580</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GMR7590</th>
<th>GMR7580C</th>
<th>GMR7590C</th>
<th>Right Angle Filter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **WellMaster™ 260**
- **Sav-Con®**
- **Latching MicroStrip**
- **Low Profile**
SERIES 89
Nanominiature Connectors

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

THE NANO TWISTPIN ADVANTAGE

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

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

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

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SERIES 89
Nanominiature Connectors
The smallest and lightest mil-spec connector

Series 89 Nanominiature Connector Performance Summary

- **Contact Spacing:** 0.025" (0.64mm)
- **Wire Accommodation:** #30-#32 AWG
- **Current Rating:** 1 AMP Max
- **DWV:** 250 VAC RMS Sea Level
- **Insulation Resistance:** 5000 Megohms Minimum
- **Operating Temperature:** -55°C to +125°C
- **Contact Resistance:** 71 Millivolt Drop Maximum
- **Shock, Vibration:** 100g's, 20 g's
- **Durability:** 200 Mating Cycles
- **Corrosion Resistance:** 48 Hours Salt Spray
- **Mating Force:** 5 Ounce Max, 0.4 Ounce Min

How Small Are They?

- **D-Subminiature Connector**
  25 Contacts on 0.109 Inch Spacing

- **Micro-D Connector**
  25 Contacts on 0.050 Inch Spacing

- **Nano Connector**
  25 Contacts on 0.025 Inch Spacing

Also available: space-grade Nano circulars

SERIES 89 NANO MINIATURE PRODUCT SELECTION GUIDE

- **Pre-Wired Single Row Connectors**
  - Insulated Wire
  - Uninsulated Wire
  - Back-to-Back Cables

- **Pre-Wired PCB Connectors**
  - Thru-Hole Vertical
  - Thru-Hole 90°
  - SMT Vertical
  - SMT 90°

- **Pre-Wired Double Row Connectors**
  - Insulated Wire
  - Uninsulated Wire
  - Back-to-Back Cables

- **Pre-Wired PCB Connectors**
  - Thru-Hole Vertical
  - Thru-Hole 90°
  - SMT Vertical
  - SMT 90°

- **Pre-Wired Single Row Connectors**
  - Single Row, Insulated Wire
  - Double Row, Insulated Wire

NANOMINIATURE CONTACT ARRANGEMENTS

- **Single Row Mating Face of Pin (Plug) Connector**

- **Double Row Mating Face of Pin (Plug) Connector**

Also available: space-grade Nano circulars
ADVANCED-PERFORMANCE
HiPer-D Connectors
Space-grade M24308 intermateable

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

STANDARD AND HIGH DENSITY HiPer-D® - CUTAWAY

■ Advanced temperature, vibration and EMC/electrical performance
■ 11 standard and 20 combo insert arrangements
■ High temperature epoxy insulators
■ Watertight sealing
■ Rugged machined one-piece shell
SERIES 28
HiPer-D Space Grade Connectors

Product features and specifications

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

<table>
<thead>
<tr>
<th>Specification / Feature</th>
<th>M24308</th>
<th>HiPer-D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>-55°C to +125°C</td>
<td>-65°C to +200°C</td>
</tr>
<tr>
<td>Insulator</td>
<td>Thermoplastic</td>
<td>Thermoset Epoxy</td>
</tr>
<tr>
<td>Shell</td>
<td>Steel (Brass)</td>
<td>Aluminum (SS)</td>
</tr>
<tr>
<td>Voltage</td>
<td>1000 VAC</td>
<td>1000 VAC</td>
</tr>
<tr>
<td>Grounding</td>
<td>Dimples in shell (not in Mil-Spec)</td>
<td>Nickel-plated Copper Alloy EMI spring</td>
</tr>
<tr>
<td>Environmental</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Vibration, sine</td>
<td>20 g</td>
<td>60 g</td>
</tr>
<tr>
<td>Vibration, random</td>
<td>N/A</td>
<td>43 g</td>
</tr>
<tr>
<td>Shock</td>
<td>50 g</td>
<td>300 g</td>
</tr>
<tr>
<td>Bolt-on backshells</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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 Quadra contact
- 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
Mars Curiosity rover self portrait. The MAHli camera on Curiosity’s robotic arm took multiple images that were stitched together into this selfie.
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
EMI/RFI Filter
EMP Transient Voltage Suppression

Bulkhead feed-thrus and penetrators
Sav-Con® connector savers
High-pressure subsea / submersible
High-speed Ethernet
Single- and multimode fiber optic

AVAILABLE COTS SPECIAL-PURPOSE DESIGNS AND PACKAGING

Low-profile COBRA
Mouse Bud
Double-standoff PC tail
COTS flex jumpers
Special feed-thrus
Series 806 Mil-Aero Connectors

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

SAVE SIZE AND WEIGHT WITH SERIES 806 CONNECTORS

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

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

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

Astronauts work in tandem to remove debris and lubricate the starboard Solar Alpha Rotary Joint on the STS-126 mission.
Support wire sizes:
- #20HD contacts
  20–24 AWG
- #22HD contacts
  22–28 AWG

Dielectric withstanding voltage:
- #20HD layouts: 1800 Vac
- #22HD layouts: 1300 Vac

Reduced pitch triple-start modified anti-decoupling stub ACME mating threads

“Triple ripple” wire sealing grommet (75,000 ft. rated)

Integral Nano-Band shield termination platform

EMI shielding effectiveness per D38999M para. 4.5.28 (65 dB min. leakage attenuation @ 10GHz)

10,000 amp indirect lightning strike

MIL-S-901 Grade A high impact shock

CODE RED is a lightweight encapsulant sealing and assembly process with 50% package-weight savings compared to glass-to-metal seal Kovar/stainless steel solutions. Non-outgassing CODE RED (IAW NASA/ESA) provides durable hermetic sealing with $1 \times 10^{-7}$ leak rate performance. Gold-plated copper contacts deliver outstanding low-resistance current carrying capacity.
HIGH PERFORMANCE

Series 791
The next-generation micro-miniature rectangular connector for demanding aerospace applications

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

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

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
About The Series 791

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

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

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

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

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

- M-17P17 with size 16 contacts
- Integral backshell cable connector
- Coax, twinax, quadrax and Ochito octaxial contacts
- Rugged aluminum shell with dual polarizing lobes
- Straight and right angle printed circuit board mounting
- Shell size A – the smallest 791
- -65°C to +150°C
- Epoxy sealed board-mount configurations, straight and 90°, with and without panel mount sealing
- Internal ground spring
- Fully shrouded shells for superior EMC performance compared to M24308
The next-generation micro miniature rectangular connector with El Ochito contacts for high-speed aerospace applications

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.

- High-speed Ethernet, USB 3.0, HDMI, and DisplayPort
- PCB-mount and cable connectors
- Scoop-proof interface
- 12 arrangements and 6 shell sizes
- Precision-machined dual-lobe polarized shells
- Environmentally sealed
- Integrated EMI shielding and grounding
- Blind mating
HIGH-SPEED Series 792

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

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

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>REQUIREMENT</th>
<th>PROCEDURE / NOTES</th>
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<tbody>
<tr>
<td>Shell-to-shell resistance</td>
<td>2.5 millivolt maximum</td>
<td>EIA-364-83</td>
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<tr>
<td>Shielding effectiveness</td>
<td>Frequency</td>
<td>Attenuation dB</td>
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<td></td>
<td>1000</td>
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<td>38</td>
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<td></td>
<td>10000</td>
<td>35</td>
</tr>
<tr>
<td>Ingress protection</td>
<td>IP67 rating</td>
<td>IEC-60529</td>
</tr>
</tbody>
</table>

**Insert Arrangements**

- A-1W1 • A-1G1* 1 #8
- A-3W1 1 #8 / 2 #23
- B-2W2 • B-2G2* 2 #8
- B-6W2 2 #8 / 4 #23
- B-23W1 1 #8 / 22 #23
- C-3W3 • C-3G3* 3 #8
- C-9W3 3 #8 / 6 #23
- C-24W2 2 #8 / 22 #23
- D-4W4 • D-4G4* 4 #8
- D-12W4 4 #8 / 8 #23
- D-27W3 3 #8 / 24 #23
- E-5W5 • E-5G5* 5 #8
- E-15W5 5 #8 / 10#23
- E-48W3 3 #8 / 45#23
- F-9W9 • F-9G9* 9 #8
- F-31W9 9 #8 / 22#23

Contact Key
- Size #8
- Size #23

* Grounded aluminum insert
FLIGHT-PROVEN
Connector Savers and Bulkhead Feed-Thrus

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

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

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

circular and rectangular configurations available including hermetic and EMI/RFI filter configurations
HIGH-PERFORMANCE CONNECTOR GO-BETWEENS

Sav-Con® Connector Savers and Bulkhead Feed-Thrus

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-83999 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)
POLYMER AND METAL-CORE Conduit Systems

The flexible, lightweight alternative to standard jacketed cables

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

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

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

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

Turnkey factory-terminated assemblies or user-installable systems

SERIES 72 CONVOLUTED TUBING PRODUCT SELECTION GUIDE

Convoluted Tubing
Factory Terminated Assemblies
Sentry system
Easy-to-Install Guardian system

SERIES 74 CONVOLUTED TUBING PRODUCT SELECTION GUIDE

Helical Convoluted Tubing
Factory Terminated Assemblies
Easy Assembly Hat Trick System
Super Durable Internal Braid System
Ultra Lightweight Composite Hummer Nut System

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

Metal-Core Helical-Wound Conduit
Turnkey Factory Terminated Assemblies
Low-Profile RP Plus System
Heavy-Duty Environmental Metal System
Heavy-Duty Hybrid Composite/Aluminum

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

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

AmberStrand®

Composite metal-clad EMI/RFI expandable braided shielding

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

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

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

AmberStrand® Composite Braid for EMI/RFI Shielding Applications

The lightest weight EMI/RFI braid in the industry

| 103-026 AmberStrand® 100% Lightweight Composite Thermoplastic Nickel Plated EMI/RFI Braid |
|-----------------------------------|-----------------------------------|-----------------------------------|
| **Tensile Strength**             | 590,000 psi (min)                 | ATP196 MOD                        |
| **Operating Temperature**        | -80°C to +220°C                   | 85% shielding effectiveness, 1000 hrs |
| **Specific Gravity**             | 1.45% (max)                      | ISO 1183                          |
| **Thermal Cycling**              | No adverse effects in visual inspection or resistance after 50 cycles | -65°C to +200°C In accordance with ANSI/EIA-364-75-1997 |
| **Lightning Current**            | Glenair qualification test report 040607AMB | In accordance with ANSI/EIA-364-75-1997 |
| **Surface Transfer Impedance**   | Glenair qualification test report 040607AMB | IEC 96.1 A.5.5.3 method 2         |
| **Vertical Flammability**        | Self-extinguishing ≤ 2 sec. Burn length 0.1 in. max. Dripping 0.0 sec | 14CFR part 25.833 (A)
| | | AMDT25-116 Appendix F Part I (a) (i) (ii) |
| **Fungus Resistance Testing**    | 28 day incubation test: No fungus growth | Mil-Std 810F, Method 508.5 |
| **Mass Loss And CVCM**           | 1.0% max mass loss; 10% max CVCM | ASTM E595 |
| **Flex Test 50,000 Cycles**      | No tearing or visible damage | 90° to 120° bend |
| **Salt Spray 500 hrs.**          | DC Resistance IAW AS85049 .5 milliohms; no visible evidence of base metal on braid | ASTM B 117-03 Sodium Chloride 5% |
| **Salt Fog SO₂**                 | No damage or adverse effects | ASTM G 85 Annex 4 200 hrs. |
| **JP-8 (Mil-T-83133) Military Jet Aircraft Fuel (70°C)** | No fraying, DC resistance within limits (AS85049 paragraph 4.6.3) | Mil-STD 810F Method 504 (Modified) |
| **Skydrol Military Jet Aircraft Fuel (90°C)** | No fraying, DC resistance within limits (AS85049 paragraph 4.6.3) | Mil-STD 810F Method 504 (Modified) |
| **Hydraulic Fluid Mil-H-5606 (70°C)** | No fraying, DC resistance within limits (AS85049 paragraph 4.6.3) | Mil-STD 810F Method 504 (Modified) |
| **Silicate Ester Based Coolanol 25R (70°C)** | No fraying, DC resistance within limits (AS85049 paragraph 4.6.3) | Mil-STD 810F Method 504 (Modified) |
| **Polyalphaolefin Mil-C-87252 (70°C)** | No fraying, DC resistance within limits (AS85049 paragraph 4.6.3) | Mil-STD 810F Method 504 (Modified) |
| **Lubricating Oil Mil-L-23699 8 hrs. @ 150°C, followed by 72 hrs. @ 65°C** | No fraying, DC resistance within limits (AS85049 paragraph 4.6.3) | Mil-STD 810F Method 504 (Modified) |
| **Isopropyl Alcohol 8 hrs. @ 50°C followed by 72 hrs. @ 65°C** | No fraying, DC resistance within limits (AS85049 paragraph 4.6.3) | Mil-STD 810F Method 504 (Modified) |
| **Cleaner Fluid Mil-C-85570 8 hrs. @ 23°C followed by 72 hrs. @ 65°C** | No fraying, DC resistance within limits (AS85049 paragraph 4.6.3) | Mil-STD 810F Method 504 (Modified) |
| **De-icer Fluid AMS-1432 8 hrs. @ 23°C followed by 72 hrs. @ 65°C** | No fraying, DC resistance within limits (AS85049 paragraph 4.6.3) | Mil-STD 810F Method 504 (Modified) |
| **Fire Extinguishing foam 8 hrs. @ 23°C followed by 72 hrs. @ 65°C** | No fraying, DC resistance within limits (AS85049 paragraph 4.6.3) | Mil-STD 810F Method 504 (Modified) |
| **R-134 Refrigerant 8 hrs. @ 23°C followed by 72 hrs. @ 65°C** | No fraying, DC resistance within limits (AS85049 paragraph 4.6.3) | Mil-STD 810F Method 504 (Modified) |

**Up to 88% weight savings vs. NiCu**

| AmberStrand® 100% vs. nickel-coated copper |
|------------------------------------------|------------------------------------------|
| Braid Dia.                              | AmberStrand® 100%                       | Nickel-Coated Copper 100-003 |
| .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% NiCu 103-427            | Nickel-Coated Copper 100-003 |
| .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%                        |
Microfilament nickel-clad expandable stainless steel EMI/RFI braided shielding

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

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

<table>
<thead>
<tr>
<th>Diameter (in)</th>
<th>Weight (Lb/ft)</th>
<th>Length (in)</th>
<th>Length in feet</th>
<th>weight (Lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 0.25</td>
<td>0.02</td>
<td>12564.8</td>
<td></td>
<td>21.08</td>
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<tr>
<td>0.25 - 0.5</td>
<td>0.05</td>
<td>5259.3</td>
<td></td>
<td>21.17</td>
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<tr>
<td>0.5 - 0.75</td>
<td>0.07</td>
<td>1212.6</td>
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<tr>
<td>0.75 - 1.0</td>
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<td>1.0 - 1.5</td>
<td>0.18</td>
<td>467</td>
<td></td>
<td>7.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Total weight 73.3</strong></td>
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**Length and Weight of NiCu Braid in Typical Commercial Aircraft**

<table>
<thead>
<tr>
<th>Diameter (in)</th>
<th>Weight (Lb/ft)</th>
<th>Length (in)</th>
<th>Length in feet</th>
<th>weight (Lb)</th>
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</thead>
<tbody>
<tr>
<td>0 - 0.25</td>
<td>0.00507</td>
<td>12564.8</td>
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<td>5.309</td>
</tr>
<tr>
<td>0.25 - 0.5</td>
<td>0.0097</td>
<td>5259.3</td>
<td></td>
<td>4.251</td>
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<tr>
<td>0.5 - 0.75</td>
<td>0.0178</td>
<td>1212.6</td>
<td></td>
<td>1.737</td>
</tr>
<tr>
<td>0.75 - 1.0</td>
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<td>1437.4</td>
<td></td>
<td>3.063</td>
</tr>
<tr>
<td>1.0 - 1.5</td>
<td>0.0368</td>
<td>467</td>
<td></td>
<td>1.434</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Total weight 15.794</strong></td>
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</table>

**Weight Savings Using ArmorLite™ (Equivalent Lengths)**

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<tr>
<th>Diameter (in)</th>
<th>Weight (Lb/ft)</th>
<th>Length (in)</th>
<th>Length in feet</th>
<th>weight (Lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 0.25</td>
<td>0.00507</td>
<td>12564.8</td>
<td></td>
<td>5.309</td>
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<td>0.25 - 0.5</td>
<td>0.0097</td>
<td>5259.3</td>
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<td>4.251</td>
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<tr>
<td>0.5 - 0.75</td>
<td>0.0178</td>
<td>1212.6</td>
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<td>1.737</td>
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<tr>
<td>0.75 - 1.0</td>
<td>0.0256</td>
<td>1437.4</td>
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<td>3.063</td>
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<tr>
<td>1.0 - 1.5</td>
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<td>1.434</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Total weight 15.794</strong></td>
</tr>
</tbody>
</table>

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

---

**DESCRIPTION**

- **Operating Temperature**: -80°C to +260°C (85% Shielding effectiveness 1000 hours)
- **Braid Resistivity test, Pre and Post**: Test pre/post-5 cycles–minimal disparity per spec.
- **Surface Transfer Impedance**: Glenair Qual. Test Plan ATP-194
- **Shield Effectiveness Test, Pre and Post**: Glenair Qual. Test Plan ATP-194
- **Tensile/ Pull Strength**: 220 lbs. (min.). No anomalies within 8% - 10% of pre test for variable sizes
- **Lightning Current Test**: Glenair Qual. Test Plan 191/ DC resistance/voltage criteria per DO-160F Level for 3 sizes up to 30Ka.
- **Vertical Flammability**: Self extinguishing ≤ 2 sec. Burn length 0.1 inch. max. Dripping 0.0 seconds.
- **Mass Loss and Collected Volatile Condensable Materials**: Total Mass Loss (TML) ≤1.0% Collected Volatile Condensable Mat.(CVCM) ≤1%
- **Salt Spray Test**: DC Resistance IAW AS85049 .5 milliohm. No evidence of base metal on braid
- **Vibration Resistance**: EAI Test Report 33247, DO160 section 8 Cat. R Vib. Curves E1
- **Thermal Shock Cycling test and Resistivity**: No adverse effects in visual inspection or resistance after 50 cycles
- **Abrasion and Plating test**: DC Resistance IAW AS 85049. Glenair internal QTR-003
- **Fluid Immersion Test**: Broad material compatibility
- **Flex Test**: 2 Cycles: starting 0° over vertical ctr. line across to 180° cycle. Total cycles of 25633

**REQUIREMENT PROCEDURE REPORT**

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

- **Armolite™** lightweight EMI/RFI braided shielding is ideally suited for weight reduction efforts in Electrical Wire Interconnect Systems
Blind-Mate Connectors
Rack-and-Panel Sealed, Assisted Kick-off and Feed-Through Blind-Mate to D38999

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

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

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.
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.

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

Lanyard-Release Quick-Disconnect Connectors

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

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

**Lanyard-Release Quick-Disconnect Connectors**

### How To Order SuperNine® 233-216 MIL-DTL-38999 Type

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

![Diagram of Type -4](image)

### How To Order 253-020 AS81703* Type Push-Pull Lanyard Release

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

![Diagram of 812](image)

*The MIL-C-81703 standard was superseded by SAE-AS81703 10-December 2010 per Navair*
Best-of-Class Hermetic Seal Connector Design

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

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

LIGHTWEIGHT HERMETIC SEALING

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

Aluminum shell CODE RED hermetic connectors and copper contacts reduce weight and improve electrical performance compared to heavier-duty glass-to-metal seal hermetic solutions
ADVANCED PERFORMANCE
Glass-Sealed
Hermetic Connectors

UNIQUE HERMETIC OFFERINGS AND CATALOG (COTS) SOLUTIONS

Coax, Triax, Quadax and hybrid-contact layouts
Rectangular hermetics including Series 28 HiPer-D and Series 79
El Ochito high-speed octaxial contacts in a lightweight CODE-RED sealed bulkhead feed-thru
Triax hermetic
Hermetic Sav-Con Feed-thrus and Gender Changers
Dual-flange PC tail hermetic
Hermetic with crimp-removable contacts
Hermetic bulkhead penetrators
Hermetic receptacles with integrated band porch
“Mission-Critical” hermetic sealing with better than $1 \times 10^{-7}$ leak-rate performance

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

CODE RED is an innovative sealing encapsulant and application process—invented by Glenair—that provides durable hermetic sealing in a lightweight aluminum package. CODE RED allows for the use of conventional gold-plated copper alloy contacts, significantly improving electrical performance. CODE RED hermetic connectors are available now in Glenair SuperNine® (D38999 Series III type metal and composite), Series 80 Mighty Mouse, and M24308 D-Sub; and deliver reliable, life-of-system $1 \times 10^{-7}$ max leak-rate hermetic sealing. Special non-magnetic (zero residual magnetism) versions are also available, consult factory.

- Full hermetic sealing, better than $1 \times 10^{-7}$ in a lightweight aluminum shell with low electrical resistance gold-plated copper contacts
- Meets NASA outgassing requirements, as well as aerospace temperature and corrosion resistance standards
- Operating temperature -65°C to +200°C
- Available today in Mighty Mouse 806 Mil-Aero, M24308/9 D-Sub and D38999/23 glass-to-metal seal hermetics
- Significant weight savings—up to $+50\%$
- Order-of-magnitude improvement in current carrying capacity and electrical resistance compared to Kovar/Inconel solutions
LIGHTWEIGHT, LOW RESISTANCE
Code Red Hermetic Connectors

“Mission-Critical” hermetic sealing solution

CODE RED LIGHTWEIGHT HERMETIC CONNECTOR TESTING AND VALIDATION

Connectors utilizing CODE RED hermetic encapsulant sealing went through a grueling qualification test and validation process to prove material durability and hermeticity. Validation testing including 100 cycles of thermal shock IAW EIA-364-32 Test Condition A -65°C to +200°C while maintaining hermeticity followed by 1000 hours of thermal aging at 200°C. Additional tests included:
• DWV, DWV at altitude
• IR, IR at temperature
• Highly Accelerated Life Testing (HALT)
• Insert and contact retention
• Mating durability
• Random vibration at temperature IAW MIL-DTL-38999
• Hermetic seal at 30 psi

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

CODE RED USES PROVEN-PERFORMANCE CONNECTOR AND CONTACT MATERIALS

<table>
<thead>
<tr>
<th>CODE RED Materials / Finish</th>
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</thead>
<tbody>
<tr>
<td>Sealing</td>
</tr>
<tr>
<td>Adhesive</td>
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<tr>
<td>Contacts*</td>
</tr>
<tr>
<td>Insulator</td>
</tr>
<tr>
<td>Seals</td>
</tr>
<tr>
<td>Receptacle Shell and Jam Nut*</td>
</tr>
<tr>
<td>Finish*</td>
</tr>
</tbody>
</table>

*zero residual magnetism materials also available

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

1. Fuel Cells: Although CODE RED exhibits outstanding resistance to caustic chemicals and fuels, its use in fuel tanks/fuel cell applications is not recommended.
2. Cryogenics: CODE RED has been tested and qualified to -65°C IAW MIL-DTL-38999
3. Sustained High-Operating Temperatures: CODE RED has been tested and qualified to +200°C IAW MIL-DTL-38999
4. High Radiation: Exposure to no more than 6 Megarads of radiation
5. Deep Subsea: CODE RED is ideally suited for aerospace and downhole applications that do not exceed 3 BAR (50 psi) atmospheric pressure differential.
6. Space Life Support Systems: Requires additional qualification testing not yet performed by Glenair.

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

![Current Carrying Capacity Graph](image-url)
CIRCULAR AND RECTANGULAR

Backshells and Connector Accessories

Corrosion resistance, weight reduction, environmental durability and design innovation

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

The Glenair Qwik-Clamp connector accessories shown here are used on the International Space Station. The gold plated circular part is extremely resistant to space corrosion and radiation. Both styles are designed with smooth surfaces to eliminate potential damage to space suits.
SPACE-GRADE 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, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, and 76

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

- Removable round cable entry
  - 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
Reference Applications

Brief history of Glenair space-grade design-ins

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.

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 $1 \times 10^{-6}$ 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.

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

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

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

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. JWST is designed to find the first galaxies that formed in the early Universe, connecting the Big Bang to our own Milky Way Galaxy.

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

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.

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.

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

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

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

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 5 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.

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

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

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

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

Other circular backshell and connector accessory space applications include:

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

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

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

**Recent / Notable Space-Grade Application Wins for Glenair**

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

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

Glenair’s qualified MIL-DTL-24308 Class K space-grade hermetic, and our recently-introduced Series 28 HiPer-D connector series have become the go-to standard for mission-critical space applications and are now qualified for use by Ball Aerospace, LMCO Denver, Orbital Sciences, and others.
GLEN AIR GLENDALE:
Complete vertical integration of manufacturing resources—at home in Southern California since 1956

Glenair operates the largest high-reliability interconnect manufacturing operation in the United States, allowing us to fully support our broad range of military, defense, and security customers.
Glenair SoCal’s most important asset: highly technical staff, fully empowered with all the right facilities and operation resources.
SAME-DAY SHIPMENT STOCKING
Immediate availability for high-demand connectors and tooling.

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

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

Glenair UK complex integrated system for an exoatmospheric application with custom machined connectors and complex cabling.
GLENAIR UK:
Mission-critical connectors and assemblies for UK and European markets with a special focus on micro and nanominiature flexi assemblies
GLENAIR ITALIA:
Manufacturing harsh-environment military, nuclear, and aerospace interconnect 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 $1 \times 10^{-7}$ 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.
GLEN AIR SPACE SYSTEMS, SALEM:
Facility includes a 600 m² production floor, 300 m² ISO 8 and ISO 6 clean rooms, an ISO 5 flow chamber (certified to ESD Standard 61340-5-1), with ample accommodation for large mock-up and integration projects.
CLEAN ROOM ASSEMBLY
with both environmental filtering and electrostatic discharge protection.

SPACE-GRADE HARNESS FABRICATION AND INTEGRATION
In-house or at customer facility.

ELECTRO-MECHANICAL
Fabrication of space-grade interconnect technologies including HDRM (release nut) mechanisms.
<table>
<thead>
<tr>
<th>Company</th>
<th>Address</th>
<th>Telephone</th>
<th>Facsimile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glenair Power</td>
<td>20 Sterling Drive, Wallingford, CT 06492</td>
<td>203-741-1115</td>
<td>203-741-0053</td>
</tr>
<tr>
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<td>847-679-8849</td>
</tr>
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<td>06172 / 68 16 90</td>
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<td>06172 / 68 16 90</td>
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<tr>
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</tr>
</tbody>
</table>

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