QwikConnect

GLENAIR • APRIL 2018 • VOLUME 22 • NUMBER 2

Constant, Relentless

INTERCONNECT INNOVATION

Glenair®

Constant, Relentless INTERCONNECT INNOVATION

> "Our main business is not to see what lies dimly at a distance, but to do what lies clearly at hand."
>
> —Thomas Carlyle

We often get asked about our commitment at Glenair to new product development. Customers are rightly concerned whether or not they are partnering with an organization that will help keep them competitive with the latest ideas and innovations. Nowadays, customers want a design-partner—not just a supplier—and are intensely interested in how effectively we are positioned to fulfill that role. Electrical and optical interconnect systems are the power and data backbones of "mission-critical" electronics. From the flight deck to the battlefield the demand for lighter, faster, and smarter interconnect technology challenges our engineers and inventors to develop, test and qualify solutions that truly "do a job" for the customer. Our focus is on innovations with clear, concrete application in the real world. Nobody wants a science project when the demands for improved performance are right here and right now for the individuals and teams that depend on these technologies to complete their mission. Here's how we do it

(1) A Humble Commitment to Listen to the Customer

Glenair manufactures and supplies a number of innovative interconnect solutions that were real game-changers when they were first introduced. The Series 80 Mighty Mouse is a perfect example. This "half-size" cylindrical connector revolutionized soldier-wearable interconnect systems, and grew into one of the most successful new connector families the military and aerospace industries have ever seen. How did we do it? First and foremost by biting our collective tongues and listening to the customer. Time and time again we have re-learned the wisdom of bringing a humble and practical attitude into design discussions. Our overriding goal is maximizing utility to the customer. And you can't do that if you come to the party with an arrogant attitude.

(2) Dedicated Resources

Nothing puts out the lamp of innovation faster than a lack of dedicated resources. Glenair, like most suppliers in our niche, undertakes an unbelievable amount of routine engineering work servicing our existing product lines. Most of our mil-aero connector engineers, for example, have a key daily responsibility to complete red-folder "bid-file" projects that are mostly sustaining engineering in nature, making it difficult for the engineer to also focus on innovation. For this reason, Glenair maintains a deep bench of research, development and design talent that can tackle longer-term work without the daily distraction of completing bid-files. And we support this team with prototype machinery, tooling centers and lab equipment—as well as quick-turn CNC production capabilities—that are not encumbered by the day-to-day work of the factory. This is not the norm in our industry. We believe we have by far the largest and most experienced engineering team in the mil-aero interconnect business as well as the highest number of designers focused solely on the development of new interconnect technologies.

(3) Big Bets

There are always new development projects underway at Glenair—we call it constant, relentless innovation. Some work falls into the "product line extension" category, such as the recently launched Mighty Mouse 806 Mil-Aero connector series (see page 16). But other work is much more ambitious and combines a new business focus in addition to new product development. Our recently

completed HD Stacker series (page 12) represents a major push by Glenair to evolve into more of a board-level supplier with solutions suitable for use in high-speed, high-density backplane and mezzanine applications. Our massive push into underwater connectors with the launch of our SeaKing and SuperG55 series technologies (see pages 18–25) is another powerful example. These "big bet" initiatives demonstrate Glenair's commitment to growing our capabilities to meet the evolving and changing needs of our customers.

(4) No Bubbles

Much of the time, innovations come from our product and engineering teams responding directly to customers with solutions exactingly tailored to their interconnect issue. But innovation can come from any quarter, even outside the walls and discipline of our particular industry. Many of the most significant innovations in current use on the diagnostic side of the medical industry, for example, came from technologies that were invented outside of hospitals and medical research labs. From X-Ray technology to MRIs, today's medical diagnostician has physics labs to thank for the tools most relied upon in internal medicine. We apply this same idea at Glenair by bringing in the product development and design talent of folks who did not grow up inside our industry. From materials engineers to experts in design prototyping and packaging, our R and D team benefits from the insights and contributions of individuals who bring an outside perspective to the work.

HDSTACKER™

(5) Empowered People

Innovation is not a micro-managed process at Glenair. Sure, we have a New Product Rollout committee that meets regularly, with appropriate measures for coordinating key deliverables such as tooling, qualification testing, marketing collateral and so on. But Glenair employs a distributed approach to innovation that gives individual designers within our many product groups the freedom to take risks and try out new ideas without fear of failure, or the too-heavy hand of management. In fact, quite a number of recent Glenair interconnect innovations originated as "skunk works" type projects free from executive management oversight. Our space-grade blind-mate assisted separation force connector series with its unique environmental sealing capability, for example, began life as just such a project (see page 30). Simply put, innovation at Glenair is not subject to the same constraints it suffers from in other organizations. New product teams are not required to adhere to strict budgets, timelines, return-on-investment calculations or other constraints that might inhibit their appetite to take risks and stretch the boundaries of our business.

Constant, Relentless

INTERCONNECT INNOVATION

Attentive readers of *QwikConnect* will note it's been less than three years since our last special issue focused on new product innovation (see cover above). Here we are in April 2018 with another massive tranch of innovative interconnect technologies. Enjoy the show!

HIGH-SPEED CONNECTIONS INCLUDING NEW USB 3.0 SOLUTIONS

Speed-Master™ High-speed, repairable connection system

El Ochito®: High-speed contacts for Ethernet, USB 3.0 and HDMI

SuperSeal™ USB 3.0 rugged field connectors and cables

HIGH-DENSITY BOARD-TO-BOARD CONNECTIONS

HD Stacker™ High-density, solder-free, rugged board-to-board stackable connectors

NEXT-GENERATION ULTRAMINIATURES

Series 791 next-generation ultraminiature rectangular connector

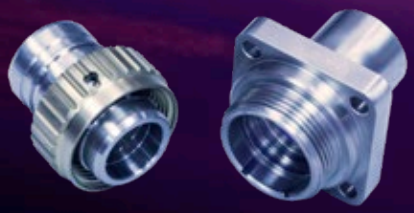
Advanced-performance Series 806 Mighty Mouse Mil-Aero

UNDERWATER CONNECTIONS

SeaKing™ 10K psi high-density underwater connectors

SuperG55™ high-pressure dry-mate underwater connectors

HIGH-DENSITY UNDERWATER CONNECTIONS



SeaKing™ Junior ultra high-density, small form-factor underwater connectors

INDUSTRIAL POWER AND LIGHTING

Series 928 HMI Lighting Connectors: Quarter-turn bayonet connectors for head-to-ballast HMI lighting

SOLDIER DATA / POWER HUBS

STAR-PAN™ Integrated soldier multiport USB data hub / power distribution systems

SPACE-GRADE ENVIRONMENTAL BLIND-MATES

SuperNine® Space-grade, blind-mate float-mount and adjustable separation force connectors

MIL-GRADE NANOMINIATURE CONNECTIONS

Nanominiature Circular board and wire connectors: high-performance small form-factor circular IAW MIL-DTL-32139

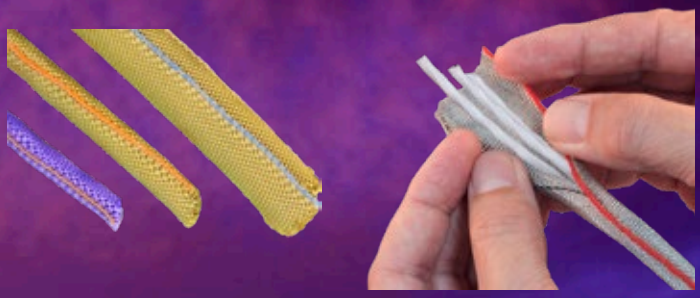
LIGHTWEIGHT HERMETIC CONNECTORS

CODE RED: "Mission-Critical" hermetic sealing with $1X10^{-7}$ leak-rate performance

HIGH-PERFORMANCE COLD SHRINK TUBING

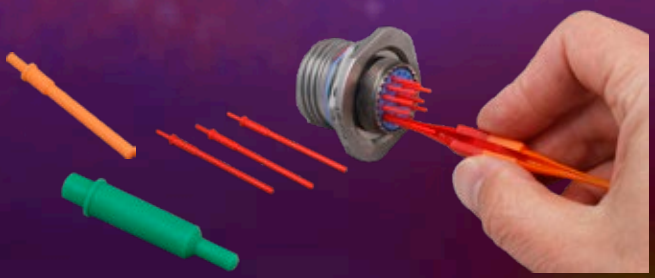
AutoShrink™: the fast and easy cold-action shrink tubing solution from Glenair

LIGHTWEIGHT WIRE PROTECTION / SHIELDING



MasterWrap™ wraparound EMI/RFI shielding and abrasion protection

LIGHTWEIGHT CONNECTOR CAVITY PLUGS



Weight-saving Dummy Contact Sealing Plugs (DCSP) for reliable sealing of contact cavities without the use of electrical contacts

NEXT-GENERATION SWING-ARM®

Swing-Arm® FLEX Lightweight EMI/RFI strain relief backshells with drop-in shield termination follower

SPEEDMASTER™

High-speed connection system for use in MIL-DTL-38999 Series III connectors

SpeedMaster™ 10G is a dedicated contact module and interconnect insert package designed for use in MIL-DTL-38999 Series III type SuperNine™ connectors. SpeedMaster™ meets the unique installation, performance requirements, and use preferences of the aerospace industry. Optimized for high-speed Cat 6A Ethernet, the SpeedMaster™ 10G system offers industry-leading NEXT, return loss and insertion loss performance due to its highly-engineered isolation and separation architecture. Easy to assemble, terminate, install, and repair, the SpeedMaster™ 10G utilizes size #22D contacts, tools, and cable, and meets the broad range of aerospace industry requirements for vibration, temperature cycling, durability, and safe, reliable performance. Applications include defense, military and commercial aircraft electronics, medical equipment, rail and industrial automation/robotics.

SpeedMaster High Speed Cable Options							
Cable Type	Cable P/N	Cable Category	Cable Construction	Wire Gage	Max Wire Insulation Ø	Cable Ø	Assembly Instructions
1	963-003-24	CAT 6A	SF/UTP	24	.050	.275	AI85082
2	963-003-26	CAT 6A	SF/UTP	26	.050	.220	AI85082
4	963-037	CAT 6A	SF/UTP	24	.050	.260	AI85082
5	963-038	CAT 6A	SF/UTP	24	.050	.270	AI85082

- **Utilizes aerospace industry standard #22D contacts, tools and widely available Ethernet flight cable**
- **Fast, easy termination**
- **Significant weight reduction compared to Quadrax solutions (reduces cable requirement by ½)**
- **High-density, repairable solution—designed for packaging in mil-aero network environment interconnects including D38999 and Series 80 Mighty Mouse**

SpeedMaster™ repairable high-speed connection system

for use in MIL-DTL-38999 Series III type connectors

SPEEDMASTER™

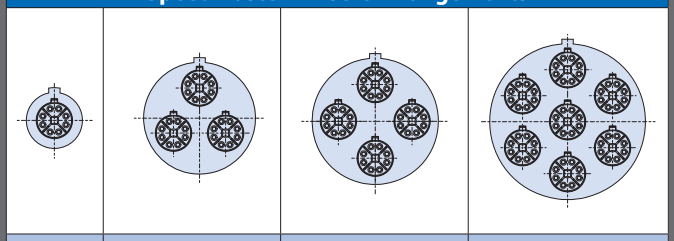
SPEEDMASTER™ 10G NEXT-GENERATION CONNECTION SYSTEM

SpeedMaster™ 10G modular inserts are available for Series 23 SuperNine®, Series 80 Mighty Mouse Locking Push/Pull and Series 28 HiPer-D M24308 intermateable connectors

The SpeedMaster™ 10G is optimized for high-speed / Ethernet performance and incorporates standard M39029 #22D contacts isolated for superior NEXT, return loss and insertion loss performance

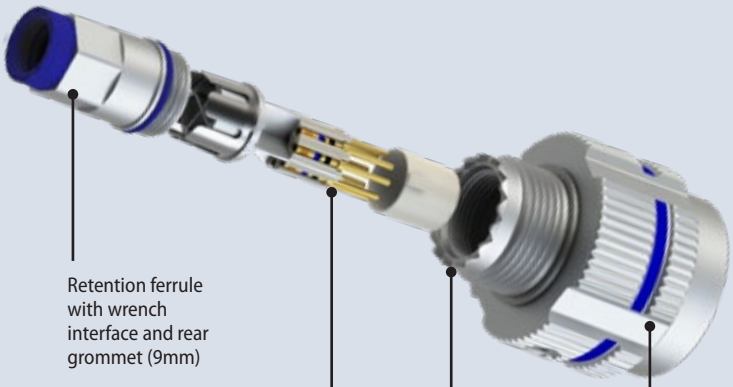
SuperNine® Plug and Receptacle with SpeedMaster™ high-speed insert and contact modules

SpeedMaster™ Insert Arrangements



11-1	19-3	21-4	25-7

Available SpeedMaster™ insert arrangements for use in MIL-DTL-38999 Series III type SuperNine® connectors



THE SPEEDMASTER™ DIFFERENCE

SpeedMaster™ is a high-speed shielded contact and insert solution for SuperNine 38999 type connectors. SpeedMaster™ shielded contact modules incorporate 4 pairs of size #22D pins or sockets for full 10G Ethernet performance per module. Each module is individually shielded within the special shell insert, and retained in place with a threaded ferrule. Module cavities in the special SpeedMaster™ insert are genderless allowing both pin and socket interfaces for plugs or receptacles. Contact modules are easily removable and repairable, helping to reduce network downtime and improve network function and performance. Meet the demand for the next generation Cat 6A networks with SpeedMaster™, the next generation contact / connector system from Glenair.

El Ochito®

High-speed octaxial contacts for Ethernet, SuperSpeed USB and multi-gigabit datalinks

High speed, harsh environment El Ochito® octaxial contacts save size and weight. Suitable for aircraft avionics, weapons systems, satellites, radars, communications equipment and other aerospace/defense gear, El Ochito® contacts are optimized for drop-in use in all connector packages with keyed size #8 contact cavities, including MIL-DTL-38999, ARINC 600, Series 80 Mighty Mouse, Series 791 Micro-Crimp, and others.

El Ochito® White

10G Ethernet
1000BASE-T
10GBASE-T
10Gbps / 100 Ohms

El Ochito® Blue

SuperSpeed
USB 3.0
Aerospace-grade
5Gbps / 90 Ohms

El Ochito® Red

HDMI
SATA
DisplayPort
5Gbps / 100 Ohms

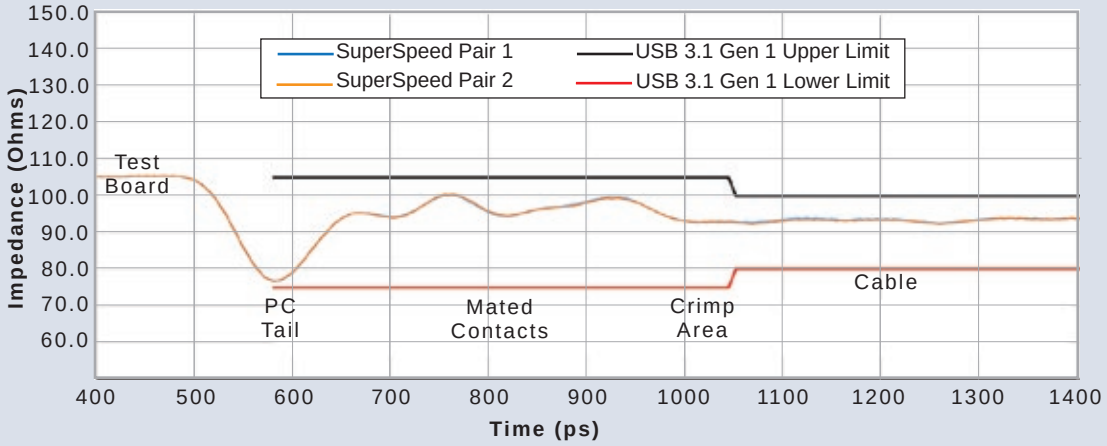
- **10GbE, SuperSpeed USB, and multi-gigabit shielded pairs**
- **Universal drop-in for keyed size #8 connector cavities**
- **Data-pair isolation for optimal signal integrity**
- **Crimp or threaded shield termination contact types**
- **Snap-in, rear release**
- **Environmentally sealed**
- **Aerospace-grade cable assemblies**
- **50% cable / contact reduction compared to Quadrax**

El Ochito®: The Ultimate Shielded High-Speed Data Contact

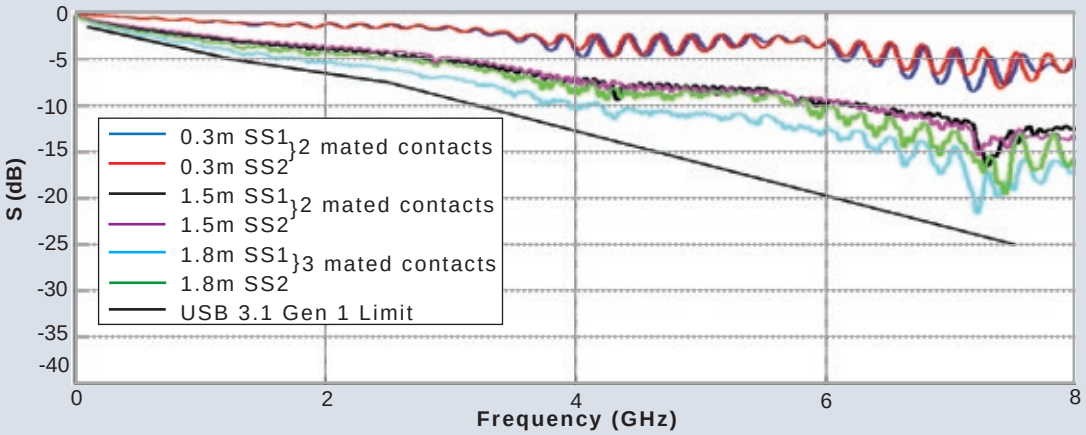
Now available for SuperSpeed USB 3.0 and HDMI

SuperSpeed USB 3.0 Compliance Testing for El Ochito® Blue

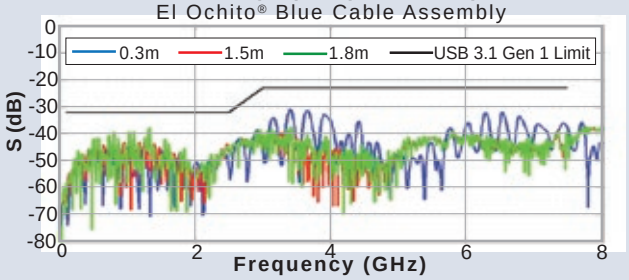
TDR Profile
50ps RT 20%-80%
El Ochito® Blue
PC tail contact to
Cable Assembly



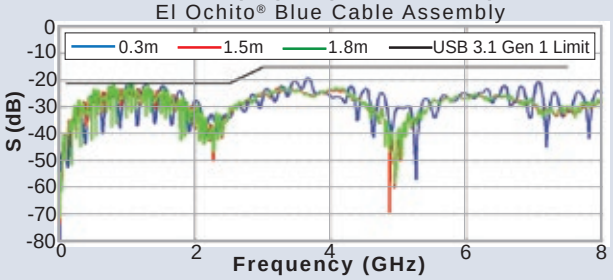
De-Embedded Insertion Loss
El Ochito® Blue
Cable Assembly



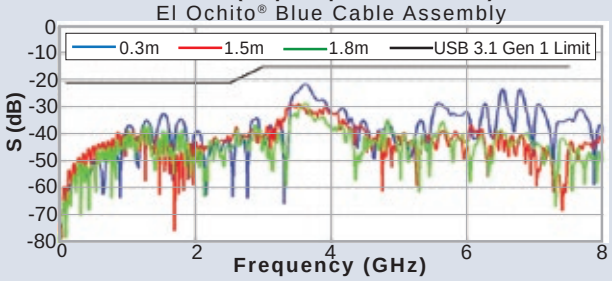
NEXT (SuperSpeed Pairs)
El Ochito® Blue Cable Assembly



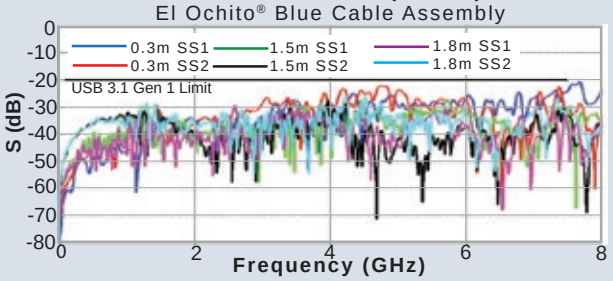
NEXT (SuperSpeed to D+/D-)
El Ochito® Blue Cable Assembly



FEXT (SuperSpeed to D+/D-)
El Ochito® Blue Cable Assembly



Mode Conversion (SCD21)
El Ochito® Blue Cable Assembly



RJ45/USB SUPER SEAL™

New USB SuperSpeed 3.0 Ruggedized solutions

SuperSeal is a series of ruggedized field connectors that delivers improved environmental sealing, EMI/RFI grounding, and a broader range of wire termination options for commercial high-speed protocol connectors such as RJ45 and USB. Glenair now offers ruggedized SuperSeal connectors and cables for SuperSpeed USB 3.0 commercial interfaces. All connector configurations are IP68 (mated) and IP67 (unmated) rated. Signal integrity and SuperSpeed USB protocol performance testing ensures plug-and-play connectivity and hot-swappable addition of USB 3.0 peripherals including latest-generation C4ISR ground soldier and vehicle technologies. Glenair SuperSeal USB 3.0 connectors deliver military grade connector mechanical features including metal-to-metal grounding, polarization keying, and non-corrosive conductive material and finish options.

Available ruggedized memory stick
32GB, 64GB, and 128GB versions

- **New SuperSpeed USB 3.0 protocol support**
- **Superior sealing—IP67 unmated—for complete system protection against water, sand and dust**
- **Highly durable SuperSeal™ insert design, provides enhanced operating temperature, increased life-cycle, and rugged vibration and shock performance**
- **Crimp, solder-cup, PC tail and cable assemblies**

SuperSpeed USB 3.0
Ruggedized connectors and cables

MIL-DTL-38999 Series III Type

RJ45/USB SUPER SEAL™

AVAILABLE SUPERSPEED USB 3.0 RUGGEDIZED FIELD CONNECTORS

Cable plug

Wall mount receptacle with metric clinch nuts

Wall mount receptacle with slotted holes

Wall mount receptacle with round holes

Jam nut mount Receptacle

TURNKEY SUPERSPEED USB 3.0 CABLE ASSEMBLIES AND JUMPERS

Glenair SuperNine USB 3.0 cable jumpers, SuperSeal to standard USB Type A and Micro-B connectors

SuperSeal USB 3.0 connectors are available as turnkey cable jumpers. Rugged field connector styles—including plug, wall mount and jam-nut receptacles—may be cabled with commercial 3.0 connector types including male Type A, female Type A, and male Micro B. Assemblies may be ordered with straight or right angle cable exit. In addition, the USB 3.0 insert may be ordered in horizontal or vertical orientation to provide protection against mis-mating. Maximum overall length is 15 feet.

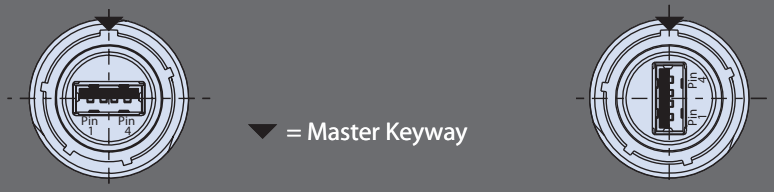
SUPPORTED USB 3.0 CONNECTOR TYPES

USB 3.0 male Type A

USB 3.0 female Type A

USB 3.0 male Micro B

USB ORIENTATION OPTIONS



Horizontal

Vertical

HIGH-DENSITY
BOARD-LEVEL
CONNECTIONS

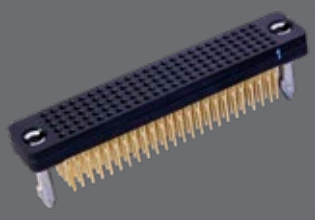
HD STACKER™

High-density, solder-free, rugged board-to-board stackable connectors

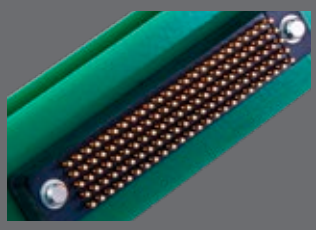
Mission-critical board-to-board connector applications demand fail-safe signal integrity and rugged, reliable harsh-environment performance. HD Stacker™ brings Glenair innovation to stacking board-to-board connectors with several significant design improvements: Ultra high-density .0625" Chevron Contact System provides 55% more contacts per connector size, or a 31% size reduction for the same number of contacts compared to current industry solutions. Polarized connector bodies and 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. Choose HD Stacker™ for the ultimate in high-density, rugged board-to-board stackable connector performance.

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

HD STACKER™ THE MISSION-CRITICAL BOARD-TO-BOARD CONNECTOR



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



.0625" pitch contact spacing: highest available density

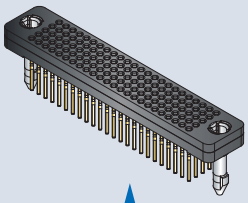
Polarized shells and keyed guide pin hardware prevent mis-mating

High-Density Stacker™

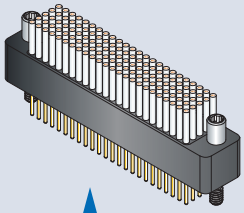
Rugged high pitch compliant pin board-to-board stackable connectors

HD STACKER™ POSITION AND MATING COMPATIBILITY GUIDE

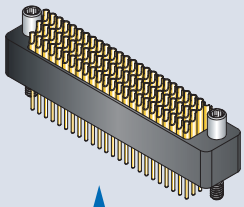
GSTBL
Single-Sided Mate, Top-of-Stack
Mates with GSTB and GSTB (.095)



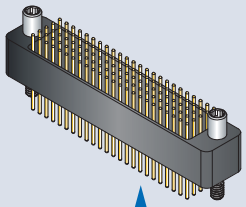
GSTT-PW
Prewired, Top-of-Stack
Mates with GSTB

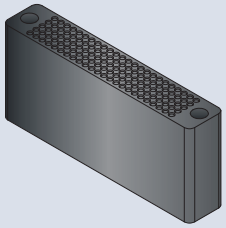


GSTT-PS
Solder Cup, Top-of-Stack
Mates with GSTB



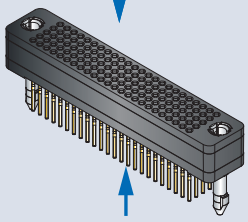
GSTT-PF
PC Tail (Flex), Top-of-Stack
Mates with GSTB

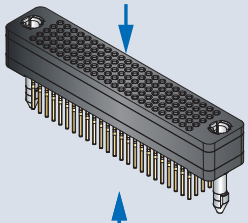




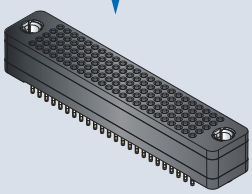
980-008 Spacer is used in applications that require additional space between PCBs to accommodate board electronics. Spacers serve as a rigid, precision standoff for board-to-board heights up to 1.025" (26.03mm).

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

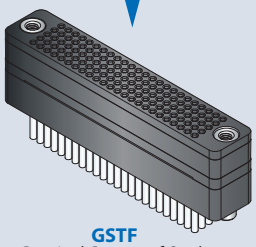




All Glenair HD Stacker™ connectors are equipped with our innovative .062" pitch high-density Chevron Contact System (CCS). Special non-orthogonal socket tines enable both higher density layouts as well as improved signal integrity. The GSTB is equipped with pin/socket contacts with solder-free press-fit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



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



GSTF
Prewired, Bottom-of-Stack
Mates with GSTB

QUALIFICATION TESTING / HIGH-SPEED PERFORMANCE

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

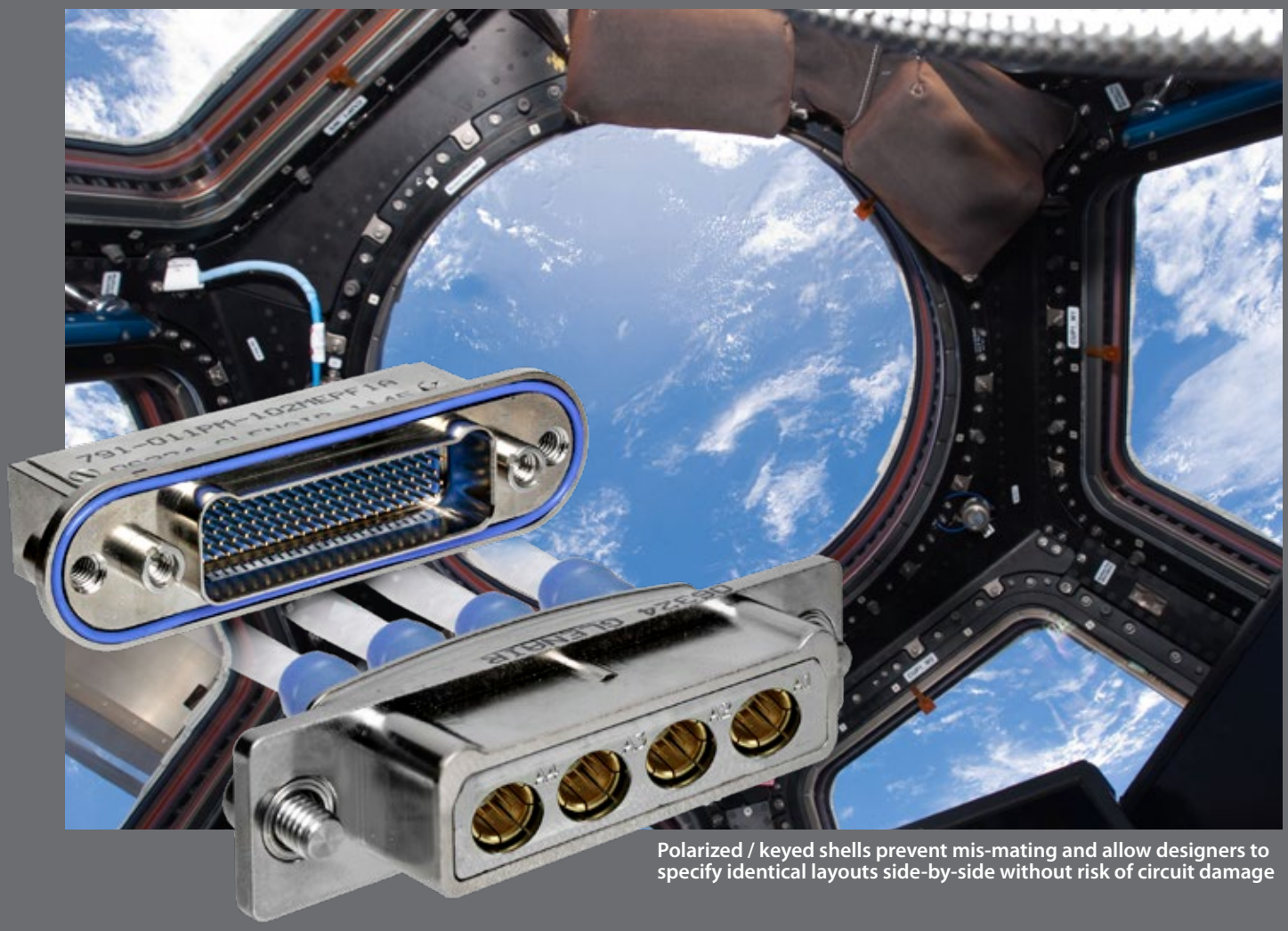
- Contact engagement/separation
- Contact retention
- DWV
- Electrical resistance
- Mechanical vibration and shock
- Insulation resistance
- Thermal shock
- Contact resistance
- Humidity

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

NEXT-
GENERATION
ULTRAMINIATURES

SERIES
791
SEVEN
NINETY-ONE

The next-generation ultraminiature rectangular connector for demanding aerospace applications



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

Sometimes the simplest ideas are the best ideas. The Series 791 is a simple idea. Let's create a brand new class of connector—the ultraminiature rectangular. Let's combine the versatility of the Series 790 Micro-D connector with the rugged features of our popular HiPer-D M24308 connector. Let's add a unique dual lobe shell and recess the pins to eliminate the possibility of scooping damage. Then let's add high speed datalink capability. Originally designed for NASA's Orion project, the Series 791, with all its special features, is qualified for manned space flight. The Series 791's small size and blind mate capability make it a perfect choice for 2U and 3U electronics modules. Applications include radars, weapons systems, comms gear, satellites, exoatmospheric vehicles, avionics, power distribution units, instrumentation, and other applications that require a smaller, higher performance interconnect system.

- **Next-generation small form factor aerospace-grade rectangular connector**
- **Scoop-proof recessed pin contacts**
- **37 arrangements, 12 shell sizes for the ultimate in versatility**
- **Rugged aluminum alloy dual-lobe shell**
- **Environmental**
- **EMI shielded**
- **Blind mating**

Next-generation ultraminiature rectangular

for demanding aerospace applications

SERIES 791 SEVEN NINETY-ONE

About The Series 791

The Series 791 is an aerospace-grade ultraminiature 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.

Save Size and Weight with Series 791 Connectors

The Next Generation Ultraminiature Rectangular Connector for Demanding Aerospace and Defense Applications

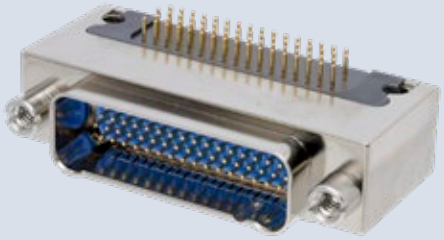
M-17P17 with size 16 contacts

- **Two to 102 contacts**
- **Coax, twinax, quadrax and Ochito octaxial contacts**
- **Rugged aluminum shell with dual polarizing lobes**

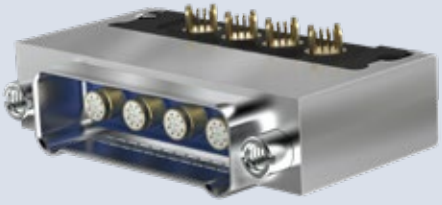
Shell size A – the smallest 791

- **Integral band platform for direct attachment of cable braid**
- **-65°C to +150°C**
- **Panel mount versions with O-ring or EMI spring**

- **37 contact arrangements**
- **Crimp-and-poke or epoxy-sealed board mount versions**
- **Scoop-proof recessed pins**
- **Size 23, 16, 12 and 8 contacts**



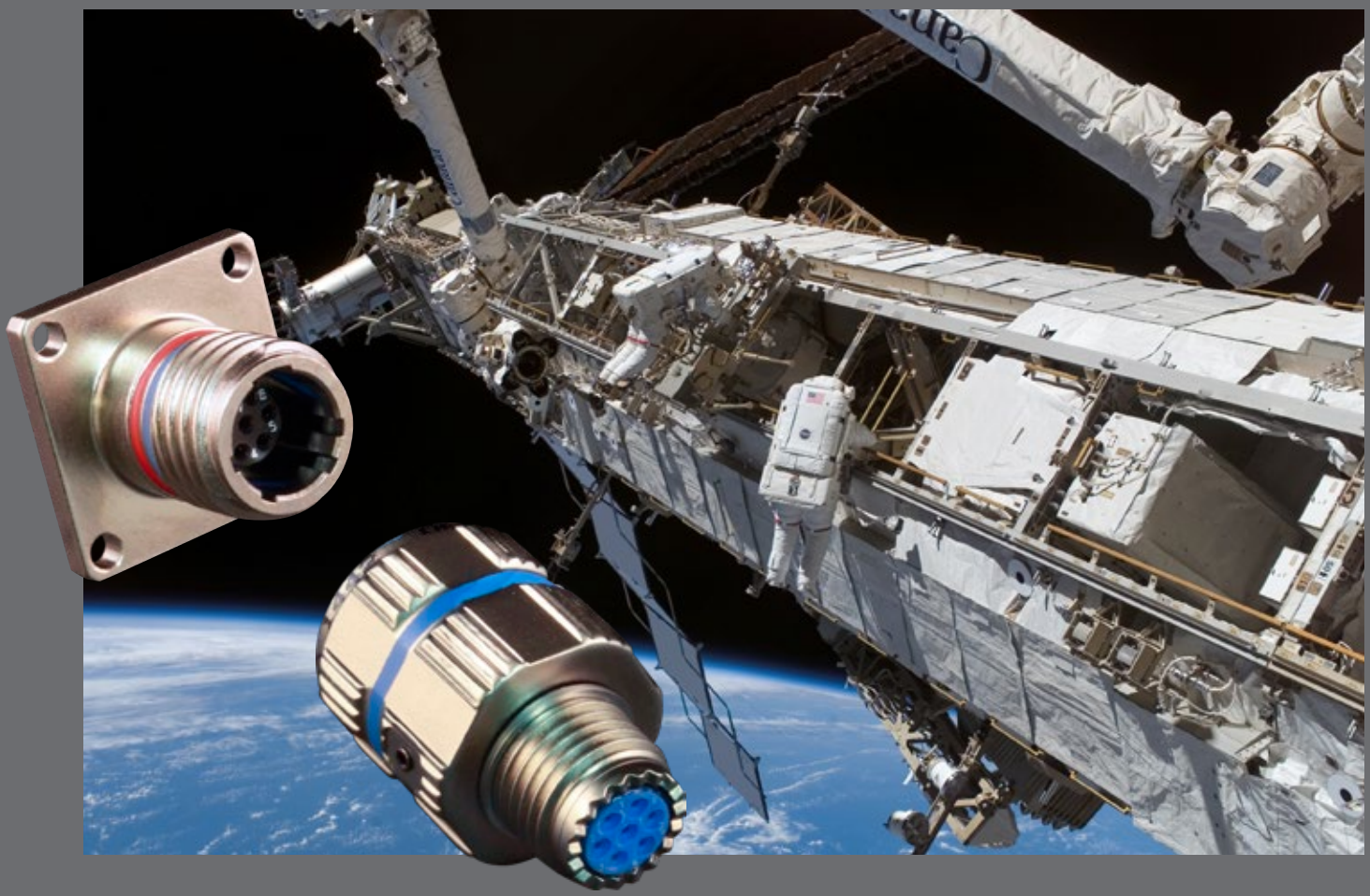
- **Straight and right angle printed circuit board mounting**
- **12 shell sizes**
- **Guide pins for blind mate modules**



- **Contacts meet SAE AS39029 requirements**
- **Internal ground spring for EMI protection**
- **Approved for manned space flight**

NEXT-
GENERATION
ULTRAMINIATURES

Series 806 Mighty Mouse Mil-Aero: Advanced performance, reduced size and weight



Series 806 offers significant size and weight savings while meeting key performance benchmarks for a broad range of applications such as commercial and military aerospace, robotics, transportation, and more. Designed for general use in harsh vibration, shock, and environmental settings—as well as high-altitude, unpressurized aircraft zones with aggressive voltage ratings and altitude immersion standards—the Series 806 Mil-Aero features numerous design innovations including durable mechanical insert retention, radial seals and triple-ripple grommet seals. Its reduced thread pitch and re-engineered ratchet prevent decoupling problems, particularly in small shell sizes, solving one of the major problems of shell size 9 and 11 MIL-DTL-38999 Series III connectors.

SAVE SIZE AND WEIGHT WITH SERIES 806 CONNECTORS

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

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

- **Next-generation small form factor aerospace-grade circular connector**
- **Designed for 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**
- **Hermetic and filter versions**
- **+200°C temperature rating**

Series 806 Mighty Mouse Ultraminiature Circular Connectors

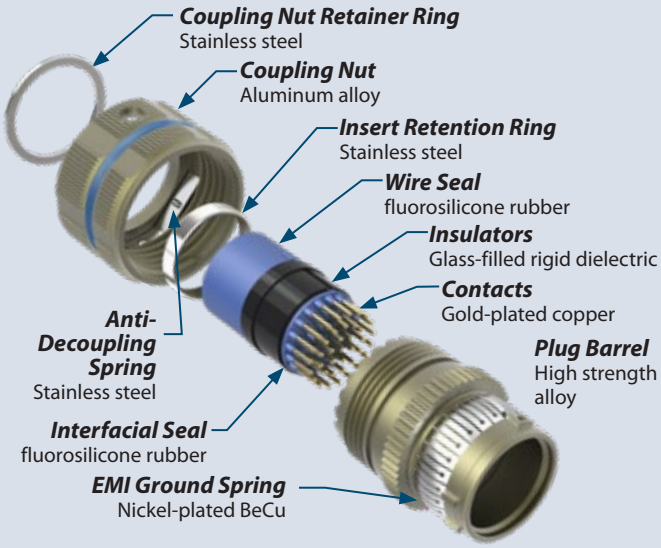
for harsh mil-aero applications IAW MIL-DTL-38999

SERIES 806 MIL-AERO: FEATURES / SPECIFICATIONS

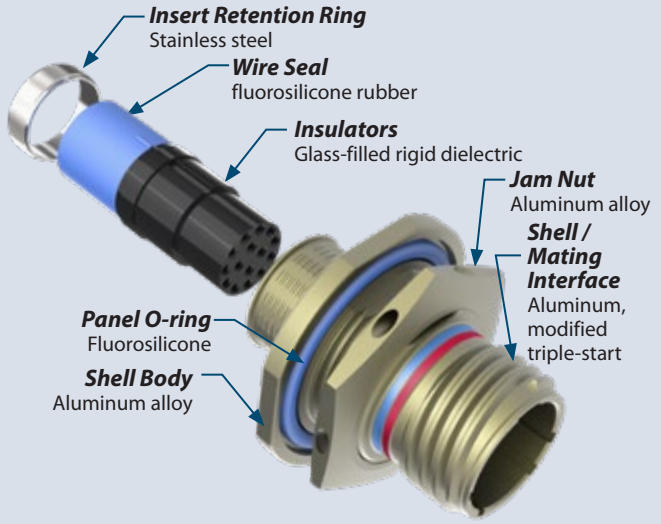
- Next-generation Mighty Mouse designed for universal mil-aero use including high-altitude, unpressurized zone applications
- High-density #20HD and #22HD arrangements for reduced size and weight
- Supported wire sizes:
  #20HD contacts 20–24 AWG
  #22HD contacts 22–28AWG
- Dielectric withstanding voltage
  #20HD layouts: 1800 Vac
  #22HD layouts: 1300 Vac
- Reduced pitch triple-start modified anti-decoupling stub ACME mating threads
- +200°C operating temperature
- "Triple ripple" wire sealing grommet (75,000 ft. rated)
- Snap in, rear release crimp contacts
- Metal contact retention clips
- Integral Nano-Band shield termination platform
- EMI shielding effectiveness per D38999M para. 4.5.28 (65 dB min. leakage attenuation @ 10GHz)
- 10,000 amp indirect lightning strike
- MIL-S-901 Grade A high impact shock
- Environmental crimp contact, glass-to-metal seal plus CODE RED lightweight encapsulant-sealed aluminum hermetic connector classes

Series 806 Mighty Mouse is designed for universal mil-aero use, including high-altitude, unpressurized zones. Other Mighty Mouse Series connectors, such as the 801 and 805 with size #23 contact layouts, are optimized for maximum size and weight reduction in pressurized zones.

SERIES 806 MIL-AERO PLUG

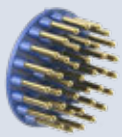


SERIES 806 MIL-AERO RECEPTACLE



SMALLER AND LIGHTER WITH EQUAL D38999 PERFORMANCE?

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

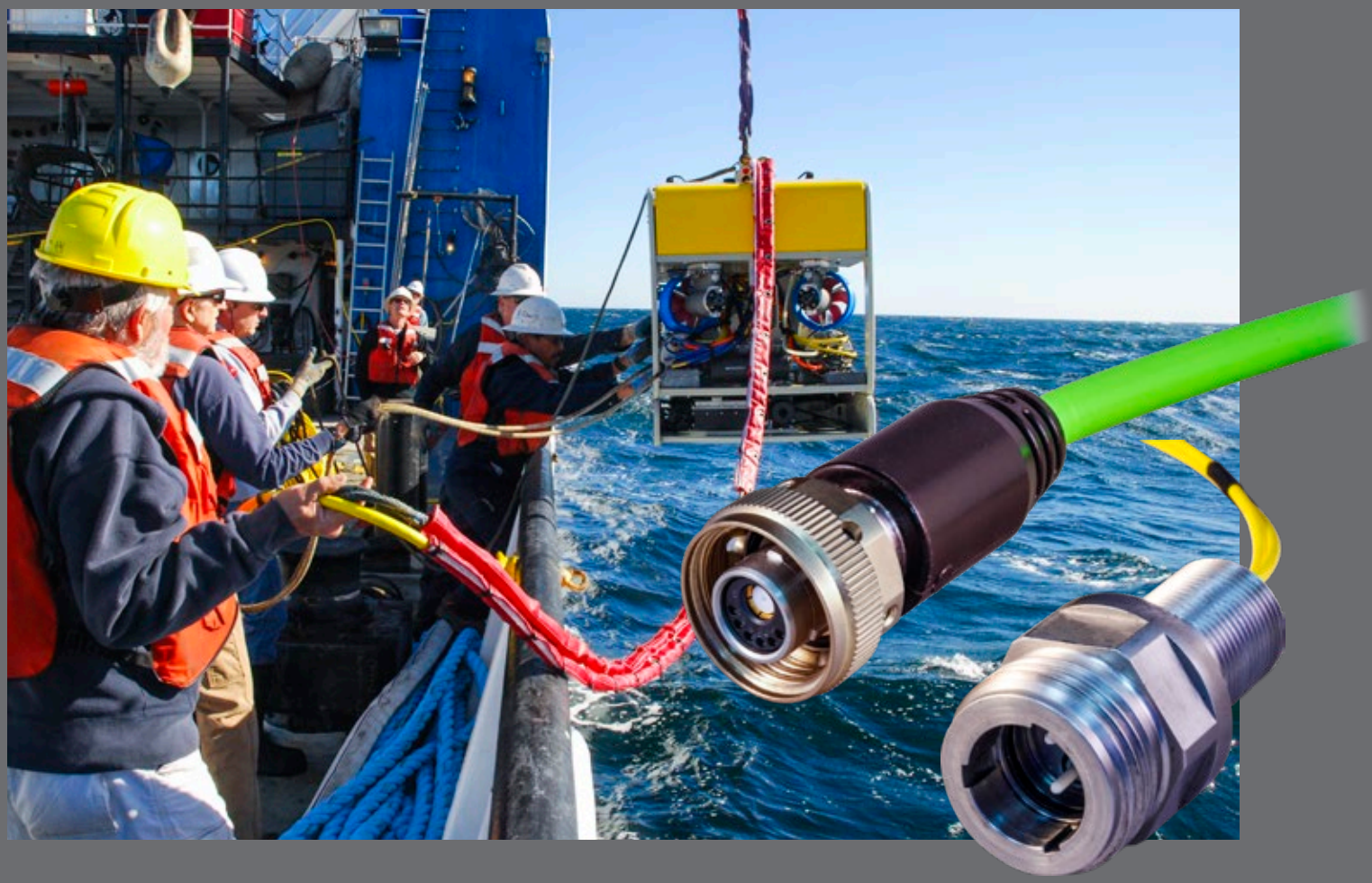


"Top Hat" Insulator
High voltage rating, foolproof alignment

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

SeaKing

10K psi high-density, high-voltage, fiber optic and hybrid electrical/optical underwater connectors



SeaKing is an innovative new underwater connector series that eliminates a broad range of mechanical design weaknesses found in many of today's high-pressure subsea connector families. From its double O-ring seals and retractable engaging nut, to its multi-keyed mating interface, the SeaKing underwater connector represents a bold new approach to subsea power and signal connectivity.

Ideally suited for deep water offshore oil & gas, military/defense, oceanographic research, and other harsh-environment subsea applications, the dry-mate connector series is built for optimal durability and reliability. Tested to 15,000 PSI (open face and mated), and equipped with integrated dual O-ring seals, marine bronze coupling nuts, corrosion-resistant stainless steel shells and high-pressure contact inserts with gold-plated signal contacts, special RF and fiber optic solutions, the Series 70 SeaKing is today's most advanced high-density signal and standard-density power underwater connector available.

Glenair Series 70 SeaKing™ delivers high-pressure open-face mating up to 10K psi.

- **High density, small form-factor connector**
- **Dual O-ring seals ensure high-pressure performance**
- **Signal, power, RF and optical contact arrangements**
- **Stainless steel construction with anti-galling marine bronze engaging nut**
- **Full-mate inspection ports**
- **Easy O-ring replacement**
- **Key and keyway polarization**

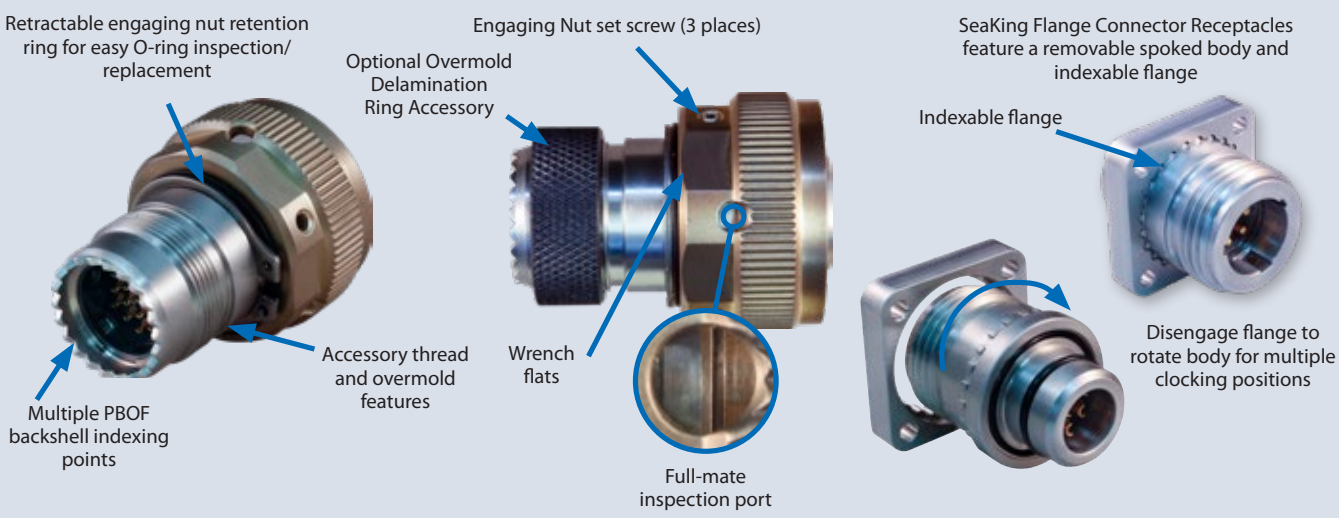
SeaKing™ High-Pressure Underwater Connectors, Cables, and PBOF Assemblies

10K psi open-face rating

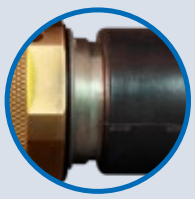
Sealing: The Series 70 SeaKing™ is the best sealed subsea connector on the market. All critical interfaces, including bulkhead seals, glass-to-metal insert seals, mating interface bore seals, and face seals are fully redundant ensuring 10K PSI protection, even in the event of a single-seal failure.

Mating: SeaKing™ utilizes a modified UNC (coarse) mating interface with added clearance to reduce bio-fouling and facilitate rapid-advance mating. The marine bronze engaging nut on the plug is equipped with wrench flats as well as knurling and is less susceptible to galling than standard steel engaging nuts. Polarized keys and keyways prevent both thread damage and mismating.

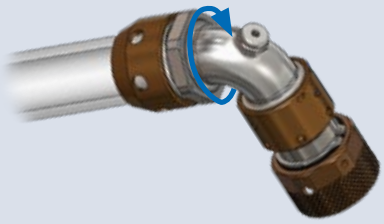
Ease-of-Use: Multiple PBOF backshell indexing points, indexable flange FCRs, full-mate inspection ports, retractable engaging nuts, and other features make SeaKing™ the most user-friendly subsea connector on the market.



BCR showing keyway-assisted mating and polarization feature and wrench flats for reliable, secure attachment to pressure bulkheads



Series 70 SeaKing™ cable assemblies are available from the factory with special 10,000 PSI overmolded cable-to-plug connector environmental sealing.

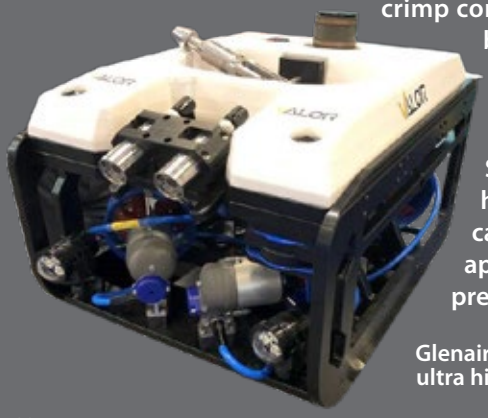


Revolutionary PBOF swivel assembly features kink-proof hose swivel, straight, 45° and 90° routing, and superfast assembly

SeaKing™ Junior

Ultra high-density, small form-factor underwater connectors

Originally developed for overmolded cables used in petroleum pipeline inspection equipment, Series 701 SeaKing Junior connectors are available in ten sizes from 1 to 130 contacts and equipped with Nitrile O-rings to withstand exposure to corrosive chemicals and high temperature environments. These 10,000 psi pressure rated (mated) connectors feature high density crimp-contact or solder cup inserts, 316 stainless steel or marine bronze shells and a piston O–ring for hydrostatic sealing. Series 701 connectors are available in cable plug configurations with Marine Bronze coupling nuts, or in a square flange connector receptacle. Crimp style gold–plated crimp contacts accept #12–30 wire. Connectors are backfilled with epoxy potting compound. Hermetic glass–sealed connectors are also available and are supplied with solder cup contacts (non-removable) or PC tails. SeaKing™ Junior is specifically designed for high-pressure, mated condition overmolded cable applications and is not suitable for PBOF applications. Consult the factory for open-face pressure versions.



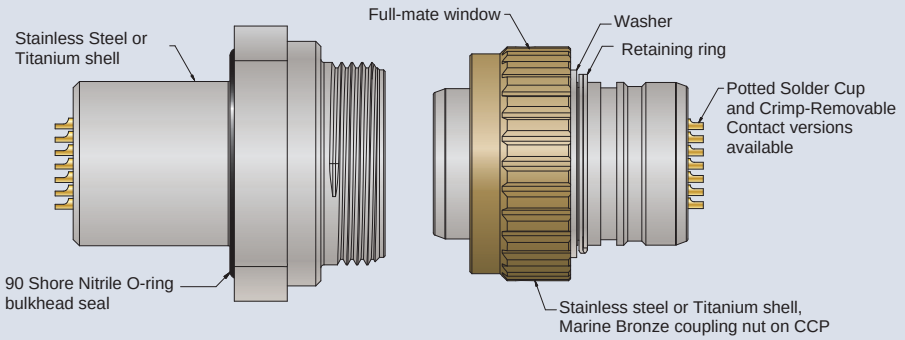
Glenair Series 701 SeaKing™ Junior delivers ultra high-density and ultraminiature connector packaging

- **10,000 psi mated pressure rating solution for overmolded (non-PBOF) applications**
- **High density, small form-factor solution**
- **Corrosive chemical-resistant 90 shore Nitrile O-rings**
- **Size #23, #20, #20HD, #16, #12, #8 signal, power, fiber optic and shielded contacts**
- **El Ochito® and SpeedMaster™ Size #8 high-speed contact comptabibility**

High-Pressure Ultraminiature Subsea Connectors

Series 701 SeaKing™ Junior

GLENAIR SERIES 701 SEAKING™ JUNIOR DELIVERS HIGH-PRESSURE SEALING AND RUGGED DESIGN IN A MINIATURE PACKAGE



Series 701 Flange Connector Receptacle

Series 701 Cable Connector Plug

STAINLESS STEEL OR TITANIUM SHELLS, MARINE BRONZE COUPLING NUTS

Available in ten sizes from 1 to 130 contacts, Series 701 connectors feature 316 stainless steel or marine bronze shells. Nitrile O-rings resist high temperature and corrosive chemicals.

10,000 PSI

These connectors withstand up to 10,000 PSI hydrostatic pressure in a mated condition. Consult the factory for open-face pressure sealed configurations.

SEAKING™ JUNIOR CONNECTOR CONFIGURATIONS AND CLASSES

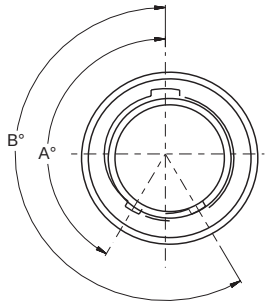
Series 701-001: Cable Connector Plug with Marine Bronze coupling nut

Series 701-016: Hermetic Flange Connector Receptacle with PC tail or solder cup contacts

Series 701-006: Epoxy Potted Flange Connector Receptacle with PC tail or solder cup contacts

SEAKING™ JUNIOR SPECIFICATIONS AND PLUG KEY POSITIONS

Series 802 Plug Key Positions



Key Position	Key Rotation A°	Key Rotation B°
Normal (N)	150°	210°
A	75°	210°
B	95°	230°
C	140°	275°

Performance Specifications	
Current Rating	#23–5 A, #20–7.5 A, • #16–16 A, #12–23 A
Dielectric Withstanding Voltage	#23–750 VAC, #20HD–1000VAC, #16 and #12–1800 VAC
Insulation Resistance	5000 megohms minimum
Operating Temperature	-65° C to +175° C
Hydrostatic Pressure	10,000 PSI mated, 1000 PSI open face (hermetic)
Shock	300 g.
Vibration	37 g.
Durability	2000 mating cycles

Material and Finish	
Shells, Jam Nuts	316 stainless steel or Titanium
CCP Coupling Nuts	Marine bronze, unplated
Contacts	Copper alloy, gold plated
Insulators	Composite thermoplastic
Retaining ring and hardware	316 stainless steel
Interfacial Seal (pin inserts only)	Fluorosilicone
O-rings and seals	Nitrile, 90 shore

I wonder what they all did to end up on postage stamps?

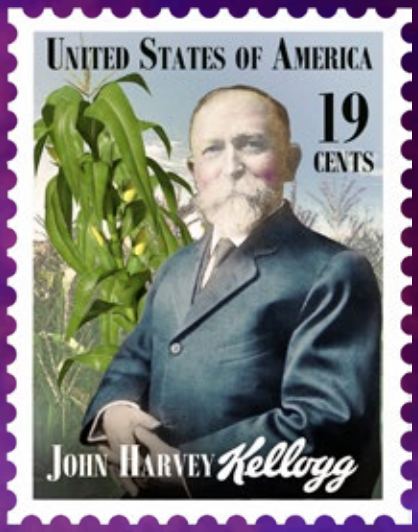
Answers posted May 15th • www.glenair.com/qwikconnect


AMERICAN INGENUITY
USA
3
CENTS
King C. Gillette


AMERICAN INVENTORS
USA
14¢
Percy Spencer


33
Sir John Harrington
1561 - 1612


American Industrialist
10
USA
Sam. Colt
1814-1862


UNITED STATES OF AMERICA
19
CENTS
JOHN HARVEY Kellogg


Frederick Morrison


BLACK HERITAGE
34
USA
GARRETT A. MORGAN


REPUCLIQUE FRANCAISE
30c
POSTES
1572 - 1626
PETER CHAMBERLEN

SUPER G55™ High-pressure, dry-mate underwater connectors

The SuperG55™ series of dry-mate deep water high-pressure connectors is a revolutionary new design based on the popular industry standard used in countless ROV, underwater camera, diver communications, lights, pan and tilts, and other deep subsea equipment. The SuperG55™ is manufactured from 316L Stainless Steel with insert molded contact assemblies designed for pressure-sealed applications up to 10K psi mated and unmated. Intermateable and intermountable with other "55" series connectors, the Glenair solution introduces a long list of innovations designed to improve performance and durability. Our PBOF versions, for example, utilize easy-to-assemble threaded fittings which deliver superior sealing performance while reducing installation time. Other innovations include full-mate inspection ports, improved solder cup contact design and more. Cable plugs and receptacles are available in attachable (user-terminatable) versions as well as factory overmolded single-ended whips.

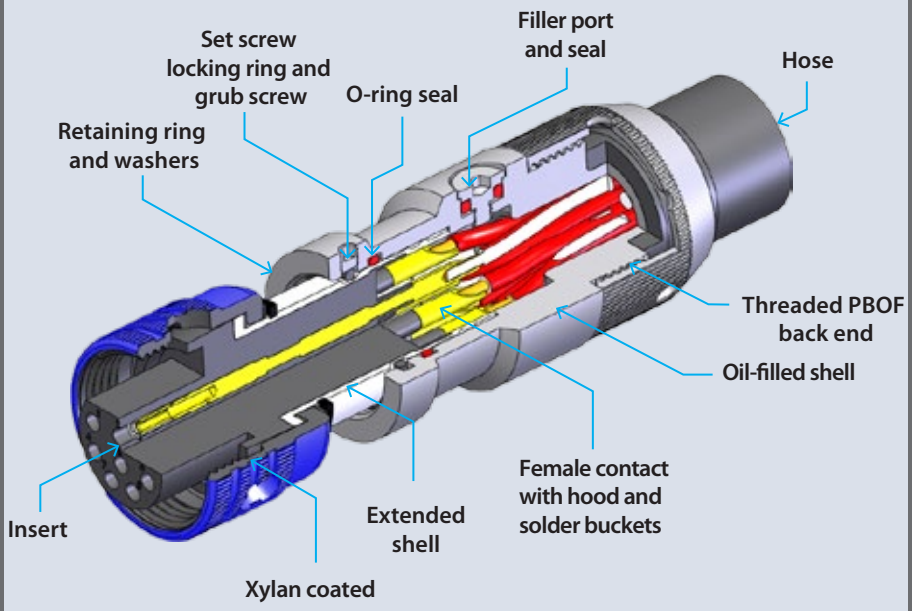
Modular valvepack intelligent control system for a complex underwater system equipped with Glenair SuperG55 connectors

- **10,000 psi mated/ unmated (approx. 22,500 ft / 7,000m)**
- **Recessed socket contacts in plugs for electrical safety**
- **Intermateable and intermountable with other "55" series connectors**
- **3 shell sizes: 15, 20 and 24 and 3 to 21 contacts**
- **PBOF versions available**
- **600 VDC, 5 to 18 Amps (dependent on conductor and cable size and make-up)**

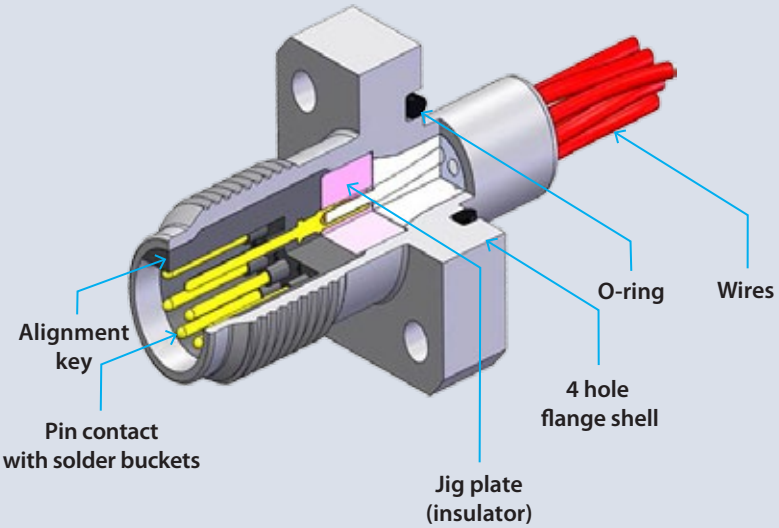
SuperG55™ High-Pressure, Dry-Mate Underwater Connectors

for deep water applications

SUPERG55™ PRESSURE-BALANCED OIL-FILLED CABLE CONNECTOR PLUG (CCP)



SUPERG55™ FLANGE CONNECTOR RECEPTACLE (FCR)



SuperG55™ Performance Specifications	
Mating Cycles	500
Pressure	689 Bar (10,000 PSI) Mated and Un-mated
Operating Temperature	-20°C to +90°C
Voltage Rating	600 VDC / 440 VAC
Current (max.)	5 to 18 Amps (dependant on contact and cable conductor sizes)

SuperG55™ Material/Finish	
Shells	316L Stainless Steel/ Passivated
Insulator	PEEK/NA
Insert	Neoprene/NA
Contacts	Copper Alloy/Gold Plated
O-rings	Nitrile/NA
Overmold and Cable	Polyurethane or Neoprene/NA
Coupling Nut	316L Stainless Steel/ Protective Coating Blue
Bulkhead Receptacle Tails	PTFE Insulated 16 AWG Wire/NA
Cable	Polyeurethane or Neoprene Jacketed/NA

NON-STANDARD MATERIALS: Other material options are available including anodized aluminium, titanium, and aluminium bronze. Glenair is also able to supply SuperG55™ interconnects in composite thermoplastic (PEEK) to meet application requirements for reduced cathodic corrosion as well as weight reduction without affecting connector performance.

HIGH-SPEED ETHERNET: The SuperG55™ Ethernet option is available in the 1508, 2013, and 2021 contact configurations and provides both high-speed (Up to 1GB) and power (600 Volts) in a full subsea environment (10,000 psi). Gigabit speed data transfer up to a distance of 75 meters.

HMI Lighting Connectors: Quarter-turn bayonet connectors for head-to-ballast HMI lighting

Theatrical lighting demands reliable, built-to-last connectors and cables. Durability and safety is crucial for interconnection between ballast and lamps. Glenair Series 928 quarter-turn bayonet connectors meet demanding European "VG" standards for performance, durability and ruggedness. Available in all standard lighting industry configurations, these connectors feature electrocoated aluminum housings, neoprene inserts and machined copper alloy contacts.

UL LISTED, ROHS COMPLIANT

Series 928 connectors are part of Glenair's ITS power product family. VG approved Series ITS quarter-turn bayonet connectors are available in hundreds of arrangements and dozens of styles. Used worldwide for urban rail systems , construction equipment, and military equipment, the ITS connector is recognized as a "go to" solution wherever there is a need for rugged power interconnects. Glenair's ITS connectors are recognized under the Component Recognition Program of UL, file number E328968.

- **Robust coupling mechanism for the area most affected by wear and tear**
- **Arctic Coupling nut and RadGrip**
- **A snag-less clamp and seal mechanism for every cable type and/or size (EZ-Clamp)**
- **Connectors compatible with all major HMI Lamp manufacturers from 400w to 24kW**

HMI Lighting Connectors

Quarter-turn bayonet connectors for head-to-ballast HMI lighting

Available in Black, Yellow, Red, Blue, Light Green, Orange and Grey.

RADGRIP™ RUBBER COUPLING RINGS

For better grip, improved durability

Glenair Series 928 plugs with RadGrip™ rubber coupling rings feature wide, easy-to-grip castellations as well as a raised thumb tab. Built for maximum durability and mechanical protection, RadGrip™ is the perfect solution for advanced protection against shock, cold weather, and other sources of mechanical damage. In addition, RadGrip™ facilitates rapid mating and demating of connectors, particularly in cold or wet environmental conditions. The highly durable rubber compound may be specified in seven different colors for improved connector and cable identification.

HEAVY DUTY COUPLING RINGS

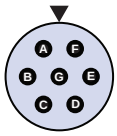
Extended length aluminum ring with oversized flutes for easy mating and damage resistance

Glenair Series 928 plugs with heavy-duty aluminum coupling ring are electrocoated with scratch-resistant black polymer. These rings feature a lengthened profile with enlarged flutes for easy mates and de-mates.

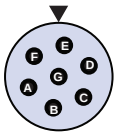
INSERT ARRANGEMENTS, FEATURES, SPECIFICATIONS

Available contact arrangements

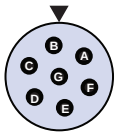
14S-07
7 #16 Contacts



24-2
7 #12 Contacts

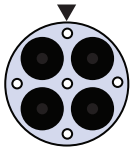


24-2W
7 #12 Contacts
Insert rotated 80°



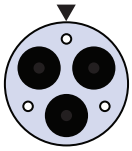
24-2Z
7 #12 Contacts
Insert rotated 280°

24-11
6 #12 Contacts
3 #8 Contacts

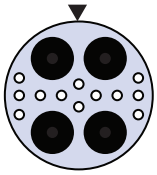


28-09
5 #16 Contacts
4 #4 Contacts

28-10
3 #12 Contacts
2 #8 Contacts
2 #4 Contacts



28-22
3 #16 Contacts
3 #4 Contacts



32-68
12 #16 Contacts
4 #4 Contacts

- ¼ turn bayonet lock for secure attachment
- Intermateable, interchangeable with "VEAM" type connectors
- Machined contacts
- Durable polymer electrocoat finish
- UL #E328968 recognized
- IP67 ingress protection
- Operating temperature: -55°C to +125°C.
- Suggested maximum operating voltage: 500 VAC
- Current rating: size #4 contact 80 A, size #8 46 A, size #12 23 A, size #16 13 A
- Meets mechanical, electrical and environmental requirements of MIL-DTL-5015 and VG95234

STAR-PAN™

JTAC-Tough™ multiport power and data hubs for digitally aided close air support and ground soldier C4ISR applications

EXAMPLES OF STAR-PAN™ SUPPORTED EUDs, PERIPHERALS, RADIOS, AND BATTERIES

Connectorized Juggernaut.Case™

Connectorized Kägwerks EUD case

Laser range finders and IR goggles

TacROVER ISR receiver

DAGR and other GPS/ navigation systems

PRC-117G manpack and vehicle-mounted radios

AN/PRC-154 Rifleman radios

MBITR PRC-148 radios

Hand-held tactical PRC-152A radios

BB-2590 or BA-5590 battery

Conformal Wearable Battery (CWB)

Universal field charging station

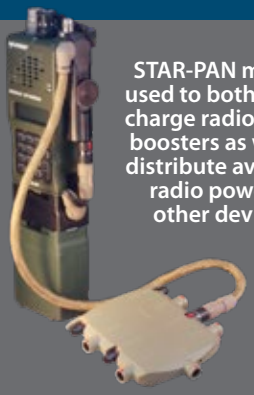
Handheld radio battery

JTAC-TOUGH STAR-PAN™

Multiport USB hub / power distribution technology for DACAS and other dismounted soldier missions

GLENAIR

STAR-PAN™



STAR-PAN may be used to both trickle charge radio power boosters as well as distribute available radio power to other devices.

SMART POWER = LONGER MISSIONS, LIGHTER LOAD

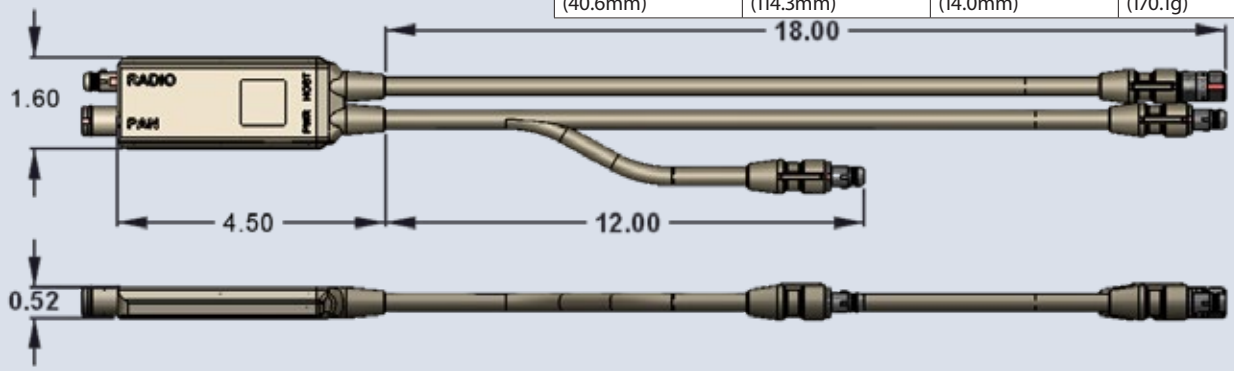
From the JTAC's perspective, STAR-PAN is primarily a high-speed data transmission and routing device. But its second core function—smart power monitoring, conditioning and charging—turns STAR-PAN into a powerful tool for extended mission life and operational effectiveness. *Smart power equals longer missions, lighter load*. STAR-PAN significantly reduces the number of batteries that must be carried by the soldier. Available interconnect cabling and power adapter accessories facilitate accelerated charging of the EUD, radio and peripherals as well as scavenged power from DC sources such as vehicles.

Glenair multiport STAR-PAN™ USB hub and power distribution systems are engineered and manufactured under one ISO 9001:2008 and AS9100D certified quality system in our 1,000,000 sq. ft Southern California factory. All components, from the I/O interconnects to the precision-machined enclosures are produced in-house by Glenair. The STAR-PAN™ system is designed for maximum compatibility with non-proprietary USB data interfaces, and is capable of smart charging and power distribution for the broad range of military batteries, as well as from Direct Current (DC) power sources including vehicle power, solar panels, kinetic energy devices and fuel cells.

Export of STAR-PAN™ USB Hub/Power Distribution systems is restricted and/or controlled by U.S. Department of Commerce Export Administration Regulations

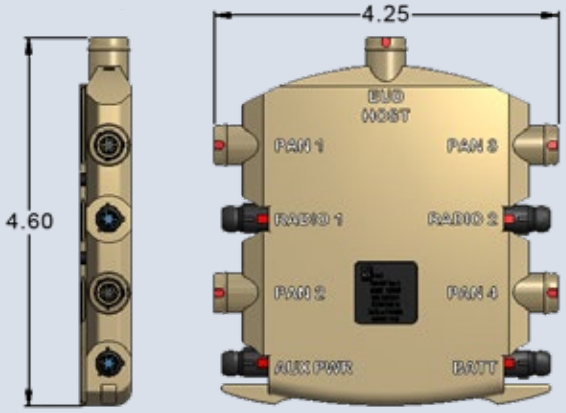
STAR-PAN II ULTRA LOW-PROFILE DESIGN

Width ≤1.60" (40.6mm)	Length ≤4.50" (114.3mm)	Thickness ≤0.55" (14.0mm)	Weight 6.0 oz. (170.1g)



STAR-PAN VI ULTRA LOW-PROFILE DESIGN

Length ≤4.60" (116.9mm)	Width ≤4.25" (108.0mm)	Thickness ≤0.65" (16.5mm)	Weight 12.50 oz.* (354.4g)



*Tolerance: 0.xx ± 0.03 · 0.xxx ± 0.005. * Weight does not include MOLLE POUCH or dust caps. Dimensions are for reference only.*

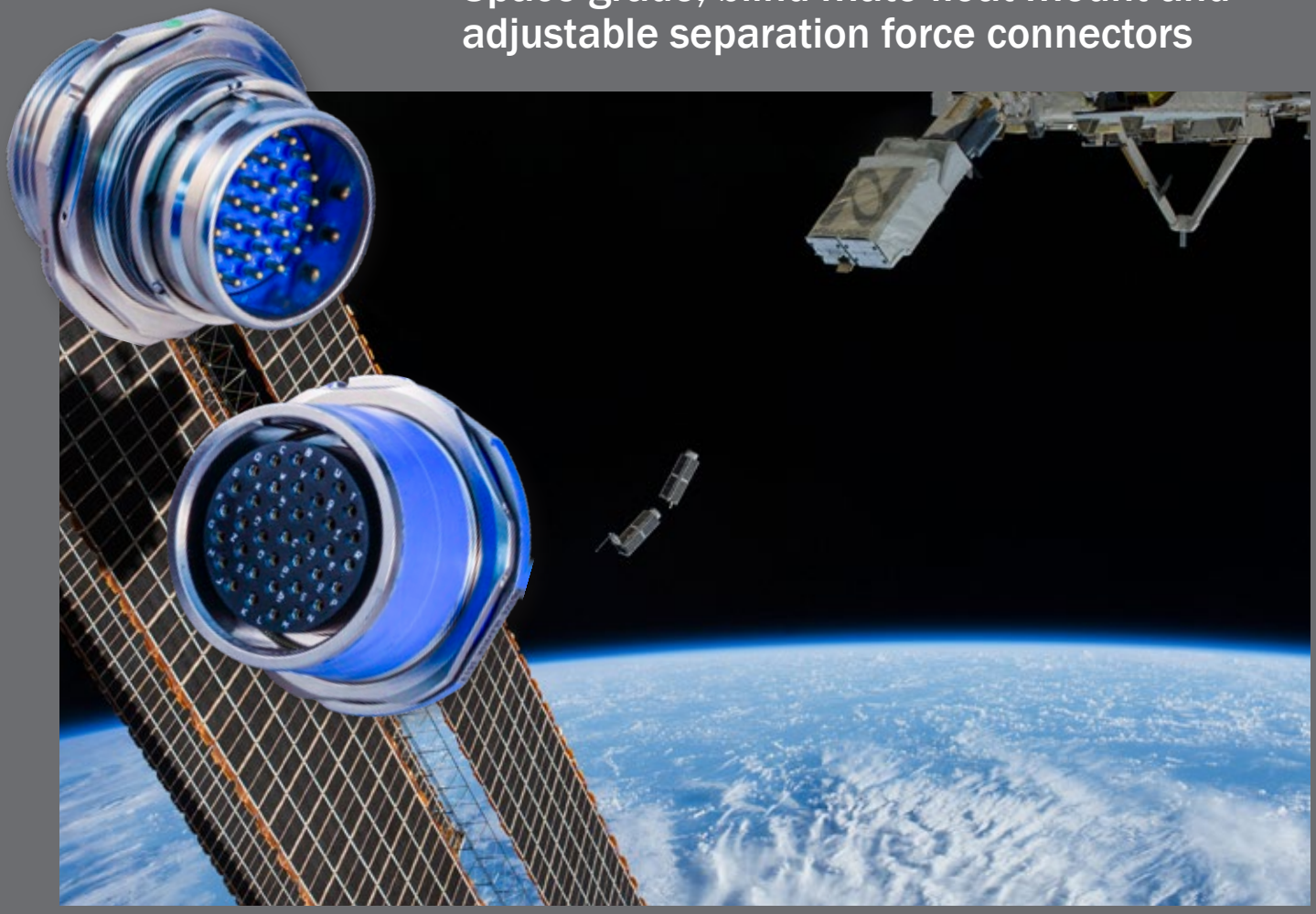
STAR-PAN II AND VI APPLICATIONS

- Digitally Aided Close Air Support (DACAS)
- Video data uplink
- SATCOM GPS
- Search and rescue
- Strategic UAV support

SPACE-GRADE
ENVIRONMENTAL
BLIND-MATES

SuperNine®

Space-grade, blind-mate float-mount and adjustable separation force connectors



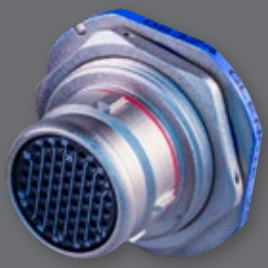
Application: Glenair Series 253 blind-mate connectors are designed for use in commercial rack-and-panel instrumentation applications, as well as a blind-mate solution for satellite deployment, scientific research and development payloads, interstage, UAV, and munitions release and more.

- **Blind-mate, fixed and float-mount interconnects for non-ITAR commercial as well as military/defense applications**
- **Adjustable separation force (AKA assisted-release, zero extraction force) solutions**
- **Misalignment accommodation and special auxiliary sealing for trouble-free blind mating in environmental 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. Consult factory for PC tails, dual-flange standoffs, custom blind-mate configurations, and hermetically sealed options**

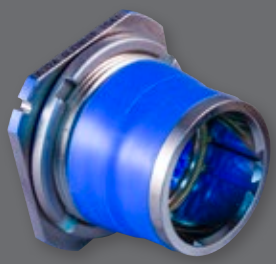
SuperNine® Space-grade, blind-mate float-mount and adjustable separation force connectors

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

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

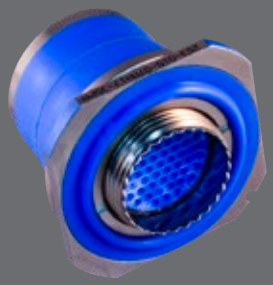


Roll-off nose: allows for the smooth disconnection of blind mate plugs and receptacles. Without this feature, connectors can catch or hang during mate and demate.

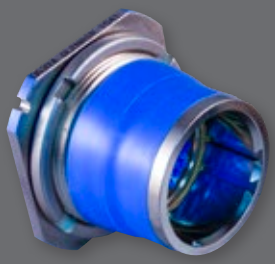


Float mounting: allows for a modicum of coplanar movement of the receptacle during rack-and-panel and other blind mate applications, preventing both contact and shell damage.

Misalignment accommodation: Additional radial, axial, and angular misalignment during mating is accounted for in the receptacle design with integral wave springs.



Sealing: Misalignment accommodation makes environmental sealing difficult in blind-mate connectors. The problem is solved with auxiliary external seals.



EMI shielding: Glenair incorporates ground springs in receptacle connectors as well as grounding fingers in special coupling nut-equipped plugs (253-018-G6 feed-thru shown) to optimize 360° shell-to-shell continuity.

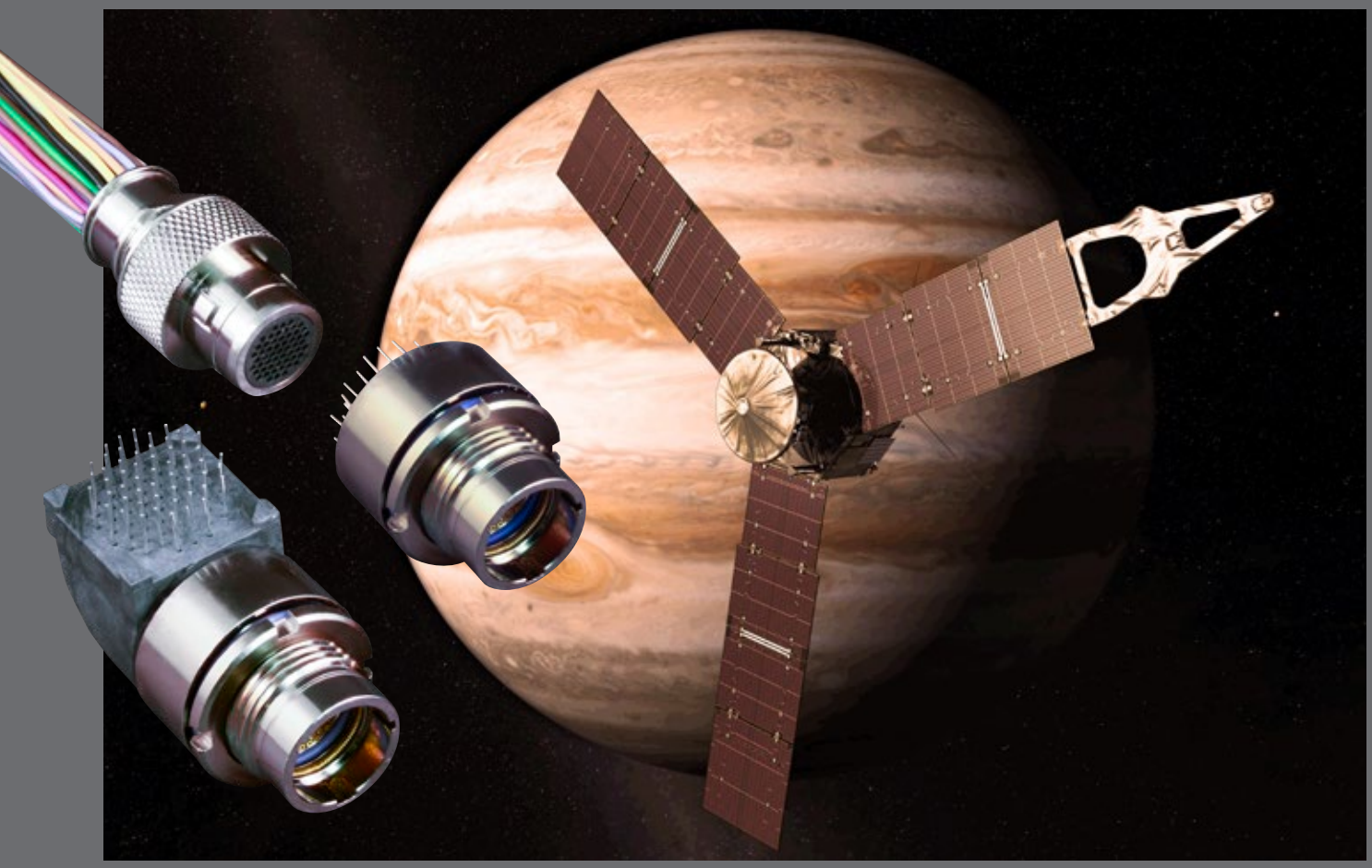
Assisted separation force: Glenair supplies two styles of spring-loaded blind-mate connectors. **Adjustable kick-off styles** feature spring-loaded posts on the plug and an adjustment ring on the receptacle used to calibrate separation force. A second style uses wave springs on the shell body.

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

MIL-GRADE
NANOMINIATURE CONNECTORS

nano circular

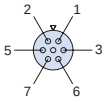
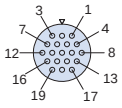
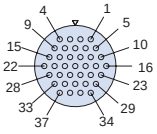
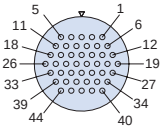
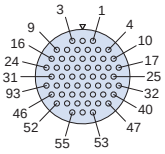
High-performance, small form factor, weight saving connectors



Glenair high-performance Nanominiature connectors are built to exacting military/aerospace standards and utilize high-performance TwistPin contacts—the preferred alternative to stamped and formed contacts in Nanominiature connections. Circular breakaway and threaded connectors are available in 6 ultra high-density shell size/contact arrangements with 4 to 55 contacts set on .025" centers. The series includes front panel mount, rear panel mount and inline plugs and receptacles. Three wire type options are supported including ultra lightweight XLETFE with silver-coated high-strength copper; extruded PTFE with silver-coated copper; and cross link modified ETFE with high-strength silver-coated copper. Direct PCB termination is supported with both thru-hole and surface mount configurations.

- **1 Amp current rating**
- **.025 Inch (0.64 mm) contact spacing**
- **#30 and #32 gage wire accommodation**
- **Aluminum, titanium or stainless steel shells**
- **Gold alloy TwistPin contact system**
- **Thru-hole and surface mount PCB connectors**

Series 89 Nano Circular Receptacle Mating Face View and Contact Layouts

Size 1-4, 4 Contacts	Size 1-7, 7 Contacts	Size 2-19, 19 Contacts	Size 3-37, 37 Contacts	Size 4-44, 44 Contacts	Size 4-55, 55 Contacts
					

Nano Circular Connectors

The smallest and lightest connector with mil-spec pedigree

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

THREE REASONS TO CHOOSE TWISTPINS

1. Gas-Tight Crimp Joint

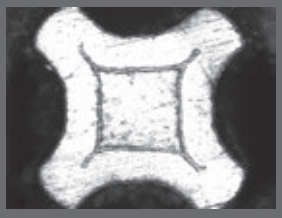
TwistPin contacts assure gas-tight crimp joints for stable resistance after years of environmental exposure. The photograph below demonstrates the superiority of a gas-tight, void-free 4-indent crimp.

2. Better Shock and Vibration Performance

The nanominiature TwistPin contact is made from six strands of wire.The five outer strands provide multiple points of contact with the mating socket contact for superior shock and vibration performance.

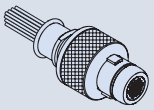
3. Corrosion-Proof Contact Alloy

Both the TwistPin contact and the mating socket contact are made from a special alloy consisting of 71% gold, 8% platinum and 5% silver alloyed with copper and zinc.

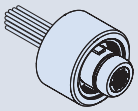


Transverse cross-section of a TwistPin contact crimp, solid wire

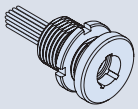
NANO CIRCULAR SELECTION GUIDE



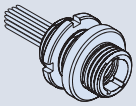
892-007 Breakaway Plug



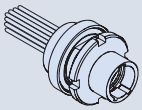
892-006 Threaded Plug



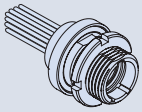
892-000 Front Panel Mount Breakaway Receptacle



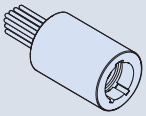
892-001 Front Panel Mount Threaded Receptacle



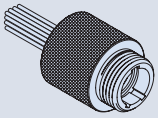
892-002 Rear Panel Mount Breakaway Receptacle



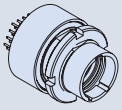
892-003 Rear Panel Mount Threaded Receptacle



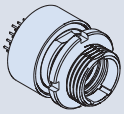
892-004 Inline Breakaway Receptacle



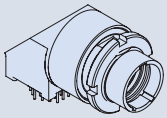
892-005 Inline Threaded Receptacle



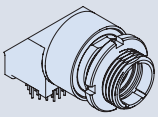
893-008 Rear Panel Mount, Breakaway Receptacle with PC Tails



893-009 Rear Panel Mount, Threaded Receptacle with PC Tails



893-010 Rear Panel Mount, Breakaway Receptacle with Right Angle PC Tails



893-011 Rear Panel Mount, Threaded Receptacle with Right Angle PC Tails

LIGHTWEIGHT
HERMETIC
CONNECTORS

CODE RED

Lightweight, low-resistance, "Mission-Critical" hermetic sealing with 1X10^{-7} leak-rate performance

Hermetically-sealed interconnects used in vacuum or high-altitude applications prevent moisture and other contaminants from damaging sensitive electronic equipment. Glass-to-metal hermetic sealing has been the gold standard in the aerospace and petrochemical industries for decades due to the strength and long-term durability of the materials used. But glass-to-metal seal hermetics come with a big price tag in both weight and electrical resistance. CODE RED is an innovative sealing encapsulant and application process invented by Glenair that provides durable hermetic sealing in a lightweight aluminum package. CODE RED allows for the use of gold-plated copper alloy contacts, significantly improving electrical performance. CODE RED hermetic connectors are available now in SuperNine® (D38999 Series III type metal and composite), Mighty Mouse, and M24308 D-Sub; and deliver reliable, life-of-system 1X10^{-7} max leak-rate hermetic sealing. Special non-magnetic (zero residual magnetism) versions are also available, consult factory.

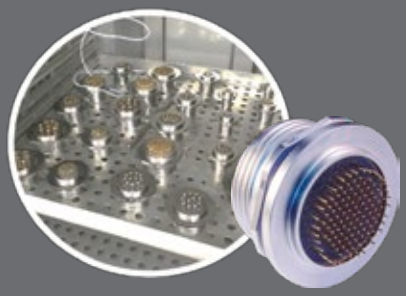
CODE RED: Available today in Mighty Mouse 806 Mil-Aero, M24308/9 D-Sub and D38999/23

- 1X10^{-7} hermetic sealing in a lightweight aluminum shell
- Low-resistance gold-plated copper contacts
- Passed full D38999/23 qualification testing
- Meets NASA outgassing and aerospace temperature/corrosion resistance standards
- Operating temperature -65°C to +200°C
- Up to +50% weight savings
- Improved current carrying capacity and electrical resistance compared to Kovar/ Inconel solutions

Code Red Hermetic Connectors

Lightweight, low-resistance "Mission-Critical" hermetic sealing solution

CODE RED LIGHTWEIGHT HERMETIC CONNECTOR TESTING AND VALIDATION



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

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

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

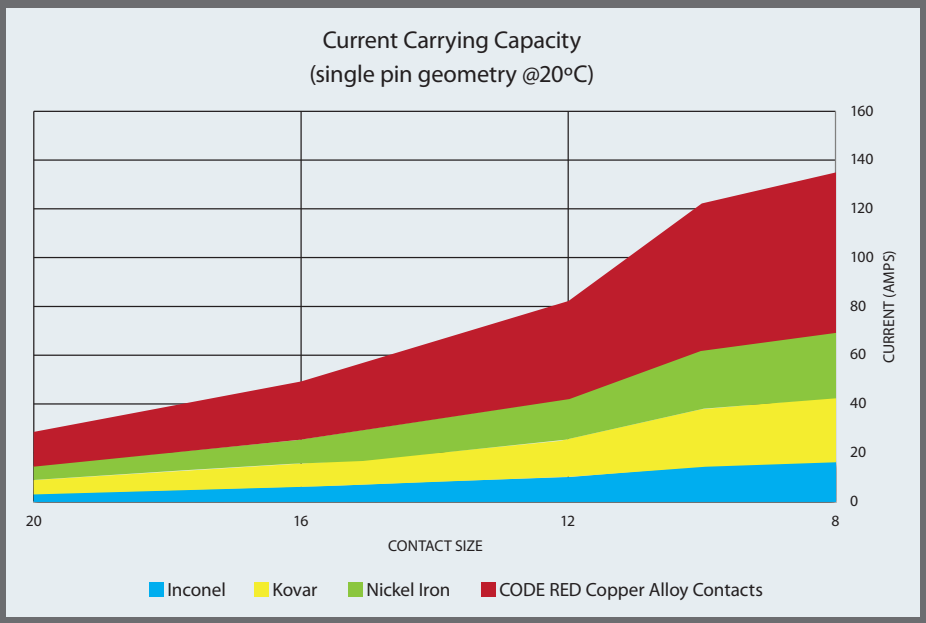
CODE RED USES PROVEN-PERFORMANCE CONNECTOR AND CONTACT MATERIALS

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

*zero residual magnetism materials also available

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

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



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

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

HIGH-PERFORMANCE
COLD-SHRINK
TUBING

AUTOSHRINK™

The fast and easy cold-action shrink tubing solution

Designed for rugged weathering, UV and ozone-resistant performance, Glenair AutoShrink is the one-piece easy-action solution for Turboflex™ cable and lug termination, splice insulation, and Duralectric® jacketing repair. Universal design AutoShrink tubing delivers reliable and durable sealing as well as mechanical protection for cable end terminations in harsh military and industrial applications. Built from Glenair Duralectric material, AutoShrink is fully hydrophobic and resistant to caustic chemicals and solvents. Easy-action spiral hold-out and large cold shrink ratio makes for fast installation and durable, split-resistant performance.

- **Ideal for repair of cables and conduit with Duralectric® jacketing**
- **Reliable IP68 sealing**
- **3000 VAC rated**
- **Multiple color options**
- **Service temperature range: -65°C to 225°C**
- **Fire-resistant, Low Smoke-Zero Halogen (LSZH)**
- **Mil-aero and industrial fluid-resistant**
- **Accelerated UV/sunlight resistant, 53 year equivalent exposure**
- **Ozone resistant IAW ASTM D518**

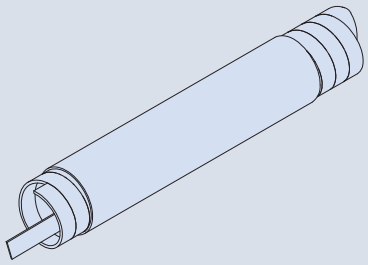
Fast and easy repair of Duralectric-jacketed cables

Utilize for termination of lugs on new installations

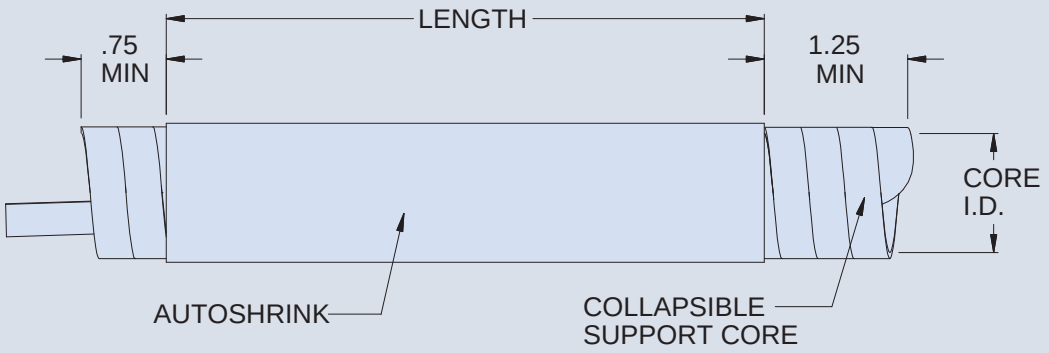
Broad range of colors for safety marking and cable identification

AutoShrink™

Duralectric cold-action shrink tubing



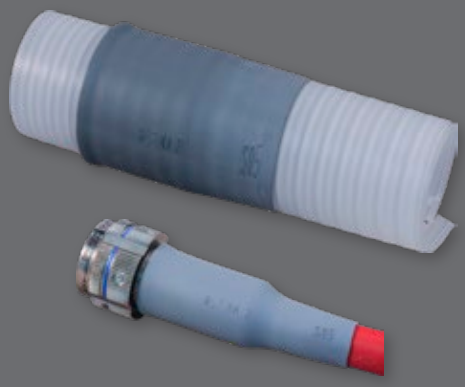
How To Order				
Sample Part Number	**777-004**	**-01**	**-6**	**-0**
Product Code-Basic No.	AutoShrink			
Size Code	See Table I			
Length	in Inches. 3" min., 12" max.			
Color Code	See Table II			



Note: **779-005** Adhesive (sold separately) may be specified for applications that require extraordinary environmental sealing performance

Table I - Size, Dimensions, Wire Bundle Range

Dash No.	Tube I.D. after unrestricted shrinkage (ref)		As Supplied Core I.D.		Ref. Wire Bundle Range min / max	
	In.	mm	In.	mm	In.	mm
01	0.250	6.4	0.80	20.3	0.35 / 0.65	8.9 / 16.5
02	0.375	9.5	1.18	30.0	0.55 / 1.00	14.0 / 25.4
03	0.625	15.9	2.00	50.8	0.85 / 1.65	21.6 / 41.9
04	0.750	19.1	2.34	59.4	1.00 / 2.00	25.4 / 50.8
05	0.937	23.8	2.75	69.9	1.25 / 2.50	31.8 / 63.5
06	1.437	36.5	4.00	101.6	2.00 / 3.85	50.8 / 97.8



Sneak Peek: AutoShrink Boots

Fast, easy-to-install environmental sealing for cable-to-connector terminations. No heat gun needed! Designed for use with Duralectric cable jacketing. Consult the factory for available sizes, styles, and colors.

Table II - AutoShrink Color Option

Code	Color	Reference
0	Black	FED-STD-595C; #17038
1	Desert Tan	FED-STD-595C; #33446
2	Red	FED-STD-595C; #11120
3	Orange	FED-STD-595C; #12300
4	Yellow	FED-STD-595C; #13591
5	Green	FED-STD-595C; #14193
6	Blue	FED-STD-595C; #15125
7	Purple	FED-STD-595C; #17142
8	Gray	FED-STD-595C; #26270
9	White	FED-STD-595C; #17875

NOTES

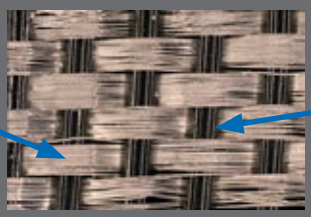
Length in expanded form may be less than length after unrestricted shrinkage.
Material: Duralectric per GPS67-E1
Extruded wall thickness: .062"

MasterWrap™

Flexible, lightweight wraparound EMI/RFI shielding and abrasion protection material

Tubular braided sleeving meets the broad range of EMC shielding and mechanical protection requirements of aircraft harness assemblies. But the need to apply conductive shielding materials over installed aircraft wire and cable bundles requires new technology. Legacy self-wrapping cable braid has long been available for EMI/RFI applications and abrasion protection, albeit with poor performance due to its heavy weight, inflexibility, and "windowing," which results in poor shielding performance. MasterWrap™, a lightweight, easy-to-install, side-entry, self-wrapping shielding solution —incorporating Glenair microfilament ArmorLite™ and composite thermoplastic PEEK fibers—solves these problems and more. MasterWrap™ is ideally suited for both long-run wire harness protection as well as spot coverage and maintenance of EMC cable applications—all with outstanding weight reduction and ease-of-assembly. MasterWrap™ is qualified for use at major aircraft manufacturers for both long cable runs and spot coverage and repairs.

Material design provides uniform surface with limited interference to structures and clamps. Reduces kinking and windowing compared to full metal braid solutions for excellent shielding performance



Interwoven with high-temperature PEEK composite thermoplastic spring members that ensure up to 95% optical coverage

- **Up to 70% weight reduction compared to standard metallic EMI shielding**
- **Fast and easy side-entry installation and removal**
- **Reduces windowing and coverage gaps**
- **Superior flexibility, durability and repairability**
- **Temperature tolerant from -65°C to 200°C**
- **Outstanding abrasion and mechanical protection**
- **500 hour salt spray corrosion resistance**
- **50,000 cycle 90°–120° bend flex tested**

MasterWrap™ flexible, lightweight wraparound EMI/RFI shielding and abrasion protection

with ArmorLite™ technology—for spot EMI/RFI shielding coverage and repair of wire harnesses

MasterWrap™

HERE'S WHAT YOU NEED TO KNOW ABOUT WEIGHT

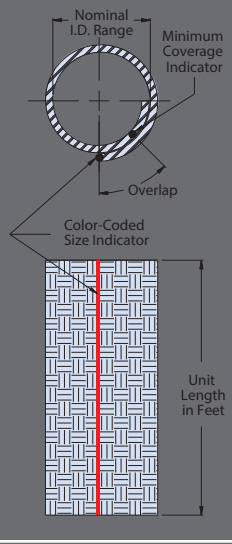
Weight of standard metallic tubular braided cable shielding		
EMI Braided Shielding Type (measured samples all 1/2" diameter)	Weight g/ft	Weight g/m
Glenair nickel-clad copper braid	21.6	70.9
Raychem RAY-103-12.5 nickel-clad copper braid	21.9	72.0
Weight of lightweight tubular (LWB) braided cable shielding		
AmberStrand® 100%	3.7	12.1
AmberStrand® 75% / NiCu 25%	4.9	16.1
ArmorLite™ 100%	4.4	14.4
ArmorLite™ 75% / NiCu 25%	5.4	17.7
Raychem INSTALITE	13.4	44.0
Weight of side-entry self-wrapping braided cable shielding		
MasterWrap™	6.2	20.3
Federal Mogul ROUNDIT® EMI FMJ	18.0	59
Federal Mogul ROUNDIT® EMI C27 XWS	23.5	77

Mechanical and Environmental Performance Summary		
Vibration	No evidence of wear or visible defect	DO-160G Cat S and H
Abrasion	No evidence of wear, visible defect or electrical degradation	EN-3475-511:2002
High Temperature Exposure	168 hours at 200°C; no visual or electrical degradation	EN 6059-302 part 302
Rapid Change of Temperature	10 hour hot and cold cycling; no evidence of wear or visible defect	EN 6059-308 part 308
Vertical Flammability	Pass	14 CFR part 25.853
Fluid Immersion Testing	No visual or electrical degradation	DO-160G
Bending Properties	25000 cycles; no breakage, no plating delamination	EN 6059-402
Salt Fog 500 Hours	No evidence of base metal on braid	ASTM B117-03 NaCl 5%

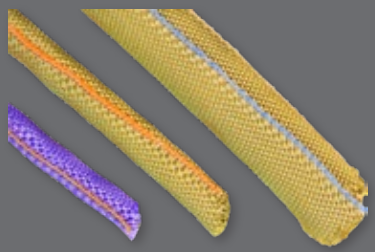
MasterWrap is compatible with most aerospace industry fluids. Consult factory for specifics.
DuPont™ Nomex® is a registered trademark of E.I. duPont de Nemours and Company.

WHAT YOU NEED TO KNOW ABOUT EMI/RFI SHIELDING PERFORMANCE

	NiCu	Armorlite™	Amberstrand®	MasterWrap™
TRANSFER IMPEDANCE (Per IEC 62153-4) • (Max values for 1/2 inch diameter shields)				
FREQUENCY				
10 KHz	5 mΩ/m	50 mΩ/m	60 mΩ/m	40 mΩ/m
100 KHz	5 mΩ/m	50 mΩ/m	60 mΩ/m	40 mΩ/m
1 MHz	12 mΩ/m	50 mΩ/m	60 mΩ/m	40 mΩ/m
10 MHz	80 mΩ/m	50 mΩ/m	80 mΩ/m	40 mΩ/m
100 MHz	130 mΩ/m	30 mΩ/m	110 mΩ/m	80 mΩ/m
SHIELDING ATTENUATION (Per IEC 62153-4) • (Min values for 1/2 inch diameter shields)				
FREQUENCY				
1 GHz	38 dB	55 dB	48 dB	40 dB
3 GHz	40 dB	60 dB	55 dB	35 dB
5 GHz	44 dB	60 dB	60 dB	45 dB
8 GHz	40 dB	50 dB	60 dB	40 dB
WEIGHT	**70.9 g/m**	**14.4 g/m**	**12.1 g/m**	**20.3 g/m**



ALSO AVAILABLE: MASTERWRAP™ (NOMEX®)

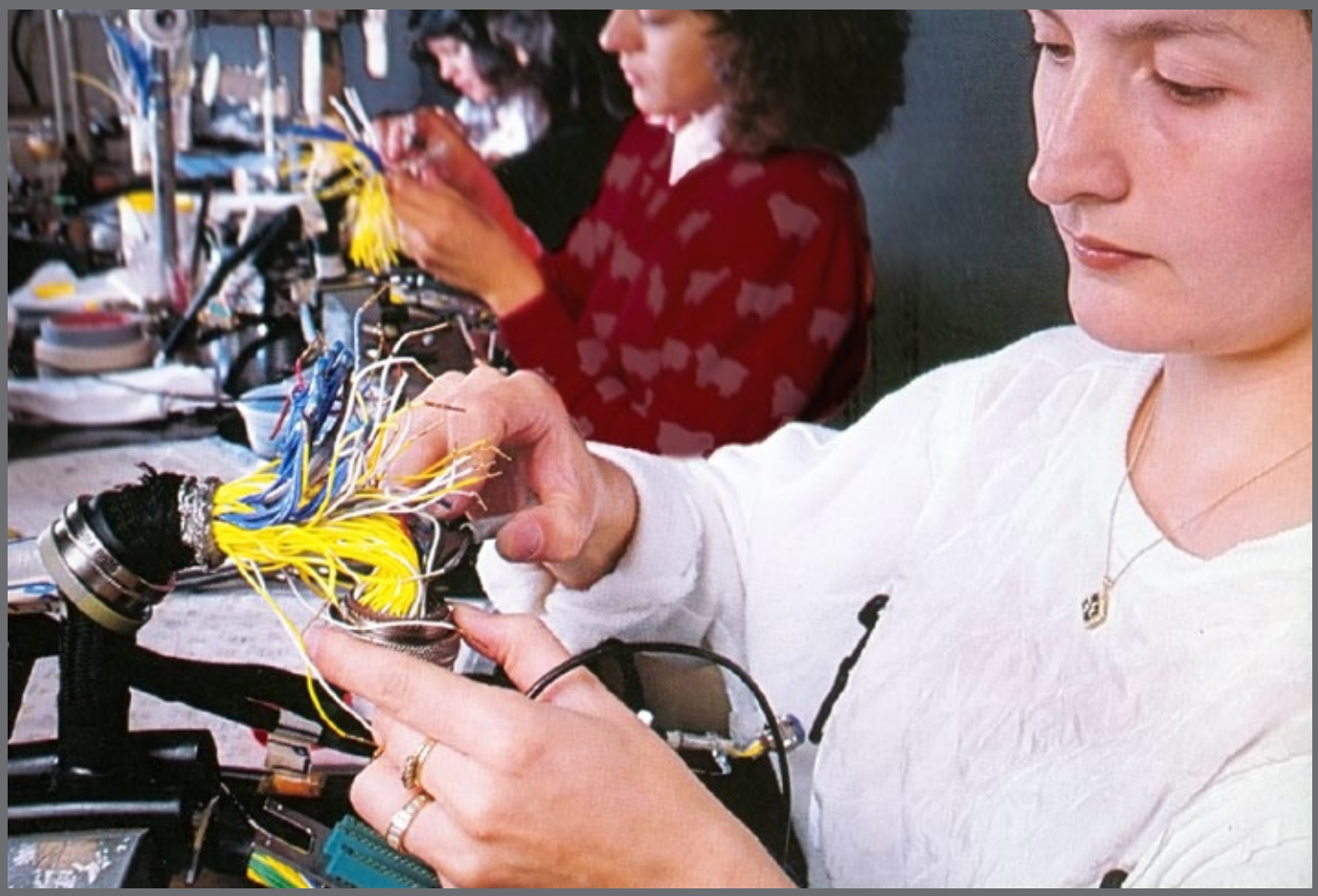


The ideal solution for mechanical abrasion protection of wire bundle harnessing. Available color selections allow for easy identification and labeling of wire circuitry.

This table is a useful summary of MasterWrap™ shielding performance compared to NiCu and lightweight braid. Transfer impedance and shielding attenuation data is supplied for 1/2" diameter test samples. At high frequencies, both LWB and MasterWrap™ provide comparable and even superior performance to nickel-copper due to reduced windowing and superior optical coverage with significant reduction in weight. Further improvements in high-frequency shielding attenuation can be achieved using conductive tape wraps and/or via hybrid blends of LWB and NiCu.

LIGHTWEIGHT CONNECTOR CAVITY PLUGS

Dummy Contact Sealing Plugs (DCSP) For reliable sealing of unused contact cavities—without the use of electrical contacts



The use of color-coded M27488 type plastic sealing plugs in unused contact cavities is a requirement in all environmental interconnect applications (IAW NA01-1A-505-1, WP 007 00 or 020 00). Conventional sealing plugs, combined with the connector grommet seal, provide reliable dust and moisture ingress protection. But common contact sealing plugs still require that a properly-sized electrical contact be first inserted into the cavity, followed by the plastic plug. Glenair innovative Dummy Contact Sealing Plugs (DCSP) eliminate the need to use expensive electrical contacts as part of the sealing regimen. Fast and easy-to-install, these longer form-factor Dummy Contact Sealing Plugs (DCSP) are a one-piece solution to contact cavity sealing that results in significant reduction in weight, material cost, and assembly labor. Available in Size #22 to Size #8, for connector series D38999, EN4165, Series 800 Mighty Mouse, EN4644 and ARINC 600.

- **Powerful EWIS weight reduction tool—reduce weight as much as 90% compared to conventional contact/sealing plug configurations**
- **Eliminates use of expensive electrical contacts for sealing-only applications**
- **Leverages connector contact clip for secure retention of the sealing plug—No FOD**
- **Easy-to-install single piece design**

Dummy Contact Sealing Plugs (DCSP)

for reliable sealing of unused contact cavities and weight reduction in electrical wire interconnect systems

Dummy Contact Sealing Plug (DCSP) Selection Guide

Connector Series	Crimp Removable Contact Cavity Size						
	23	22	20	16	12	8	8 w/ Boot
D38999 Series I, III, IV	680-116-23	680-116-22	680-116-20	680-116-16	680-116-12	680-116-8	680-116-8B
D38999 Series II							
EN4165							
Series 800–805 Mighty Mouse							
EPX		680-116-22	680-117-20			680-117-8	680-117-8B
ARINC 600							
Series 806 Mighty Mouse Mil-Aero		680-120-22HD	680-120-20HD				

INSTALLATION OF DUMMY CONTACT SEALING PLUGS (DCSP)

1. Insert Dummy Contacts into unused contact cavities.
   A. Dummy Contacts may be installed using contact insertion tool, needle nose pliers or by hand (space permitting).
   B. Isopropyl alcohol may be used to facilitate insertion of Dummy Contacts.
2. Push Dummy Contact into cavity until flange locks into contact retention clip.
3. Attempt to pull Dummy Contact from connector body to ensure full retention.

Important note: Size #22 Dummy Contacts In 38999 socket cavities

4. Dummy Contact shall only be inserted into cavity far enough to engage retention clip.
5. Pull Contact back for maximum tail exposure.

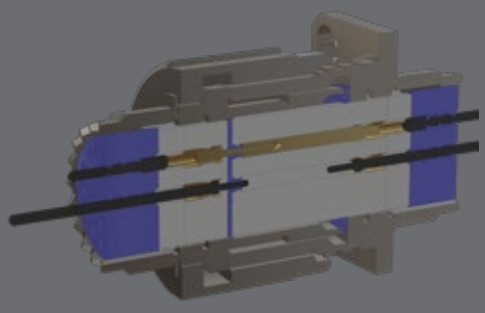
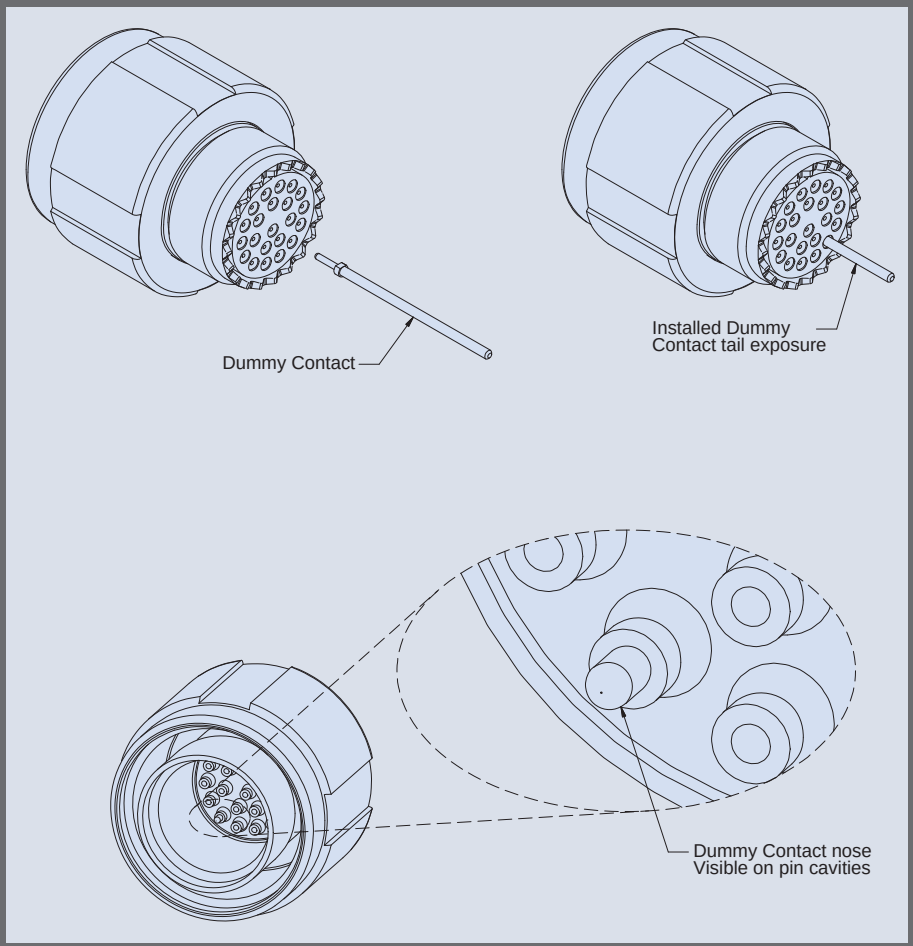


Illustration shows conventional sealing plug / contact configuration (top) and long form-factor Dummy Contact Sealing Plugs (bottom).



NEXT-GENERATION
SWING-ARM™
FLEX

SWING ARM®
COMPOSITE THREE-IN-ONE BACKSHELL
FLEX

Composite

3-in-1 lightweight composite backshell with drop-in braid termination follower

600-091 backshell-to-connector holding tool: required for reliable/ safe Swing-Arm FLEX-to-connector assembly

Glenair's composite Swing-Arm™ FLEX strain relief backshell provides lightweight and corrosion free termination of EMI/RFI cable shielding in electrical wire interconnect cabling. This innovative backshell has become the standard shield termination device for weight reduction in military and commercial airframe applications. Made from temperature-tolerant composite thermoplastic, rugged Swing-Arm™ FLEX backshells offer easy installation, long-term performance, and outstanding weight and SKU reduction. Performance tested to stringent AS85049 mechanical and electrical standards and available for all commonly-specified mil-standard and commercial cylindrical connectors including MIL-DTL-38999 and Glenair Series 80 Mighty Mouse.

Straight, 45°, and 90° configurable backshell

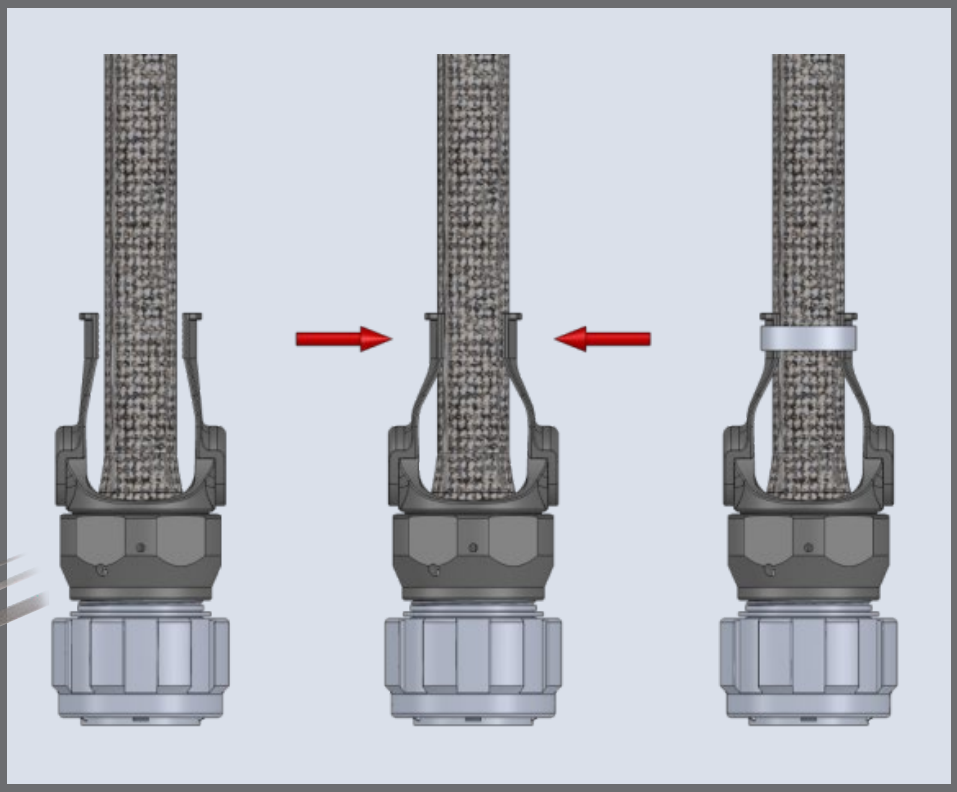
- **Significant weight reduction: composite, no saddle bars or hardware**
- **Rapid assembly: cable self-centers on bundle, little or no wrapping tape required**
- **Braid sock and drop-in band termination follower versions for EMI/ RFI applications**
- **Supports a wide range of cable bundle diameters**
- **Available in a variety of interfaces: Drop-in-follower (DIF), Direct interface, Braid sock**

Swing-Arm FLEX
3-in-1 lightweight composite backshell
with straight, 45° and 90° routing

SWING ARM® COMPOSITE THREE-IN-ONE BACKSHELL FLEX

UNIVERSAL APPLICATION: FROM SIMPLE CABLE STRAIN RELIEF TO EMI/RFI SHIELD TERMINATION

- **Fast and reliable termination of individual wire and overall EMI cable shielding with industry-standard Band-Master ATS® tools and straps**



INNOVATIVE DROP-IN FOLLOWER SHIELD TERMINATION / BANDING PLATFORMS

Swing-Arm™ FLEX drop-in shield termination follower technology is the fastest and most versatile solution to individual and overall wire shield grounding. Isolating the ground path from shield to follower to connector accessory interface eliminates the need for conductive plating on the backshell—improving durability and appearance, and reducing cost.

Various designs of solid and slotted drop-in band followers allow for fast and easy staging of individual and overall wire shields

Core series: Swing-Arm™ FLEX	
627-233	Swing-Arm™ FLEX strain relief backshell for use with lacing tape or bands
627V234	EMI/RFI Swing-Arm™ FLEX with drop-in follower for Mighty Mouse Series 806 connectors
620-084	EMI/RFI Swing-Arm™ FLEX with drop-in follower for wire shield termination

Available Swing-Arm™ FLEX Braid Sock Materials
100% AmberStrand® (metal-clad composite)
75%/25% AmberStrand® / Nickel/Copper blend
100% ArmorLite™ (stainless steel microfilament, plated)
75%/25% ArmorLite™ / Nickel/Copper blend
Standard Nickel/Copper (34 AWG)
Tin/Copper (34 AWG)

Outlook

The Courage to Begin

I ran across a little coffee table book the other day called *Rising to the Occasion, a Practical Compilation for the Occasionally Perplexed*. It contained dozens of short, witty essays on how-to topics such as changing a flat tire, starting a camp fire or unclogging a sink. All the practical little things you hope someone in your world knows how to do, and more importantly, will rise to the occasion to tackle when they most need doing. Left unsaid in the book is the reality that possessing the knowledge of how to do a thing means nothing without the courage to step up and do it. What if you screw up? What if people laugh at you? What if you harm your reputation? Well, as Robert Frost said, "The best way out is always through." And George Patton, "The courageous man is the man who forces himself, in spite of his fears, to carry on."

Few of us are called upon to display the kind of courage Patton is talking about (for those of you who do, thanks for your service!) But whatever the demons and dragons are we face in life, the key moment—the key decision point—usually comes right at the start: The moment when you stand up to deliver that toast that someone really needs to make, or the moment you roll up your sleeves and tackle that difficult customer request to design a better mousetrap. We've all heard the wisdom that the fear of what *might* happen is usually overblown compared to the reality of what likely *will* happen. So what's the trick? How do we ever begin tackling something that we've never done before?

Well as Jaime Escalante famously observed, what you need first and foremost is *ganas,* or desire; the desire to achieve all the greatness that is in you. We've all heard the commencement address at the end of the school year: dream big, take a risk, leave the world better than you found it, build relationships, and be a responsible member of society. Great stuff. But if you really want to do it, if you really want to be more in life than just a name on a business card, then you have to have courage. All the knowledge and luck in the world isn't enough.

The centerfold in this issue of *QwikConnect* is relevant to this topic. It features postage stamps celebrating the larger-than-life achievements of some noteworthy inventors. In case you missed the joke, the stamps aren't real. But the accomplishments certainly are. And my guess is that the most common attribute shared by everyone on the page—whether some government gave them a commemorative stamp or not—is courage. The courage to rise to the occasion. The courage to begin.

QwikConnect

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