

MISSION-CRITICAL
INTERCONNECT
SOLUTIONS



Glenair
SIGNATURE SERIES

Space-Grade Circular Connectors

Proven, Rugged, Flight-Heritage Technologies





NASA's STEREO
(Solar TERrestrial Relations Observatory),
artist's concept



Blind-Mate Connectors

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

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

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



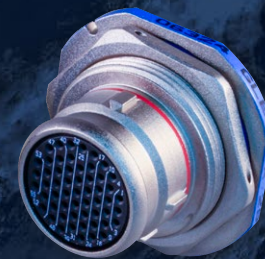
- Available in most symmetrical MIL-STD-1560 insert arrangements with contacts sizes from #23 to #8
- Selected materials offer low outgassing properties and high resistance to both corrosion and stress corrosion cracking
- NASA outgassing bake-out process available
- Designed to withstand the rigors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

SPACE-GRADE BLIND MATE

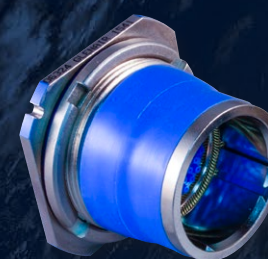


Float-mount and adjustable separation force connectors
MIL-DTL-38999 Series III type, environmental, crimp contact

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



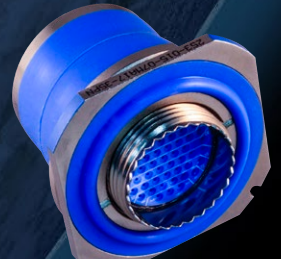
Roll-off nose: allows for the smooth disconnection of blind mate plugs and receptacles.



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



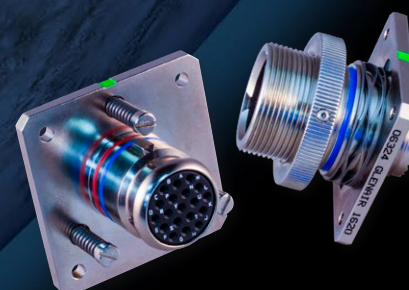
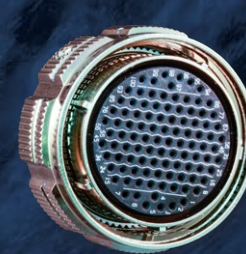
Misalignment accommodation: Radial, axial, and angular misalignment during mating is accounted for with integral wave springs.



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



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



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



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



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

SPACE-RATED

Lanyard-Release Quick-Disconnect Connectors

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

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

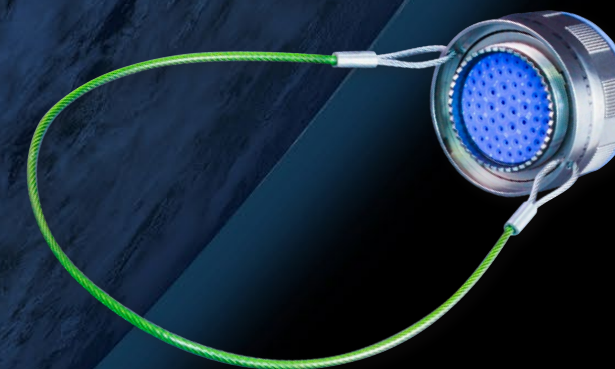
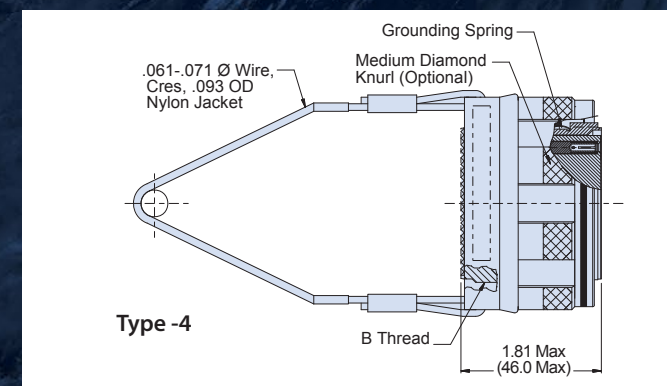


- Jam-free, push on/pull off technology
- Reliable fail-safe axial pull lanyard equipped coupling
- Instant disengagement for critical quick-release systems
- Manufactured IAW MIL-STD-1760
- Special umbilical buffers and go-betweens also available
- Blind-mate rack-and-panel versions available
- Qualified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

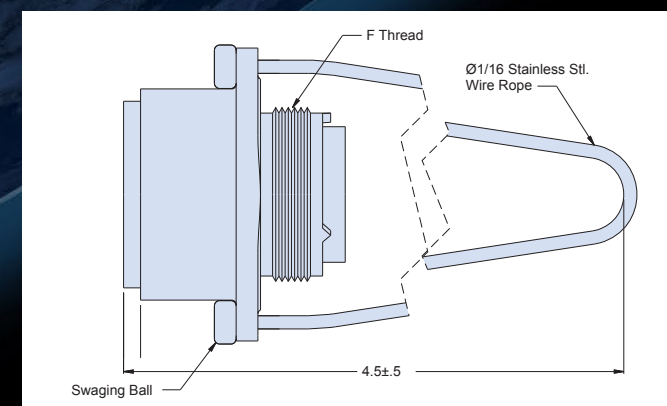
SPACE-GRADE Lanyard-Release Quick-Disconnect Connectors



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



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



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

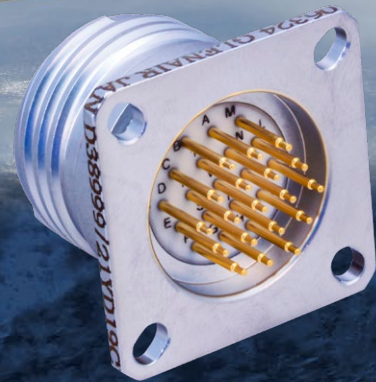


At the International Space Station, the SpaceX Dragon commercial cargo craft is grappled by the Canadarm2 robotic arm

Best-of-Class Hermetic Seal Connector Design

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

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



CODE RED

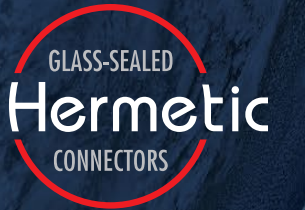
LIGHTWEIGHT HERMETIC SEALING

Lightweight hermetic encapsulant sealing solution with 1×10^{-7} leak rate performance. Available today in Mighty Mouse 806 Mil-Aero, M24308/9 D-Sub and D38999/23



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

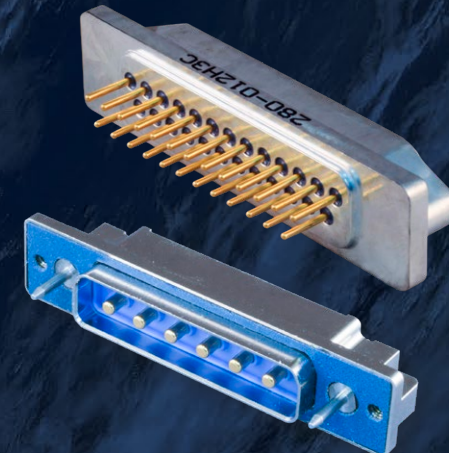
ADVANCED PERFORMANCE Glass-Sealed Hermetic Connectors



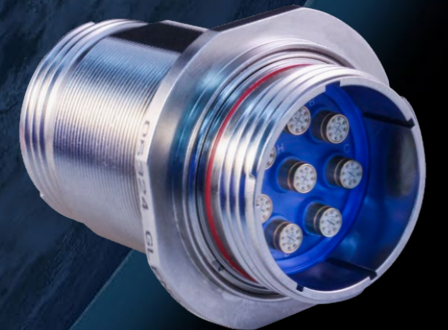
UNIQUE HERMETIC OFFERINGS AND CATALOG (COTS) SOLUTIONS



Coax, Triax, Quadax and hybrid-contact layouts



Rectangular hermetics including Series 28 HiPer-D and Series 79



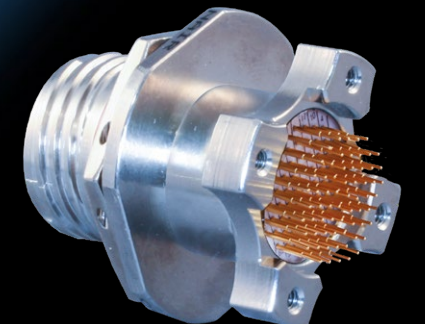
E1 Ochito high-speed octaxial contacts in a lightweight CODE-RED sealed bulkhead feed-thru



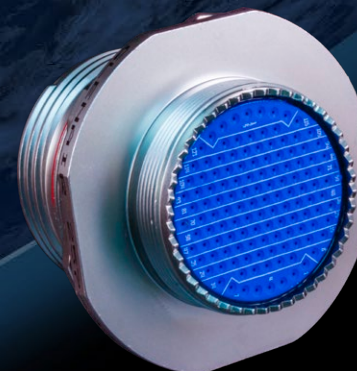
Triax hermetic



Hermetic Sav-Con Feed-thrus and Gender Changers



Dual-flange PC tail hermetic



Hermetic with crimp-removable contacts



Hermetic bulkhead penetrators



Hermetic receptacles with integrated band porch



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

LIGHTWEIGHT, LOW RESISTANCE



“Mission-Critical” hermetic sealing with better than 1×10^{-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 1×10^{-7} max leak-rate hermetic sealing. Special non-magnetic (zero residual magnetism) versions are also available, consult factory.

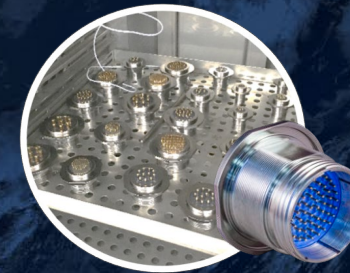
- Full hermetic sealing, better than 1×10^{-7} in a lightweight aluminum shell with low electrical resistance gold-plated copper contacts
- Meets NASA outgassing requirements, as well as aerospace temperature and corrosion resistance standards
- Operating temperature -65°C to $+200^{\circ}\text{C}$
- 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 $+200^{\circ}\text{C}$ 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.

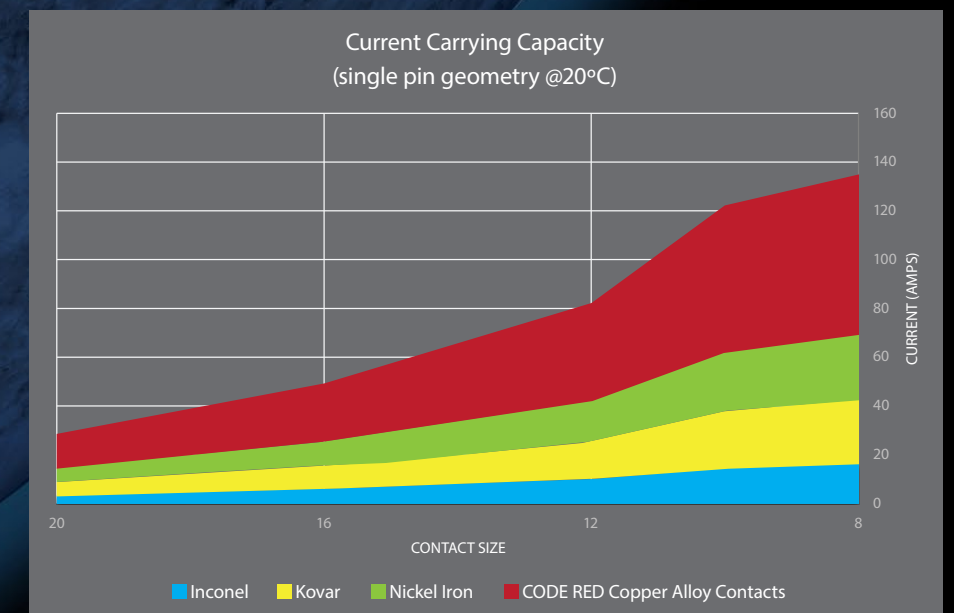
CODE RED USES PROVEN-PERFORMANCE CONNECTOR AND CONTACT MATERIALS

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 $+200^{\circ}\text{C}$ 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.



Launching ESA's MetOp-B
weather satellite

SPACE-GRADE EMI/EMP Filter Connectors

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.

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



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

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

- 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

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



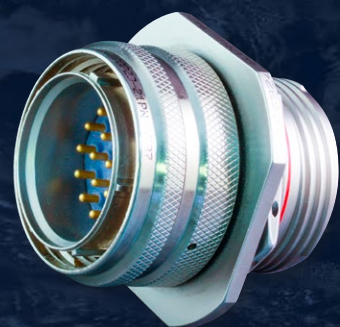
Quick-disconnect circular with
solder-free contact filter array



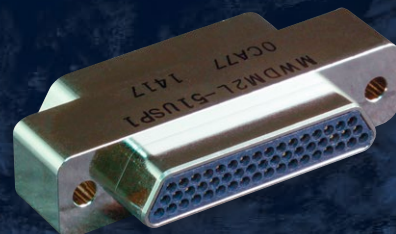
Glenair Sav-Con's protected the umbilical connectors on every Space Shuttle mission

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



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



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



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

HIGH-PERFORMANCE CONNECTOR GO-BETWEENS Sav-Con® Connector Savers and Bulkhead Feed-Thrus

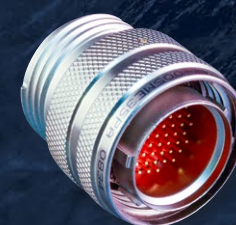


Each Glenair Sav-Con® Connector Saver meets the military specification performance requirements of its mating connector. Glenair manufactures and supplies a Sav-Con® connector saver for every military standard connector currently in use including:

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

Comprehensive materials, plating, and polarization options available

TRADITIONAL PLUG-RECEPTACLE SAV-CON® CONNECTOR SAVERS



MIL-DTL-38999 series III type



Series 89 Nanominiature rectangular

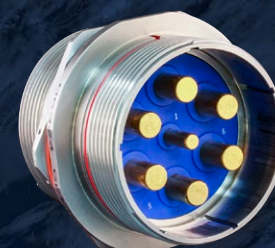


MIL-DTL-38999 series II bayonet-coupling saver



Series 80 Mighty Mouse Sav-Con®

BULKHEAD FEED-THRUS



Special high-voltage power bulkhead feed-thru



Special wide panel accommodation Mighty Mouse bulkhead feed-thru



MIL-DTL-5015 bulkhead feed-thru



Special non-cadmium plating classes

SPECIAL-PURPOSE ADAPTERS AND SAVERS



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



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



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



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



SERIES 80 MIGHTY MOUSE

Reducing the Size and Weight of Electrical Wire Interconnect Systems

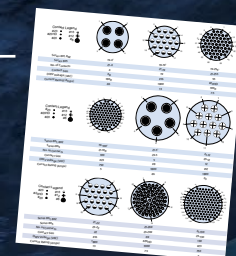


The industry standard ultraminiature interconnect—from low earth orbit to Mars

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

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

FULL RANGE OF SUPPORTED CONTACTS, 67 CONTACT ARRANGEMENTS



67 arrangements, from 1–130 contacts

SERIES 80 ULTRAMINIATURE Mighty Mouse Connectors and Cables

Connector series overview



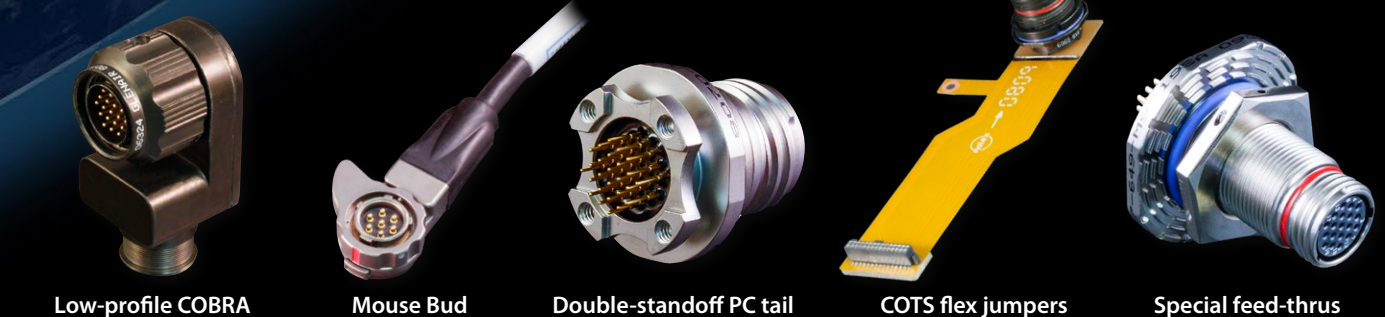
CHOOSE FROM 8 DIFFERENT COUPLING DESIGNS



AVAILABLE MIGHTY MOUSE CONNECTOR CLASSES



AVAILABLE COTS SPECIAL-PURPOSE DESIGNS AND PACKAGING





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

NASA
ESA, JAXA
SCREENED
SPACE GRADE

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

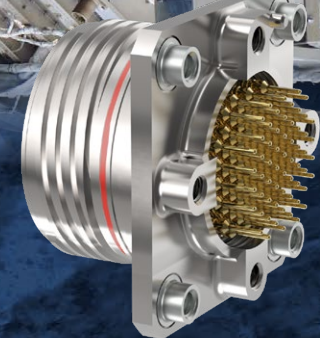
SAVE SIZE AND WEIGHT WITH SERIES 806 CONNECTORS

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 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



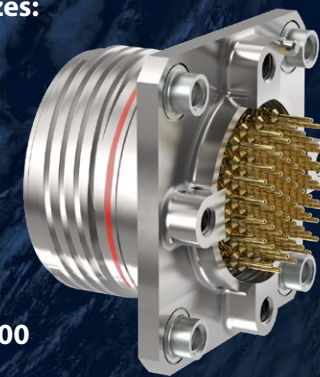
Series 806 Mil-Aero Ultraminiature Circular Connectors

for harsh space applications IAW MIL-DTL-38999

SERIES
806
MIL-AERO

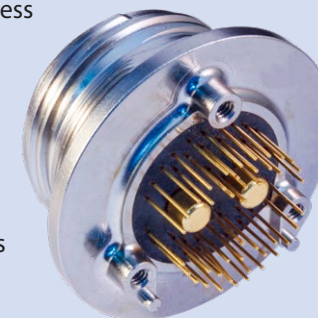
SERIES 806 MIL-AERO: FEATURES / SPECIFICATIONS

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



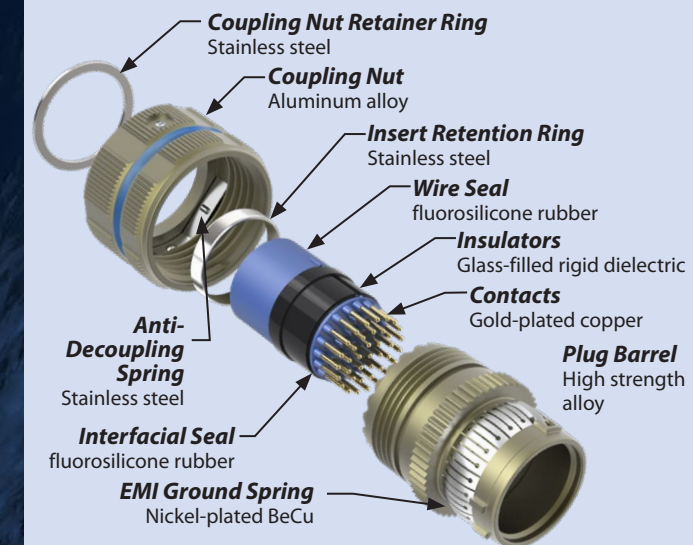
AVAILABLE LIGHTWEIGHT ALUMINUM “CODE RED” HERMETICS

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

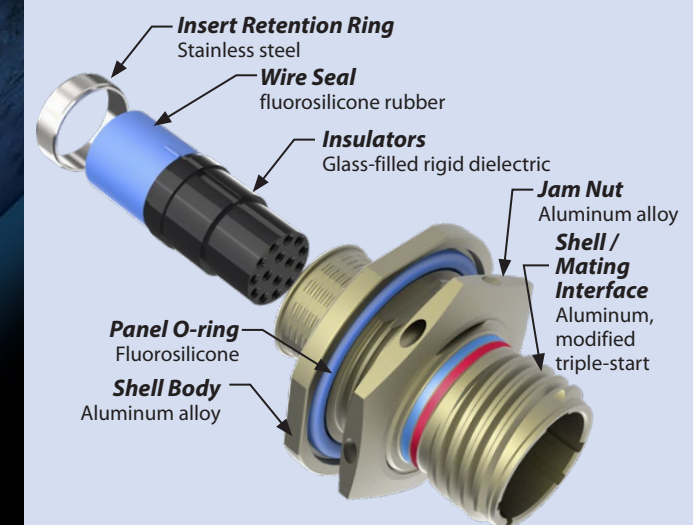


CODE RED

SERIES 806 MIL-AERO PLUG

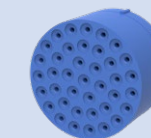
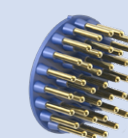


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