QwikConnect

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MISSION-DRIVEN DESIGN:

MIL-DTL-38999 TYPE Micro Miniature **Connectors and Cables**

SERIES 806 MIL-AERO

Glenair®

Electronic and digital embedded systems technology—such as deployed in fly-by-wire computer systems or in other electronics gear—enables military and commercial aircraft to process the massive loads of data generated by critical navigation, communication, and flight-control systems.

↑ *Embedded RF transmit/receive systems on communication satellites require interconnects that save size and weight and can operate successfully under the extreme environmental conditions of space*

Interconnects and the Evolution of Modern Flight Systems

Mission-critical electronics extend through every zone of a modern aircraft, ship, or spacecraft, and require complex interconnection of critical power supplies, remote sensors, and control computers. Radio frequency (RF) and higher-frequency microwave systems, for example, are ubiquitous in avionic platforms. RF transmission-and-receive modules are backbone technologies in AESA radar systems. Other RF LRUs are found in satellite communications and instrument flight procedure (IFP) platforms. High-speed digital datalinks, such as deployed in short-distance copper connections for 10 Gigabit Ethernet, are critical in a wide range of sensor, video downlink, and data storage applications.

Power connections are equally essential, as every avionic and flight technology system depends on the safe provision of electrical power for operation. From low-power sensor requirements (say 3–5 amps) to higher power requirements for actuators and other electromechanical devices, the delivery of reliable power is a key requirement in EWIS wiring.

In all these cases—RF, high-speed digital, and power, as well as in more conventional signal (databus) applications—industry requirements have evolved far beyond the capabilities of conventional interconnect devices. Gone are the days when a standard-density power or signal connector would be of any interest to EWIS designers facing extreme data-rate, mechanical, environmental, and electrical requirements of operation. Likewise gone is any interest in interconnect technologies that fail to contribute to size and weight reduction efforts in modern aerospace systems.

Mighty Mouse: The Original Small Form-Factor Circular

From fixed wing and rotary aircraft to space launch and satellite systems, the evolution in connector and cable miniaturization has reached full maturity in high-density, ruggedized connectors like the Glenair Mighty Mouse. These reduced form-factor circulars have been optimized for harsh environmental performance in aerospace and defense platforms. The Mighty Mouse Series 805, for example—a double-start rapid mate circular connector—has been designed into more commercial and military aircraft platforms than any other mil-grade micro miniature connector.

← *Evaluation flight of the first-ever formation of F-16 Fighting Falcons equipped with Active Electronically Scanned Array (AESA) radars*

But even the Series 805, as ideally suited as it has been for aircraft applications these many years, has been historically unable to meet several of the most stringent performance benchmarks of the MIL-DTL-38999 spec.—the "gold-standard" in the qualification of interconnects for aerospace use. In key areas such as vibration and shock resistance, high-altitude environmental performance, and high-altitude DWV, the double-start Series 805 has been limited to use in less-harsh, pressurized aircraft zones.

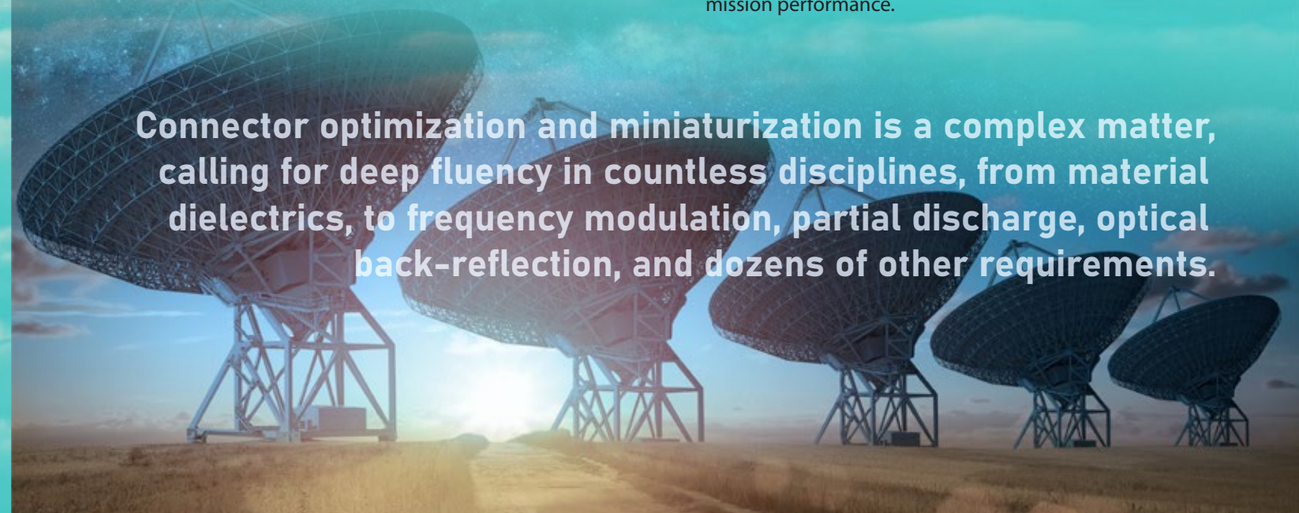
Series 806: Mission-Driven Design

For this reason, Glenair embarked several years ago on a new miniaturized connector development project to create the ultimate harsh-environment, reduced form-factor circular connector—one that could truly meet, if not exceed, MIL-DTL-38999 Series III specifications. Our goal was to create a triple-start ACME-thread mating connector, suitable for use in every aircraft zone, both pressurized and non-pressurized.

The result of this work, the Series 806 Mil-Aero, is today the only available micro-miniature circular connector with independent lab-verified performance in accordance with every MIL-DTL-38999 Series III qualification requirement. The Series 806 is a mature interconnect solution with environmental crimp-contact offerings as well as hermetics, filters, high-speed, RF, fiber optic, and power solutions. The Series 806 is fully tooled, 100% made in America, and available with lead-times from one day to five weeks.

Connector optimization and miniaturization is a complex matter, calling for deep fluency in material dielectrics, frequency modulation, partial discharge, optical back-reflection and dozens of other disciplines.

As LRU proliferation and packaging continues to evolve, so must connector and cable technologies. The differing equipment sets used in manned and unmanned applications, as well as in evolving systems such as eVTOL air taxis, all share the same challenges and opportunities: compliance to harsh application safety requirements and the reduction of size and weight so critical to mission performance.



Connector optimization and miniaturization is a complex matter, calling for deep fluency in countless disciplines, from material dielectrics, to frequency modulation, partial discharge, optical back-reflection, and dozens of other requirements.

SERIES 806 MIL-AERO

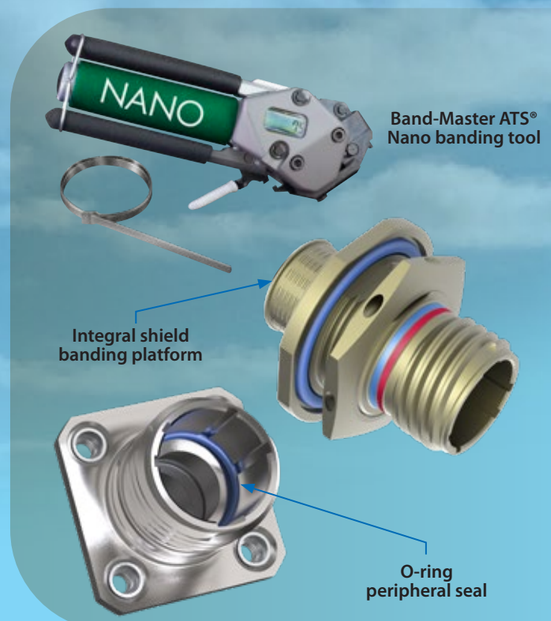
MISSION-DRIVEN DESIGN:

MIL-DTL-38999 TYPE Micro Miniature **Connectors and Cables**

The Series 806 Mil-Aero is a high-density, high-performance micro miniature circular connector ideally suited for harsh military/ aerospace applications.

The Series 806 Mil-Aero is an aerospace-grade micro miniature circular connector with triple-start threaded coupling. The 806 connector is smaller and lighter than conventional aerospace connectors. Featuring size 22HD and 20HD contacts, plus size 8 power and high-speed El Ochito®, quadrax, and fiber optic options, the Series 806 offers up to twice the number of contacts—with no reduction in performance—compared to MIL-DTL-38999 Series III. In fact, independent laboratory testing has demonstrated that the Series 806 meets, and in many cases exceeds, the requirements of MIL-DTL-38999.

Glenair pioneered integral shield banding platforms to allow direct attachment of cable shields, boots, and overmolds. This innovation continues with the 806—Glenair's first connector to exclusively use the ultra lightweight Nano shield Band-Master ATS band for maximum size and weight reduction.

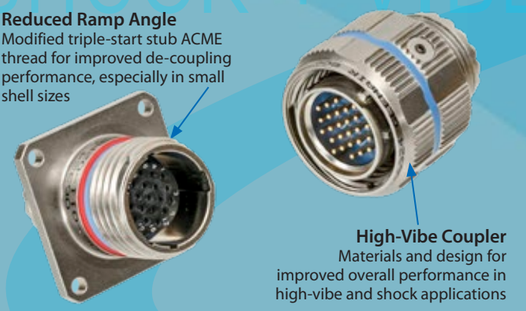


But there is more to the 806 than just size and weight reduction. This flight-proven high-performance connector has many innovative features that meet the most aggressive requirements of the military/aerospace industry, including better resistance to vibration-induced decoupling. This is accomplished by re-engineering the ratchet mechanism and introducing a shallower mating thread ramp angle than is available in D38999.

When it comes to sealing, the Series 806 Mil-Aero connector features an O-ring radial interface sealing design instead of a flat gasket. This allows for easier metal-to-metal coupling for improved sealing, as well as better EMI performance. The MIL-DTL-38999 Series III and other legacy aerospace circular connectors have a flat gasket inside the receptacle shell. This peripheral seal must be compressed sufficiently to allow full metal-to-metal connector bottoming. In certain tolerance conditions this seal can make it difficult to fully mate the connectors "without the use of tools" as is required by MIL-DTL-38999.

SHOCK + VIBE

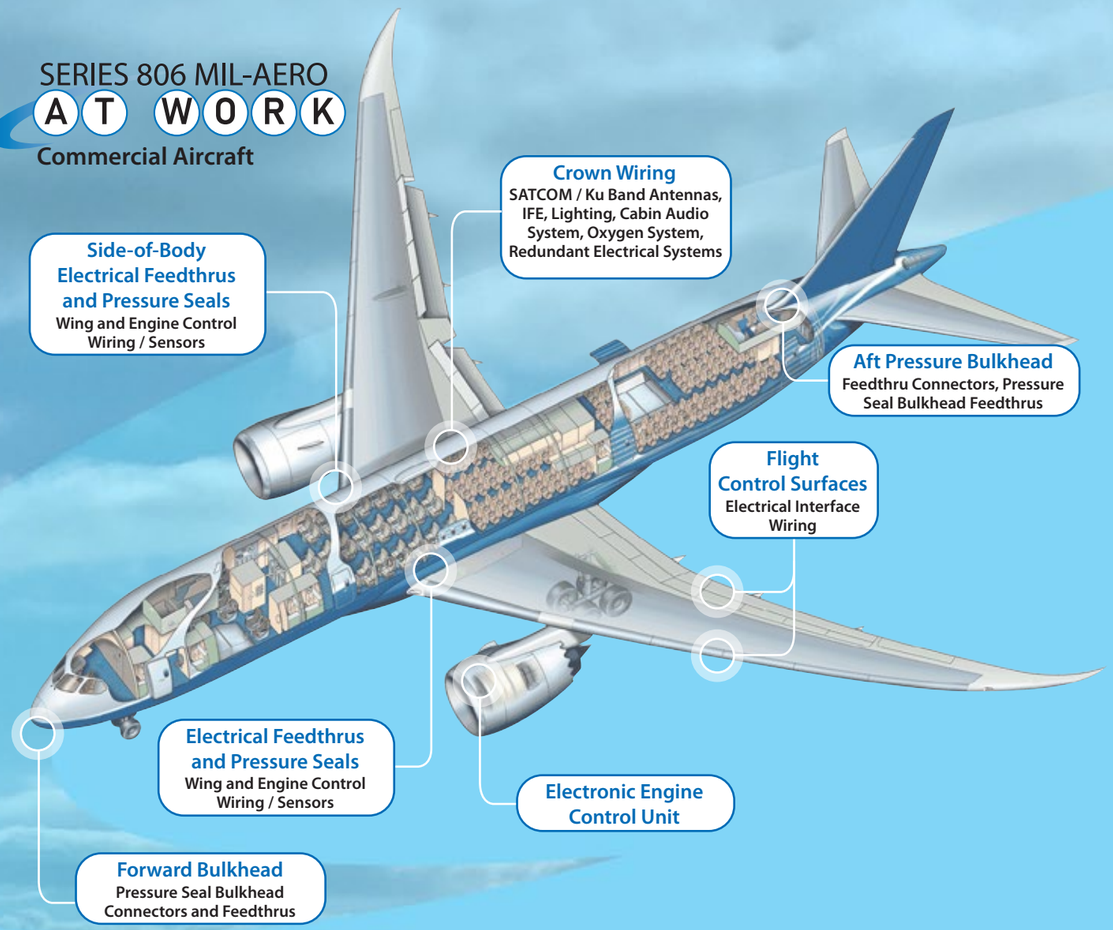
Reduced Ramp Angle
Modified triple-start stub ACME thread for improved de-coupling performance, especially in small shell sizes



High-Vibe Coupler
Materials and design for improved overall performance in high-vibe and shock applications

SERIES 806 MIL-AERO AT WORK

Commercial Aircraft



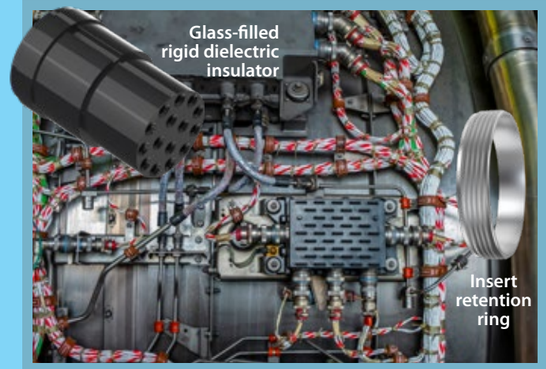
Rigorous Qualification Testing

Glenair has completed numerous rounds of qualification testing on the Series 806 and has all necessary test reports on file. A comprehensive summary report on Series 806 performance, including operating temperature range, moisture resistance, vibration and shock, and dielectric withstanding voltage is offered here in this issue. But for overview purposes, let's take a look now at four of the most important qualification benchmarks.

High-temperature tolerance in the range of +200°C is a rare capability in micro miniature connectors. High temperature tolerance is critical for the Series 806 Mil-Aero as high-altitude DWV and the placement of the connector in FADEC controls and other areas in close proximity to engines was a primary design requirement.

Dielectric insulators are fabricated from high-temperature tolerant, glass-filled rigid dielectric. And unlike many current and legacy military/aerospace connectors, insert retention in the Series 806 is guaranteed through the incorporation of a mechanical retention ring.

For applications requiring even higher temperature tolerance, special ThermaRex and ThermaRex Cryo designs are currently in testing, with expanded temperature tolerance from -200°C to +300°C.



↑ *Both the dielectric glass material and the insert retention ring contribute to the improved strength and reliability of Series 806 Mil-Aero connectors in high-temperature environments like aircraft FADECs.*

We mentioned earlier that the shallower ramps on the triple-start thread mating interface, combined with an extremely robust self-locking coupling nut, results in a connector series that excels in vibration testing. In fact, Series 806 Mil-Aero is the only high-density micro miniature connector of its kind that has successfully passed all MIL-DTL-38999 Series III vibration tests including sine and random vibration testing at 200°C.

The anti-decoupling mechanism, engineered around a special 7075 Aluminum alloy shell, delivers excellent ductility, strength, and proven performance in highly-stressed structural applications such as the knurled ratchet mechanism on the Series 806. High-durability performance in the anti-decoupling mechanism is further ensured with the use of a stainless-steel ratchet spring.

SERIES 806 VIBRATION		
TEST	**REQUIREMENT**	**MIL-DTL-38999M SPEC**
Random vibration, elevated temp., 43g rms	No discontinuities of 1 ms or longer. No resonance at frequencies less than 300 Hz	Para. 4.5.23.2.3 with Figure 24 accessory load EIA-364-28 +200°C
Random vibration, ambient temp., 49g rms	No discontinuities of 1 microsecond or longer	Para. 4.5.23.2.4 EIA-364-28 Test Condition V
Sine vibration, 60g	No discontinuities of 1 microsecond or longer	Para. 4.5.23.2.1 with Figure 24 accessory load. 12 hours in each of 3 axes. 4 hours at ambient, 4 hours at -55° C, 4 hours at +200° C

SST ratchet spring for reliable anti-decoupling performance

ENVIRONMENTAL SEALING

HIGH-ALTITUDE DWV

"Top Hat" insulator lengthens creep path

Turning to environmental performance, the Series 806 Mil-Aero utilizes a "triple ripple" wire grommet seal, cork-and-bottle interfacial seal, and internal O-ring peripheral seal to ensure robust environmental sealing, even during 75,000 ft. altitude immersion testing.

Ensuring high-altitude voltage ratings is a critical concern for microminiature circulars, given the minimal center-to-center distance between contacts. Nevertheless, it was considered critical for this connector to meet the same sea level and 70,000 ft. unpressurized zone DWV benchmarks as the MIL-DTL-38999 for both size #22HD and #20HD contacts utilized in high-density Series 806 insert arrangements.Glenair engineers were able to achieve this higher voltage rating through the use of an innovative Top Hat insulator, which lengthens the discharge creep path in shorting and flashover testing. This unique capability and design is only available in the Series 806 Mil-Aero—the only micro miniature circular with proven real-world performance meeting this 70,000 ft. DWV rating.

Maximize Contact Density with Series 806

The promise of the Series 806 Mil-Aero is not only that it meets or exceeds MIL-DTL-38999 performance—*and* that it does so in a significantly smaller size and weight package—but that it enables much higher contact density compared to standard subminiature connectors.

This figure compares a D38999 Series III size 9 (lower left) with a Series 806 size 11 (upper right).

Although relatively similar in size, the Series 806 size 11 can carry over three times the number of size #22HD contacts. Even when the 38999 is equipped with ultra-small size 23 contacts, the 806 can still carry more than double that number of larger size #22s, with better electrical performance and larger gauge wire support.

SERIES 806 MIL-AERO AT WORK
Communications Satellites

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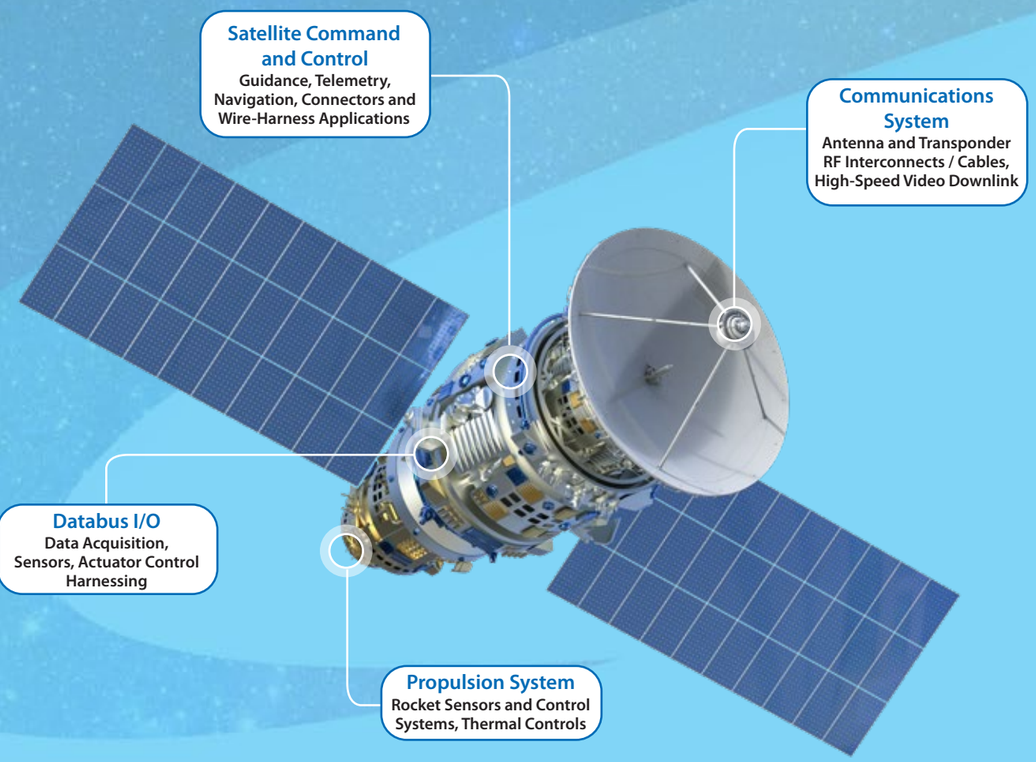
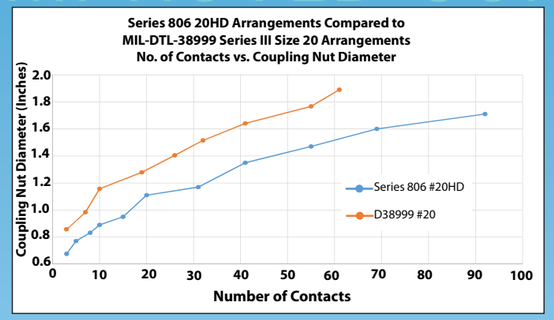
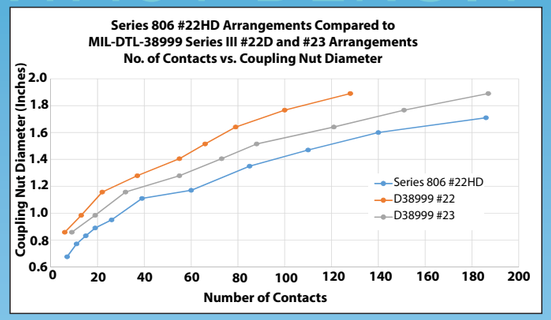


IMPROVED CONTACT DENSITY





The table on the left demonstrates overall improved density compared to D38999 across all shell sizes for size 20HD in the Series 806 (the blue line) and size 20 in the 38999 (the orange line).

The table on the right compares 38999 with size 22 contacts (the red line), 38999 with size 23 contacts (the green line), and series 806 with size 22HD contacts (the blue line). Again, the Series 806 Mil-Aero delivers significantly improved contact density and package miniaturization.

CONTACT SELECTION GUIDE

Crimp Contacts
#22HD and #20HD

Fiber Termini
Size #20HD

El Ochito Contacts
High-Speed Octax

Twinax / Quadrax
Size #8 RF

Power Contacts
Size #8

RF Coax Contacts
Matched-Impedance

Glenair's new product development model—for all our signature connector series—features constant, relentless expansion of supported contacts, wire sizes, and tooled insert arrangements. The Series 806 Mil-Aero is no different, and has now become the interconnect industry's most comprehensive high-density circular connector solutions with tooled support for over 60 hybrid and non-hybrid contact arrangements. As you can see from the graphic above, the series now offers support for five contact sizes, giving the Series 806 the ability to support everything from standard signal, to power, high-speed datalink, high-frequency RF and microwave, fiber optics, and more.

Series 806 Mil-Aero: a complete range of connector classes and functionality

As mentioned, Series 806 Mil-Aero is available in standard environmental, high-speed, high-temperature, hermetic, EMI filtered, and other special-purpose designs. Datasheets on these solutions are provided later in the issue—but for now, let's do a brief overview of these many high-performance offerings.

High Temperature

Sensor devices in aerospace engine applications are increasingly exposed to higher temperature operating environments, well beyond the capabilities of conventional interconnect devices. As mentioned, the Series 806 Mil-Aero is available in a special high-temperature solution. ThermaRex 806 includes connectors, cables, and accessory wire protection conduit systems for high-temperature applications up to 300°C.

The series utilizes high-temperature ceramic insulators, and silicone seals. The key technology, however, is the Glenair Signature Crown Ring contacts that ensure continuous low-resistance performance in high continuous operating temperatures. Available in all standard Series 806 power and signal insert arrangements, Glenair Crown Ring contacts deliver far superior high-temperature performance than any other available contact series.

High-temperature ThermaRex connector and Crown Ring contacts

Fiber Optic

806 plug with #20HD F/O termini

Glenair Signature #20HD fiber optic termini, available in hybrid and non-hybrid insert arrangements, offer the same high data rate performance as larger size #16 D38999 series connectors with more fiber lines and reduced form factor in every shell size.

The system supports both singlemode and multimode applications in all common wavelengths, and delivers outstanding environmental , electrical, and optical performance, with typical insertion loss of only 0.5 dB.

RF / Microwave

The Series 806 Mil-Aero is designed for rugged, harsh-environment land, air, and space applications, such as AESA and SAR radar, RF/microwave signal processing, GPS navigation, signal intelligence, altitude and orbit control systems, tracking telemetry and control, and other radio frequency- controlled systems.

Drop-in multi-channel RF coaxial contacts in sizes 16, 12, and 8 are readily incorporated into the Series 806, and offered as turnkey assemblies with tested cable and commercial RF interfaces. Catalog solutions support frequencies DC to 6 GHz. Higher-frequency offerings up to 40 GHz may also be supported, depending on application requirements.

SERIES 806 MIL-AERO AT WORK
Fighter Jets

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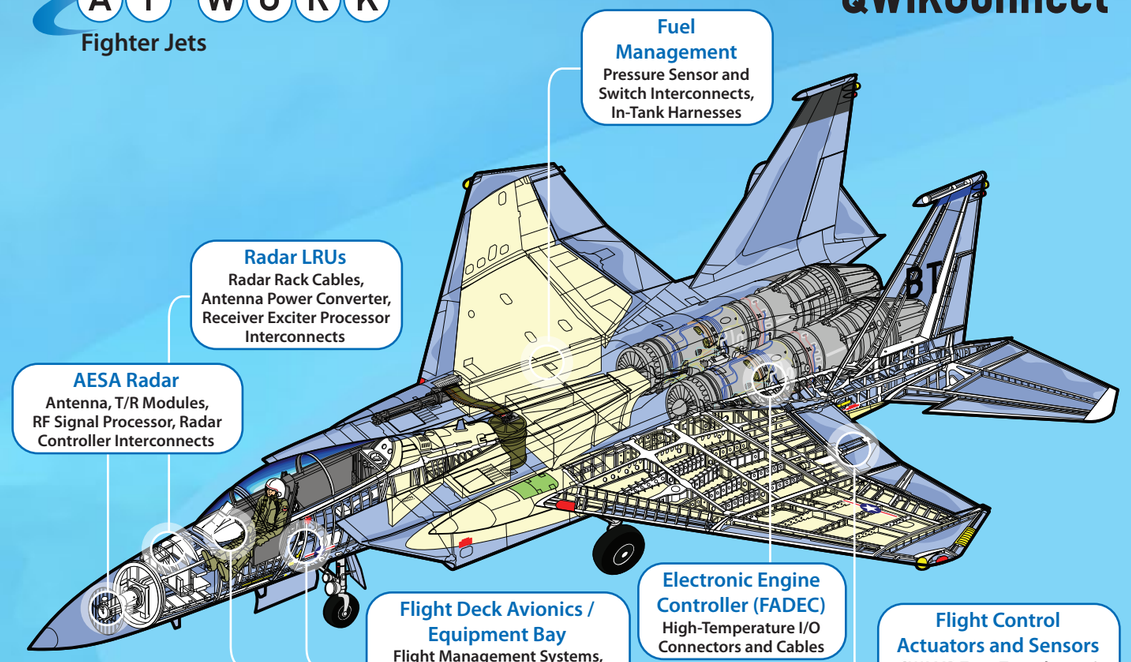


High Speed

High-speed datalink El Ochito octaxial solutions for Series 806 include environmental connectors with customer-terminateable drop-in contacts, PCB solutions for high-speed board applications, and turnkey double- and single-ended jumper cables.

Series 806 El Ochito jumper solutions are available for single-ended flying leads, back-to-back assemblies, and even point-to-point solutions with El Ochito terminated to a COTS Ethernet, USB, or HDMI interconnect. These latter solutions are typically used for testing in a lab environment.

Series 806 high-speed solutions include El Ochito drop-in contacts and turnkey jumper cable assemblies

The need to launch impedance-controlled signals from a circuit board may be accomplished with El Ochito transition adapters supplied as an unassembled kit. The kit accepts 90 ohm USB 3.0 cable or 100 ohm Category 6A Ethernet cable.

Series 806 Mil-Aero: Advanced Electrical, Mechanical, and Environmental Performance, With Reduced Size and Weight

Summarizing the key attributes of this innovative micro miniature circular, the Series 806 offers users significant size and weight savings while delivering true MIL-DTL-38999 performance. The series is equipped with a robust coupling mechanism and reduced-pitch triple-start mating thread for superior anti-decoupling performance, particularly in small shell sizes, and is available in additional mil-aero classes including hermetics and EMI filter designs.

Here now is a complete briefing book on this fully-tooled, high-availability micro miniature connector series.

MICRO MINIATURE CIRCULAR

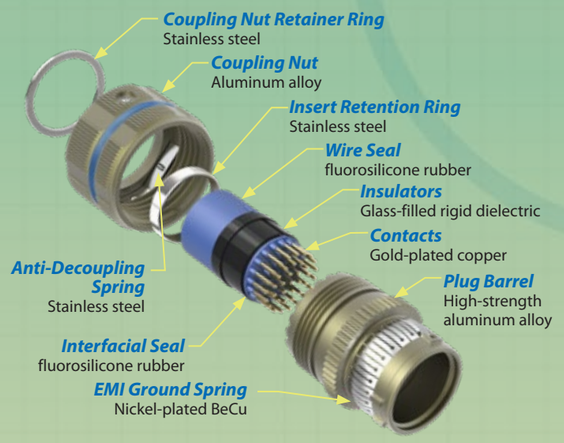
Series 806 Mil-Aero Connectors

Product Features

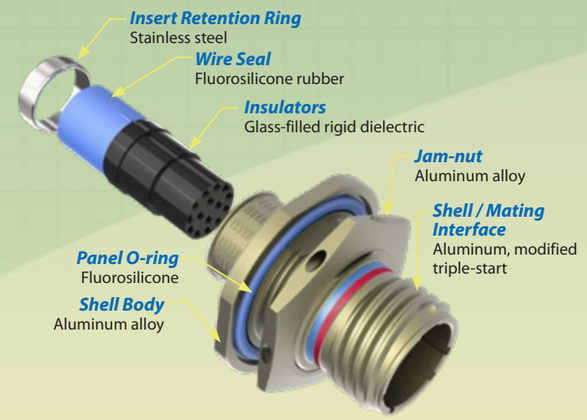
KEY FEATURES

- **Next-generation high-performance micro miniature aerospace connector**
- **Reduced-pitch triple-start modified anti-decoupling stub ACME thread**
- **Higher density 20HD and 22HD contact arrangements**
- **+200° C operating temperature**
- **High-strength aluminum alloy plug barrel**
- **"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 IAW MIL-DTL-38999M para. 4.5.28 (65 dB min. leakage attenuation @ 10GHz)**
- **10,000 amp indirect lightning strike**
- **300g. shock**
- **MIL-S-901 Grade A high-impact shock**
- **Aluminum and stainless steel versions**
- **Environmental crimp contact, glass-to-metal seal PC tail and solder cup hermetics, RF, fiber, and EMI filter versions**
- **RoHS compliant nickel, nickel-PTFE, black zinc and stainless steel plus mil-grade cadmium finish options**
- **Printed circuit board versions with threaded mounting holes**

Plug Connector



Receptacle Connector

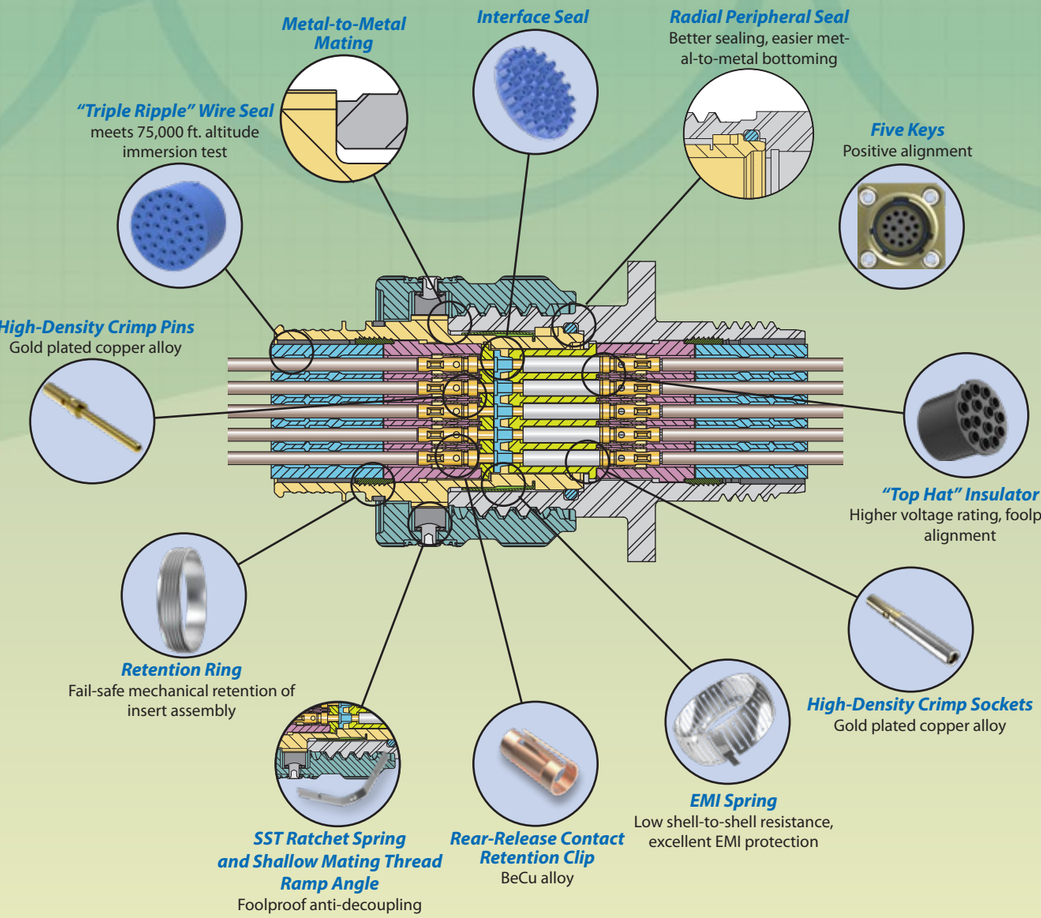


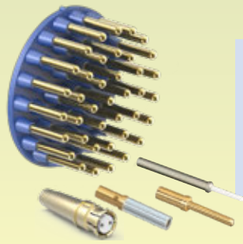
AVAILABLE LIGHTWEIGHT ALUMINUM "CODE RED" HERMETICS

CODE RED is a lightweight encapsulant sealing and application process with 50% package-weight savings compared to glass-to-metal seal Kovar/stainless steel solutions. Non-outgassing CODE RED (IAW NASA/ESA) provides durable hermetic sealing with better than $1X10^{-7}$ leak-rate performance. Gold-plated copper PCB contacts deliver outstanding low-resistance current carrying capacity. See 806-028.

Exploded View

SERIES 806 MIL-AERO DESIGN FEATURES IAW MIL-DTL-38999 SERIES III





Series 806 Mil-Aero, with its high-density size #8, #20HD and #22HD contact arrangements, is designed for universal mil-aero use. The many special design features shown above allow this micro miniature circular connector to meet and even exceed MIL-DTL-38999 performance even in high-altitude, unpressurized zones. In addition to high-density signal contacts, Series 806 also supports a broad range of high-speed shielded contacts including Glenair Signature El Ochito®, as well as Size #8 Coax, and fiber optic termini.

Series 806
Mil-Aero Connectors

Contact Arrangements (Mating face of pin connector shown. Socket numbering is reversed.)

Contact Arranagements

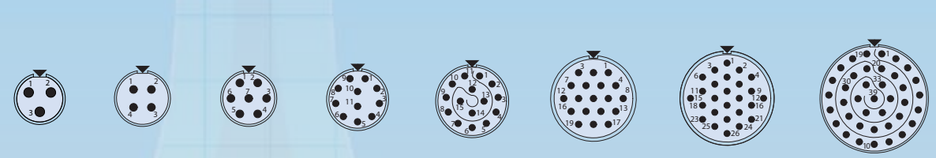
Contact Layout	Number of Contacts				
	22HD	20HD	16	12	8
7-3	3				
8-4	4				
8-7	7				
9-11	11				
10-15	15				
11-19	19				
12-26	26				
14-39	39				
16-60	60				
18-85	85				
20-110	110				
22-140	140				
24-186	186				
8-3		3			
9-5		5			
10-8		8			
11-10		10			
12-15		15			
14-20		20			
16-31		31			
18-41		41			
20-55		55			
22-69		69			
24-92		92			
8-1			1		
10-2			2		
11-4			4		
12-5			5		
14-7			7		
16-12			12		
18-15			15		
20-22			22		
22-24			24		
24-35			35		
12-2				2	
14-3				3	
16-4				4	
16-7				7	
18-8				8	
20-11				11	
22-13				13	
24-19				19	
10-1					1
16-2					2
18-3					3
20-4					4
22-5					5
24-8					8
10-8A	6		2		
11-13	11		2		
12-27	26		1		
14-21	17		4		
16-41	37		4		
18-59	55		4		
11-14	13			1	
12-14	12			2	
14-22	20			2	
12-14	12			2	
16-42	40			2	
18-62	60			2	
14-20A	19				1
16-22	20				2
18-21	18				3
20-28	24				4
22-44	40				4
24-97	93				4

Note: Size 8 contact cavities are key-wayed for use with keyed size #8 El Ochito octaxial, quadrax, and differential twinax contacts

Series 806 Size 22HD Contact Arrangements (1300 VAC, 5 A)

Mating face of pin connector. Socket numbering is reversed.

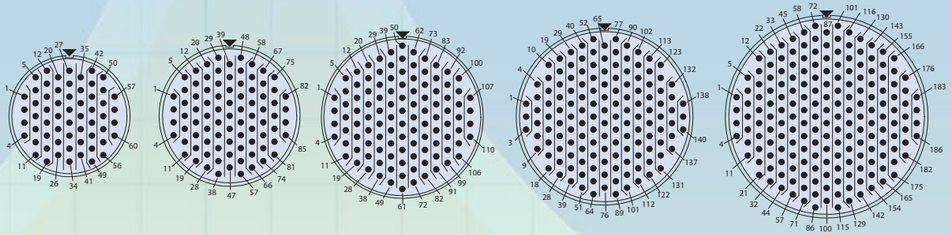
Symbol ▼ indicates master key location.



Arrangement No.	7-3	8-4	8-7	9-11	10-15	11-19	12-26	14-39
No. of Contacts	3	4	7	11	15	19	26	39

Mating face of pin connector. Socket numbering is reversed.

Symbol ▼ indicates master key location.



Arrangement No.	16-60	18-85	20-110	22-140	24-186
No. of Contacts	60	85	110	140	186

Contact Arrangements (Mating face of pin connector shown. Socket numbering is reversed.)

Series 806 Size 20HD Contacts Arrangements (1800 VAC, 7.5 A)

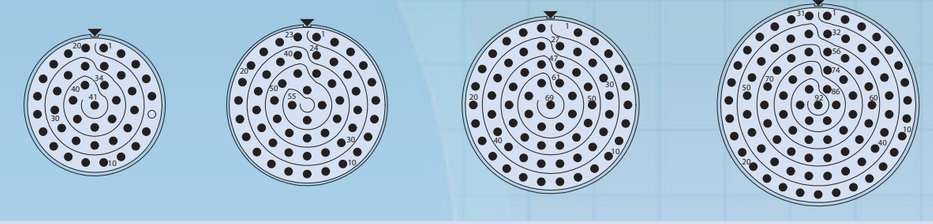
Mating face of pin connector. Socket numbering is reversed.

Symbol ▼ indicates master key location.

Arrangement No.	8-3	9-5	10-8	11-10	12-15	14-20	16-31
No. of Contacts	3	5	8	10	15	20	31

Mating face of pin connector. Socket numbering is reversed.

Symbol ▼ indicates master key location.



Arrangement No.	18-41	20-55	22-69	24-92
No. of Contacts	41	55	69	92

Series 806 Size 16 Contact Arrangements

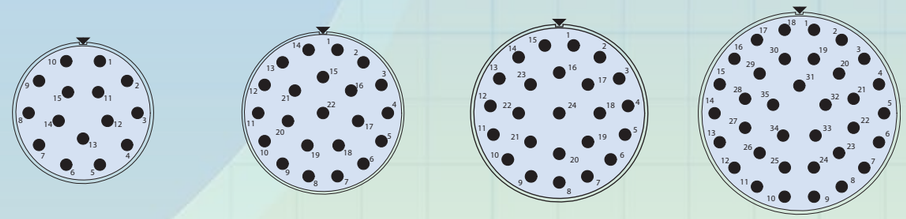
Mating face of pin connector. Socket numbering is reversed.

Symbol ▼ indicates master key location.

Arrangement No.	8-1	10-2	11-4	12-5	14-7	16-12
No. of Contacts	1	2	4	5	7	12

Mating face of pin connector. Socket numbering is reversed.

Symbol ▼ indicates master key location.



Arrangement No.	18-15	20-22	22-24	24-35
No. of Contacts	15	22	24	35

MICRO MINIATURE CIRCULAR

Series 806 Mil-Aero Connectors

Contact Arrangements (Mating face of pin connector shown. Socket numbering is reversed.)

Series 806 Size 12 Contact Arrangements

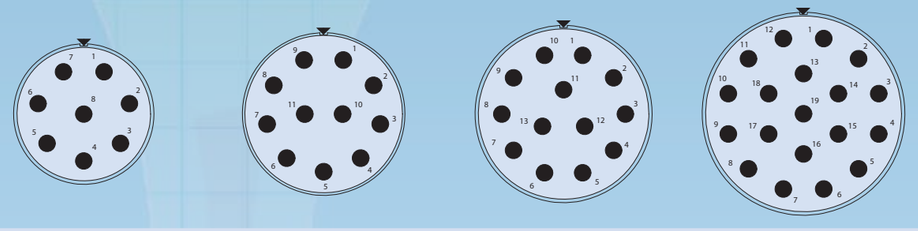
Mating face of pin connector. Socket numbering is reversed.

Symbol ▼ indicates master key location.

Arrangement No.	9-1	12-2	14-3	16-7
No. of Contacts	1	2	3	7

Mating face of pin connector. Socket numbering is reversed.

Symbol ▼ indicates master key location.

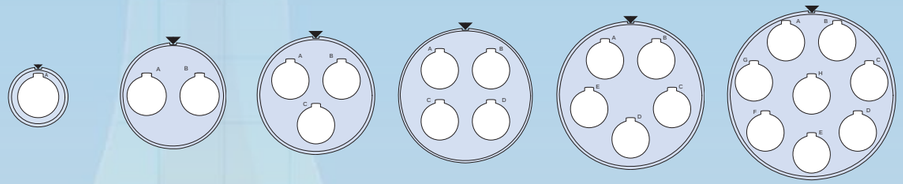


Arrangement No.	18-8	20-11	22-13	24-19
No. of Contacts	8	11	13	19

Series 806 Size 8 Contact Arrangements

Mating face of pin connector. Socket lettering is reversed.

Symbol ▼ indicates master key location.

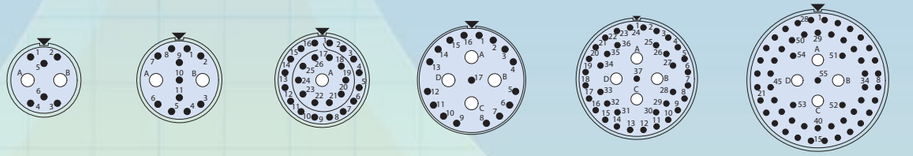


Arrangement No.	10-1	16-2	18-3	20-4	22-5	24-8
No. of Contacts	1 - #8	2 - #8	3x #8	4x #8	5x #8	8x #8

Series 806 Size 22HD and 16 Combo Contact Arrangements

Mating face of pin connector. Socket numbering is reversed.

Symbol ▼ indicates master key location.



Arrangement No.	10-8A	11-13	12-27	14-21	16-41	18-59
No. of #22HD Contacts	6	11	26	17	37	55
No. of #16 Contacts	2	2	1	4	4	4

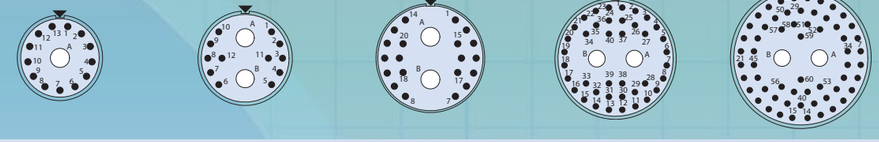
SERIES 806 MIL-AERO

Contact Arrangements (Mating face of pin connector shown. Socket numbering is reversed.)

Series 806 Size 22HD and 12 Combo Contact Arrangements

Mating face of pin connector. Socket numbering is reversed.

Symbol ▼ indicates master key location.

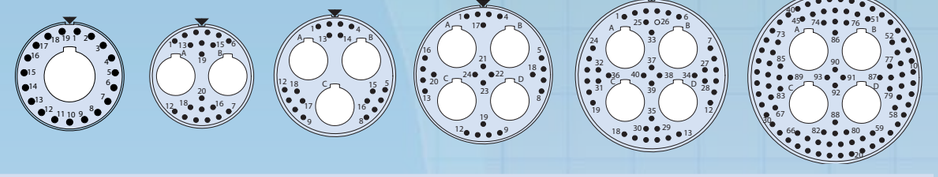


Arrangement No.	11-14	12-14	14-22	16-42	18-62
No. of #22HD Contacts	13	12	20	40	60
No. of #12 Contacts	1	2	2	2	2

Series 806 Size 22HD and 8 Combo Contact Arrangements

Mating face of pin connector. Socket numbering is reversed.

Symbol ▼ indicates master key location.



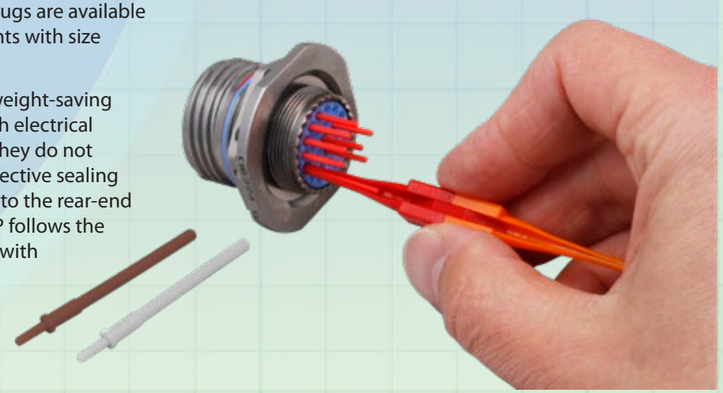
Arrangement No.	14-20A	16-22	18-21	20-28	22-44	24-97
No. of #22HD Contacts	19	20	18	24	40	93
No. of #8 Contacts	1	2	3	4	4	4

Series 806 Mil-Aero combo insert arrangements support applications with both standard data signal requirements, plus high-speed datalink (multi-gigabit Ethernet, HDMI, etc.), as well as RF / microwave, and power. Keyed El Ochito® octaxial contacts support 10GbE in a single shielded contact. Keyed size #8 differential Twinax and industry-standard Quadrax are also supported. A broad range of non-keyed RF Coax contacts—available in different frequency ranges—as well as non-keyed size #8 power contacts are also supported in these combo insert arrangements.

LIGHTWEIGHT DUMMY CONTACT SEALING PLUGS

Glenair recommends the use of dummy contact sealing plugs for use in unwired contact cavities. Sealing plugs are available for use in any of the above insert arrangements with size #22HD and #20HD contacts.

Dummy Contact Sealing Plugs (DCSP) are a weight-saving alternative to populating unused cavities with electrical contacts and conventional sealing plugs, as they do not require the use of unwired contacts in the effective sealing of the contact cavity from the interfacial seal to the rear-end grommet seal. Insertion and removal of DCSP follows the same procedures and uses the same tools as with standard contacts.



MICRO MINIATURE CIRCULAR

Series 806
Mil-Aero Connectors

Materials and Finishes, Performance Specification

Standard Materials and Finishes		
DESCRIPTION	**MATERIAL**	**FINISH**
Pin Contact	Copper alloy	50 microinches gold over nickel
Socket Contact	Copper alloy, with stainless steel hood	50 microinches gold over nickel Contact hood: passivate
Insulators	High-grade rigid dielectric	None
Seals	Fluorosilicone/silicone blend, blue	None
EMI Spring	Beryllium copper	Nickel
Shell, Coupling Nut, Jam-nut	Aluminum alloy or stainless steel	See how-to-order tables for finish options
Contact Retention Clip	Beryllium copper	None
Anti-Decoupling Ratchet Spring	Stainless steel	Passivate

Performance Specification

TEST DESCRIPTION	REQUIREMENT	PROCEDURE
Dielectric withstanding voltage at sea level	Contact Size / Altitude / Voltage 20HD / Sea level / 1800 22HD / Sea level / 1300	MIL-DTL-38999M para. 4.5.11.1 EIA-364-20 Method A 2 mA maximum leakage current Unmated pairs
Dielectric withstanding voltage at altitude	Contact Size / Altitude / Voltage 20HD / 50,000 ft / 1000 20HD / 70,000 ft / 1000 20HD / 100,000 ft / 1000 22HD / 50,000 ft / 800 22HD / 70,000 ft / 800 22HD / 100,000 ft / 800	MIL-DTL-38999M para. 4.5.11.2 EIA-364-20 Method A 2 mA maximum leakage current Mated pairs
Insulation resistance at ambient temperature	5000 megohms minimum	MIL-DTL-38999M Para. 4.5.10.1 EIA-364-21
Insulation resistance at elevated temperature	1000 megohms minimum	MIL-DTL-38999M Para. 4.5.10.2 EIA-364-21
Contact resistance at 25°C, crimp contacts	Wire Size / Test Current Amperes / Maximum Voltage Drop (millivolts) Initial / After Conditioning 20 / 7.5 / 55 / 66 22 / 5 / 73 / 88 24 / 3 / 45 / 54 26 / 2 / 52 / 63 28 / 1.5 / 54 / 65 30 / 1 / 60 / 73	AS39029C Para. 4.7.5 EIA-364-06 Silver-plated wire
Contact resistance at 200° C, crimp contacts	Wire Size / Test Current Amperes / Maximum Voltage Drop (millivolts) 20 / 7.5 / 94 22 / 5 / 125 24 / 3 / 77 26 / 2 / 89 28 / 1.5 / 92 30 / 1 / 103	AS39029C Para. 4.7.5 EIA-364-06 Silver-plated wire
Low level contact resistance, crimp contacts	Wire Size / Maximum Contact Resistance (milliohms) Initial Values / After Conditioning 20 / 9 / 11 22 / 15 / 17 24 / 20 / 23 26 / 31 / 38 28 / 50 / 60 30 / 75 / 88	AS39029C Para. 4.7.4 EIA-364-23 Silver plated wire

SERIES 806 MIL-AERO

Performance Specification

Performance Specification

TEST DESCRIPTION	REQUIREMENT	PROCEDURE
Contact resistance, glass-sealed hermetic connectors	Contact Size, Wire Size / Test Current Amperes / Maximum Millivolt Drop Initial / After Conditioning 20 / 5 / 60 / 75 22 / 3 / 85 / 95	MIL-DTL-38999M Para. 3.18.2 EIA-364-06
Shell-to-shell conductivity	Finish Code / Shell Matl/Fin / Millivolt Drop (mV) NF / Al/OD Cad / 2.5 MT / Al/Ni-PTFE / 2.5 ME / Al/EN / 1.0 ZR / Al/Zn-Ni / 2.5 Z1 / SST/pass. / 10.0 ZL / SST/Ni / 1.0	MIL-DTL-38999M Para. 4.5.25 EIA-364-83
Backshell shield braid to shell conductivity	Finish Code / Shell Matl/Fin / Millivolt Drop (mV) NF / Al/OD Cad / 5.0 MT / Al/Ni-PTFE / 5.0 ME / Al/EN / 3.5 ZR / Al/Zn-Ni / 5.0 Z1 / SST/pass. / 15.0 ZL / SST/Ni / 3.5	MIL-DTL-38999M Para. 4.5.25.1 EIA-364-83
Indirect lightning strike	No evidence of damage which could impair proper functioning. Connectors shall meet shell-to-shell conductivity, DWV and coupling torque.	MIL-DTL-38999M Para. 4.5.47 EIA-364-75 10,000 Amps peak current
EMI shielding	Freq. MHz / Leakage Attenuation, (dB) minimum Electroless Nickel Finish / Cadmium, Nickel-PTFE, Zinc-Nickel Finish 100 / 90 / 90 200 / 88 / 88 300 / 88 / 88 400 / 87 / 87 800 / 85 / 85 1,000 / 85 / 85 1,500 / 76 / 69 2,000 / 70 / 65 3,000 / 69 / 61 4,000 / 68 / 58 6,000 / 66 / 55 10,000 / 65 / 50	MIL-DTL-38999M Para. 4.5.28
Durability	No evidence of damage which could impair proper functioning following 500 cycles of mating and unmating.	MIL-DTL-38999M Para. 4.5.8 EIA-364-09
Coupling and uncoupling torque	Shell size / Maximum Engagement lbs-inch. / Minimum Disengagement lbs.-inch. 8 / 8 / 2 9 / 8 / 2 10 / 12 / 2 11 / 12 / 2 12 / 12 / 2 14 / 16 / 2 16 / 20 / 3 18 / 24 / 3 20 / 28 / 3 22 / 32 / 5 24 / 36 / 5	MIL-DTL-38999M Para. 4.5.7 EIA-364-114
Insert retention	100 pounds per square inch, 25 pound minimum force	MIL-DTL-38999M Para. 4.5.12 EIA-364-35
External bend moment	Shell size / Pound inches 8 / 100 9 / 100 10 / 100 11 / 200 12 / 300 14 / 400 16 / 500 18 / 600 20 / 700 22 / 800 24 / 900	MIL-DTL-38999M Para. 4.5.16 EIA-364-43

MICRO MINIATURE CIRCULAR

Series 806 Mil-Aero Connectors

Performance Specification

Performance Specification

TEST DESCRIPTION	REQUIREMENT	PROCEDURE
Contact retention	Contact size: Pounds ± 10 percent 22HD: 10 20HD: 10	MIL-DTL-38999M Para. 4.5.20.1 EIA-364-29
Magnetic permeability	2 µ maximum	MIL-DTL-38999M Para. 4.5.48 EIA-364-54
Contact engaging /separation force	Contact forces shall meet AS39029 Table 9 requirements	AS39029C Para. 4.7.6 EIA-364-37
Temperature cycling (thermal shock)	No evidence of damage detrimental to the function of the connector	MIL-DTL-38999M Para. 4.5.4 EIA-364-32 Mated connectors, -65° C to +200° C
Random vibration, elevated temperature, 43g rms	No discontinuities of 1 microsecond or longer No resonance at frequencies less than 300 Hz	MIL-DTL-38999M Para. 4.5.23.2.3 with Figure 24 accessory load EIA-364-28 +200°C
Random vibration, ambient temperature, 49g rms	No discontinuities of 1 microsecond or longer	MIL-DTL-38999M Para. 4.5.23.2.4 EIA-364-28 Test Condition V
Sine vibration, 60g	No discontinuities of 1 microsecond or longer	MIL-DTL-38999M Para. 4.5.23.2.1 with Figure 24 accessory load 12 hours in each of 3 axes 4 hours at ambient, 4 hours at -55° C, 4 hours at +200° C
Mechanical shock, 300g	No discontinuities of 1 microsecond or longer	MIL-DTL-38999M Para. 4.5.24.1 EIA-364-27
High impact shock (901)	No discontinuities of 1 microsecond or longer No evidence of damage which could impair proper functioning.	MIL-DTL-38999M Para. 4.5.24.2 MIL-S-901 Grade A
Humidity (cyclic)	Meet DWV and IR test	MIL-DTL-38999M Para. 4.5.26 EIA-364-31 Method 4 10 cycles, 10 days, 25 – 65°C 80 – 100% RH
Ozone exposure	No evidence of damage detrimental to the function of the connector	MIL-DTL-38999M Para. 4.5.29 EIA-364-14
Fluid immersion	No damage to plastic, elastomeric and bonding materials detrimental to the function of the connector. Connector shall meet coupling torque and DWV requirements when tested within 3 hours of immersion.	MIL-DTL-38999M Para. 4.5.30 EIA-364-10
Altitude immersion	No evidence of moisture on connector interface or contacts. At the end of the third cycle, while still submersed, connectors shall meet dielectric withstanding voltage and 1,000 megohms insulation resistance.	MIL-DTL-38999M Para. 4.5.9 EIA-364-03 75,000 feet
Altitude (low temperature)	Connectors shall meet insulation resistance requirement while at -65°C and 100,000 ft. Connectors shall meet DWV requirement when returned to ambient conditions.	MIL-DTL-38999M Para. 4.5.21 EIA-364-105 -65°C 100,000 ft.
Thermal vacuum outgassing	All nonmetallic materials shall not exceed 1.0% Total Mass Loss and 0.1% Total Volatile Condensible Materials. Applicable only to connectors that have been subjected to optional thermal vacuum outgassing.	MIL-DTL-38999M Para. 4.5.42 ASTM E595
Salt Spray (dynamic)	Finish Code / Matl/Fin / Hours NF / Al/OD Cad / 500 MT / Al/Ni-PTFE / 500 ME / Al/EN / 96 ZR / Al/Zn-Ni / 500 Z1 / SST/passivate / 1000 ZL / SST/Ni / 1000	MIL-DTL-38999M Para. 4.5.13.2 EIA-364-26 500 mating cycles

MADE IN AMERICA:

From Design Engineering to Component Part Manufacture, Assembly, and Test

Connector shells, plating, inserts, contacts, environmental seals, filter arrays, cable assembly, and qualification testing all performed in-house

- **Largest small form-factor connector engineering team in the industry**
- **Largest U.S. CNC metal turning operation in the high-rel interconnect industry**
- **Largest U.S. interconnect component part fabrication and assembly facility**
- **Fully certified in-house (third party) qualification test facility**
- **Massive same-day inventory of Series 806 Mil-Aero connectors and cables—bagged, tagged, and ready for immediate shipment**

THAT'S WHAT ALLOYS ARE MADE OF ?

Something's wrong with this infographic…
See if you can puzzle it out

Key to Elements

Al	Aluminum	Co	Cobalt
Mg	Magnesium	Mn	Manganese
Si	Silicon	K	Potassium
Cu	Copper	Ag	Silver
Cr	Chromium	Al	Aluminum
Sn	Tin	Au	Gold
Pb	Lead	N	Nitrogen
Zn	Zinc	V	Vanadium
Fe	Iron	O	Oxygen
C	Carbon	Mo	Molybdenum
P	Phosphorus	S	Sulfur
Ni	Nickel	Nb	Niobium
Ti	Titanium	Ta	Tantalum
Be	Beryllium		

Metals · Nonmetals · Metalloids · Other

Puzzle answers published at:
www.glenair.com/qwikconnect

Titanium Alloy

Al 98% · Mg 1% · Si Cu Cr <1%

Developed in 1935. Originally called "Alloy 61S"

Excellent corrosion resistance, workability, and joining characteristics

Beryllium Copper

Cu 85% · Sn 5% · Pb 5% · Zn 5%

Used in industrial bushings, frames, struts, gears, valve stems, and cams

Corrosion resistant, thermally conductive, produces little friction

Diecast Aluminum (A380)

Fe 89% · Cr 10%–30% · C <1.2%

Mechanical properties can be enhanced by adding Ni, Mb, Ti, Nb, Mn

Infinitely recyclable, environmentally neutral, does not leach compounds, over 150 unique alloys available

(High) Carbon Steel

P 2%–14%

Used in applications ranging from aerospace to healthcare and culinary

Ni Alloyed with Ti Cu Al Fe Cr

Co-deposition coating on metal substrate. Low friction, solves sticking, galling, and drag problems

Inconel (X-750)

Cu 98% · Be 2% · Co Ni Fe <1%

Used in springs, cryogenic equipment, and percussion instruments

High-strength, non-magnetic, non-sparking. Ductile, weldable, and machinable.

Marine Bronze

Fe 98% · C Mn Si Cu <2%

Used in cutting tools, springs, high-strength wires, and dies

Hard, high-strength, wear-resistant

6061 Aluminum (T6)

Al 80%–89.5% · Si 7.5%–9.5% · Cu 3%–4% · Sn <3.5% · Zn <3% · Fe <1.3% · Mg, Mn, Ni <1%

Versatile, corrosion-resistant, temperature-tolerant, lightweight and strong

Super Duplex

Sn 60% · Pb 39% · Alloys 1%

Useful in electronics and plumbing. Lead-free options use Tin, Silver, and Copper and other materials.

Used to create a permanent bond between metal workpieces

FR4

K Ag $(CN)_2$

In high-humidity environments, "red plague" galvanic corrosion can occur

Primary material has the highest known electrical and thermal conductivity of all metals

Solder

C_2 Au K N_2 — *Au 68.2%*

A barrier material, usually Nickel, is deposited over a copper substrate before plating with this material.

Primary material has high electrical conductivity, is workable, and corrosion-resistant

Kovar

Ti 90% · Al 6% · V 4% · Fe .25% max · O .2% max

As strong as steel, half the weight

Lightweight, high strength, low-corrosion, low electrical/thermal conductivity, paramagnetic

Stainless Steel

Fe 98% · Cr 0.8%–1.1% · Mo Mn C Si P S <2%

Its name comes from two of its major alloying elements

Excellent strength-to-weight ratio, used in aircraft parts

Chromoly Steel

Fe 60% · Cr 24%–26% · Ni 6%–8% · Mo 3%–5% · Mn 1.2% max

First developed for use in the paper industry

High corrosion resistance and mechanical strength

Silver Plating

Ni ≥70% · Cr 14%–17% · Fe 5%–9% · Ti 2.25%–2.75% · Nb & Ta 0.7%–1.2%

Co, Mn, Cu, Al, Si, C, S≤1%

Oxidation corrosion resistant, suited for extreme pressure and heat environments

Nickel PTFE (Plating)

Fe 54% · Ni 29% · Co 17% · Si Cr C <1%

Thermal expansion similar to glass

Invented to meet the need for reliable glass-to-metal sealing

Gold Plating

Glass Fiber · Epoxy Resin

Glass fiber epoxy resin laminate with Bromine added to make the material flame-retardant.

Strong, lightweight, flame-retardant, good electrical properties and low moisture absorption

Glenair®
MISSION-DRIVEN DESIGN

SERIES 806 MIL-AERO

Environmental Crimp-Contact Series

Series 806 offers significant size and weight savings while meeting key performance benchmarks for a broad range of harsh-environment interconnect applications. The crimp-contact series is fully tooled with available contacts and layouts optimized for use in sensor applications, high-frequency RF, high-speed datalink, LRU power and more. Rear-release copper alloy retention clips provide fast and reliable assembly and retention of contacts ranging from size #22HD to #8. The two-piece dielectric insulator is constructed with a special "top hat" architecture to ensure qualified DWV at altitude. Triple-ripple rear grommet ensures wire-to-contact sealing IAW MIL-DTL-38999 Series III.

- **Crimp-contact environmental series**
- **Over 65 tooled and available insert arrangements**
- **Designed for harsh environments such as aircraft, satellites, and defense applications**
- **High density 20HD and 22HD contact arrangements**
- **Support for standard signal, high speed, RF, and power crimp contacts**
- **Complete range of crimp-contact asssembly tooling**
- **Full range of backshells including special extended-shell versions for use with size #8 shielded contacts**

SAVE SIZE AND WEIGHT WITH SERIES 806 VERSUS D38999

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

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

MISSION-DRIVEN DESIGN

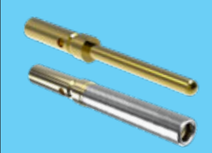
Series 806 Mil-Aero Connectors

SERIES 806 MIL-AERO

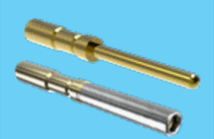
ENVIRONMENTAL CRIMP-CONTACT SERIES

Cable Plugs, Environmental *806-012*
Square-flange Receptacles *806-013*
In-line Receptacles *806-019*
Jam-nut Receptacles *806-020*
Jam-nut PCB Receptacles *806-021*
Square-flange PCB Receptacles *806-022*
Jam-nut Coax PCB Receptacles *806-058*

CRIMP CONTACT TYPES: SIGNAL, POWER, COAX, RF, TWINAX, AND QUADRAX



850-094/-095
Size 22HD Crimp Contacts for #22–30 wire



850-442/-443
Size 22HD Crimp Contacts for #20–24 wire

809-204/-205
Size 20HD Crimp Contacts for #20–24 wire

809-110/-111
Size 16 Power Crimp Contacts for #16–20 wire

809-114/-115/-116/-117
Size 16 Coax Contacts for 50/75 Ohm Cable

809-112/-113
Size 12 Power Crimp Contacts for #12–14 wire

809-118/-119/-120/-121
Size 12 Coaxial Crimp Contacts for #12–14 wire

852-015/-016/-017/-018
Size 12 50 Ohm 3GHz Coax Contacts

852-103
Size 12 75 Ohm High-Frequency Coax Contacts

850-158/-159
Size 8 Crimp-Removable Power Contacts

850-148
Size 8 50 Ohm Matched-Impedance Coaxial RF Contacts

852-150/-151
Size 8 75 Ohm Matched-Impedance Coaxial RF Contacts

853-075
Size 8 Differential Twinax Contacts

854-048
Size 8 Quadrax Contacts

Dimensions in Inches (millimeters) are subject to change without notice.

Glenair®
MISSION-DRIVEN DESIGN

SERIES 806 MIL-AERO

Environmental High-Speed Series

Series 806 High-Speed environmental receptacles are available with potted-in-place printed circuit board terminals, integral standoffs, and threaded holes for secure attachment to rigid or flex circuit boards. High-speed cable plugs are supplied with separately-ordered size #8 shielded crimp contacts or turnkey jumper assemblies. Available high-speed datalink contact types include Octaxial El Ochito, industry-standard Quadrax, and differential Twinax for 10GbE, HDMI, and USB 3.0 applications. RF contacts are also supported for high-frequency and microwave applications. Hybrid insert arrangement connectors are available for mixed high-speed digital and standard signal applications.

- **Size 8 El Ochito, Quadrax, and differential Twinax contacts**
- **High-speed digital datalink support for 10GbE, USB 3.0, HDMI, SATA, DisplayPort, and other protocols**
- **Glenair tested and qualified cables available for all popular high-speed applications**
- **Hybrid insert arrangements with size #22HD, #16, #12, and #8 contacts**
- **Support for coaxial contacts for RF and microwave applications**
- **Contacts and jumpers sold separately for cable plug style**
- **High-speed receptacles feature PCB terminals and environmental potting**
- **Turnkey high-speed jumper cables available**

ENVIRONMENTAL SERIES 806 HIGH-SPEED CABLE PLUG

Cable-mount El Ochito Plug
806-012

ENVIRONMENTAL SERIES 806 HIGH-SPEED PCB RECEPTACLES

Jam-nut El Ochito Receptacle
806-039

Square-flange El Ochito Receptacle
806-040

MICRO MINIATURE CIRCULAR

Series 806 Mil-Aero Connectors

El Ochito®

El Ochito Protocols		
		
WHITE	**BLUE**	**RED**
10GBASE-T	**USB 3.0**	**HDMI, SATA, DisplayPort**

El Ochito Mating Contacts and Protocols		
PART NUMBER		**PROTOCOLS**
WHITE (Pin)	858-045	1000BASE-T, 10GBASE-T Ethernet, 40GBASE-T
WHITE (Socket)	858-046	1000BASE-T, 10GBASE-T Ethernet, 40GBASE-T
BLUE (Pin)	858-047	USB 3.0, other 90 Ohm signals
BLUE (Socket)	858-048	USB 3.0, other 90 Ohm signals
RED (Pin)	858-049	HDMI, DisplayPort, SATA, other 100 Ohm signals
RED (Socket)	858-050	HDMI, DisplayPort, SATA, other 100 Ohm signals

Example Code E7

Example Code E5

PREVENT CONTACT SPLAY WITH SERIES 806 EXPANDED CLEARANCE BACKSHELLS

Standard clamps and adapters are too small for use with El Ochito octaxial contacts with sealing boots, leading to axial displacement of the boot and contact splay. Conventional 45° and 90° elbows can also cause axial contact stress and overbending of wires. Expanded clearance accessories eliminate these problems as larger inside dimensions reduce interference with sealing boots. Expanded clearance extenders and banding adapters have full-radius "swept" 45° and 90° elbows to prevent overbending of wires. Expanded clearance saddle clamps have lengthened frames for improved management of coax and shielded twisted pair cables.

Protocol Code for El Ochito PCB Contact Positons B = Blue, R = Red, W = White								
SYMBOL	Contact							
	A	B	C	D	E	F	G	H
E	W	W	W	W	W	W	W	W
E2	B	W	W	W	W	W	W	W
E3	R	W	W	W	W	W	W	W
E4	B	B	W	W	W	W	W	W
E5	R	B	W	W	W	W	W	W
E6	R	R	W	W	W	W	W	W
E7	B	B	B	W	W	W	W	W
E8	R	B	B	W	W	W	W	W
E9	R	R	B	W	W	W	W	W
E10	R	R	R	W	W	W	W	W
E11	B	B	B	B	W	W	W	W
E12	R	B	B	B	W	W	W	W
E13	R	R	B	B	W	W	W	W
E14	R	R	R	B	W	W	W	W
E15	R	R	R	R	W	W	W	W
E16	B	B	B	B	B	W	W	W
E17	R	B	B	B	B	W	W	W
E18	R	R	B	B	B	W	W	W
E19	R	R	R	B	B	W	W	W
E20	R	R	R	R	B	W	W	W
E21	R	R	R	R	R	W	W	W
E22	B	B	B	B	B	B	W	W
E23	R	B	B	B	B	B	W	W
E24	R	R	B	B	B	B	W	W
E25	R	R	R	B	B	B	W	W
E26	R	R	R	R	B	B	W	W
E27	R	R	R	R	R	B	W	W
E28	R	R	R	R	R	R	W	W
E29	B	B	B	B	B	B	B	W
E30	R	B	B	B	B	B	B	W
E31	R	R	B	B	B	B	B	W
E32	R	R	R	B	B	B	B	W
E33	R	R	R	R	B	B	B	W
E34	R	R	R	R	R	B	B	W
E35	R	R	R	R	R	R	B	W
E36	R	R	R	R	R	R	R	W
E37	B	B	B	B	B	B	B	B
E38	R	B	B	B	B	B	B	B
E39	R	R	B	B	B	B	B	B
E40	R	R	R	B	B	B	B	B
E41	R	R	R	R	B	B	B	B
E42	R	R	R	R	R	B	B	B
E43	R	R	R	R	R	R	B	B
E44	R	R	R	R	R	R	R	B
E45	R	R	R	R	R	R	R	R

Environmental High-Speed Jumper Assemblies

Glenair supplies a complete family of low-resistance, high-durability rear-release crimp-contact jumpers and pigtails for snap-in use in environmental versions of our Signature micro miniature Series 806 Mil-Aero. Our popular El Ochito octaxial contact family is available in turnkey jumpers and pigtails for 10Gb Ethernet, SuperSpeed USB, SATA, HDMI, and other multi-gigabit data link protocols. Assemblies are fully qualified with full insertion and return loss test data available for all wire configurations. Commercial-grade cabling has PVC jacket. Aerospace-grade versions have high-temperature fluoropolymer construction and braided shields on SuperSpeed pairs.

Glenair signature high-speed Octaxial El Ochito contact series may be specified as factory-wired jumpers and pigtails, including El Ochito-to-commercial RJ45 and USB connectors

- **El Ochito® octaxial contact pigtail and jumper assemblies, factory terminated, 100% inspection and test**
- **Available El Ochito-to-RJ45 / USB and other commercial connector configurations**
- **Two available wire types, commercial-grade and flexible aerospace-grade**
- **Solutions for 10GbE, USB 3.0 SuperSpeed, HDMI, and SATA**
- **Glenair recommends the use of available extended backshell designs for protection and routing of high-speed assemblies**

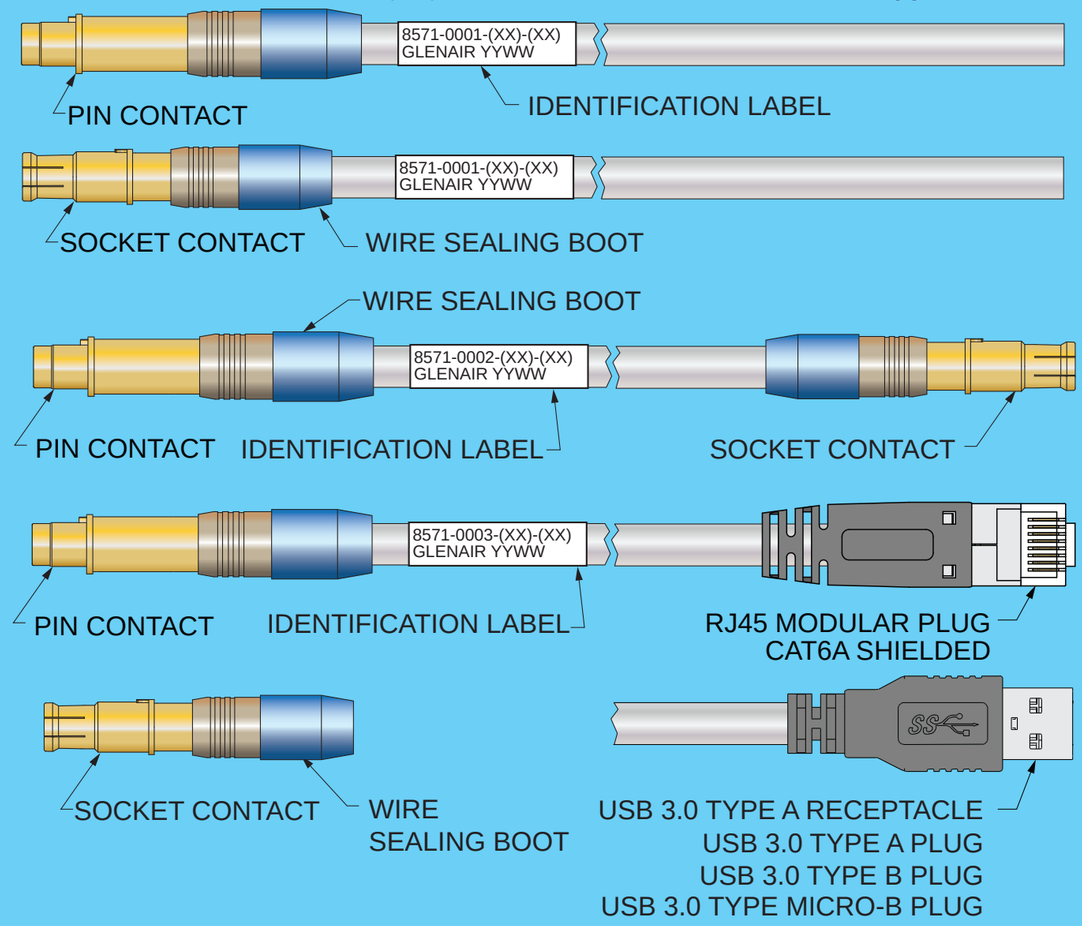
MICRO MINIATURE CIRCULAR

Series 806 Mil-Aero Connectors

El Ochito®

SERIES 806 HIGH-SPEED EL OCHITO PIGTAILS, JUMPERS, AND COMMERCIAL CONNECTOR JUMPERS

El Ochito® White	El Ochito® Blue	El Ochito® Red
		
1000BASE-T, 10GBASE-T	**SuperSpeed USB**	**HDMI, DisplayPort, SATA**
El Ochito® White octaxial contacts provide 10GbE in a single size #8 contact cavity (compared to two Quadrax) for 100BASE-T solutions.	***Low-dielectric material. 90 ohms.*** El Ochito® Blue octaxial contacts provide an aerospace-grade solution for SuperSpeed USB 3.0	***Low-dielectric material. Up to 5 Gbps. 100 ohms.*** El Ochito® Red octaxial contacts provide an aerospace-grade solution for multi-gigabit data rates.



Glenair®
MISSION-DRIVEN DESIGN

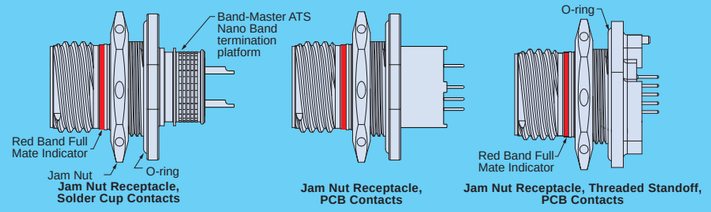
SERIES 806 MIL-AERO

Environmental EMI/RFI Filter Series

Glenair Series 806 environmental filter connectors are built in-house for use in EMC management of electronic systems and interconnect cabling. Series 806 filter connectors are built IAW applicable series specifications, and are designed to mate with 806 plugs with the same insert configuration and opposite contact gender. Ceramic planar filter arrays are supplied in C and Pi capacitance configurations. Jam-nut and square-flange panel mounting with PC tail teminals, fully potted for environmental protection in high-vibration and high-altitude applications, as well as temperature ranges from -55°C to +125°C. Size 22HD, 20HD contact arrangements and hybrid arrangements with size #16 and size #12 contacts for combined power / signal applications. Board mounting flange has threaded standoffs and orientation post.

- **Planar, multilayer ceramic capacitive filters**
- **C, Pi, L-C, and C-L electrical configurations**
- **PC tail or solder cup wire termination**
- **35 – 56,000 pF capacitance**
- **High-density #20HD and #22HD arrangements for reduced size and weight plus size #16, #12, #8 standard and hybrid layouts**
- **Operating temperature: -55°C to +125°C**
- **Dielectric withstanding voltage: 300 VDC**
- **Turnkey in-house manufacturing of all filter connector elements**

FILTERED SERIES 806 CONNECTOR CONFIGURATIONS AND DETAILS



MICRO MINIATURE CIRCULAR

Series 806 Mil-Aero Connectors

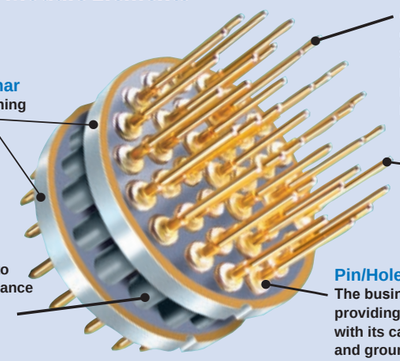
filter connectors

FILTERED SERIES 806 MIL-AERO CONNECTORS

Filtered Solder Cup or PC Tail Jam-nut Receptacle, *240-806 (-07) or (-08)*

Filtered Solder Cup or PC Tail Receptacle, *240-806-21*

Filter Module Elements



Multilayer Ceramic Planar Array: Containing a network of capacitors, feedthrus, and ground lines

Contact Types: Choose from Solder Cup or PC Tail (Consult Factory for PC Tail Length Options)

Contact Material: Gold-Plated Copper Alloy

Inductors: Ferrite beads to provide inductance and increase insertion loss

Pin/Hole Intersection: The business end of the filter, providing each contact with its capacitance value and grounding

Vertical in-house integration of all filter elements and processes

Capacitance Class		
	Capacitance Range (pF) Filter Type	
Class	P (Pi-Section)	C, L, M (C, L-C, C-L)
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

Filter Types

C
Single capacitor with low self-inductance

Pi
Dual capacitors with a single inductive element positioned between

L-C
Single capacitor and an inductive element

C-L
Single capacitor and an inductive element

Glenair®
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SERIES 806 MIL-AERO

Environmental Fiber Optic Datalink Series

Glenair's innovative fiber optic / electrical connector design meets key performance benchmarks for harsh vibration, shock, and environmental settings in rigid conformance with MIL-DTL-38999 Series III—but at nearly half the size and weight. The rugged fiber optic connection system delivers typical insertion loss 0.5 dB and supports 50/125, 62.5/125, and 9/125 size fiber in singlemode (1310 and 1550 nm) and multimode (850 and 1300 nm) wavelengths. Glenair Signature #20HD fiber optic termini offer the same high data rate performance as larger size #16 D38999 series connectors with more fiber lines and reduced shell size in every insert arrangement.

- **Next-generation small form factor aerospace-grade circular connector**
- **Designed for harsh application environments such as military and commercial aircraft**
- **Outstanding environmental, optical, and mechanical performance**
- **Integrated anti-decoupling technology**
- **Seven tooled high density 20HD fiber termini arrangements**
- **Low dB loss performance**
- **Factory-terminated and tested harness assembly available**

SAVE SIZE AND WEIGHT WITH SERIES 806 CONNECTORS

Series 806 Mil-Aero smallest shell (size 8) .500 in. mating threads 3 #20 electrical or optical contacts / termini

MIL-DTL-38999 smallest shell (size 11) .750 in. mating threads 2 #16 electrical or optical contacts / termini

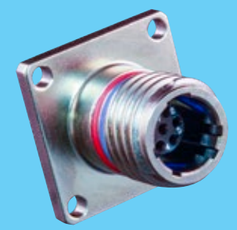
MICRO MINIATURE CIRCULAR

Series 806 Mil-Aero Connectors

Rugged Fiber Optic CONNECTORS

CONNECTOR PLUG AND RECEPTACLE SHELL STYLES FOR #20HD FIBER OPTIC TERMINI

Cable Plug



Square-flange Receptacle

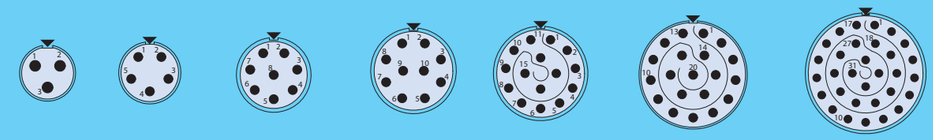
Jam-nut Receptacle

In-line Receptacle

Series 806 Arrangements compatible with #20HD Fiber Optic Termini

Mating face of pin connector. Socket numbering is reversed.

Symbol ▼ indicates master key location.



Arrangement No.	8-3	9-5	10-8	11-10	12-15	14-20	16-31
No. of Termini	3	5	8	10	15	20	31

#20HD FIBER OPTIC TERMINI FOR SERIES 806 MIL-AERO CONNECTORS

Single or multimode. Ceramic ferrule. 0.5 dB loss. Size 20HD fiber optic termini are compatible with Series 806 connectors with size 20HD contact arrangements. These snap-in, rear release termini feature precision ceramic ferrules and alignment sleeves for accurate fiber alignment. Typical insertion loss 0.5 dB. Fits 50/125 and 62.5/125 multimode and 9/125 singlemode fiber.

MATERIAL/FINISH

- Ferrule, alignment sleeve: zirconia ceramic
- Body, shroud: copper/nickel/zinc alloy
- Spring (socket, not shown): SST/passivated
- Protective cover (socket): BeCu alloy/nickel plated

#20HD Fiber Optic Termini for Series 806 Connectors

Termini Type	Optical Fiber Type	Part Number	ØA Ferrule Hole	Fiber Size Core/Cladding
Pin	Singlemode	181-134-1255	125.5 microns	9/125
Pin	Multimode	181-134-126	126.0 microns	50/125, 62.5/125
Socket	Singlemode	181-135-1255	125.5 microns	9/125
Socket	Multimode	181-135-126	126.0 microns	50/125, 62.5/125

FACTORY-TERMINATED SERIES 806 FIBER OPTIC CABLE ASSEMBLIES

Glenair is able to supply turnkey fiber optic cable assemblies for both environmental applications as well as non-jacketed harnesses for use inside the box. Rugged Series 806 Mil-Aero with size #20 HD fiber optic termini are a significant size and weight savings compared to conventional D38999 or other standards. Please consult the factory for design assistance and quoting.

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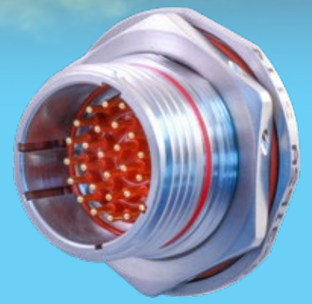
SERIES 806 MIL-AERO

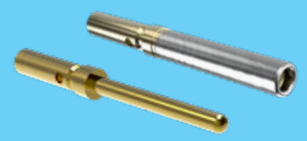
Extreme Temperature “ThermaRex” Series



Sensor devices in aerospace engine applications are increasingly exposed to higher temperature operating environments. Environmental sensors in nuclear power reactors—an extremely high temperature and radiation-rich environment—are also exposed to temperature extremes well beyond the capabilities of conventional interconnect devices. Series 806 micro miniature connectors with Glenair Signature ThermaRex high-temperature inserts are designed to survive and excel in high continuous operating temperature application environments up to 300°C. The Series 806 Mil-Aero ThermaRex product family includes connectors, cables, and accessory wire protection conduit systems. Glenair recommends ArmorLite CF high-temperature corrosion-resistant shielding for hybrid EMC electrical/optical applications.

- **Service rating -65° to +300°C**
- **Vibration-resistant stub ACME threaded coupling**
- **High-temperature ceramic insulators and silicone seals**
- **Durable stainless steel construction**
- **Utilizes Glenair Signature Crown Ring contacts**
- **Contact and wire support in sizes #22HD, #20HD, #16, #12, and #8 including hybrid layouts**

GLENAIR SIGNATURE CROWN RING CONTACTS



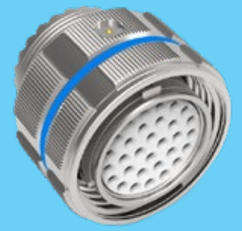
- **Crimp removable contacts, sizes #22HD, #20HD, #16, #12, and #8**
- **Optimized for use at 300°C or higher while maintaining low electrical resistance**
- **Stainless steel Crown Ring provides compression force on the socket**
- **Superior vibration resistance**
- **Higher current carrying capabilities, lower contact resistance**

MICRO MINIATURE CIRCULAR

Series 806 Mil-Aero Connectors

ThermaRex™

THERMAREX CONNECTOR TYPES



Plug
806-042

Jam-nut Receptacle
806-053

Square-flange Receptacle
806-052

300°C THERMAREX WIRE

- **Special nickel-coated copper alloy conductors**
- **300°C continuous service**
- **24 to 8 AWG, 10 colors of insulation**
- **Single-wires plus jacketed, shielded, twisted pair available**

300°C THERMAREX POLYMER-CORE CONDUIT

- **High-temperature-tolerant flexible polymer-core conduit**
- **All standard colors: black, clear, orange, blue, yellow**
- **Qualification test report GT-17-261 available**
- **300°C continuous service**
- **Available with high-temperature braid shield and/or jacket**

300°C THERMAREX METAL-CORE CONDUIT

- **Flexible passivated stainless steel core conduit**
- **High-temperature-tolerant ThermaRex jacket**
- **.127" to .250" outer diameter sizes**
- **300°C continuous service**

ARMORLITE CF MICROFILAMENT EMI/RFI SHIELDING

- **Stainless steel over copper microfilament EMI shield**
- **High temperature -80˚C to 300˚C**
- **Corrosion / harsh environment resistant, 1000 hr. salt spray**
- **70% reduced weight vs. standard braid**
- **Superb electrical resistance and shielding performance**

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MISSION-DRIVEN DESIGN

SERIES 806 MIL-AERO

Vitreous Glass Hermetic Seal Series

Series 806 hermetic receptacles feature 304L stainless steel shells and glass-to-metal seals. Rated for -65°C to +200°C temperature range. Micro miniature Series 806 connectors save size and weight compared to legacy aerospace-grade hermetic connectors. These high-performance, parylene compatible connectors are suitable for pressurized bulkhead applications subject to vibration, moisture, and temperature extremes. Available receptacle shell styles include square-flange, jam-nut, and weld mount.

All Series 806 hermetic connectors are 100% tested prior to shipment. A helium leak test is performed to certify the hermetic seal. This test is conducted by inducing 1 ATM of vacuum on one side of the connector, while Helium gas is released on the other side, and a mass spectrometer "counts" the number of helium molecules that penetrate the connector seal. Series 806 hermetic connectors are designed specifically for commercial and military aircraft zones such as engine compartments—areas typically exposed to fuel, oil, and changes in elevation. Sensitive electronic equipment in these zones must be protected from the effects of caustic chemicals and moisture ingress. Other locations such as the aircraft fuselage require hermetic connectors to maintain passenger cabin pressure while allowing for data transmission in and through separated compartments of the aircraft.

VITREOUS GLASS TECHNOLOGY ADVANTAGES

- **Superior pressure resistance, up to 32,000+ PSI capable**
- **Higher resistance to extreme operating temperatures—up to 260° C available**
- **Superior mechanical strength**
- **No material breakdown or aging over time**
- **Helium leak rate <1X10^{-7} cc/sec to 1X10^{-10}**
- **Vertically-integrated manufacturing process: all critical components and sub-assemblies manufactured in-house**

MICRO MINIATURE CIRCULAR

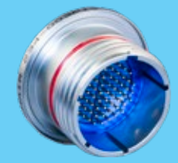
Series 806 Mil-Aero Connectors

GLASS-SEALED Hermetic CONNECTORS

HERMETIC GLASS-TO-METAL SEAL SERIES 806 MIL-AERO CONNECTORS

Hermetic Jam-nut Mount, PC Tail / Solder Cup
806-025-07

Hermetic Square-flange Mount PC Tail / Solder Cup
806-025-02



Hermetic Weld-Mount PC Tail / Solder Cup
806-025-13

Hermetic Square-flange Mount PCB Receptacle Threaded Standoff
806-026-02

Hermetic Jam-nut Mount PCB Receptacle Threaded Standoff
806-026-02

Features

- Glass-to-metal seal
- Non-removable solder cup or PC tail contacts
- High-density #20HD and #22HD arrangements for reduced size and weight plus #16, #12, #8 standard and hybrid arrangements
- Aerospace-grade materials

Specifications

- Operating temperature: -65°C to +200°C
- Leak Rate: 1E-7 cm^3/s at 1 ATM pressure differential
- Dielectric withstanding voltage
  #22HD contacts: 1300 VAC
  #20HD contacts:1800 VAC
  #16 contacts: contact factory
  #12 contacts: contact factory
  #8 contacts: contact factory
- Shell-to-Shell conductivity: 10 mV max.
- Mating durability: 500 cycles
- Mechanical shock: EIA-364-27, 300g.
- Vibration (sine): MIL-DTL-38999M, 60g.
- Vibration (random) EIA-364-28 Condition VI, Letter J, 43.92 Grms, +200°C
- High-impact shock: MIL-S-901 Grade A
- Indirect lightning Strike: EIA-364-75 Type B Level 2 10kA Peak

Connector Construction

- Shell and jam-nut: 316L CRES
- Shell (-13 only): 304L CRES
- Hermetic contacts: nickel-iron alloy, gold plated
- Socket contacts: copper alloy, gold plated
- Insulator, hermetic: vitreous glass
- Interfacial seal, peripheral seal, O-ring: fluorosilicone
- Insulator, socket: high-grade rigid dielectric

In-house component fabrication, assembly, firing, and test all under one roof and one quality control system. Full support for all Series 806 insert arrangements including shielded contact layouts

Std cc/sec Approximate	Approximate Bubble Equivalent	Std cc/sec Approximate	Approximate Bubble Equivalent	Std cc/sec Approximate	Approximate Bubble Equivalent
1 x 10^{-1}	1 cc/10 sec	1 x 10^{-4}	1 cc/3 hours	1 x 10^{-7}	3 cc/year
1 x 10^{-2}	1 cc/100 sec	1 x 10^{-5}	1 cc/24 hours	1 x 10^{-8}	1 cc/3 year
1 x 10^{-3}	1 cc/hour	1 x 10^{-6}	1 cc/2 weeks	1 x 10^{-9}	1 cc/30 years

Lightweight Hermetic Seal Series

"Mission-Critical" 1X10^{-7} hermetic encapsulant sealing

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.

In response, Glenair invented CODE RED: an innovative sealing encapsulant and application process 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 the Series 806 mil-aero with complete coverage for all insert arrangements including shielded contact layouts. CODE RED delivers reliable, life-of-system 1X10^{-7} max leak-rate hermetic sealing with significantly lighter weight and better electrical performance when compared with conventional glass-to-metal solutions.

- **Full hermetic sealing, 1X10^{-7} in a lightweight aluminum shell with low electrical resistance gold-plated copper contacts**
- **Passed full D38999/23 qualification testing**
- **Meets NASA outgassing requirements, as well as aerospace temperature and corrosion resistance standards**
- **Operating temperature -65°C to +200°C**
- **Significant weight savings—up to +50%**
- **Order-of-magnitude improvement in current carrying capacity and electrical resistance compared to Kovar/ Inconel solutions**

MICRO MINIATURE CIRCULAR

Series 806 Mil-Aero Connectors

HERMETIC CODE RED CONNECTORS

LIGHTWEIGHT CODE RED HERMETIC SEAL SERIES 806 MIL-AERO CONNECTORS

PC Tail Receptacle
806-028

PC Tail Receptacle with El Ochito Octaxial Contacts
806-043

APPLICATION NOTES:

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

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.

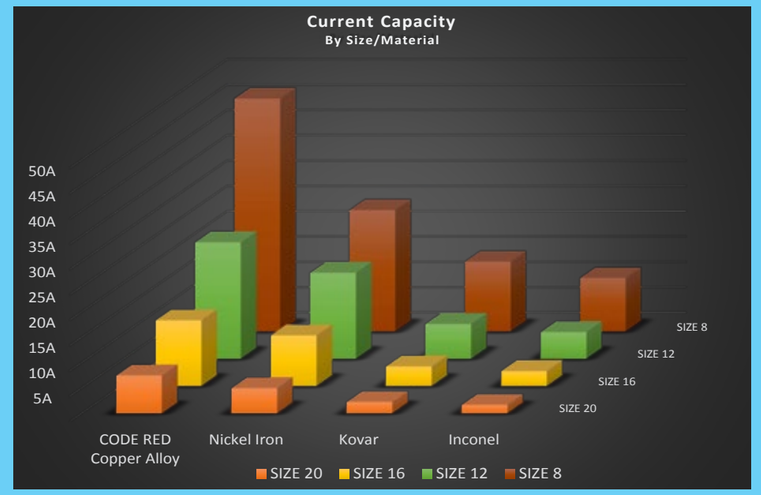
CODE RED USES PROVEN-PERFORMANCE CONNECTOR AND CONTACT MATERIALS

CODE RED Materials / Finish	
Encapsulant Sealing	Signature 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.



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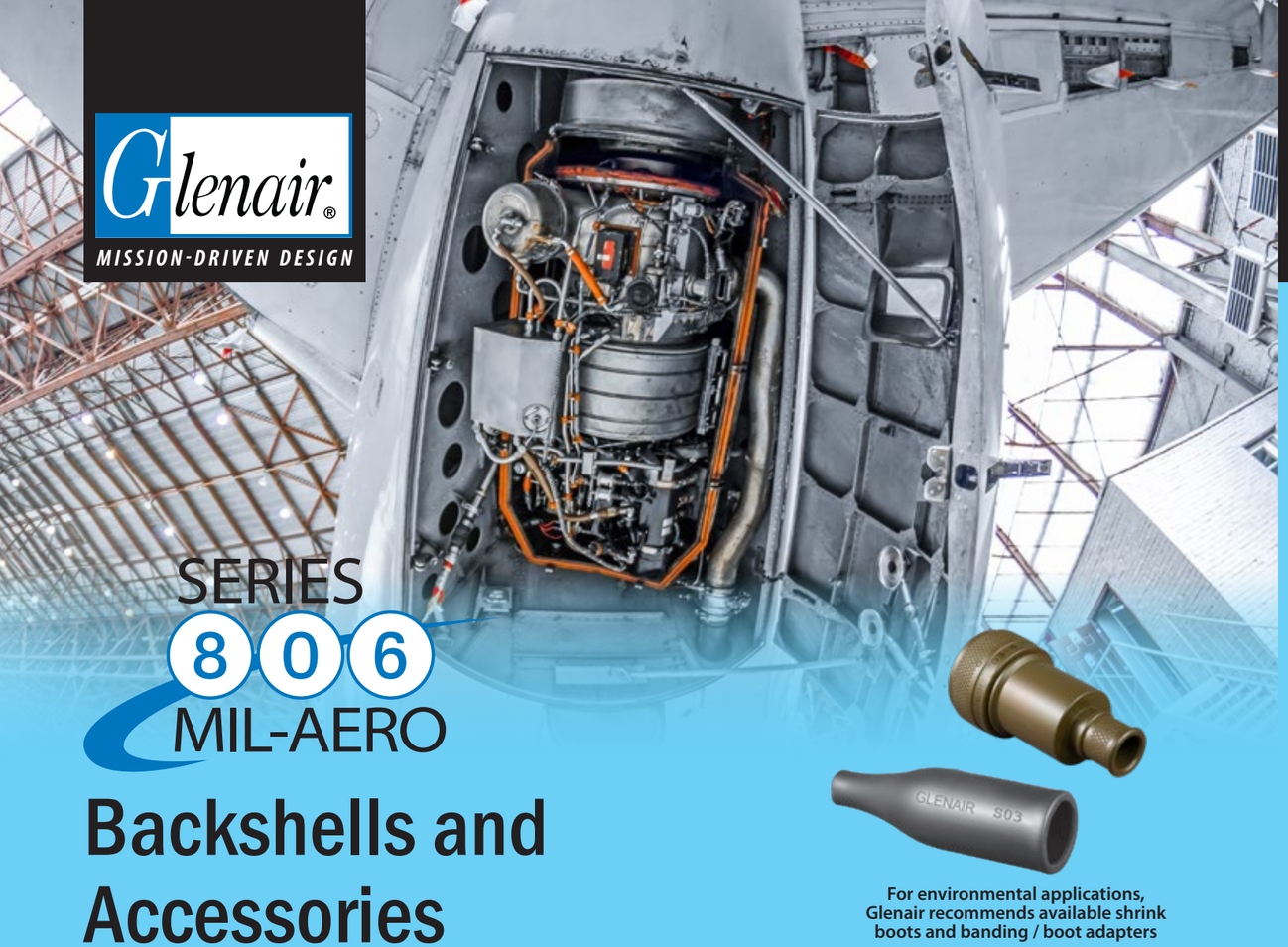
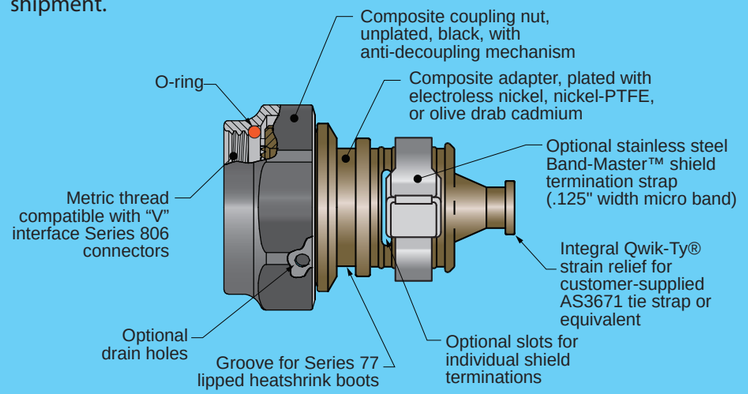


SERIES 806 MIL-AERO

Backshells and Accessories

For environmental applications, Glenair recommends available shrink boots and banding / boot adapters

Glenair has designed and developed a comprehensive family of cable clamps and EMI / environmental backshells for Series 806 Mil-Aero harness applications. These are purpose-designed accessories compatible with the reduced form-factor Series 806. the composite banding and boot adapter shown below is the perfect example of the extensive engineering work that has gone into the development of the Series 806 family of accessories. All designs are in-stock and ready for immediate shipment.



- **Lightweight, small form-factor accessory series designed explicitly for use with the Series 806 Mil-Aero connector**
- **Metal and composite cable clamps for use in open-loom harnesses and jacketed cable applications**
- **EMI/RFI shield termination backshells—conventional cone-and-ring designs as well as lightweight, low-profile banding adapters**
- **Special extended-length backshells recommended for use with El Ochito, Quadrax, and other shielded contact assemblies**
- **High availability: same-day shipment stocking for all popular designs**

MICRO MINIATURE CIRCULAR

Series 806 Mil-Aero Connectors

SERIES 806 MIL-AERO

STRAIN RELIEF CLAMPS

620V081
Composite Strain-Relief Clamp

620V080
Strain-Relief Clamp

627V234
Swing-Arm® Flex with Drop-in EMI Adapter

457V048
Composite Qwik-Ty with Drop-In EMI Adapter

EMI RFI BANDING ADAPTERS

440V191
Band/Boot Adapters

440V202
Composite Band/ Boot Adapters

317V111
Piggyback Boot Adapter

4470V1061
Composite Band-in-a-Can

443V039
Aluminum or SST Band-in-a-Can

EMI / ENVIRONMENTAL BACKSHELLS

380V143
EMI Backshell

387V243
Composite EMI

390V091
EMI Environmental

340VS035
Shorting Backshell

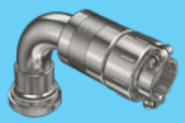
EXPANDED CLEARANCE BACKSHELLS FOR USE WITH SIZE #8 CONTACTS

320V030
Environmental Adapter

440V233
Environmental Banding Backshell

620VS090
Strain-Relief Cable Clamp

440VS232
Cable Clamp with Banding Platform



443V042
Cable Clamp Band-in-a-Can

Outlook

Wagon Train or Rail Car?

Some years ago, I visited the Museum of Western Expansion under the Gateway Arch in St. Louis, MO. I remember being shocked (gobsmacked, as I like to say) to learn that back in 1820, the trip by wagon train from St. Louis to California would take pioneers anywhere from five to six months. That's 2000 miles at an average speed of 10 to 20 miles a day—with the pioneers mostly walking next to their heavily-laden wagons. After the Civil War concluded and the transcontinental railroad began its service, the wagon trains largely died out. Understandable, as the "iron horse" could make relatively the same journey in under a week, and was of course far less risky and considerably more reliable.

I was reminded of all this recently as I walked the factory floor and noted the extraordinary number of orders with accelerated delivery dates currently in process. I was also struck by just how few late jobs there were on the special tables reserved for these items. I won't bore you with all the details, but the key takeaway here is that Glenair is absolutely killing our on-time delivery numbers—even with super-short lead times. To say this is extraordinary is a monumental understatement—particularly to us veterans in the industry who know only too well the crazy lead times and late deliveries that, for our customers, are sadly so routine.

So how does all this relate to wagon trains? My thought is that sometimes the pace in business, the speed at which we operate, is tied to the standards and norms of the day. In 1820, the norms of human migration were tied to how far and how fast you could walk in a day. Available technology (oxen, Conestoga wagons, etc.) was another norm. The fact that the travelers were mostly families—and not for example single men—was another factor. And so, the pace of Western Expansion, the "lead time" if you will, was five to six months—with no real guarantee you would even make it to the Golden State.

Then along came the train. And suddenly, six days was the new norm. Technology and service had made it so. And the era of the wagon train, about 1820 to 1860, was summarily over. The way I see it, Glenair is that train. Because unless I miss my guess, our fast lead times and dependable on-time delivery will change customer perceptions regarding how they "travel" from point A to point B. Not to put too fine a point on it, but who wants to walk to California when you can ride on the train with us?

Chris Toomey

QwikConnect

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