



Technology overview: SAE-AS81703 and MIL-DTL-38999 Series III fail-safe lanyard-release quick-disconnects



SAE-AS81703 SERIES 3 HISTORICAL USE AND HERITAGE

The push-pull, lanyard-release AS81703 Series 3 connector emerged to meet the critical operational demands of launch vehicle umbilicals and ground support equipment (GSE) requiring rapid, reliable disconnect under time-sensitive and hazardous conditions. This blind-mate, rack-and-panel style interconnect became prominent in the space industry during the Shuttle program and evolved through subsequent launch vehicle programs (e.g., Atlas, Titan, Delta families), where quick-disconnect umbilicals serve as mission-critical interfaces for power, telemetry, environmental control, and propellant monitoring. The connectors' rugged design and ease of operation in constrained and often inaccessible locations made them a de facto standard for launch pad umbilicals.

SAE-AS 81703 SERIES 3 FUNCTIONAL DESCRIPTION AND OPERATION

The AS81703 push-pull, lanyard-release connectors are circular, blind-mate capable connectors designed for high-reliability, rapid-mate/demate cycles. The connector features a spring-loaded locking sleeve engaged upon insertion. A pull on the attached lanyard sleeve disengages the lock, enabling rapid, tool-less disconnection. This is critical for emergency egress or liftoff, where rapid umbilical release is mandatory.

BACKSHELLS AND ACCESSORIES

Both available connector series may be equipped with cable strain relief and other rear- and front-end accessories. See Glenair Circular Connector Backshell catalog for order information.

ADAPTER CODE **A**

"A" adapter code accessories fit AS81703 Series 3 (imperial thread) connectors

ADAPTER CODE **H**

"H" adapter code accessories fit D38999 Series III (metric thread) connectors

SAE-AS81703 AND SUPERNINE D38999 SERIES III TYPE Lanyard-Release Fail-Safe Connectors



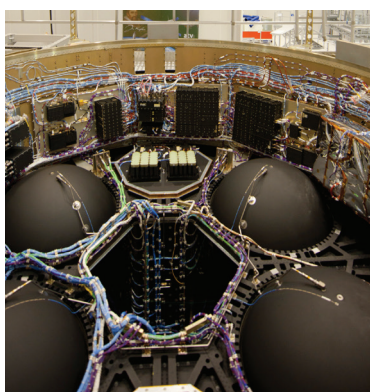
Technology Overview



Launch vehicle telemetry,
command, and environmental
control



Launch pad ground support
equipment



Rack-and-panel applications such
as flight control avionics

The connectors are designed to mate in low-visibility or restricted-access situations, often on vertical or horizontal panels with limited sight lines. Self-aligning features, such as chamfered shell noses and robust polarizing keys, ensure correct orientation without visual confirmation in rack-and-panel applications. Multi-level sealing including elastomeric grommets and O-rings provide resistance to dust, moisture, propellant vapors, and corrosive agents typical of launch environments. Contacts conform to AS39029 specifications, supporting a range of wire gauges and current ratings. The standard contact arrangements facilitate power, signal, and coaxial connections within a single shell.

MIL-DTL-38999 TYPE LANYARD-RELEASE FAIL-SAFE INTERCONNECTS

In contrast to the legacy AS81703 series, Glenair lanyard-release interconnects built to MIL-DTL-38999 Series III specifications with MIL-STD-1560 and high-speed contact arrangements offer enhanced performance characteristics tailored for modern spaceflight applications. While both systems utilize lanyard-actuated quick-disconnect mechanisms, the D38999 Series III architecture supports higher contact density, enabling significant reductions in weight and panel footprint—critical for satellite buses, upper stages, and reusable launch vehicles. The connector series' utilization of MIL-STD-1560 insert patterns simplifies integration across diverse subsystems and facilitates interconnect system design and installation. Additionally, these D38999 Series III type connectors offer improved EMI shielding, superior contact retention under shock and vibration, and the ability to accommodate high-speed data and shielded RF insert arrangements. Breakaway plug designs are available with an integrated cable shield band porch, further reducing package size and weight. Rugged triple-start stub ACME coupling offers outstanding performance in high vibration and shock applications. These advantages, combined with an improved release mechanism with faster, more reliable separation, make the MIL-DTL-38999-based quick-disconnect solutions a technically superior and forward-compatible replacement for AS81703 connectors in current-generation space and launch platforms.

SPACE APPLICATIONS AND DEPLOYMENT

Both series of lanyard-release umbilical connectors have been deployed in Launch Vehicle applications, serving as electrical interfaces between ground systems and the vehicle for power, telemetry, command, and environmental control prior to launch. These connectors facilitate quick disconnect at liftoff while maintaining signal integrity during extended pre-launch operations. Other applications include:

Ground Support Equipment (GSE): Integrated into umbilical towers, service platforms, and mobile servicing equipment, enabling rapid connection/disconnection during vehicle processing.

Payload Integration and Checkout: Used for temporary connections to satellite or spacecraft payloads during pre-launch functional testing.

Environmental Control Systems: Connecting fluid sensors, valves, and electrical control lines delivering conditioned air or purge gases.

Across the board, the blind-mate capability and reliable release designs of both series make them well-suited for constrained pad environments where operators may have limited visibility or access and where rapid planned disconnect is mandatory.

SAE-AS81703 AND SUPERNINE D38999 SERIES III TYPE Lanyard-Release Fail-Safe Connectors



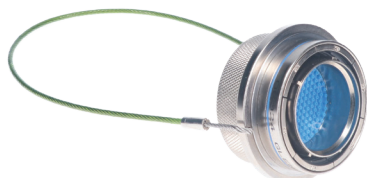
Technology overview: SuperNine Series III fail-safe lanyard-release connector

TECHNICAL FEATURES

- **Commercial equivalents of D38999/31 Types 1, 4, and 6; and D38999/29 and /30**
- **Connectors are supplied with contacts including spares**
- **Blue color band indicates rear-release retention system**
- **Mates with any QPL manufacturer's MIL-DTL-38999 Series III receptacle connector having the same shell size, insert arrangement, and polarization**
- **Available with accessory threads, integrated banding porch, shrink boot adapter**
- **Summary of Connector types:**
 - Type 1 long shell
 - Type 4 standard (short) shell
 - Type 6 medium-length shell



233-216 IAW D38999/31
Note forward location of coupling nut, and rearward position of lanyard release ring.



233-223 IAW D38999/29 and /30
Note rearward location of coupling nut, and forward position of lanyard release ring.

SUPERNINE SERIES III FAIL-SAFE LANYARD-RELEASE FUNCTIONALITY

Glenair SuperNine Series III Type 1, 4, and 6 lanyard-release breakaway plugs are special variants of the popular triple-start threaded circular connector, designed for rapid disconnect applications. Originally developed for droppable stores, aircraft ejection seats, fuel tank quick-disconnects, missile pods, and other military applications, the series is also suited for use in space vehicle launch, stage separation, and payload deployment. These connectors are engineered to separate quickly and cleanly without requiring rotation, when mated to standard threaded receptacles.

MECHANICAL ACTION OVERVIEW:

The breakaway plug has an integral coupling and breakaway mechanism that bypasses the normal threaded un-mating action of standard Series III connectors. Here's how the release works:

1. Threaded Coupling, But with a Twist

Plugs are fully threaded and mated with standard D38999 Series III receptacles using ACME-style stub threads (per MIL-DTL-38999 Series III). These threads are robust and resistant to vibration and shock decoupling.

In the breakaway design, the plug's coupling mechanism is engineered to override the thread engagement when axial force is applied, rather than requiring the typical rotational back-off.

2. Spring-Loaded and Friction-Limited Coupling Nut

The threads on the plug are divided into concentric sections which are pushed outward by spring-force upon retraction of the lanyard-equipped outer sleeve, thus releasing their hold on the mating receptacle.

3. Retention Ring Location and Function

233-216 series connectors IAW D38999/31 position the retention ring and lanyard release attachment in a rearward (aft) position on the connector for optimal speed of release and deployment. 233-223 series connectors IAW D38999/29 and /30 position the retention ring and lanyard release attachment in a more forward location providing easier access to the knurled connector coupler. Both designs provide rapid, reliable, fail-safe demating.



Retraction of the lanyard sleeve allows the threaded coupler—split into six sections—to rapidly expand and release.

SUMMARY OF KEY DESIGN FEATURES

Feature	Function
Threaded coupling nut	Mates like a normal Series III connector
Release mechanism	Allows axial breakaway without rotation
Receptacle compatibility	Compatible with standard threaded receptacles
Lanyard actuation	Triggers fail-safe release, with calibrated preset force
Connector length	Short, medium, and long packaging for different bulkhead thicknesses