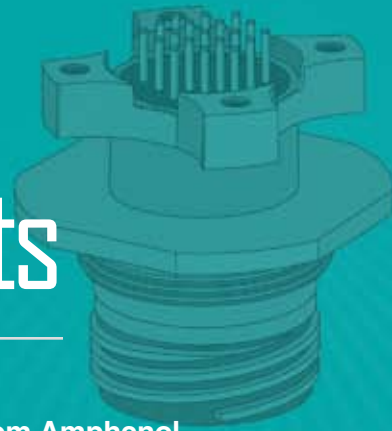


Amphenol Options, Other Products



Press Fit
Connectors
on PC Board



Cable
Assemblies



38999 Connectors
with RADSOK®

Custom
Epoxy Sealed
Hermetic



Integrated Systems



Amphe-Power
with RADSOK®



Class 'L'
Heavy Duty



Rectangular
Connectors with
Brush Contacts



TABLE OF CONTENTS

Options and Other Products from Amphenol

- Table of Contents 415
- Press Fit Connectors for PC Board Applications (38999 Option) 416
- Cable Solutions - Value Added Cable Assemblies 417, 418
- RADSOK® Contacts for High Power Applications 419
- RADSOK® Technology Advantages & Interconnect Solutions . . . 420, 421
- ESD Protected Connectors - Protection from Electrostatic Discharge . 422
- Custom Hermetic/Epoxy Sealed Connectors (38999 Series III Option) . 423
- Durmalon Connector Finish, Alternative to Cadmium 424
- Amphenol Integrated Systems, A Leading Choice
for Packaging Solutions 425

Additional Circular Connectors for a Wide Range of Applications - Military and Industrial

- Amphenol's Wide Range of Circular Interconnects 426
- Amphe-Lite, Non-MS Commercial 38999 Type 426
- GT, GT-PC, GTC-M Connectors 427
- Pyle Star-Line®, Star-Line EX® 428
- Amphe-Power™ Connectors with RADSOK® Contacts 428, 429
- Class "L", MIL-DTL-22992 429
- QWLD, MIL-DTL-22992, and QWL, MIL-DTL-22992 Type 430
- Aquacon Immersible Connectors 430
- 67 and 165 Series (5015 Type) 431
- 348 Series, MIL-C-81511 Series I & II 431
- Shorting Plugs 431

Rectangular Interconnects for a Wide Range of Military Applications

- Low Mating Force Rectangular Connectors with Brush Contacts . . . 432
- Brush Contact Technology 432
- Hybrid Rectangular Connector with Brush/Power/Coax/Fiber Combo . 433
- LRM Surface Mount Connectors 433, 434
- Pyle LMD & LMS Modular Connectors 435
- VME P0/J0 MT Connectors with Fiber Optics 435



Interconnects for Industrial Markets:

- Process Control
- Rail Mass Transportation
- Heavy Equipment
- Energy
- Petrochemical, Power Generation

Rectangular Interconnect Typical Markets:

- Medical Equipment, Factory Automation
- IC Chip Testers
- GPS Systems, Telecommunications
- Military and Commercial Aviation
- Military Vehicles



Press Fit Connectors

For PC Board Applications—38999 Option

38999
SJT I II III

26482
Matrix 2

83723 III
Matrix Pyle

5015
Crimp Rear
Release Matrix

26500 Pyle

Printed
Circuit Board

EMI Filter
Transient

Fiber Optics

High Speed
Contacts

Options
Others

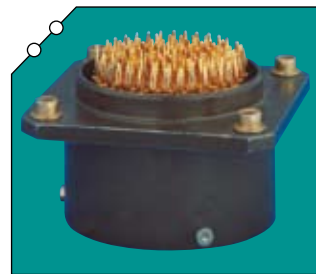
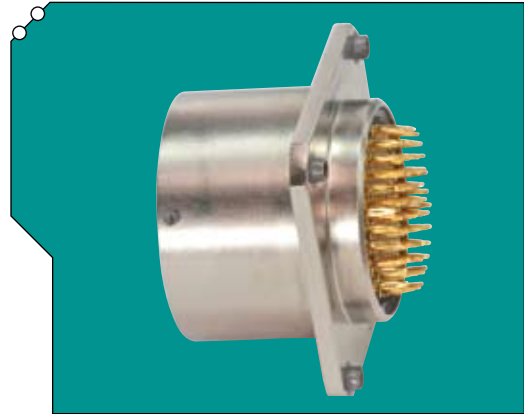
Amphenol manufactures a complete series of MIL-DTL-38999 Series I, II, and III Connectors with Press Fit compliant pin contacts for solderless mounting on printed circuit boards. Both pin and socket contacts are available in any MIL-DTL-38999 Series I, II or III insert pattern having contact size 16, 20 or 22D. Available in Mil-Spec and custom shell configurations.

See section "Series III TV", "Series II JT", and "Series I LJ" for MIL-DTL-38999 Circular Connectors' inserts and shell styles and the PCB section for Press Fit Connectors on Printed Circuit Board applications.

Benefits include:

- High speed, low cost board assembly
- Elimination of soldering thermal stress
- No cold soldered joints
- No short circuits by soldered connections
- No cleaning of excess flux
- Optional contact for piercing conformal board coating is available

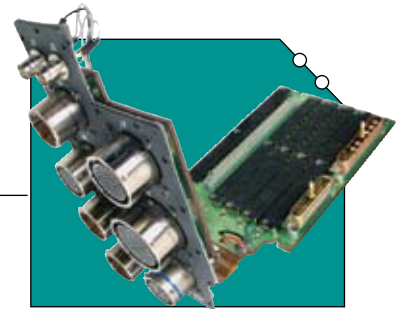
Press fit connectors accommodate boards with minimum 0.090 inch thickness and 0.040 +/- .003 plated through holes. The insertion force for mounting the connector on the board is 7 to 16 pounds per contact. Refer to L-40450-207 for installation instructions. Contact Powell Electronics for ordering information.



Amphenol Press Fit Connectors for Solderless mounting on printed circuit boards.

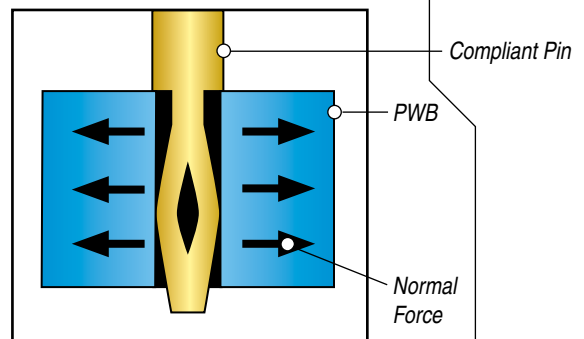
Press Fit

Press Fit Connectors on Printed Circuit Board



Amphenol Press Fit Contact Technology

- Beryllium copper tail, heat treated to spring hardness
- The compliant eye is a natural 2 beam spring
- The eye is oversized relative to the plated through hole and is compressed upon insertion
- After insertion the spring exerts a normal force on the hole creating an electrical path via a tight friction fit



Cable Solutions

Value Added Cable Assemblies



With over 100K Sq. Ft. of cable manufacturing space, and multiple locations in North America and Asia, Amphenol Aerospace has diverse capabilities to design and manufacture harsh environment cable assemblies. Our engineers have over 40 years experience designing cables and harnesses to a wide variety of requirements.

From simple point-to-point assemblies to ruggedized overmolded harnesses, Amphenol has the capabilities to meet a diverse range of cable needs.

Production Capabilities Include:

- Automated twistors, strippers, cutters, crimpers
- Crimp capabilities for 777MCM to 24AWG wire
- Primary wire extrusions/jacketing
- Custom overmold presses with in house production tooling
- Twisted shielded pair and quadrx cable assemblies
- Full testing capabilities for DWV, IR, continuity, etc.



Markets Currently Served

- Military Vehicles
- Harsh Environments
- Automotive
- Avionics
- Commercial Aerospace
- Rail Mass Transit
- Munitions Communications
- Oil and Gas



III
II
I
SJT
38999

Matrix 2
26482

Matrix
Pyle
83723 III

Crimp Rear
Release Matrix
5015

26500 Pyle

Printed
Circuit Board

EMI Filter
Transient

Fiber Optics

High Speed
Contacts

Options
Others

MARKETS



Cable Solutions

A Wide Range of Capabilities



Overmolding

- Amphenol excels in overmolding cable technology, perfect for ruggedized power applications.
- Custom overmold solutions utilize either low or high pressure manufacturing methods, and include various environmental materials.
- Overmolding techniques can include straight and right angle mechanical strain relief in a variety of backshells as well as overmolded in SantoPrene® and other elastomeric materials.

Environmental Capabilities

- Temperature Range: -40° to 200° C capable
- Fluid Resistance: oil, battery acid, hydraulic fluid, diesel
- Flammability: UL94V-O
- Waterproof: IP67

Mold/Press Capability	Over 40 presses: vertical, horizontal, shuttle base
Shot Size	85 cm ³ , Discrete Parts: 200 cm ³
Material	PA, PPA, PBT, PET, TPV, PU, PP, PVC, ABS... others
Production Tooling Time	Simple Tool: 4-6 wks, Complex/High Volume: 10-12 wks
Type of Process	Pre-Mold/Pot and Mold
Testing Capabilities	Hi-Pot up to 1000 VDC/AC
	DWV up to VDC/AC (0.1mA)
	IR, 1Gohm
	Wire Processing, pull test, crimp inspection with CFM

High-Speed Cable Assemblies

Amphenol provides a large array of cable assemblies with high speed quadax and differential twinax contacts, as well as coax and concentric twinax contacts. From a simple one-cable interconnection, to a multiple cable system, Amphenol can design and supply your cable needs for high frequency contacts and connectors.



Cables with various electrical protocols, including:

- 100 Base-T
- 1,000 Base-T, -CX, Gigabit Ethernet
- USB 2.0
- IEEE 1394B Firewire
- Ethernet, USB
- And others

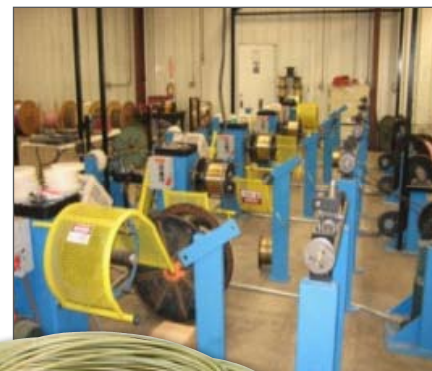


Primary Wire and ArmorLite

- Amphenol is a recognized supplier of primary wire and specialized cable.
- Cable designed for harsh environment applications.
- Production facility includes wire extrusion and cabling lines along with 5 ArmorLite twistors.
- Polyurethane cable jacketing also available.

ArmorLite Features

- Low cost
- Improved crush factor
- Light weight
- Flexible bend radius
- Abrasion resistant
- Cable sizes .210" to .500"
- Durable, UV stabilized polyurethane cable jacket
- Operational temp -40° to +70° C



38999
SJT I II III

26482
Matrix 2

83723 III
Matrix Pyle

5015
Crimp Rear Release Matrix

26500 Pyle

Printed
Circuit Board

EMI Filter
Transient

Fiber Optics

High Speed
Contacts

Options
Others

RADSOK® Contacts

For High Power Applications



RADSOK® technology is based upon a stamped and formed flat grid, uniquely twisted into a hyperbolic geometry to provide robust, high density contact to the mating pin contact. Most pin and socket technologies rely upon spring (beam element) properties of the contact elements, which tend to weaken over time. Unlike most other pin and socket solutions, the RADSOK® also utilizes the tensile strength properties of the flat, high conductivity alloy grid. This provides the high normal forces required for conductivity while also providing large conductive surface area. Correspondingly low voltage drop and low temperature rise are also achieved while maintaining low insertion forces.

- Socket cylinder within female contact has several equally spaced longitudinal beams twisted into a hyperbolic shape.
- As male pin is inserted, axial members in the female half deflect, imparting high current flow across the connection with minimal voltage loss.
- The hyperbolic, stamped grid configuration ensures a large, coaxial, face-to-face surface area engagement.
- Ideal for crimp termination applications requiring repeated mating cycles and high current with a low milli-volt drop.

The RADSOK® (RADial SOcKet) High Amperage, Low Insertion Force Electrical Terminal provides value to your purchasing, engineering, quality and manufacturing objectives.



Amphenol Mil-Power Connectors

38999 with RADSOK® High Amperage Contacts

- 6 layouts available:
 - Shell size 21 with 4 size 8 RADSOK®
 - Shell size 25 with 4 size 4 RADSOK®
 - Shell size 25 with 1 size 0 RADSOK®
 - Shell size 25 with 2 size 4 RADSOK®
 - Shell size 33 with 2 size 1/0 RADSOK®
 - Shell size 37 with 3 size 1/0 RADSOK®
- Increased current capacity (50% more than standard power)
- Reduced insertion force
- More reliable coupling mechanism (Tri-Start) coupling
- Alternative to cadmium finishes



Amphe-Power 5015 connector with insert pattern 28-5 with (2) size 4 RADSOK® sockets and standard contacts.



Standard RADSOK® socket contacts for Amphe-Power® connectors are available in sizes 0, 4, 8 and 12 crimp or solder. Specific sizes can often be produced more economically than other fastening solutions. Amphenol can tailor the contact design to exact customer needs. See page 428 and 429 for more information about Amphe-Power Connectors.



38999
III II I SJT

26482
Matrix 2

83723 III
Matrix Pyle

5015
Crimp Rear Release Matrix

26500 Pyle

Printed
Circuit Board

EMI Filter
Transient

Fiber Optics

High Speed
Contacts

Options
Others



RADSOK® Technology Advantages

RADSOK® Products for Printed Circuit Boards

• HIGH RELIABILITY

Unique RADSOK® design and construction technology create an electrical contact interface that exceeds typical interconnect requirements. Applications in aerospace, medical, industrial, automotive, mining, offshore, and other harsh environments depend on high reliability of the Amphenol RADSOK® technology.

• LOW CONTACT ENGAGEMENT/SEPARATION FORCES

The hyperbolic lamella socket contact construction distributes normal forces over a high percentage of the mating pin surface. This creates a smooth, even engagement effort. This force distribution also contributes to excellent performance in vibration applications with resistance to typical fretting corrosion.

• LOW CONTACT RESISTANCE

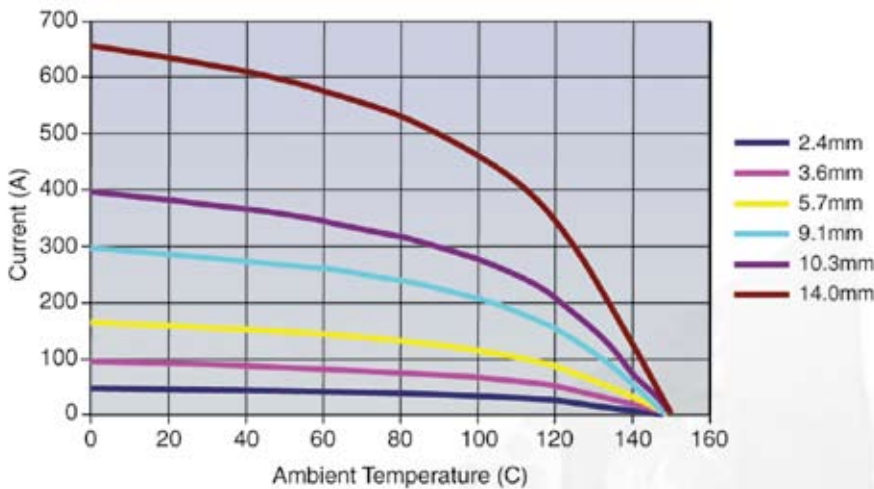
The large interface area between the socket lamella and pin surface result in very low contact resistance, enabling the RADSOK® contacts' high current ratings compared to traditional power contact designs.

• HIGH MATING CYCLE DURABILITY

RADSOK® contacts with typical silver plating finishes have demonstrated survival of 20,000 mating cycles. Specialized plating and contact lubricants can extend cycle life to 200,000 matings or higher. Even with continuous exposure to harsh environmental abuse (salt, sand, and high humidity), RADSOK® contacts have been tested to maintain low contact resistance beyond 10,000 mating cycles.

RADSOK® Derating Chart – Temperature vs. Current

Based on single conductors in free air. Wire cross-section same size as pin contact cross-sectional area.



For more information on RADSOK® products Contact Powell Electronics.



The Amphenol® RADSOK® Solution to Bring more Power to the Board... Three High Amperage Products: PowerBlok, RADSERT, PGY

Amphenol's RADSOK® solution offers many options for high current single-point connections to printed circuit boards. The compact footprint design can supply up to 120 Amp to the board which preserves surface area and provides more flexibility in board design.

Options
Others

- 38999 SJT I II III
- 26482 Matrix 2
- 83723 III Matrix Pyle
- 5015 Crimp Rear Release Matrix
- 26500 Pyle
- Printed Circuit Board
- EMI Filter Transient
- Fiber Optics
- High Speed Contacts



Standard and Custom-Developed Solutions

- In addition to the various standard sizes of RADSOK® components, custom-developed solutions are also available. Amphenol has the global design, engineering and manufacturing resources to provide RADSOK® sockets pressed into busbars, crimped to cables, assembled into connectors, assembled into customer or Amphenol designed specialized electrical devices, or as stand-alone components. Amphenol also manufactures a full compliment of mating pin contacts for any application.
- Steady-state current capacities for standard RADSOK® products range from 50 amps to over 1000 amps.
- Standard contact plating is typically Silver (Ag) although many other plating specifications may be used for your application.
- Amphenol connectors with RADSOK® contacts are offered with a variety of positive-locking features that insure and maintain fully-mated connections.
- Sealing (Sealtac™) and high voltage hot break options are available within the RADSOK® itself or within a very wide range of IP rated connector housings to provide environmental protection to the contact area.

The Wide Variety of RADSOK® Applications include:

- Replacement of ring terminals (lugs) on threaded studs
- High current PCBs
- Communication towers
- Backplane power
- Uninterrupted power supplies
- Fuel cell connectors
- AC inductive drive motors
- Power distribution modules
- Busbar terminations (plug-in hardware/modules)
- “Pluggable” breakers
- Battery terminals
- Contacts with RADSOK® technology give 50% more ampacity.
- RADSOK® contacts can be designed to fit any housing
- Combinations of RADSOK® and high speed copper contacts in the same interconnect package

Amphenol operates quality systems that are certified to ISO9001:2000 by third party registrars.



III
II
I
SJT
38999

Matrix 2
26482

Matrix
Pyle
83723 III

Crimp Rear
Release Matrix
5015

Pyle
26500

Printed
Circuit Board

EMI Filter
Transient

Fiber Optics

High Speed
Contacts

Options
Others



(ESD) Protected Connectors

Protection from Electrostatic Discharge

Amphenol has developed cylindrical and rectangular connectors which protect sensitive components from Electrostatic Discharge (ESD) without diodes, varistors, gas tubes, or "experimental" semi-conductive materials.

These connectors utilize the Faraday Cage principal to shunt electrostatic discharge events to the conductive enclosure on which the connector is mounted, thus never allowing the high voltage, high current discharge event to reside on any contacts.

The ESD protected connectors have the same physical envelope as their standard counterparts, and do not require special mounting or terminating techniques. All of the contacts remain fully functional, and electrical characteristics such as capacitance are not effected.

Product Features:

- Connector envelope identical to unprotected design for most applications
- Exceeds protection requirements of IEC 801-2 and MIL-STD-1686:
- Ensures that all components within a conductive enclosure will be subjected to a maximum of 10V during electrostatic discharges between -26 KV and +26 KV
- Voltage observed on contacts during ESD events - <10V (at 1 megohm)
- Current observed on contacts during ESD events - <100 milliamperes (at 2 ohms)
- Response time - instantaneous (voltage and current are maximum values)
- Maximum ESD voltage - tested to ±26KV
- No capacitive loading
- Eliminates the need for discrete components (such as diodes) and maximizes printed circuit board real estate for equipment housed in conductive enclosures which require ESD protection as free-standing units
- Operating voltage of connectors not effected for most designs
- Pulse life - infinite

What is Electrostatic Discharge (ESD)?

Electrostatic Discharge (ESD) is the rapid transfer of a static electric charge from one body to another. A static electric charge consists of either a surplus or depletion of electrons on a body, which gives that body a potential or voltage relative to ground (or another body). The discharge is extremely fast (less than 1 nano-second risetime) and the current flow may exceed 100 amps!

Static electricity is normally the result of two materials transferring charges when rubbed or separated, such as shoes scuffing across a dry carpet, or sheets of untreated plastic being separated. This phenomena is commonly referred to as the triboelectric effect.

The voltage developed due to the triboelectric effect depends on the materials involved, the quantity and type of contact, and relative humidity. In a dry environment a person can accumulate a charge of up to 25 KV! In a moist environment a person's potential is reduced due to the effect of moisture on the insulating properties of materials.



ESD Testing on MIL-DTL-38999, Series III Filter Cylindrical Connector (Actual Photo)

What is a Faraday Cage?

A **Faraday cage** is a conductive enclosure. It may be solid in form such as a sheet-metal enclosure, or it may be full of apertures, such as a wire cloth box. When a charge is placed on a faraday cage the electrons which make up the charge, having like polarity, try to position themselves as far as possible from each other. This places the electrons on the outer surface of the enclosure, leaving the inner surface uncharged. The charge on the outer surface does not induce a charge on any neutral object inside of the faraday cage, and therefore does not try to transfer itself onto the internal object. Neutral objects (such as IC's) inside of a faraday cage are thereby protected from ESD activity external to the faraday cage.

The voltage and current observed on neutral objects within a faraday cage during ESD events are due to the secondary effects of ESD. These include Electromagnetic Interference (EMI), magnetic and electrical field coupling. The faraday cage of the Amphenol ESD Protected Connectors has been designed to minimize these effects.

The Amphenol® ESD Protected Connectors

The Amphenol ESD Protected Connectors have a faraday cage at the mating interface. The faraday cage has been specifically designed to intercept electrostatic discharges from the contacts in the unmated state, while maintaining each contact's isolation when the connector is mated. When the ESD Protected Connectors have been mounted to a conductive enclosure, a faraday cage is created which will protect components located within the enclosure from electrostatic discharges. This eliminates the need for discrete components such as diodes and gas discharge tubes, and saves printed circuit board real estate. Amphenol ESD Protected Connectors have also been applied to Line Replaceable Modules (LRM).*

* For further information on Amphenol LRM connectors with ESD protection see page 434.

38999
SJT I II III

26482
Matrix 2

83723 III
Matrix Pyle

5015
Crimp Rear Release Matrix

26500 Pyle

Printed
Circuit Board

EMI Filter
Transient

Fiber Optics

High Speed
Contacts

Options
Others

Custom Hermetic/Epoxy Sealed Connectors

Series III TV Options



Custom Hermetic Connectors

Amphenol glass sealed hermetic connectors are available in a wide variety of Mil-Spec and custom configurations.

Features and benefits:

- Leakage rate of 1×10^{-7} cc of He/sec or less
- Fused glass insert in steel shell

Options include:

- Special flanges
- PC board mounting stand-offs
- PC board mounting tails
- EMI filtering
- Through bulkhead configurations
- Crimp termination

Applications:

- Pressurized avionics boxes
- Environmental sealed boxes
- Moisture sealing for industrial equipment and missiles

(Contact your Powell representative for information regarding custom configurations)



Epoxy Sealed Connectors

Amphenol epoxy sealed connectors are a light weight alternative to glass sealed hermetic connectors for use in avionics and other weight-sensitive applications where a high level of sealing is required. Epoxy sealed connectors are an optimal solution when increasingly stringent water immersion requirements must be met in radio and vetronics applications.

- Same epoxy as used in EMI filter connectors
- Less than 1×10^{-4} cc of He/sec leak rate
- Maintained after temperature cycling, 5 cycles -55 to +125°C
- Custom designs available with lower leak rates upon request
- Available in standard and custom configurations including PC tail, solder cup, and crimp termination, board mounting stand-offs, and through bulkhead configurations.

(Contact your Powell representative for information regarding custom configurations)



III
II
I
SJT
38999

Matrix 2
26482

Matrix
Pyle
83723 III

Crimp Rear
Release Matrix
5015

Pyle
26500

Printed
Circuit Board

EMI Filter
Transient

Fiber Optics

High Speed
Contacts

Options
Others



Durmalon Connector Finish Alternative to Cadmium



Commercial, industrial & military markets are rapidly moving away from hazardous materials such as Cadmium (Cd) & Hexavalent Chrome (Cr6+). Amphenol is offering an alternative finish & process that complies with all customer requirements tied to these specifications.

Cd & Cr6+ have been applied to numerous components of land, sea and air weapon systems for many years & provides sacrificial corrosion protection for steels and excellent lubricity for threaded applications. However, Cd is a toxic metal and a known carcinogen. In addition, Cd is plated from an aqueous bath containing cyanide salts. Cr6+ is a known carcinogen as well.

MIL-DTL-38999 rev L, controlled by the Defense Supply Center Columbus (DSCC) has established 3 new service classes as alternatives to Cd.

- Class P Pure Dense Electrodeposited Aluminum (Alumiplate)
- Class T Nickel Fluorocarbon Polymer (Ni-PTFE)
- Class Z Zinc-Nickel (Zn-Ni)

Amphenol is using this & the European Union directive 2002/95-EC-RoHs (Restriction of Hazardous Substances) as direction to qualification for all domestic, global, commercial, industrial & military specifications requiring the reduction or elimination of these hazardous materials.

At this time, we are focusing on Ni-PTFE, Durmalon, our internal part number coding "DT" finish. Amphenol Durmalon is now QPL'd (qualified) by DSCC to MIL-DTL-38999 Rev L, Series III, Class T. The finish is also RoHS compliant due to the NON-use of Cr6+.

Amphenol also continues to develop a heavy duty Durmalon (Amphenol "DX" p/n code designation) to support the JSF, F-35 program. This plating is intended to meet the additional higher corrosive Sulfur Dioxide (SO₂)/salt fog requirements of JSF.

Also under development & qualification testing is Zinc-Nickel (Amphenol "DZ" p/n code designation) to comply with the new D38999 class "Z" finish requirements.

Amphenol's Durmalon like Olive-Drab Cadmium plating (Class W), meets 500 hours of Salt Spray, combined with 500 mating cycles and maintains less than a 2.5 millivolt drop shell-to-shell conductivity. Of all platings tested, Durmalon has been proven to meet these requirements and is also under development & showing positive results for the following:

- Sulphur Dioxide (SO₂) corrosion requirement of the JSF Program
- Potassium Formate- Deicer fluid testing performed by Boeing

Please consult the factory for availability.

Applications

Interest for non-hazardous alternative finishes is gaining momentum & many customers are currently using Durmalon. As mentioned above, Amphenol is developing a "Heavy Duty" version of Durmalon to comply with the higher level requirements by Lockheed Martin for the F-35, Joint Strike Fighter (JSF) program. The requirements include 2000 hrs of neutral salt fog exposure & an acidic salt fog environment exposure with added sulfur dioxide (SO₂) for 336 hrs. Please contact the factory for availability.

Testing

Amphenol Aerospace has performed extensive testing on 14 alternative platings with the most consistent performer being Durmalon. Please contact Powell Electronics for more information or test data on Durmalon.



Requirements	Cadmium	Durmalon™	Zinc Nickel	Alumiplate sm	Zinc Cobalt	Stainless Steel	Electroless Nickel
Coupling Torque Post 500 hr salt	■	■	NA	■	NA	■	NA
Shell-to-Shell Conductivity <1 millivolts							■
<2.5 millivolts	■	■	■	■			
<10 millivolts	■	■	■	■		■	
Cycles of Durability 500 mates	■	■	■	■		■	■
Salt Spray 48 hours	■	■	■	■	■	■	■
Dynamic-500 hours	■	■	■	■		■	
1000 hours		■*					
Temperature Rating 175° C	■	■	■	■	■	■	■
200° C		■	■	■		■	■
>200° C						■	
Non-Reflective	■	■	■	■	■	■	■
RoHs Compliant		■	TBD		■	■	■
Non-Magnetic	■	■	■	■	■	■	■
Available on Composite	■	■	■	■	■		■
Cr6+ Presence	■		TBD	■	**		**
Sulfur Dioxide Resistance F35-336 hours	■	*					
Aviform De-Icing Fluid		TBD				■	

* Durmalon XP See "applications"

**Meets EU RoHs/ELV hexavalent chromium maximum concentration value (MCV) of 1000ppm (0.1% w/w) per homogenous material.

Notice: Specifications are subject to change without notice.

38999
SJT I II III

26482
Matrix 2

83723 III
Matrix Pyle

5015
Crimp Rear
Release Matrix

26500 Pyle

Printed
Circuit Board

EMI Filter
Transient

Fiber Optics

High Speed
Contacts

Options
Others

Amphenol Integrated Systems

The Leading Choice for Packaging Solutions



Amphenol is the leading manufacturer of integrated system solutions for the military and aerospace markets. Amphenol Integrated Systems is the synergistic combination of three key divisions:

- **Amphenol Aerospace**
 - **Circular Interconnects**
 - **Rectangular Board Level Products**
- **Amphenol Backplane Systems**
- **Amphenol Printed Circuits**

We have over 60 years of experience in the military and aerospace market and our commitment to the industry is exemplified in everything we do. With our dedicated facilities in Nashua, New Hampshire; Sidney, New York; and Nogales, Mexico, Amphenol Integrated Systems is the military and aerospace industries premier choice for system-level packaging solutions. We understand the relationship between the interconnect, the printed circuit board, the backplane and the chassis. We use that knowledge to provide complete solutions for our customers.

Amphenol Products-Performance in the Most Demanding Environments

We lead the industry by offering the elements necessary for success in the military and aerospace OEM supply chain:

- Design and Modeling
- Applications Engineering
- Fabrication
- Value-added Assembly
- Test

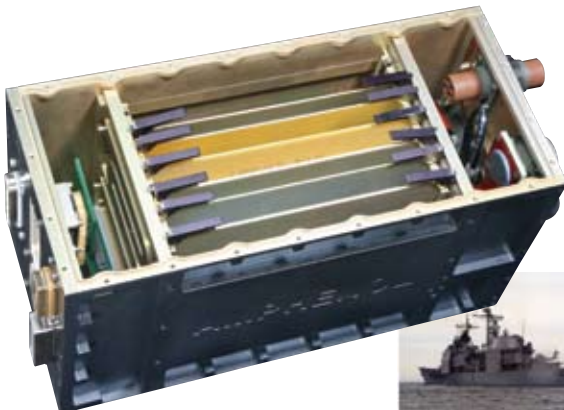
Coupled with the largest interconnect offering in the market, Amphenol supports all of your system-level needs.

Integrated System Packaging

Amphenol can provide systems solutions - everything you need inside and outside the box: Interconnect products, printed circuit boards, backplane assemblies, heat-sink and metal enclosures. Amphenol also provides value added assembly including bussing: full system assembly including chassis build and sub-system integration and testing.

An example integrated system box, shown below, includes the following Amphenol interconnect products:

- **Circulars:** D38999 circular connectors with MT Fiber Optics, RJ Field Connectors
- **Rectangulars:** LRM interconnects, NAFI connectors, UHD Connectors
- **Rectangulars:** ARINC 600 connectors, Micro-D Connectors
- **Rectangulars:** HDB3 High Density Brush contact Connectors
- **Backplane Systems, Flex Circuitry, metal enclosure**



Amphenol Backplane Systems and Printed Circuit Boards

Amphenol's Solutions - The Pinnacle of Technology
Some of the world's most demanding programs rely on Amphenol's packaging solutions, including:

- **F-35**
- **F-22**
- **F-18**
- **MIDS/JTRS Radio**
- **Theater High Altitude Air Defense Radar (THAAD)**
- **AH-64 Apache**
- **787 Dreamliner**
- **Future combat Systems**
- **DDG-51**
- **DDG-1000**

Integrated Systems solutions are found aboard commercial airliners, helicopters, Navy and Air force Fighters, C4I electronics, missiles, ground vehicles, Homeland Security Systems, and Navy warships.

38999
III
II
I
SJT

26482
Matrix 2

83723 III
Matrix
Pyle

5015
Crimp Rear
Release Matrix

26500 Pyle

Printed
Circuit Board

EMI Filter
Transient

Fiber Optics

High Speed
Contacts

Options
Others





Additional Circular Connectors

For a Wide Range of Applications, Military & Industrial

Wide range of Circular Interconnects

Amphenol has the broadest circular interconnect offering in the market place. Amphenol meets or exceeds the following major military specifications for circular connectors:

- MIL-DTL-38999
- MIL-DTL-26482
- MIL-DTL-83723
- MIL-DTL-5015
- MIL-DTL-22992
- MIL-C-81511



MIL-DTL-5015

A wide range of MIL-DTL-5015 products not covered in this catalog is available in Catalog 12-020 or refer to page 198 in the MIL-DTL-5015 Crimp Rear Release section of this catalog.

MIL-DTL-26482

Additional MIL-DTL-26482 Series 1 circular connectors not covered in this catalog is available in catalog 12-070 or refer to page 120 in the MIL-DTL-26482 Matrix 2 section of this catalog.

MIL-DTL-22992

Heavy Duty rugged series of connectors, "Class L", QWLD and QWL are not covered in this catalog. See pages 429 and 430 for brief overviews of these series.

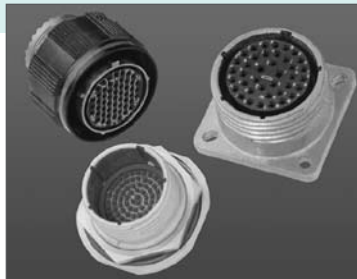
MIL-DTL-81511

General duty circular connectors 348 series, MIL-C-81511, are not covered in this catalog. See page 431 for brief overview.

This Catalog covers the majority of Amphenol Aerospace Circular Interconnects. Amphenol also offers many connector choices that serve Industrial Markets such as Process Control, Rail Mass Transit, Heavy Equipment, Energy, Petrochemical, and Power Generation. Some Commercial Circular and Industrial interconnects products are covered on the next pages.

Amphe-Lite™, Non-MS Commercial 38999 Type

Reference Catalog 12-094



APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION	PERFORMANCE ENVIRON./ELECT.
AL Series Commercial 38999, Series III type connector for higher performance industrial usage.	Offers 38999 type high performance capabilities for severe environment applications, yet is cost effective enough for general duty and non-environmental use.	Threaded coupling. Quickly, completely mates in one 360° turn of the coupling nut. Self locking - lockwiring is eliminated. Universal mounting holes for front or rear mounting, locksmith metal keying to aid in blind mating.	Crimp termination. Recessed pins (100% scoop-proof feature minimizes contact damage).	Operating temp. from -55°C to +125°C. IP67 rating for environmental sealing. Class F provides excellent EMI shielding. Class U provides a non-conductive finish. Composite shells resist severe corrosion. Operating voltage to 900 VAC (RMS) at sea level.

OPTIONAL FEATURES

- 3 shell styles, 59 insert patterns.
- Twinax, coax, filter contacts and fiber optic termini can be incorporated - ideal for communications equipment.
- Ground plane version and high decoupling version available.
- Non-magnetic version available.

MARKETS

- Communications
- Medical Equipment
- Automotive

38999
SJT I II III

26482
Matrix 2

83723 III
Matrix Pyle

5015
Crimp Rear Release Matrix

26500 Pyle

Printed
Circuit Board

EMI Filter
Transient

Fiber Optics

High Speed
Contacts

Options
Others

Additional Circular Connectors

For a Wide Range of Applications, Military & Industrial



GT Series, Reverse Bayonet

Reference Catalog 12-024



APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION	PERFORMANCE ENVIRON./ELECT.
GT Series Heavy duty, rugged connector, environmentally resistant. Preferred connector for mass transit. Also used in mil-aero applications such as military vehicles.	Utilizes MIL-DTL-5015 inserts. UL recognized. Intermateable with VG95234 connectors.	Reverse bayonet coupling (quick mating, audible, visual and tactile full mating indicators). Rated to 2000 couplings min. No lockwiring required.	Crimp or solder termination.	Operating temp. from -55°C to +125°C. With Viton inserts: -50°C to +200°C. Resilient inserts provide high dielectric strength and moisture barrier. IP67 performance in environmental versions. Resilient rubber covers provide higher shock and vibration capabilities. Operating voltage to 3000 VAC (RMS) at sea level.

OPTIONAL FEATURES

- Over 40 varieties of shell styles and backend accessory combinations.
- Optional insert materials: Neoprene, Viton*, or low smoke/flame retardant.
- Variety of conductive and non-conductive platings including non-cadmium.
- Resilient cover coupling nuts available for added damage protection and increased gripping surface.
- Many contact types are available, including both gold and silver plating, and alternate crimp barrel sizes.
- Available with RADSOK® High Power Contacts- see page 429

MARKETS

- Rail/Mass Transportation
- Power Generation, Petro-Chemical
- Heavy Equipment, Geophysical
- Power and Control Lighting Trusses
- Military Vehicles

GT-PC Series for High Power Applications

Reference Catalog 12-024



APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION	PERFORMANCE ENVIRON./ELECT.
GT-PC Series Same standard features as the GT series, but with "Dead Front" pin contacts, size 0, recessed into the socket insert. Provides higher amperage capability and operator safety by preventing inadvertent contact with a live contact.	UL recognized. Currently available with 5 insert patterns incorporating size 0 contacts.	Reverse bayonet coupling (quick mating, audible, visual and tactile full mating indicators). Rated to 2000 couplings min. No lockwiring required.	Crimp termination.	Same performance as GT series, but special "Dead Front" recessed contacts provide higher amperage levels - up to 100 amps per contact. These special contacts also prevent accidental electrical shocks to technicians. "First Mate"/"Last Break" features on one or more of the pins provide additional operator safety.

OPTIONAL FEATURES

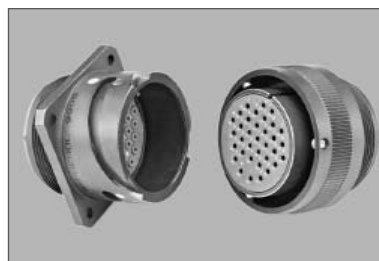
- Same shell styles offered as in standard GT series family.
- Currently 5 insert patterns available.
- Wide selection of backend accessories available.

MARKETS

- High Voltage Power Distribution

GTC-M Series - The GT with Metal Clip Inserts

Reference Catalog 12-024.
 Reference PDS-181
 (Product Data Sheet)



APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION	PERFORMANCE ENVIRON./ELECT.
GTC-M Series Combines the GT reverse bayonet shell and the rear release metal clip retention system which is used in the Amphenol®/Matrix® MIL-DTL-5015 connector. Provides easier insertion/removal of contacts and improved environmental sealing.	Intermateable and inter-mountable with standard GT series.	Reverse bayonet coupling (quick mating, audible, visual and tactile full mating indicators). Rated to 2000 couplings min. No lockwiring required. Captivated coupling nut assembly allows unmating without the rear accessories attached.	Crimp or solder termination.	Operating temp. from -55°C to +200°C. Completely environmentally sealed with contact seals, gaskets, wire seals and insert-to-shell seals. IP67 rating for environmental sealing. Operating voltage to 3000 VAC (RMS) at sea level.

OPTIONAL FEATURES

- 7 shell styles offered with all insert patterns available from standard GT series family.
- Wide selection of backend accessories available.

MARKETS

- Mass Transportation
- Power Generation, Petro-Chemical
- Heavy Equipment, Geophysical

III
II
I
SJT
38999

Matrix 2
26482

Matrix
Pyle
83723 III

Release Matrix
Crimp Rear
5015

26500 Pyle

Printed
Circuit Board

EMI Filter
Transient

Fiber Optics

High Speed
Contacts

Options
Others



Additional Circular Connectors

For a Wide Range of Applications, Military & Industrial

Pyle Star-Line®

Reference Catalog 12-054



APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION	PERFORMANCE ENVIRON./ELECT.
Heavy duty, environmental circulars for high amperage and high density control and instrumentation applications. Rugged, double lead threaded. <u>ZP/ZR designations.</u>	Equals or exceeds MIL-DTL-5015 E and R specifications. UL listed and CSA listed for circuit breaking capability.	Double lead Acme threads provide complete coupling in one turn of the coupling nut, and do not clog under adverse weather conditions. Large wiring space provided in cable housings and conduit fitting bodies.	Solder, crimp and pressure terminals. Circuit breaking power and control types.	Operating temp. from -67°F to +257°F. IP67 rating for environmental sealing. Hard anodic coating provides dielectric strength with heat and corrosion resistance. Up to high amperage of 1135 amps at 1000VAC or DC rating available.

OPTIONAL FEATURES

- 5 shell styles with over 150 insert patterns.
- 3 retention styles with captive contacts or insertable/removable contacts.
- Contact inserts and adapters are interchangeable and reversible to suit special needs.
- Thermocouple contacts available.
- Variety of backend accessories including basket weave cable grips, straight or angled adapters, and receptacle mounted to junction boxes.

STAR-LOK® SERIES ALSO AVAILABLE. Reference Catalog 12-054.

- High power and rugged features of the Star-Line series, but with spring loaded reverse bayonet coupling.
- Same choices of inserts, contacts and hardware as Star-Line.
- Solder, crimp and pressure terminals. Circuit breaking power and control types.


MARKETS

- Mass Transportation
- Oil Exploration & Production Equip.
- Automotive Tooling
- Motor Operated Valves
- Co Generation Equip.

Pyle Star-Line EX®

Reference Catalog 12-054



APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION	PERFORMANCE ENVIRON./ELECT.
Heavy duty, environmental circulars for high power applications with harsh/potentially explosive environments. Rugged, double lead threaded. <u>EX designations.</u>	Hybrid form of the Star-Line series with higher temperature ranges. Cenelec Certified for use in Zone 1-IIC hazardous environment.  EX Certificate #03ATEX 1101X	Double lead Acme threads provide complete coupling in one turn of the coupling nut, and do not clog under adverse weather conditions. Large wiring space provided in cable housings and conduit fitting bodies.	Solder, crimp and pressure terminals. Circuit breaking power and control types.	Operating temp. from -65°C to +257°C. IP67 rating for environmental sealing. Hard anodic coating provides dielectric strength with heat and corrosion resistance. Up to high amperage of 1135 amps at 1000VAC or DC rating available.

OPTIONAL FEATURES

- 5 shell styles with same insert patterns of Star-Line series.
- Variety of backend accessories including basket weave cable grips, straight or angled adapters, and receptacles mounted to junction boxes.
- Can be terminated onto unarmored or armored and sheathed cables built to several popular standards. Custom cable assemblies available.

MARKETS

- Mass Transportation
- Aircraft Refueling Pits
- Petro-chemical
- Pharmaceutical Mfg. Equip.
- Off-shore oil drilling
- Automotive paint booths

Amphe-Power™ P-Lok Connectors

Reference Brochure SL-391



APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION	PERFORMANCE ENVIRON./ELECT.
Amphe-Power P-Lok connectors are designed for high amperage usage in industrial and transportation applications.	P-Lok and MIL-DTL-5015 characteristics, enhanced with RADSOK for higher amperage usage.	Spring pressure push-pull mating of the P-Lok series. Audible and tactile conformation of positive locking.	Crimp termination. Amphe-Power P-Lok connectors have RADSOK contacts, available in size 8 (69 amps), size 4 (120 amps), and size 0 (250 amps). The 14mm Amphe-Power design has size 28 shell, and a single crimp pin contact in 2/0 or 4/0 AWG size. The receptacle has the 14mm RADSOK® socket with crimp or busbar-mount terminations available.	Meets same performance levels as P-Lok. RADSOK socket is rated for 500A continuous duty. Environmentally sealed to IP67.

Amphe-Power P-Lok



Amphe-Power 14mm P-Lok

OPTIONAL FEATURES

- Standard connector options available, electroless nickel finish on the shell.
- Dead-front pin contacts are available.
- UL recognized leakage paths is an option.
- Touch-proof sockets are available.
- Custom over-molded cable solutions. Neoprene, Hypalon and other materials are available in both straight and right-angle wire orientations.

MARKETS

- Power Generation, Petro-Chemical
- Rail/Mass Transportation
- Fuel Cells, Energy Storage, Power Motors
- Hybrid Vehicles

38999
SJT I II III

26482
Matrix 2

83723 III
Matrix Pyle

5015
Crimp Rear Release Matrix

26500 Pyle

Printed
Circuit Board

EMI Filter
Transient

Fiber Optics

High Speed
Contacts

Options
Others

Additional Circular Connectors

For a Wide Range of Applications, Military & Industrial



Amphe-Power™ GT, Amphe-Power™ 5015 (AC)

Reference Brochure SL-391



Amphe-Power GT



Amphe-Power 5015 AC

APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION	PERFORMANCE ENVIRON./ELECT.
High amperage capability connectors designed for the most demanding industrial and transportation applications. <u>Amphe-Power GT designation: GT()RDS</u> <u>Amphe-Power AC designation: AC()R() designation</u>	GT and 5015 (AC) connectors enhanced with RADSOK® contacts (hyperbolic, stamped grid configuration within the socket) that handle up to 150% higher amperages than standard contacts.	Amphe-Power GT is reverse bayonet coupling. Amphe-Power 5015 is threaded coupling.	Crimp termination. RADSOK® contacts, available in size 8 (69 amps), size 4 (120 amps), and size 0 (250 amps). For RADSOK® contact advantages, see page 79.	Amphe-Power connectors are all 5015 type performance. Operating temp. from -55°C to +125°C. GT and 5015 styles are IP67 similar performance in environmental versions. Current Amphe-Power lines support from 50A to over 500A continuous duty.

OPTIONAL FEATURES

- Most shell styles available in GT family and in AC 5015
- Hybrid arrangements with RADSOK and power contacts tailored to meet customer needs.

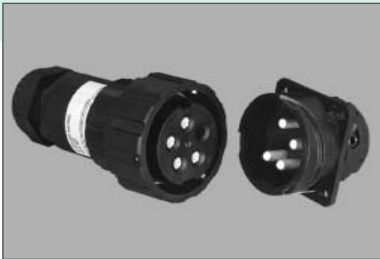
* Amphenol AC Threaded Series- Reference catalog 12-025
Amphenol AC-B Reverse Bayonet Series - Reference 12-027

MARKETS

- Power Generation, Petro-Chemical
- Mass Transportation

Amphe-Power™ Composite Amphe-GTR

Reference Brochure SL-391



APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION	PERFORMANCE ENVIRON./ELECT.
<u>Amphe-GTR</u> GT connector with RADSOK® high amperage sockets. The plug shell, coupling nut, receptacle and hardware are all high performance molded composite material.	Listed per UL1977/UL1682/UL817. Meets all the specifications for high power process control and server applications.	Reverse bayonet coupling.	Compression (setscrew) wire termination to the 4/6AWG or 8/10AWG conductors allows easy field replacement of pin or socket contacts, or complete plug and receptacle assemblies, without requiring specialized tooling.	Meets same performance levels as GT series. (See page 427). RADSOK® contacts enable increased current ratings to 120A on individual contacts. Utilizes a standard PG adapter to achieve IP67 seal rating. Flammable rated to UL94V-0.

OPTIONAL FEATURES

- Currently available in shell size 32 with 4 or 5AWG contacts. Consult Powell Power Solutions for future sizes and patterns.

MARKETS

- Factory Automation
- Rail/Mass Transportation
- Process Control

Class "L", MIL-DTL-22992

Reference Catalog 12-052



APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION	PERFORMANCE ENVIRON./ELECT.
<u>Class L Military MS90555 and Proprietary designations.</u> Heavy duty, rugged, environmental circulars designed to meet the heaviest electrical loads for military or industrial applications. Current ranges of 40 to 200 amps, conductor sizes 6 to 4/0. Automatic grounding for safety.	Qualified to MIL-DTL-22992. Within the controlled parameters of mil-spec - shell size relationship to current carrying capacity to reduce the possibility of inadequate wiring for heavy electrical loads.	Double stub threaded per MIL-STD-1373 for fast coupling, easy cleaning. 5 key polarizing system assures that circuits with incompatible power characteristics (voltage, phase and frequency) are not mated. Rated to 500 complete mating/unmating cycles.	Crimp termination. Contacts can be soldered.	Operating temp. from -55°C to +125°C. Unique arc quenching capability provides a positive safety feature if connectors are inadvertently disconnected under load. Programmed coupling sequence - grounding and neutral contacts engage before power contacts. Grommets and seals provide waterproofing. Rugged shells are resistant to vibration, high impact, shock and corrosion.

OPTIONAL FEATURES

- Direct current or single/three phase, 60/400 Hertz alternating current.
- 4 shell styles with 7 insert patterns that facilitate large conductors.
- Accessories have left hand threads to minimize cable twisting, wire breakage, accidental connector disassembly.
- Conductive and non-conductive finishes available.

MARKETS

- Military ground vehicles/Mobile facilities
- Geophysical/Heavy equipment
- Power distribution systems

III
II
I
SJT
38999

Matrix 2
26482

Matrix
Pyle
83723 III

Crimp Rear
Release Matrix
5015

Pyle
26500

Printed
Circuit Board

EMI Filter
Transient

Fiber Optics

High Speed
Contacts

Options
Others

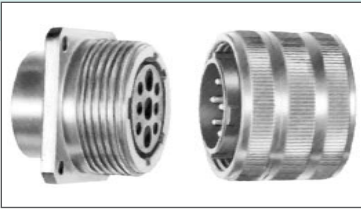


Additional Circular Connectors

For a Wide Range of Applications, Military & Industrial

QWLD, MIL-DTL-22992

Reference Catalog 12-052



OPTIONAL FEATURES

- 7 shell styles with over 300 insert patterns that include both MS and special patterns for a wide variety of multiconductor cables.
- Coax and thermocouple contacts available.
- Accessories have left hand threads to minimize cable twisting, wire breakage, accidental connector disassembly.
- Alumilite hard anodic finish for abrasion and corrosion resistance or conductive cadmium plate finish.

QDP SERIES ALSO AVAILABLE - Consult Powell for further information.

- QWLD type shells with miniature crimp (PT-SE) inserts.
- Applications which require heavy duty shells, rugged finish, higher contact density.

APPLICATION

QWLD Military MS17343 and Commercial designations. Heavy duty, rugged, environmental circular designed for power and control circuits. Increased shell size compared to standard 5015 connectors for greater durability. Industrial version available.

STANDARDS/ REQUIREMENTS

MS approved versions qualified to MIL-DTL-22992. Incorporates MIL-DTL-5015 inserts plus special arrangements. Class C: pressurized. Class R: environmental.

COUPLING/ MOUNTING

Double stub threaded per MIL-STD-1373 for fast coupling, easy cleaning. 5 key polarization. Rated to 500 complete mating/unmating cycles.

CONTACT TERMINATION

Crimp or solder termination.

PERFORMANCE ENVIRON./ELECT.

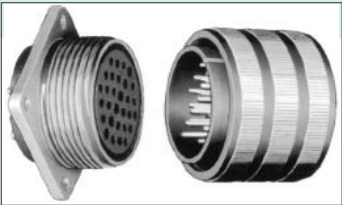
Operating temp. from -55°C to +125°C. Resilient inserts provide high dielectric strength and moisture barrier. Sealing gaskets at every joint for waterproofing. Rugged shells are explosion proof and are resistant to vibration and shock, hydraulic fluids, oils and salt spray corrosion. Operating voltage to 3000 VAC (RMS) at sea level.

MARKETS

- Military ground vehicles/Heavy equipment
- Geophysical
- Portable lighting systems
- Power distribution systems

QWL, MIL-DTL-22992 Type

Reference Catalog 12-053



OPTIONAL FEATURES

- 8 shell styles with over 300 insert patterns that include both MS and special patterns for a wide variety of multiconductor cables.
- Coax and thermocouple contacts available.
- Accessories have left hand threads to minimize cable twisting, wire breakage, accidental connector disassembly.
- Alumilite hard anodic finish for abrasion and corrosion resistance or conductive cadmium plate finish.

APPLICATION

QWL Series Commercial only. Heavy duty, rugged, environmental circulars designed to be more compact. Provides an economical alternative to military qualified designs for heavy duty connectors.

STANDARDS/ REQUIREMENTS

Commercial styles with performance levels that equal to MIL-DTL-22992. Incorporates MIL-DTL-5015 inserts plus special arrangements.

COUPLING/ MOUNTING

Double stub threaded per MIL-STD-1373 for fast coupling, easy cleaning. Single keyway polarization. Rated to 500 complete mating/unmating cycles.

CONTACT TERMINATION

Crimp or solder termination.

PERFORMANCE ENVIRON./ELECT.

Operating temp. from -55°C to +125°C. Resilient inserts provide high dielectric strength and moisture barrier. Sealing gaskets at every joint for waterproofing. Rugged shells are resistant to vibration and shock, hydraulic fluids, oils and salt spray corrosion. Operating voltage to 3000 VAC (RMS) at sea level.

MARKETS

- Instrumentation/Control/Machine Tool
- Communications
- Nuclear Industry
- Geophysical

Aquacon Immersible Connectors

Reference Catalog 12-140



OPTIONAL FEATURES

- Straight plug and either jam nut or square flange receptacle styles offered.
- Over 40 insert arrangements available.
- Hermetic receptacles are available with inserts of fused compression glass.

APPLICATION

AJ Series Designed for underwater or fluid immersion applications, offering 1500 psi sealing capability assured by metal to metal threaded coupling and "O" ring seals.

STANDARDS/ REQUIREMENTS

MIL-DTL-38999 Series III type, with enhanced features for moisture sealing and corrosion resistance.

COUPLING/ MOUNTING

Threaded coupling. Quick mating with one 360° turn of the coupling nut. Visual mating indicator.

CONTACT TERMINATION

Crimp termination. Recessed pins (100% scoop-proof feature minimizes contact damage). Solder termination for hermetic receptacles.

PERFORMANCE ENVIRON./ELECT.

Operating temp. from -55°C to +200°C. Specially designed aluminum bronze coupling nut and type 316 stainless steel shells resist corrosion and provide a 1500 pressure withstanding capability. Hermetic style inserts provide 1 x 10⁻⁶ cc/sec leakage rate. Rear accessory thread provides for the use of EMI hardware or environmentally resistant molded cable terminations.

MARKETS

- Oceanic and fluid immersion applications.

38999
SJT I II III

26482
Matrix 2

83723 III
Matrix Pyle

5015
Crimp Rear Release Matrix

26500 Pyle

Printed
Circuit Board

EMI Filter
Transient

Fiber Optics

High Speed
Contacts

Options
Others

Additional Circular Connectors

For a Wide Range of Applications, Military & Industrial



67 Series, Connectors

Reference Catalog 12-023



OPTIONAL FEATURES

- 5 shell styles with 17 insert patterns.
- 4 construction classes for unitized back end grommet or optional wire sealing, clamping and potting styles.

APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION	PERFORMANCE ENVIRON./ELECT.
67 Series Environmentally sealed, medium size connector. Designed to meet MIL-DTL-5015 specifications, but lighter weight, with gray anodized aluminum shell and bayonet coupling.	Meets temperature ranges and moisture resistance of MIL-DTL-5015 requirements with potting. Miniaturized size (approx. half the weight of standard MIL-DTL-5015 connectors). UL approved.	Spring-loaded bayonet coupling.	Crimp rear insertable, rear releasable contact termination.	Operating temp. from -55°C to +125°C. IP67 rating for environmental sealing. Operating voltage to 1800 VAC (RMS) at sea level.

- MARKETS**
- Military Aircraft
 - Missiles

165 Series, Connectors

Reference Catalog 12-023



OPTIONAL FEATURES

- 5 shell styles with 7 insert patterns.
- Styles for jacketed cable attachment or for potting.

APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION	PERFORMANCE ENVIRON./ELECT.
165 Series Environmentally sealed, medium size connector. Designed to meet MIL-DTL-5015 Class C specifications, but lighter weight, with gray anodized aluminum shell and bayonet coupling.	Meets temperature ranges and moisture resistance of MIL-DTL-5015 requirements with potting. Miniaturized size (approx. half the weight of standard MIL-DTL-5015 connectors). UL approved.	Bayonet coupling.	Crimp rear insertable, rear releasable contact termination.	Operating temp. from -55°C to +125°C. IP67 rating for environmental sealing. O-ring seals in both plug and receptacles make connectors pressure proof and water protected when mated. Operating voltage to 600 VAC (RMS) at sea level.

- MARKETS**
- Military Aircraft
 - Missiles

348 Series, MIL-C-81511 Series I & II

Reference Catalog 12-093



APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION	PERFORMANCE ENVIRON./ELECT.
348 Series M81511 For general duty requirements. Series II is standard length, Series I is longer shell with recessed pins.	MS versions are approved to MIL-C-81511 Series I & II	3 point bayonet coupling and 5 key/keyway mating	Crimp termination. Series I has recessed pins (100% scoop-proof feature minimizes contact damage).	Operating temp. from -55°C to +200°C. IP67 rating for environmental sealing. Operating voltage to 600 VAC (RMS) at sea level.

- OPTIONAL FEATURES**
- 4 shell styles available.
 - Series I with longer shells, recessed pins offers 28 insert patterns.
 - Series II with standard shells offers 16 insert patterns.
 - Shielded coax contacts available.

- MARKETS**
- Military Aerospace
 - Military Vehicles
 - Commercial Aircraft
 - Medical Equipment

Shorting Plugs

Consult your local Powell sales office for further information.



OPTIONAL FEATURES

- Available with various lengths and attachments to meet customer requirements.

APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION	PERFORMANCE ENVIRON./ELECT.
Modified plugs or receptacles in all major mil-spec cylindrical connector types. Modified with a tethered eyelet/braid attachment. Designed to provide specific circuit functions such as safety shorting, electrical commoning and arming.	Available modification design with the following series: MIL-DTL-26482 MIL-DTL-38999 MIL-DTL-5015 MIL-DTL-83723	Available with a tethered eyelet attachment.	Termination is per connector series utilized.	Performance is per connector series utilized.

- MARKETS**
- Missiles

38999
SJT

26482
Matrix 2

83723 III
Pyle

5015
Crimp Rear Release Matrix

26500 Pyle

Printed
Circuit Board

EMI Filter
Transient

Fiber Optics

High Speed
Contacts

Options
Others



Rectangular Interconnects

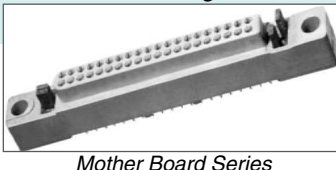

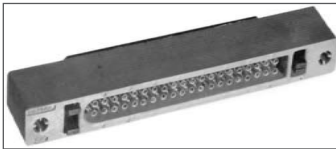
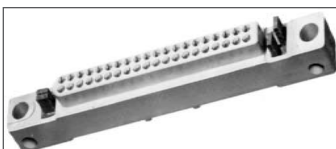

For a Wide Range of Applications, Military

Wide range of Rectangular Interconnects

Amphenol provides an impressive array of Rectangular Connectors to meet the needs of high density systems and interconnect attachments to Printed Circuit Boards. The Low Mating Force Rectangulars have proven performance on the ground, in the air, and at sea. Applications include: M1A2 Abrams, F-16 Falcon, F/A-22 Raptor, F-35 Lightning 11, AIM-132, ASRAAM. The LRM Surface Mount Connectors shown on page 433 & 434 also have met the needs of major programs that include:

F-35, F-16, F-15, F/A-22, F/A-18, B2, JTRS, EH101, Sincgars, ATACMS, M1 Tanks, Grippen, F-117, Harpoon, LANTRIN, AH-64 APACHE, ASRAAM, ATFLIR

Low Mating Force Rectangular Connectors with Bristle Brush Contacts

Reference Catalog 12-035*	APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION/ ARRANGEMENTS	PERFORMANCE ENVIRON./ELECT.
 <p><i>Mother Board Series</i></p>	<p>Military designation: M55302. Proprietary designations: MB, DB, I/O, PC.</p> <p>Rectangular connectors for attachment to printed circuit boards. Offers high contact density capability. Contain Bristle Brush contacts, consisting of multiple strands of high tensile strength wire that are bundled together to form a "brush-like" contact.</p>	<p>Military versions meet MIL-DTL-55302/166 through /172.</p>	<p>For mounting to printed circuit boards or discrete wires. Body styles offered:</p> <ul style="list-style-type: none"> • Mother board • Daughter board • Input/Output • PC <p>Flexibility in mating:</p> <ul style="list-style-type: none"> • Perpendicular boards • End to end boards • Parallel boards • Wire to boards • Card extenders. <p>Polarization keys provide up to 256 possible positions.</p>	<p>Brush contact termination. (Also called B3 contacts). Termination Styles:</p> <ul style="list-style-type: none"> • PCB through-hole solder • Wire wrap (MB only) • Crimp to discrete wires (Input/Output only) • Solderless complaint into 0.040 plated through holes (MB only) <p>Arrangements:</p> <ul style="list-style-type: none"> • 2, 3 or 4 row arrangements with 10 to 100 contacts per row in one contact per row increments. • 0.100 inch center to center square grid contact spacing. 	<p>Operating temp. from -65°C to +125°C. Connector bodies are high performance glass-filled thermoplastic moldings. Connector configurations are capable of supporting data rates up to 400 Mbps.</p> <p>Bristle Brush contacts provide:</p> <ul style="list-style-type: none"> • Low mating/unmating forces - 70% to 90% reduction from conventional pin and socket contacts. • Proven durability and long contact life - over 20,000 cycles of mating and unmating without performance degradation. • Multiple points (14-17) of contact per mated contact. • Intermittency-free performance. • Redundant current paths (stable, low resistance). • Proven electrical and gas tight contact sites.
 <p><i>Daughter Board Series</i></p>					
 <p><i>Input/Output Series</i></p>					
 <p><i>PC Series</i></p>					
					

Variety of Rectangular Brush Connectors including smaller styles that have only 10 contacts and are available in color coded moldings.

OPTIONAL FEATURES

- Locking screws and bushings are available for attaching connectors to boards.
- Contact styles available: straight, 90 degree, PCB stub, wire wrap and crimp.
- Small 10-contact arrangement styles are available with option of multi-colored moldings for color coding applications.

MARKETS

- Medical Equipment
- Military and Commercial Aviation
- IC Chip Testers
- Military Vehicles
- GPS Systems
- Space applications
- Telecommunications
- Factory Automation

Low Mating Force High Cycle, Bristle Brush Contacts

As mentioned in the Rectangular section of this publication, the Amphenol Low Mating Force and Amphenol LRM Surface Mount Connectors utilize the Bristle Brush contact design. The Brush or B³ contact is made up of multiple strands of high tensile wire that are bundled together. 70% to 90% reduction in mating/unmating forces is achieved over conventional contacts, and the brush contact has proven durability and long contact life. Hybrid Low Mating Force connectors can be designed with combinations of brush and coax/twinax/power contacts or fiber optic termini. LRM Surface Mount Connectors can also be designed with combinations of contact styles.



Bristle Brush Contacts - Multiple Stands of Wire are Bundled together to form a "Brush-like" Contact

*Amphenol is developing a combined rectangular catalog 12-R1. 12-035,12-037 and LM-300 will be included in the combined rectangular catalog please contact Powell Electronics for future availability.

38999
SJT I II III

26482
Matrix 2

83723 III
Matrix Pyle

5015
Crimp Rear Release Matrix

26500 Pyle

Printed
Circuit Board

EMI Filter
Transient

Fiber Optics

High Speed
Contacts

Options
Others

Rectangular Interconnects

For a Wide Range of Applications, Military

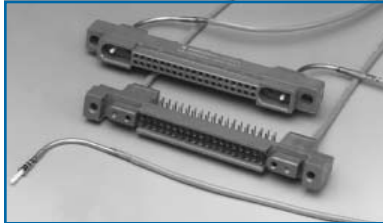


Hybrid Rectangular Connectors with Brush/Power/Coax/Fiber Optic Combinations

Reference Catalog 12-035



Power/Coax/Brush Contact Combinations



Fiber Optics/Brush Contact Combinations

APPLICATION

Rectangular connectors for attachment to printed circuit boards. Offers versatility of combining contact types- power, coax, twinax, fiber optics and Brush contacts in one high density package.

STANDARDS/ REQUIREMENTS

M55302 type rectangular connectors with hybrid contact arrangements. Power contacts and shielded coax or twinax contacts meet M39029 standards. Fiber optic termini meet M29504/4 & /5 standards.

COUPLING/ MOUNTING

Same as shown above for Low Mating Force rectangular connectors.

CONTACT TERMINATION/ ARRANGEMENTS

Combinations of termination styles:

- Brush contacts (as described above)
- Power contacts - (standard M39029 size 16 or 12; same as used in MIL-DTL-38999 Series II)
- Coax or twinax contacts - (M39029, size 16 and 12)
- Fiber optic termini (multi-mode size 16; same as used in MIL-DTL-38999 Series III)

PERFORMANCE ENVIRON./ELECT.

Connector performance and brush contact performance is the same as shown above for Low Mating Force Rectangular connectors. Optical performances of fiber optic termini are the same as termini used in multi-channel circular connectors.

OPTIONAL FEATURES

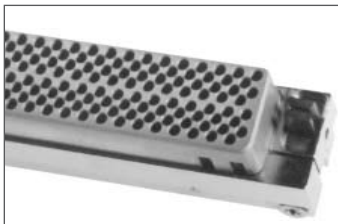
- Hybrid configurations are available with fiber optics and brush contacts. (See photo above and Fiber Optic section of this catalog).
- Hybrid configurations are available with power and/or shielded (coax or twinax contacts). (See photo shown above).

LRM Surface Mount Connectors with Brush Contacts

Reference Catalog 12-037*



Chevron Grid - Up to 300 Contacts in 6 Rows.



Staggered Grid - Up to 360 Contacts in 8 Rows.



GEN-X Grid - Up to 472 Contacts in 8 Rows.

APPLICATION

Line replaceable modular interconnects with very high contact densities, for attachment to printed circuit boards. Contain Bristle Brush contacts, consisting of multiple strands of high tensile strength wire that are bundled together to form a "brush-like" contact. LRM connectors are available in SEM-E and custom form formats.

STANDARDS/ REQUIREMENTS

Uses Bristle Brush contact which meets MIL-DTL-55302. Amphenol staggered grid LRM connector is the F-22 Avionics system connector choice.

COUPLING/ MOUNTING

Modules: Surface mount/Straddle mount with .0375 spacing between leads, with rows of leads on each side of the module. Can be centered or off-centered mounted. **Backplanes:** Available with through-hole solder posts or with compliant pins. **Polarization:** Insert arrangement controls mating orientation. Up to 4096 keying combinations.

CONTACT TERMINATION/ ARRANGEMENTS

Brush contact termination. **Chevron Grid:** Backplane termination: PCB through-hole solder. Module/LRM termination: Surface mount on 0.025 pitch. **Staggered Grid:** Backplane termination: PCB through-hole solder or solderless compliant into 0.025 plated-through holes. Module/LRM termination: Surface mount on 0.025 pitch to flex circuit. **GEN-X Grid:** Backplane termination: PCB through-hole solder or solderless compliant into 0.025 plated-through holes. Module/LRM termination: Surface mount on 0.0375 pitch to rigid flex circuit boards.

PERFORMANCE ENVIRON./ELECT.

Operating temp. from -65°C to +125°C. Suitable for vapor phase soldering. Connector bodies are aluminum alloy with electroless nickel finish. Superior performance under vibration. Connector configurations are capable of supporting data rates in excess of 1 Gbps. Staggered and GEN-X styles are standard with ESD protection - see below. Bristle Brush contacts provide:

- Low mating/unmating forces - 70% to 90% reduction from conventional pin and socket contacts.
- Proven durability and long contact life - over 20,000 cycles of mating and unmating without performance degradation.
- Multiple points (14-17) of contact per mated contact.
- Intermittency-free performance.
- Redundant current paths (stable, low resistance).
- Proven electrical and gas tight contact sites.



Variety of Rectangular Interconnection Products, including LRMs and Low Mating Force Brush Connectors. Also shows the OBIS, Optic-Electric Backplane.

OPTIONAL FEATURES

- Wide range of combinations available for PCB/heat sink accommodations.
- Ruggedized VME64-X is another LRM type connector - See next page.
- Hybrid arrangements with Brush contacts, coaxial, power and fiber optics are available in the Staggered grid style.

MARKETS

- All markets of Rectangular Low Mating Force Connectors, as shown above.

III
II
I
SJT
38999

Matrix 2
26482

Matrix
Pyle
83723 III

Crimp Rear
Release Matrix
5015

26500 Pyle

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Transient

Fiber Optics

High Speed
Contacts

Options
Others

MARKETS

- Military and Commercial Aviation
- Military Vehicles and GPS Systems

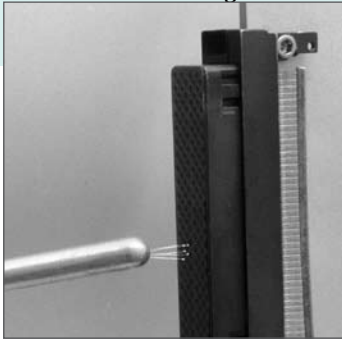


Rectangular Interconnects

For a Wide Range of Applications, Military

LRM Connectors with ESD Protection

Reference Catalog 12-037*



APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION/ ARRANGEMENTS	PERFORMANCE ENVIRON./ELECT.
Staggered style and GEN-X style are standard with ESD protection. These connectors utilize the Faraday cage principal to shunt electrostatic discharge events to the conductive enclosure on which the connector is mounted, thus never allowing the high voltage, high current discharge event to reside on any contacts.	Exceeds protection requirements of IEC 801-2 and MIL-STD-1686.	LRM connectors with the added feature of ESD protection eliminate the need for discrete components (such as diodes) and maximizes PC board real estate.	See termination information for LRM connectors above.	Ensures that all components within a conductive enclosure will be subjected to a max. of 20V during electrostatic discharges between -26 KV and +26 KV. Response time is instantaneous. No capacitive loading of signal contacts. The ESD protection is provided on the module/LRM connector in the unmated condition, making it ideal for Level 2 maintenance.

OPTIONAL FEATURES

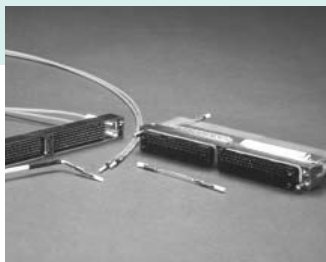
- (Also see ESD protection in MIL-DTL-38999 Series III connectors - Filter/Transient Protection section. Consult Powell for further information.)

MARKETS

- Military and Commercial Aviation
- Military Vehicles and GPS Systems

LRM Surface Mount Connectors with Fiber Optics, RF Modules, Power Supply Modules

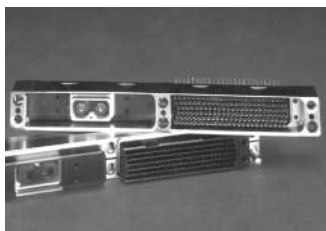
Reference 12-037*



LRM with Fiber Optics



RF Modules



Power Supply Modules

APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION/ ARRANGEMENTS	PERFORMANCE ENVIRON./ELECT.
Line replaceable modular interconnects with very high contact densities, for attachment to printed circuit boards. Offers versatility of combining contact types within modules - fiber optics, shielded RF coax, and power contacts one high density package.	High performance LRM connectors with hybrid contact arrangements available.	Same as for LRM connectors shown on preceding page.	Combinations of: <ul style="list-style-type: none"> • Brush contacts • <u>Fiber Optic LRM</u> - MIL-T-29504 type termini or MT ferrules (2-24 fiber lines per ferrule) • <u>RF Modules</u> with coax contacts - size 16 M39029 type, size 12 for DC-2 GHz or size 8 for DC-32 GHz. Other RF contacts can be accommodated. • <u>Power Supply Modules</u> with custom 270VDC sections utilizing size 22D crimp or compliant pin contacts. Crimp termination size 16, 12 and 8 contacts for high current applications. 	Connector performances and brush contact performances are the same as shown on preceding page for LRM connectors. Power supply modules with 270VDC sections are capable of providing corona-free operation at 75,000 ft.

OPTIONAL FEATURES

- Digital/Brush contact inserts can be partially populated to permit high voltage carrying capacity through the electrical PWB, while isolating sensitive electrical signals.
- Differential pair inserts have been specifically designed to support data rates with excess of 1.2 Gbps.
- Also see page 40 for optical backplane interconnection system, that can provide up to 192 fiber optic lines and 80 digital contacts in SEM-E format.

MARKETS

- Military and Commercial Aviation
- Military Vehicles
- GPS Systems

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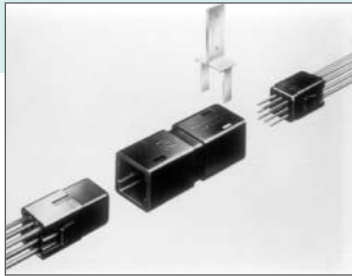
Rectangular Interconnects

For a Wide Range of Applications, Military



Pyle LMS Modular Connectors

Reference Pyle Bulletin LM-300*



APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION/ ARRANGEMENTS	PERFORMANCE ENVIRON./ELECT.
In-line splice connectors - simple, low cost interconnection devices that incorporate LMD modules and contacts.	Supplements the LMD family.	3-piece assembly with 2 styles - standard requiring removal tool, or style with a push button release. Bracket available for panel mounting.	Uses modules common to LMD connectors.	Operating temp. from -55°C to +140°C.

OPTIONAL FEATURES

- Panel mounting bracket available or tie straps.
- Module removal tool available for standard splice style.

MARKETS

- Instrumentation and Testing Equipment

Pyle LMD Modular Connectors

Reference Pyle Bulletin LM-300*



APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION/ ARRANGEMENTS	PERFORMANCE ENVIRON./ELECT.
Rectangular interconnects comprised of housings, modules and contacts, designed to provide flexibility in the assembly of wire harnesses. For attachment to PC boards. Also designs for rack & panel or cable to cable attachment.	Designed for wire harness terminations and to eliminate costly PC board and associated hardware.	<u>Linear module design</u> - for rack & panel or cable to cable applications. <u>Bussing modules</u> - allow for a plurality of circuit networks without extra hardware. <u>Diode modules</u> - sealed for protection; eliminate need for PC boards/ hardware. <u>Relay modules</u> - sealed or unsealed; eliminate need for PC boards/hardware.	Modules incorporate crimp contacts in sizes 8, 16, 20 and 22.	Operating temp. from -55°C to +140°C. Durability: 250 cycles mating and unmating. Module insertion and removal force: 5 lbs. max. Housings, modules and contacts are all ordered separately and require assembly with appropriate LMD accessory tools. Housings of black thermoplastic are U/L rated 94VO flame retardant. Housings of white thermoplastic provide increased resistance to industrial oils and solvents.

OPTIONAL FEATURES

- Variety of module options provide a mix of both active and passive devices within one connector.
- Modules offered either environmentally sealed or unsealed.
- Standard design - housings with 6 bays with choice of four module contact arrangements: 1 #8, 4 #16, 9 #20, 16 #22. PC tail contacts also available.
- Housing material options: black or white thermoplastic.
- Plug and receptacle housings may be front or rear panel mounted.
- Optional keying post provides six position keying capability.
- Optional center jackscrew available for ease of mating and unmating and high reliability under vibration.
- Two types of cable strain reliefs - for either internal or external attachment.

MARKETS

- Instrumentation and Avionics Controls

VME P0/J0 MT Connectors with Fiber Optics

Reference 12-037*



APPLICATION	STANDARDS/ REQUIREMENTS	COUPLING/ MOUNTING	CONTACT TERMINATION/ ARRANGEMENTS	PERFORMANCE ENVIRON./ELECT.
For attachment to VME-64X printed circuit board and cards where fiber optics is required. Used in place of P0/J0 electrical applicable connectors.	Tested to IEEE 1156.1-1993 paragraphs.	Mount to standard VME64X cards and backplanes in the P0/J0 location.	Uses fiber optic "MT" ferrules in the P0/J0 location.	Operating temp. from -55°C to +125°C. Shock: 100g, 6ms, 1/2 sine, 18 pulses Shock: 30g, 6ms, 1/2 sine, 18 pulses Sine Vibration: 10g, 40 min/axis, 3 axis Random Vibration: 0.15g ² Hz, 40 min/axis, 3 axis ESD: 15 KV/150 pF

OPTIONAL FEATURES

- Designed to customer specifications.

MARKETS

- Military and Commercial Aviation
- Military Vehicles
- GPS Systems

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