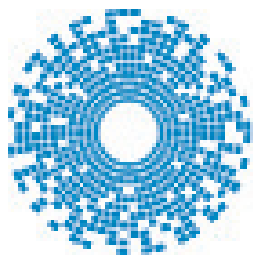


# SPACE

## VEHICLE LAUNCH SYSTEMS PRODUCTS

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**cinch**

CONNECTIVITY SOLUTIONS

a bel group

[belfuse.com/cinch](https://belfuse.com/cinch)

# ABOUT CINCH CONNECTIVITY SOLUTIONS

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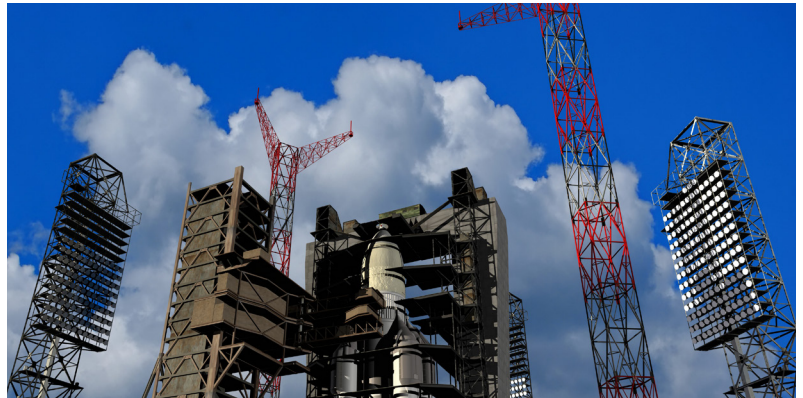
For over 100 years, Cinch Connectivity Solutions has manufactured high quality and reliable high performance connectors and cable assemblies. Cinch is recognized as a world class connectivity supplier of RF, fiber optic, hybrid, microwave components, circular, d-subminiatures, modular rectangular, electronic enclosures and cable assemblies. Cinch provides innovative solutions to the military, commercial aerospace, networking, telecommunication, test and measurement, oil and gas and other harsh environment industries. We aim to exceed our customers' expectations and continually offer innovative solutions to the rapidly changing needs of the markets and customers we serve.

Along with our parent company, Bel Fuse Inc., our mission is to provide products and services using established quality standards and to meet our customer expectations. To fulfill this objective, we strive to produce components and assemblies that embody optimum levels of reliability and performance in their design, manufacture, and delivery. Cinch Connectivity Solutions has consistently proven to be a valuable supplier to the foremost companies in its chosen industries by developing cost effective solutions for the challenges of new product development.

## WHY CINCH?

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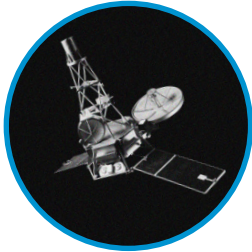
Cinch Connectivity Solutions is no stranger to space applications. From our rich history in space heritage ranging from GPS Satellites to the Emirates Mars Mission, we have supplied cables, connectors, and components able to meet the harsh testing requirements for space travel. As a new era of space commerce opens in Satellite internet, we have a broad range of products ready to meet the tests against the most extreme environments.



Launch is one of the most crucial phases of deploying a satellite. Vehicle launch systems require reliable products that withstand high levels of shock, vibration, and temperature changes. Cinch Connectivity Solutions offers a wide range of robust interconnects which are able to combat the harsh environmental stressors during satellite deployment, through both standard product lines, and bespoke engineering solutions.

# SPACE EXPERTISE & HERITAGE

Cinch Connectivity Solutions has proven space pedigree with a history of missions spanning over six decades, from the Voyager, Mariner and Apollo ventures of the 1970s to embryonic projects with planned launch dates many years from now.



1970

- Mariner Space Probe
- Apollo Missions
- Orbiter 1010 Space Shuttle
- Voyager



2000

- Beagle 2
- Alphasat/Inmarsat 4
- Copernicus Sentinel-1
- Copernicus Sentinel-2
- Inmarsat 5



2020

- Sentinel-3A
- Sentinel-3B
- K425 Earth Observation Radar Satellites
- Nilesat-301
- Exo Mars
- Sentinel-3C
- Sentinel-3D
- Inmarsat 6
- COSMO-SkyMed

## APPLICATIONS

### SATELLITES - GEO / MEO

- Communications
- Meteorology
- Navigation
- Radio / TV Networks
- Broadband

### SATELLITES - LEO

- Earth Observation
- Communications
- Military Reconnaissance
- Surveillance
- Telecom
- Space Telescopes
- Earth Sensing
- Space Cubes
- Navigation Systems

### LAUNCHERS

- Attitude Correction Module
- Central Units / Communication
- Command Memory Boxes
- Sensors

### GROUND SYSTEMS

- Docking Systems
- Ground Stations
- Communications
- Mars Rovers
- Mobility

# MIL-STD-1553B SOLUTIONS



## Trompeter Interconnect Solutions

For 60 years, Trompeter has been providing high reliability solutions to the MIL-STD-1553B, and other applications. Trompeter is a key supplier to the video and broadcast markets as well as continuing to be a leader in the use of triax interconnect solutions for precision test and measurement applications.

Trompeter has a long and proud history of servicing space applications, which include communications satellites, navigation (GPS) satellites, and even the Mars Rover. Trompeter's MIL-STD-1553B offering includes: Bus Couplers, Connectors, Cable Assemblies, Terminations, RFI Caps, and Adapters which all offer the same high level of testing regardless of product. With this high level of testing, Trompeter will continue to be a key component during space launches for any system that requires MIL-STD-1553B products.



*Space Rated connectors*



*Bus Couplers*

## Advantages

- Space rated interconnect solutions tested to Trompeter's TFS-10, TT-09 specifications and customer Source Control documents (SCD).
- Trompeter tests these conditions using ASTM E595, and the limits are:
- Total Mass Loss (TML): less than 1.0%
- Collected Volatile Condensed Materials (CVCM): less than 0.10%

## Space Rated Twinax and Triax Products

- Connectors - Bulkhead Jacks, Circuit Board Jacks, Cable Jacks, Cable Plugs, and Adapters.
- Feedthroughs - Bulkhead mounted
- Terminators and RFI Caps
- All components available in the following form factors:
  - TRB (bayonet) and TRT (threaded) Series 70 miniature
  - TRS (bayonet) and TTM (threaded) Series 150 sub-miniature
  - Series 450 bayonet and threaded micro-miniature

## Ground Support Patching Solutions

- Patch Panels (customizeable)
- Patch Jacks
- Patch cable assemblies

## MIL-STD-1553B

- Space Rated Connectors, feedthroughs and terminators
  - TRB (bayonet) and TRT (threaded) Series 70 miniature
  - TRS (bayonet) and TTM (threaded) Series 150 sub-miniature
  - Series 450 bayonet and threaded micro-miniature
- Cable Assemblies
  - TM17/176-00002
  - Trompeter TWC-78-1
  - Trompeter TWC-78-2
- Bus Couplers
  - 1 through 8 stubs
  - Unterminated

Full information on all Trompeter products download the [Trompeter Space Catalog](#)

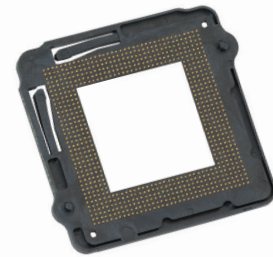
## About CIN::APSE®

CIN::APSE® solderless, high density, custom interconnects are used for board to board, IC to board, flex to board & component to board applications throughout the space industry and LEO satellites. Environmental performance proven in extreme mechanical shock, vibration, and thermal conditions. With excellent SI properties, CIN::APSE makes a great solution for application requiring signal, power, high speed data and RF in one assembly.

CIN::APSE technology was created specifically for space applications and several NASA publications are available characterizing the technology. Lightweight LGA sockets have high contact density, excellent electrical & mechanical signal properties providing exceptional performance for Low Earth Orbit Communication Platforms. PCB interposers and stacking connectors enable simple routing options for complex multi-PCB and flex circuit design in confined spaces. During space launches where high speed and reliability is a must, CIN::APSE technology can help send your spacecraft to orbit.



*Stacking Connector*



*LGA Socket*

## Advantages

- Most widely implemented crimpless & solderless, high speed, interconnect in the industry.
- Simple 2-piece, patent protected design enables 50+ Gbps, and wide range of profiles from 0.020" (0.5mm) to 1.0" (25mm).
- Contacts available in 0.020" (0.5mm) & 0.039" (1.0mm) diameters with a standard pitch of 0.039" (1.0mm) or greater.
- Number of contacts is not limited, the largest connector implemented to date contained 7,396 I/Os.
- Solderless termination is achieved through compression and the unique contact design assures multiple points of contact per I/O.

## CIN::APSE LGA Sockets

- Very thin designs that rely on contacts with multiple points of conduction per contact.
- Low contact resistance and exceptional SI characteristics.
- Technical Readiness Level 9 with proven space flight history.

## CIN::APSE Stacking Connectors

- Connects PCB to PCB or component to PCB without the use of solder for compact mezzanine layouts.
- Spring-like contact is protected from over pressure by the CIN::APSE insulator.
- Plungers are used on either side of the spring-like contact for multiple compression cycles.
- The connector mounts onto the PCB and connects electrically to gold plated pads.

## CIN::APSE Stacking Connector Jumpers and Assemblies

- Short flex PCB assemblies that are used for coplanar and right angle board to board connections.
- Jumpers in combination with the CIN::APSE stacking connectors and hardware provide a full board to board connect system.
- Rigid-flex-rigid PCB designs can be segmented, allowing modifications and repairs without replacing the entire assembly.

Full information on all CIN::APSE technology can be found within our [CIN::APSE Product Brochure](#)

# QPS ATTENUATORS



## Midwest Microwave Qualified Parts for Space (QPS)

Cinch's Midwest Microwave's QPS (qualified parts for space) attenuators and terminations have been designed specifically for space applications. QPS parts are qualified using qualification testing guided by MIL-DTL-3933 level T qualification. QPS parts are available with three standard screening options which include various levels of severity, with custom screening options available upon request.

Cinch recommends our screening level B and above for space launchers. Screening level B is the most economical option as it includes many of the testing requirements outlined in MIL-DTL-3933 level T but excludes the testing requirements exclusively required for long term deep space flight. This ensures Cinch can provide a commercially cost-effective design with the reliability of a space ready connector. For applications that are purely pre-flight testing, thermo-vacuum testing, or pre-flight system evaluation Midwest offers screening level A. This allows our customers to simulate a higher tested product at a lower cost, where the same failure modes during space flight may not be present.



*Attenuators*



*Terminations  
\*launching Q4, 2021*

### Advantages

- Qualification and screening guided by MIL-DTL-3933 level T
- Meets or exceeds 1% TML and 0.1% CVCM
- Three standard screening levels available
- Standard dB values for attenuators 1, 2, 3, 6, 10, and 20dB
- Custom dB values from 0 to 20dB available

### Attenuators

- DC - 18 GHz Performance
- SMA male to SMA female
- 2W Average Power

### Terminations

- DC - 18 GHz Performance
- SMA male configuration
- 2W average power

Example of screening level B, recommended as minimum for any space flight applications.

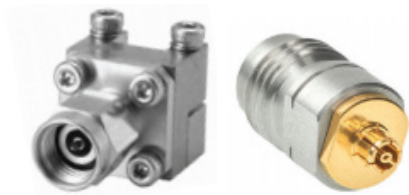
Test Sequence	Inspection Name	Test Method per ATP-09417-60-02*	Sample Size
1	Thermal Shock	4.2	100%
2	Parts and Assembly Verification (PAV)	4.5	
3	Pre-Conditioning Electrical	4.6	
	DC Resistance	4.6.1	
	VSWR & Attenuation	4.6.2	
4	Conditioning	4.7	
5	Post-Conditioning Electrical	4.8	
	DC Resistance	4.8.1	
	VSWR & Attenuation	4.8.2	
6	Stability of Attenuation: After Peak Power	4.1	
7	Radiographic Inspection	4.11	
8	Visual and Mechanical Inspection	4.13	

Full information on all screening levels can be found within our [QPS attenuators product brochure](#)

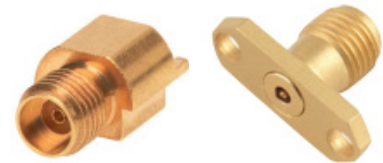
## Johnson Solutions

Cinch's industry leading line of Johnson RF coaxial connectors and adapters are designed to provide the highest quality data transmission for audio, video, and data applications. The breadth of products available within the Johnson range includes board and cable mount connectors, as well as semi-rigid, conformable, and flexible RF coaxial cables.

Johnson's widely available, cost effective RF products offer a commercial based solution for launch systems that demand reliability without extensive space testing. Our SMPM connectors specifically boast higher reliability during space launches where high levels of vibration are present. Our wide product catalogue consists of a variety connectors and accessories under a range of frequencies, making finding the RF connector a cinch.



1.85mm



2.92mm

## Advantages

- High-quality and high-performance design.
- Long product life availability.
- Widely available in distribution.

### SMA

- 0-26.5 Ghz
- Standard brass, non-magnetic brass and stainless steel options
- Patented High Frequency and Self Fixture end launch connectors
- Quick connect cable plugs and adapter

### SMP

- Allows for axial and radial misalignment (blind mate applications)
- Micro-miniature, Slide-On/Snap-On interface
- Performance up to 40 GHz
- High reliability where extreme shock & vibration conditions are experienced

### SMPM

- Allows for axial and radial misalignment (blind mate applications)
- 35% smaller size than the SMP connectors
- Performance up to 65 GHz
- High reliability where extreme shock & vibration conditions are experienced

### 1.85mm

- Stainless steel construction
- Superior electrical performance to 67 GHz
- Connectors in End Launch Jack/ Plug option
- Adapters to 1.85mm, 2.4mm, SMPM

### 2.4mm

- Stainless steel construction
- Superior electrical performance to 50 GHz
- Connectors in End Launch and Flange options
- Adapters to 2.4mm, SMP, 2.92mm, SMA

### 2.92mm (SMK)

- Great for applications that require high frequency transmission
- Connector mating interface per MIL-STD-348
- Superior electrical performance up to 40 GHz
- Female contacts have unique three-slot construction

Full information on all Johnson products can be found within our [Johnson mmWave Catalog](#)

# QPL TO MIL-DTL-83513

# Dura-Con™

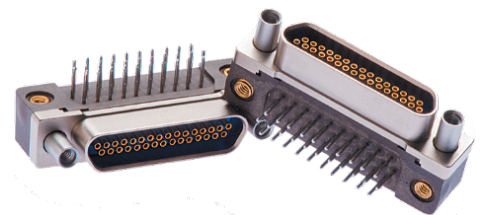
## About Dura-Con™

Cinch Dura-Con D-shaped micro miniature rectangular connectors are designed for applications that require a rugged, high performance, densely compacted interconnect. Dura-Con is the ideal connector for applications where weight and space must be kept to a minimum while maintaining maximum reliability, ideal for space launch applications.

Reliability is assured with the unique twist pin providing 7 points of contact when mated. Qualified (QPL) to MIL-DTL-83513, micro-D Dura-Con are one of the most widely used 0.05 inches (1.27 mm) pitch connectors. MIL-DTL-83513 specifies Space Qualified parts, which included Nickel plated shells and materials that meet NASA outgassing requirements. Typical applications for these connectors are miniaturized low earth orbit electronics and data processing equipment, where shorter signal paths are needed.



M83513 Micro-D



T Block

## Advantages

- Proven connectors for applications where weight and space must be kept to a minimum while maintaining maximum reliability for multiple points of contact.
- Dura-Con connectors utilize a twist pin contact design that maintains 7 points of contact between the pin and socket for continuous reliability and maintain a contact pitch of 0.050" (1.27mm).
- Wire terminated sizes range from #24 AWG to #34 AWG.
- Stranded wires are available in PTFE and ETFE insulation.

## MIL-DTL-83513

- Military Standard includes specifications of micro-d materials for Space applications, all Dura-Con M83513 with "N" Nickel plating are space qualified.
- Space rated MIL-DTL-83513 products meet NASA's outgassing requirements.
- ETFE insulated wire, uninsulated wire, solder cup, straight and right-angle PCB terminations available.
- Right-angle PCB mounted Micro-Ds have a full washout at the PCB surface for cleaning processes to reduce shorts.

## Combis (Power, RF & EB)

- Designed for applications where a single connector is required to carry low current (3 Amp) signals and higher current (15 Amp) power contacts and/or RF contacts or Expanded Beam (EB) contacts.
- Multiple contact arrangements available.
- Protective Al shell available for welding mount and with compression seal.

## Strip Connectors

- Thin and lightweight - designed for extremely space and weight constrained applications.

## EMI Protected Pigtails and Jumpers

- Compressible conductive gasket on plugs for 360° EMI protection.
- Integrated back shell with channel for metal strap.

Preinstalled EMI braided sleeves and abrasion protection sleeves available.

## Customization

- Dura-Con has a long history of design and manufacturing shells for a variety of applications to integrate shells into structural components to reduce size and weight and to provide additional capability.
- Wire assemblies can be prewired and encapsulated directly into the connector per customer wire charts including twisted pairs and shielded cable, which reduces installation labor and improves quality.
- Complete wire harness assembly options available from concept to manufacturing.

Full information on all Dura-Con products can be found within our [Dura-Con Product Catalog](#)



# FIBER OPTIC CONNECTIVITY



## About Fibreco

Fibreco fiber optic connectors and cable assemblies are typically made for military, security, outside broadcast, offshore, mining, and other industrial harsh environment applications. Fibreco expanded beam connectors and cable assemblies offer high performance, flexible, cost effective solutions perfect for use in space launches that involve communication within a harsh environment.

Fibreco offers a wide range of MIL-DTL-83526 products as well as many other commercially made fiber connectors including expanded beam connectors, junior, mini, GeoBeam EX, cable assemblies and fully customizable designs. Fibreco offers many channels, modes, and sizes to fit your specific needs. Each of these connectors have been designed for use in the most demanding harsh environmental applications, ideal for the high vibration environments during space launch.



*MIL-DTL-83526*



*Dura-Con Expanded Beam*

## Advantages

- Designed for use in harsh environment applications including military tactical communications, outside broadcast, petrochemical plant, mining, and offshore systems.
- MIL-DTL-83526 Certified offer a simple termination process allowing rapid in-field termination and repair. Inserts can be replaced within 30 mins in field conditions.

### Expanded Beam fiber optic connectors

- Military certified MIL-DTL-83526 expanded beam connectors
- The connector design enables replacement of the expanded beam insert, connector front body and grip ring without the need to re-terminate the fibers.
- Mini expanded beam plug connector has a diameter of just 21mm, ideal for applications where size and space requirements are critical.
- Mini bulkhead connector is available with D-hole, square flange and XLR mounting options. Low profile versions are also available.
- The Mini expanded beam connectors offer a simple termination process allowing rapid in-field termination and repair.
- S-Lite is designed specifically to target the outdoor broadcast market but offers versatility in rugged and harsh environments, including low earth orbit satellites.
- Hybrid version available, combining electrical with optical to target SMPTE cable specific programs.

### Dura-Con Expanded Beam

- Designed to combine proven Cinch fiber optic expanded beam technology with the durability of our high-reliability Dura-Con™ connectors.
- Offers reliable performance combined with a simple termination process allowing rapid in-field termination and repair.

### Cable Assemblies

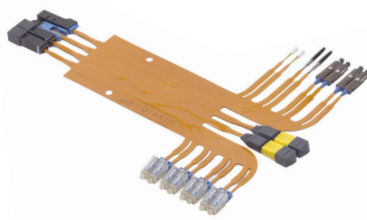
- Cinch-Fibreco manufactures custom fiber optic cable assemblies for a wide range of military and industrial harsh environment applications.
- Large stocks of single mode and multimode tactical fiber optic cable and deployable cable reels enabling fast turn-round production of all deployable cable assemblies, harnesses, and bulkhead assemblies.
- Our facility is fully equipped with the latest automated termination, polishing and testing technology including interferometer ferrule end face characterization and Optical Time Domain Reflectometer testing.

Full information on all Fibreco products can be found [Here](#)

## About Stratos Optical Connectivity

Cinch's Stratos line of optical connectivity products are globally recognized as highly reliable, cost-effective, and provides optical connectivity solutions that are virtually immune to dust, mud, oil, water, and other contaminants.

Space launches demand products with some of the most reliability and cost-effective solutions. Stratos offers lightweight products with minimal signal degradation. Our Stratos products boast the highest possible bandwidth, dense channel counts and are virtually future proof. Stratos allows the down sides of typical fiber products, for example bend radius, installation time, cleaning, and sensitivity to vibration and temperature to be mitigated. Stratos provides the perfect solution for any communications between internal systems.



*Fiber Flex*



*Transceivers*

## Advantages

- Small footprint and vibration tolerant technology to keep your systems running when traveling to low earth orbit.
- All Stratos products are thoroughly tested with local support from Cinch's team of engineers to help give you peace of mind when choosing a Stratos product from Cinch.

### Transceivers

- Low Rider Optical Transceiver family are designed specifically with the rugged Mil-Aero and Industrial markets in mind.
- The Low Rider products cover a variety of data rates and wavelengths with a common foot print form factor.
- Invented by Stratos in 2003, these have a long history of success in the rugged market, and has since been copied by other optical suppliers.

### Fiber Flex

- Provides superior solutions for fiber routing and fiber management for PCB card level or backplane applications.
- Typical features include routed netlist with controlled bend radius, cross connect, shuffle, delay lines, or matched (low skew) lines.
- Optical Flex circuit is created from custom design files and parameters to route the fiber in a compact and efficient manner.
- The use of rugged materials such as Kapton, Fluorosilicone, PEEK, FEP, and adhesives provide reliable protection to the optical fiber, satisfying the rugged demands of Mil-Aero and rugged Industrial applications.
- Supported fiber types include singlemode, multimode, or specialty fiber such as Rad-Hard or Bend Insensitive.
- Circuit designs may be as simple as a few fibers or as complex as hundreds of fiber nets.
- Circuit sizes can run from a few millimeter wide routed ribbon fiber to a 20x20 inch circuit.
- The routed circuit can be easily extended by the addition of an splicing optical harness or fan-out assemblies.

Full information on all Stratos products can be found within our [Stratos Active Brochure](#) and [Fiber Flex Brochure](#)

# CABLE ASSEMBLIES

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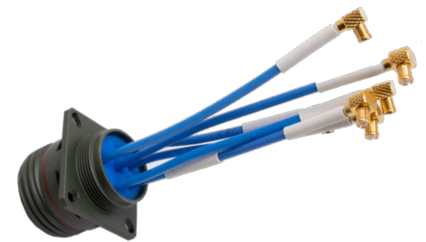
## Engineered Custom Cable Assemblies

The core component of Cinch's custom assemblies is built on the flexibility and experience of meeting customer specific applications and specifications.

Cinch's three vertical business units of Power & Signal, RF & Fiber Optic products support the creation of customised electro-mechanical assemblies that operate within the entire electromagnetic spectrum from power, to microwave, to light signals.



*M38999 modified shells with  
Semflex Coax cables*



*Cinch Mil/Aero Circular Connectors,  
Semflex cable and Johnson connectors*

## Advantages

- Direct interaction between Cinch and customer engineering teams
- Low to High production volume capacity
- Clean room production facilities approved for the Mars Rover program
- Custom assembly options for a wide range of functions
- In-house machining and metalwork fabrication for electro-mechanical assemblies
- Facilities to accommodate customer specified testing
- Highly skilled procurement to support the product diversity found in custom assemblies



## About Cinch Connectivity Solutions

In operation since 1917, Cinch supplies high quality, high performance connectors and cables globally to the Aerospace, Military/Defense, Commercial Transportation, Oil & Gas, High End Computer, and other markets. We provide custom solutions with our creative, hands on engineering and end to end approach.

Our diverse product offerings include: connectors, enclosures and cable assemblies utilizing multiple contact technologies including copper and fiber optics. Our product engineering and development activities employ cutting edge technologies for design and modeling, and our various technologies and expertise enable us to deliver custom solutions and products for our strategic partnerships.



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