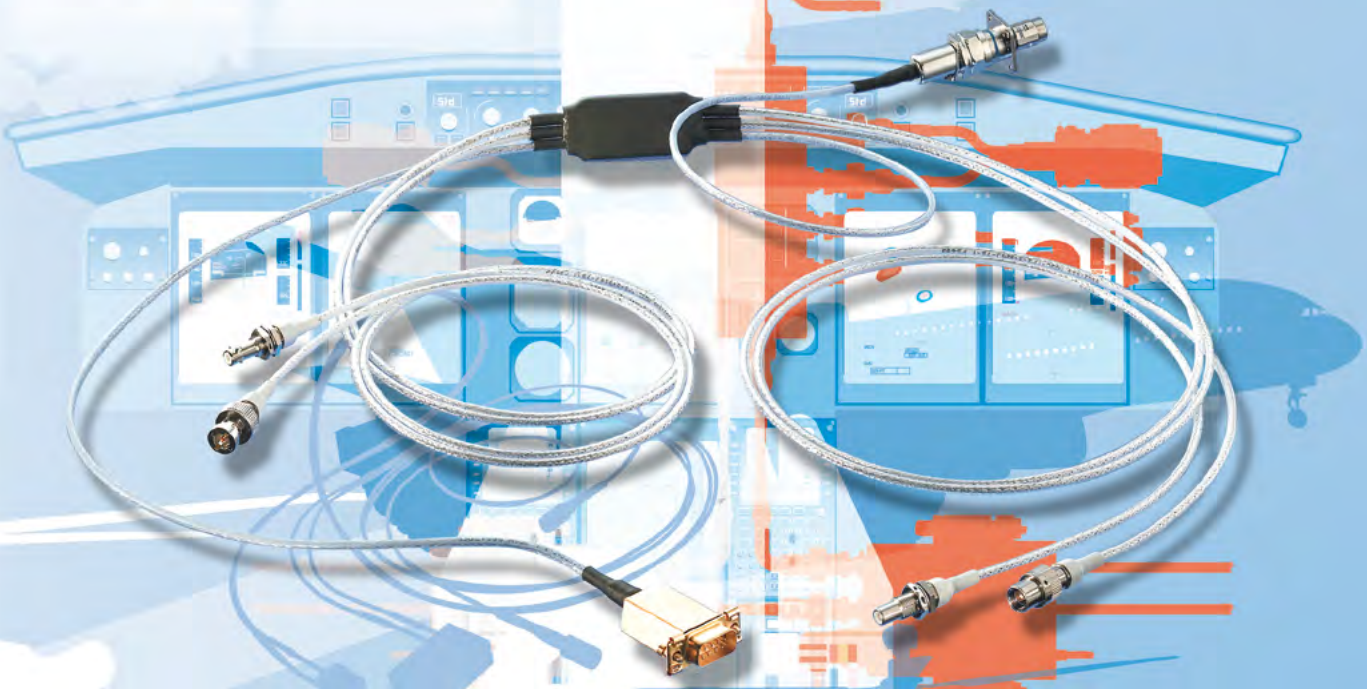
AXOBUS®



MIL-STD-1553
DIGITAL TRANSMISSION SYSTEMS

axon'

CLEAN ROOM

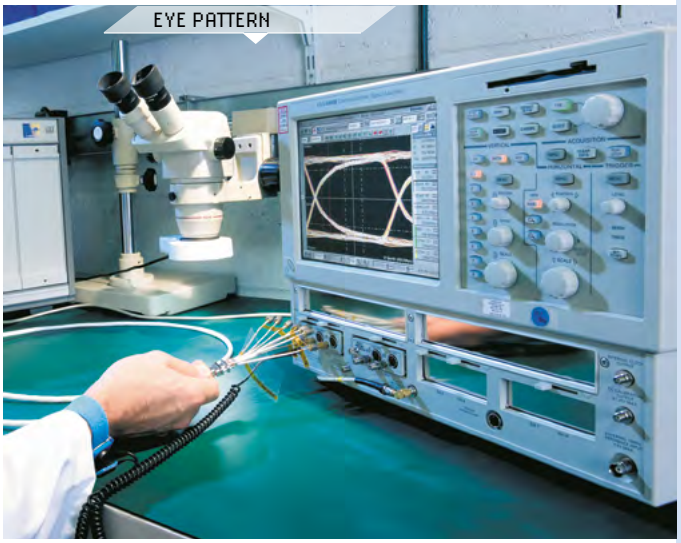
AXOMACH™ HIGH DATA RATE LINKS
UP TO 40 Gb/s

AXON' EXPERTISE

FROM THE TOPOLOGY STUDY TO THE FINAL CONTROL

As leader in MIL-STD-1553 harnesses in Europe, Axon' is able to offer the most appropriate bus network to your system from the design phase to the final control using different tools :

- **Network topology study of the bus network**: our specific knowledge and software allow Axon' s engineers to develop simulations of the bus network in operation.
- **Modelling**: a model of the bus harness can be produced to confirm the simulation.
- **EMC/EMI protection**: control of the transfer impedance of cables, couplers and connectors.
- **Class 100 000 clean room** to assemble components for space applications.
- **Manufacturing workshop under the control of CNES** (French National Centre for Space Studies).
- **High quality and validation**: all the assemblies are tested on an automatic test bench designed by Axon' (SAE-4115 test plan).
- **Technical assistance on site**.
- **Axon' develop custom designed Bus harnesses** for specific applications (high frequencies) or to specifications such as PAN 6465 or GAMT101 DIGIBUS.



EYE PATTERN

HIGH DATA RATE LINKS

Axon's assemblies allow high data rate signals to be transmitted over large distances with high fidelity and reliability. They are optimised to transmit signals up to 40 Gigabits per second.
Axon' offers high data rate cables and connectors for Voice-Data-Image transmission used in on-board electronics, for example the transmission of high resolution digital videos.

- **Fibre Channel links** for military equipment
- **SATA, USB2.0 or Gigabit Ethernet assemblies** for on-board IT applications
- **IEEE 1394a/b assemblies** for military and space applications
- **SpaceWire links** for high volume data transfer in space applications
- **Micromach links** with impedance matched connector
- **AXOMACH™ series** for ultra high data transfer up to 40 Gb/s (1 to 4 ways) for space applications.
- **Custom designed links** which meet the requirements of military, aeronautics and space applications.

Axon' high data rate links are made with:
- 100 Ω parallel or twisted pairs, multipairs or 50 Ω coaxial cable pairs insulated with PTFE, a-pair® (alveolar PTFE) or Celloflon® (expanded PTFE). Both have been patented by Axon'. It is characterized by a low dielectric constant ($\Sigma = 1,5$), a homogeneous characteristic impedance and lower insertion losses.
- Dedicated connectors based on the micro-D technology with custom designed shapes and electrical characteristics.
- Axon' is equipped with frame generators (up to 10 Gbps) and signal analyzers in order to check links electrical integrity by using measurements on eye pattern including jitters, skews, height and width of the eye diagram, quality factor, mask go/nogo test, etc. Bit Error Rate Test is also one of our control means.

MIL-STD-1553 DIGITAL TRANSMISSION SYSTEMS

Axon' Cable designs and manufactures all components (cables, couplers, connectors,...) used in data transmission systems in compliance with the MIL-STD-1553 standard. These transmission networks offer high security of data and signal integrity. This is the protocol of dialogue for strategic on-board systems for aeronautics, space and military applications.

AXON'S PRODUCTS ARE QUALIFIED FOR APPLICATIONS SUCH AS:

- **Aeronautics:** Aircrafts, fighters and helicopters.
- **Military:** Weapon systems, tanks, missiles, test benches
- **Space:** Launchers, telecommunication and observing satellites, space station

PROGRAMMES

Aircrafts such as A350, A400M, ATR, C27J, Eurofighter, Gripen, MB339, Mirage, MIG21, NIMROD ,EF18, MELTEM, ...

Helicopters such as Tiger, NH90, EH101, Lynx, A129,A109, Rooivalk, OH1, ...

Weapon systems such as Leclerc tank, Crotale.

Missiles such as Apache, Aspic, Crotale, MICA, Stormshadow.

Space programmes such as Alphabus, Ariane, ATV, Biolab, Columbus ISS, Cryosat, Eurostar3000, Galileo, Globalstar, GOSAT, HTV, Sentinel, Shenzhou, Space Bus 4000, VEGA, ...

QUALIFICATIONS AND APPROVALS

- **ISO 9001, ISO 14001, EN 9100, ISO 45001**
- **European standards:**

EN 3375, aeronautics qualification for cable.

EN 3567, aeronautics qualification for couplers.

EN 3716, aeronautics qualification for connectors.

- **PANAVIA-EFA standards:**

PAN 6421 qualification of the cable.

JN1042-JN1052 qualification of Eurofighter couplers.

- **International Space Station:**

SSQ 21655 qualification by NASA/BOEING for 4 Bus cables.

SSQ 21676 qualification by NASA/BOEING for couplers.

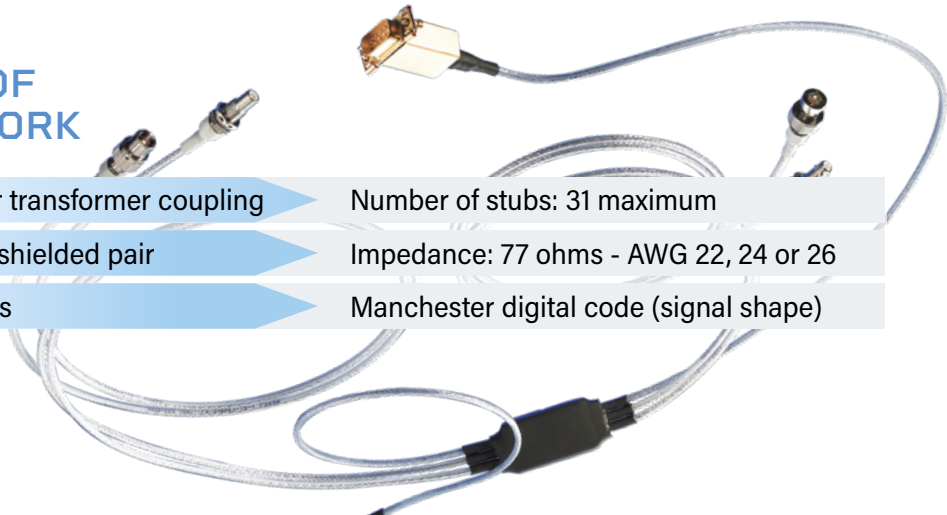
SSQ 25002 qualification by BOEING.

Couplers and cables listed in NASA's MAPTIS database.

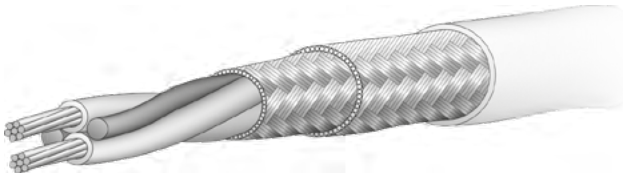
- **ARIANE V and VEGA qualifications**
- **CNES approvals: ASF/CNES**
- **ESCC qualification for ACB1 connectors: ESCC 3401/079**
- **Customers' qualifications**

CHARACTERISTICS OF MIL-STD-1553 NETWORK

Network topology	Direct or transformer coupling	Number of stubs: 31 maximum
Cable type	Twisted shielded pair	Impedance: 77 ohms - AWG 22, 24 or 26
Rate	1 M bits/s	Manchester digital code (signal shape)



BUS 1553 COMPONENTS



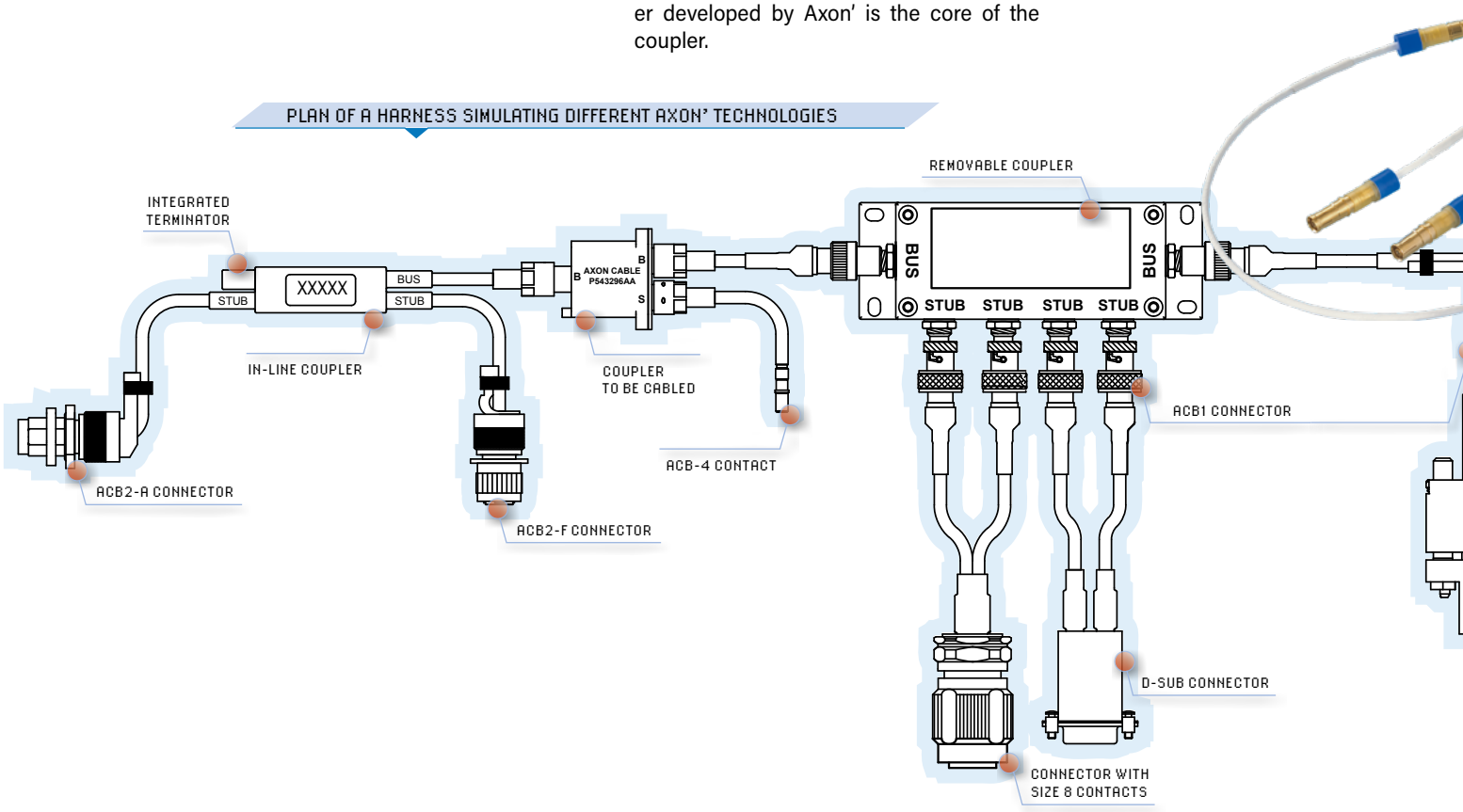
CABLES

22, 24 and 26 AWG screened twisted-pair cables. 24 AWG cables are a good compromise between the electrical, space and weight characteristics, whilst 26 AWG cables provide a reduction in weight.

TRANSFORMERS

Irrespective of the type of coupler, the high performance and small sized transformer developed by Axon' is the core of the coupler.

PLAN OF A HARNESS SIMULATING DIFFERENT AXON' TECHNOLOGIES



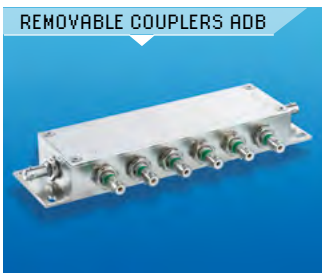
COUPLERS

Axon' offers different types of couplers: in-line couplers, removable couplers, couplers to be cabled, rackable couplers and relay couplers.

INLINE AMB COUPLERS

Inline AMB couplers for 1 to 8 stubs are an excellent weight/price compromise. These couplers are available in space and aeronautical versions.

REMOVABLE COUPLERS ADB



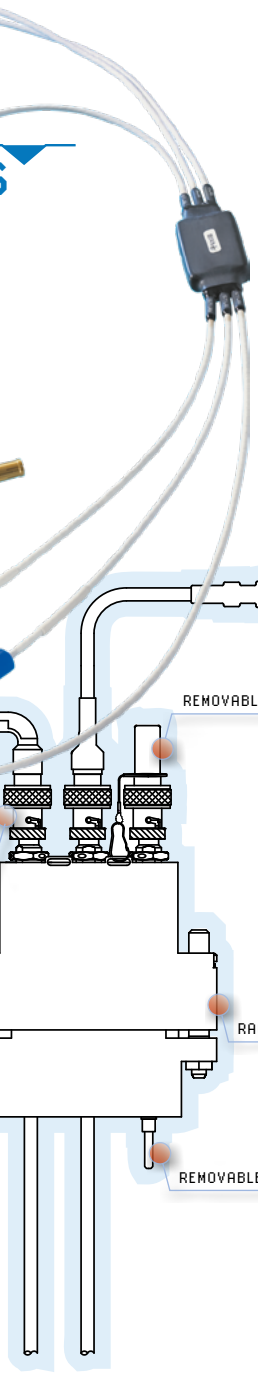
Removable couplers ADB for 1 to 6 stubs. Easy to use, they are an ideal solution for prototype manufacture or as a means of reducing maintenance cost.

RACK COUPLER

Rack couplers fit to the existing fixation system in electrical racks. They are particularly well adapted to meet the requirements of aeronautics standard racks in civil and military aircraft.

IN-LINE COUPLERS

In line couplers to be cabled-ACC for self integration by the customer. They have the advantages of in line couplers and removable couplers. Sold in kit with connectors, test and mounting instructions. Easy cabling. They provide a reduction of cost document management.



ACCESSORIES

- In-line removable or to be spliced 77 Ω **data bus terminators**. They are used to fit the main line.
- **Removable 1 or 3kΩ stub loads.** They are used to terminate a stubline.
- **Axoclamp®**, shielded termination band.
- **Axotresse®** : copper and/or silver plated aluminium braids with guaranteed transfer impedance.
- **Connector backshells** to protect the harness from EMI problems or mechanical damage.
- **D-Sub or Micro-D halorings** to facilitate termination of the wire shields.
- **Splices** to interconnect databus systems without connectors or for maintenance reason. They maintain the characteristic impedance of the cable.

TRIAXON®

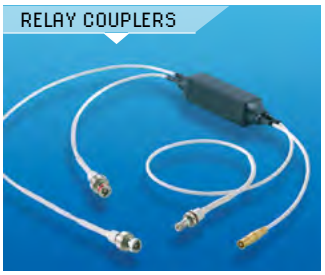
Axon' has developed several types of connectors and contacts dedicated to MIL-STD- 1553 Bus assemblies.

- **ACB1**: Contact - Size 8 – Temperature -65° - + 150°C
24-26 AWG for ABS 1592 connectors
- **ACB2**: Contact Size 10 – Temperature -65° - + 175°C
24-26 AWG for ECS 0808 connectors, JN 1032 connectors
- **ACB3**: Contact Size 8 – Temperature -65° - + 150°C
24-26 AWG for MIL-DTL-38999, EN3645 connectors
EN 4165 connectors
- **ACB4**: Contact Size 12 – Temperature -65° - + 150°C
24-26 AWG for MIL-DTL-38999, EN 4165 connectors
- **ACB5**: Contact Size 10 – Temperature -65° - + 200°C
24-26 AWG for ABS 2306 connectors, EN3545 connectors
- **ACB6**: Contact Size 8 – Temperature -65° - + 200°C
24-26 AWG for MIL-DTL-38999, EN 3645 connectors, EN4165 connectors
- **ACB7**: Contact Size 8 – Temperature -65° - + 200°C
24-26 AWG for EN3545 connectors

Advantages:

- Compatible with standardized connectors
- Easy and fast mounting
- Suited for the wiring of shielded pairs
- Keying-free connection
- EMC optimized
- Crimpable contacts: crimping is more reliable than soldering

COUPLERS



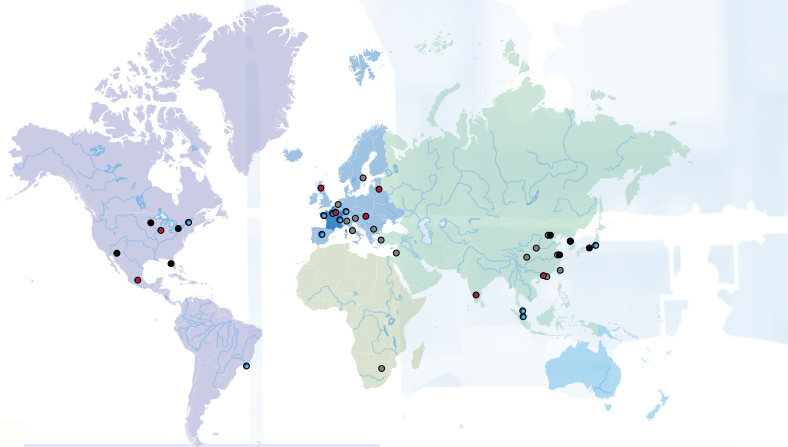
Relay couplers have been developed for applications which require to allow for an automatic disconnection of a number of equipment from the network without affecting the other remote terminals already connected. For example, this is the case when a ground test bench is connected to an aircraft

AXON' CABLE'S EXPERTISE IN CABLING ENGINEERING

Axon' Cable is a world leader in interconnect systems. The company excels in the design and manufacture of **wires**, **cables**, **harnesses**, **connectors** and **integrated systems** for demanding applications in high technology markets such as oil & gas, aeronautics, military, space, medical electronics, research centers, automotive and consumer electronics.

Axon' Cable's engineers are equipped with the latest simulation and co-design tools to assist customers at every stage of the development of a product: **idea**, **concept**, **prototypes**, **industrialization**, **volume ramp-up** and **mass production**. Axon' Cable will bring cost-effective solutions based on Lean Engineering and Lean Manufacturing principles. With an annual investment of 10% of its turnover into Research & Development, innovation is clearly what drives the Axon' Cable Group.

A GLOBAL PRESENCE



CONTACT US

BRAZIL
AXON' CABLE IND. E COM. LTDA.
TEL: +55 21 3596-8002
salesbrazil@axon-cable.com

CANADA
AXON' CABLE CANADIAN OFFICE
TEL: +1 514 898 2044
sales@axoncable.com

CHINA
AXON' INTERCONNECT LIMITED
TEL: +86 757 2838 7200
sales@axon-interconnect.com

GERMANY
AXON' KABEL GmbH
TEL: +49 7152 97992-0
sales@axon-cable.de

HUNGARY
AXON' KÁBELGYÁRTÓ KFT.
TEL: +36 76 508 195
axon@axon-cable.hu

INDIA
AXON' INTERCONNECTORS AND WIRES PVT LTD
TEL: +91 806 816 2966
sales@axon-cable.in

JAPAN
AXON' CABLE JAPAN OFFICE
TEL/FAX: +81 26 217 6728
axon-japan@axon-cable.com

LATVIA
AXON' CABLE SIA
TEL: +371 6540 78 91
axon@axoncable.lv

MEXICO
AXON' INTERCONEX, S.A. DE C.V
TEL: +52 442 215 2713
axon-mexico@axoncable.com

SINGAPORE
AXON' CONNECT PTE LTD
TEL: +65 62 50 31 69
sales.singapore@axon-cable.com

SPAIN
AXON' CABLE SPANISH OFFICE
TEL: +34 91 418 43 46
axon-spain@axon-cable.com

UNITED KINGDOM
AXON' CABLE Ltd
TEL: +44 1383 421500
sales@axon-cable.co.uk

USA
AXON' CABLE INC.
TEL: +1 847 230 7800
sales@axoncable.com

HEADQUARTERS

AXON' CABLE S.A.S.
2 RTE DE CHALONS-EN-CHAMPAGNE
51210 MONTMIRAIL - FRANCE
+33 3 26 81 70 00
sales@axon-cable.com

FOLLOW US

www.axon-cable.com
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