



AXOBUS®

MIL-STD-1553  
DIGITAL  
TRANSMISSION  
SYSTEMS

**axon'**   
cable & interconnect



## 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 Alphasat, Ariane 5, ATV, Biolab, ColumbusISS, Cryosat, Eurostar3000, Galileo, Globalstar, GOSAT, HTV, Sentinel, Shenzhou, Space Bus 4000, VEGA, ...

## OUR CUSTOMERS

Aermacchi, Agusta, Airbus, Alenia, BAE systems, Denel Aviation South Africa, Kawasaki, KHI, MBDA, Melco, Nec Toshiba Systems, Nexter, NTS Japan, Saab, Sagem, Sextant, Thales, Thales Alenia Space, Westland, etc.

## 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 :

	<p>► <b>AERONAUTICS :</b> Aircrafts, fighters and helicopters.</p>
	<p>► <b>MILITARY :</b> Weapon systems, tanks, missiles, test benches</p>
	<p>► <b>SPACE :</b> launchers, telecommunication and observing satellites, space station</p>

## QUALIFICATIONS AND APPROVALS

- **ISO 9001, ISO 14001, EN 9100, OHSAS 18001**
- **EUROPEAN STANDARDS :**  
EN 3375, aeronautic qualification for cable.  
EN 3567, aeronautic qualification for couplers.  
EN 3716, aeronautic 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)



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). Axon' also offer **PORTABLE TEST BENCHES**, useful to customers when integrating assemblies in aircraft. Precise, rapid and handy, they work with batteries.
- **TECHNICAL ASSISTANCE ON SITE.**
- **AXON' DEVELOP CUSTOM DESIGNED BUS HARNESSSES** for specific applications (high frequencies) or to specifications such as PAN 6465 or GAMT101 DIGIBUS.



PORTABLE TEST BENCH

## 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
- **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  $\Omega$  parallel or twisted pairs, multipairs or 50  $\Omega$  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.



EYE PATTERN



## 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.

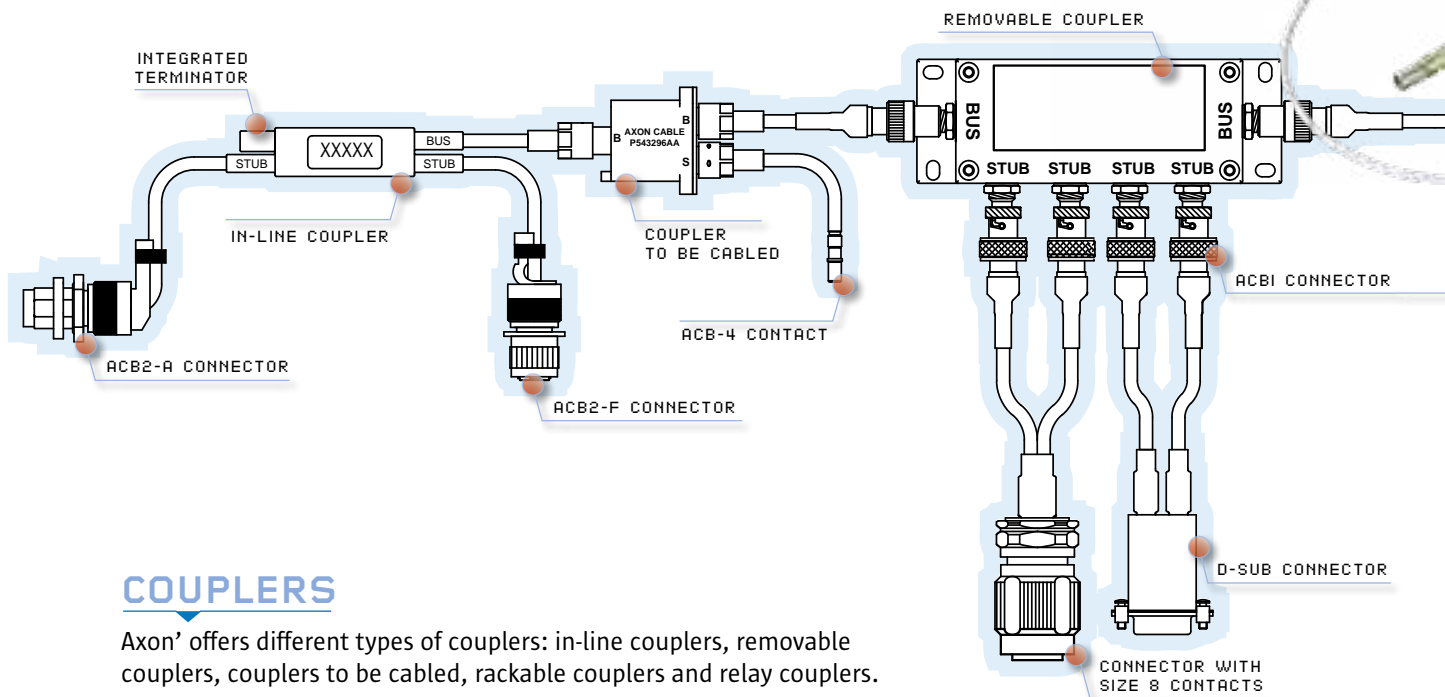


**BUS 15**  
**COMPON**

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

**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.

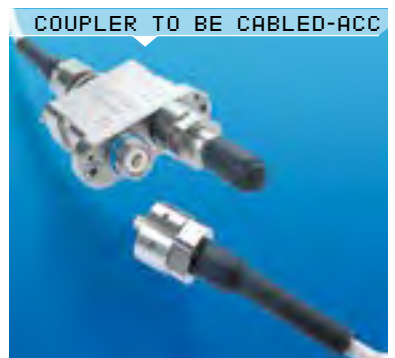
**RACK COUPLERS** fit to the existing fixation system in electrical racks. They are particularly well adapted to meet the requirements of aeronautics standard racks in civil and military aircraft.

**IN LINE COUPLERS 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.

**RELAY 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 or in the case of applications which need to simultaneously disconnect a group of devices (a satellite or a rocket).

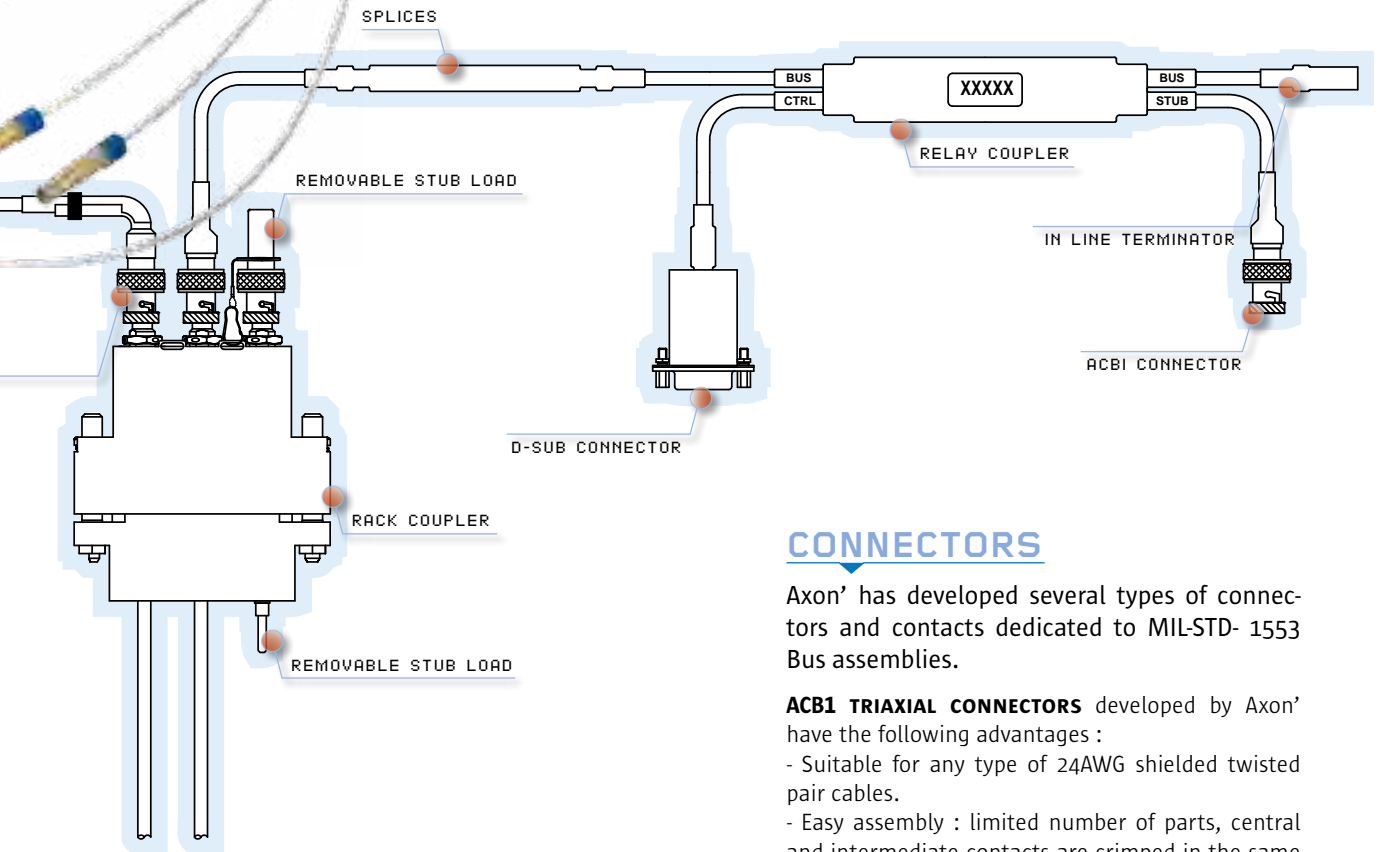
Axon's relay couplers have the following characteristics :

- they transmit the signal without distortion
- they can switch the signal to another line or to a particular component.



## 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.



## CONNECTORS

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

**ACB1 TRIAXIAL CONNECTORS** developed by Axon' have the following advantages :

- Suitable for any type of 24AWG shielded twisted pair cables.
- Easy assembly : limited number of parts, central and intermediate contacts are crimped in the same step.
- A single crimping tool M22520/5-05 with an AXON' die is required.
- The mounting of the ACB1 connector does not require potting.
- ACB1 connectors and mating halves can integrate with either pin or socket contacts.
- Available in both threaded and bayonet versions with 3 and 4 lugs (locking system).
- Scoop proof system to avoid bad mounting (keying).
- Suitable for on-board material as well as for land-based equipment. A space-saving elbow version is also available.

## TRIAxIAL CONTACTS

- **ACB3** : size 8 contact for MIL-C-38999 connectors  
ACB3 contacts are designed according to MIL-C-39029 and EN3155 ; 150°C class.
- **ACB5** : size 10 contact for EN3545 connectors ; 200°C class.
- **ACB6** : size 8 contacts for MIL-C-38999 connectors ; 200°C class.
- **ACB7** : size 8 contact for EN3545 connectors for civil avionics ; 200°C class.



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