

MIL-STD-1553 DATABUS NETWORK TESTERS

AXON' CABLE offers test benches which control MIL-STD-1553 databus networks . They check that the MIL-STD-1553 databus harnesses have been properly cabled and have not been damaged during installation. AXON' has developed 2 versions, a mobile test bench and a hand-portable test bench, which is lighter. Both use the same software and control the same electrical parameters.

Mobile test bench

The mobile network tester is a compact test bench made up of 2 independent modules working with a battery and a remote terminal :

- > A "generator module" : it includes a waveform generator, electronic cards, a battery and a RF communication module.
- > A receptor module :
It includes a PC working with Windows XP, electronic cards, a touch screen, a keyboard, a stylus, batteries, a RF communication module and accessories. The test results are displayed on a screen.
It is possible to connect a printer, to register the results on a USB output, or to connect to the company's IT network.
- > A remote terminal unit.

For an easy transportation, all parts are integrated into a transport suitcase with wheels and a handle. Cables and a dismountable coupler are delivered with the network tester in order to test the good working of the test bench.

When the available space is very limited to carry out the tests, we recommend the use of our hand-portable test bench (see page 140).



RECEPTOR MODULE



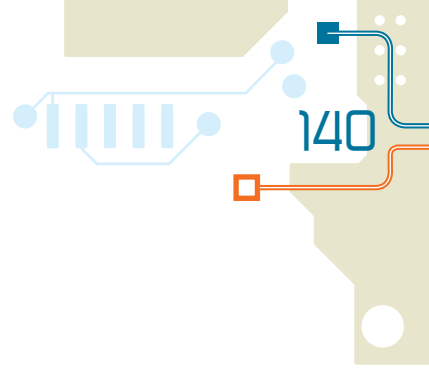
GENERATOR MODULE



REMOTE TERMINAL UNIT

Technical characteristics

RECEPTOR		GENERATOR	
SYSTEM			
CPU	Ultra Low Power processor 1GHz	AXON' generation card	Generator Card Waveform generator : 1MHz Sinusoidal signal and pulses frame DC generator
Touch screen	Panel PC 12"		
Hard disk	80 Go		
Memory	SDRAM DDR 1 Go		
Display resolution	800 x 600 mm		
OS	Windows XP		
AXON' acquisition card	Measurement : polarity, attenuation, resistance, insulation.	AXON' acquisition card	Measurement : polarity, attenuation, resistance, insulation.
Software	AXON' PTB , Issue1.0 in Visual Basic 2008 - Test report in HTML format		
Link	Receptor / Generator / Remote terminal unit with HF Module 433 MHz	Link	Receptor / Generator with HF Module 433 MHz
MEASUREMENTS			
Attenuation	Attenuation @ 1MHz, V emitted # 10Vpp, resolution from 0 dB to 50 dB, accuracy ± 0.1 dB (TBC)		
Resistance	DC measurement, resolution from 0.1 to more than 1K Ω , accuracy $\pm 0.1\Omega$ (TBC)		
Insulation	Low voltage test		
I/O : INPUT / OUTPUT			
Ethernet	Intel 82559, 100Base-TX,RJ-45		
USB	2 x USB		
ACB1	AXON' type ACB1 matable with trompeter 450 serial and Raychem DK-621	ACB1	AXON' Type ACB1 matable with trompeter 450 series and Raychem DK-621
Power	Connector supply	Jack	Charger connector
TEMPERATURE			
Storage	0°C to + 60°C		
Operating	0°C to + 45°C		
HUMIDITY			
Sealed against rain when the suitcase is closed. The test bench set can withstand exposure to maximum relative humidity of 90% without condensation in both operating and storage conditions			
POWER SUPPLY			
Voltage range	AC 100-2240 V 50-60 Hz DC 12 V (2 batteries NIMH)	Voltage range	AC 100-2240 V 50-60 Hz DC 12 V (1 battery NIMH)
Power consumption	DC 2.8 A	Power consumption	DC 400m A
Battery capacity	6 hours	Battery capacity	8 hours
DIMENSIONS AND MASS			
Dimensions	524x409x350 mm closed 524x409x250 mm opened	Dimensions	160 x 160 x 100 mm 190 x 160 x 100 mm with the handle
Mass	All included. <30 kg Receptor alone - < 25 kg	Mass	2,3 kg



Hand portable test bench

This lighter version is made up with a rugged PC with a touch screen, a stylus, 2 modules (one receptor, one generator), batteries and a communication module which is fixed behind the rugged PC.

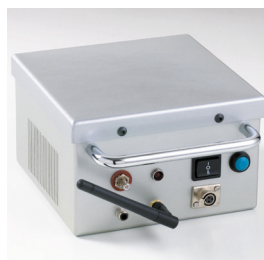
Lightweight and rugged, this test bench has been specially designed to test MIL-STD-1553 networks in different areas of large airplanes and when space available is limited.

All parts are integrated into a suitcase with a handle. Cables and a dismantable coupler are delivered with the network tester in order to control the good working of the test bench. Accessories including a docking station, a keyboard, and a carry bag can be delivered on request.

If requested, AXON' can deliver the generator, the communication module and the testing software without the rugged PC. In that case, the software can be downloaded to a standard PC by the customer. However, we recommend the use of a rugged PC which resists to shocks, vibrations, dust, dirt, heat and damp.



RUGGED PC



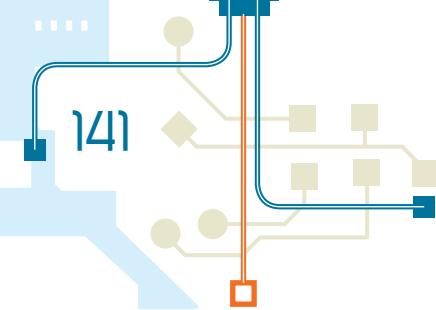
GENERATOR MODULE



RECEPTOR MODULE



COMMUNICATION MODULE



DATABUS
NETWORK
TESTER

Technical characteristics

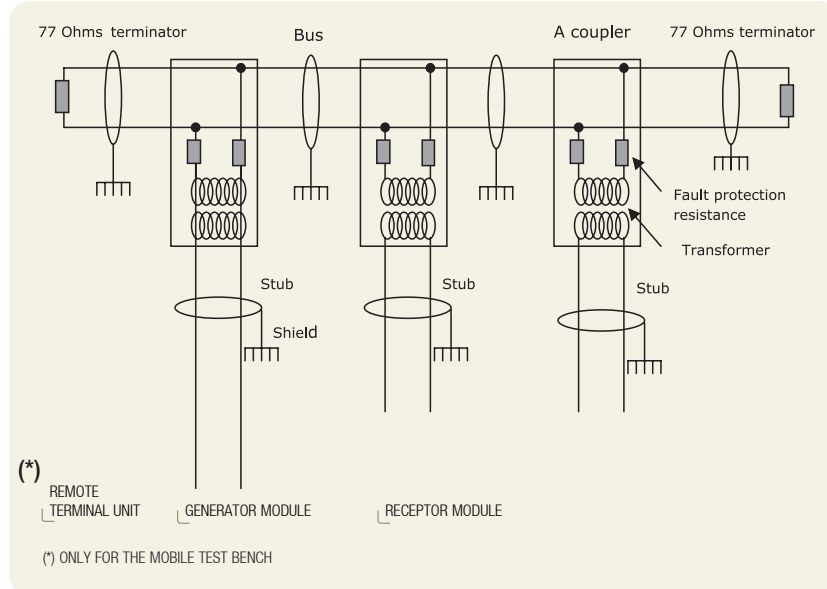
RECEPTOR/ GENERATOR		COMMUNICATION MODULE	
SYSTEM			
AXON' Acquisition card	Measurement : polarity, attenuation, resistance, insulation, ...		
AXON' generation card (only for generator)	Waveform generator : 1MHz, Sinusoidal signal and pulses frame, DC generator		
Software	Axon ' PTB		
Link	Radio Frequency Module 433 MHz	Link	Radio Frequency Module 433 MHz
MEASUREMENTS			
Attenuation	Attenuation @ 1MHz, V emitted # 10Vpp, resolution from 0 dB to 50 dB, accuracy $\pm 0.1\text{dB}$ (TBC)		
Resistance	DC measurement, resolution from 0.1 to more than $1\text{K}\Omega$, accuracy $\pm 0.1\Omega$ (TBC)		
Insulation	Low voltage test		
Polarity	Pulse @ 100KHz		
I/O : INPUT / OUTPUT			
ACB1	AXON' type ACB1 matable with trompeter 450 serial and Raychem DK-621		
RCA	Used for shield continuity measurement		
Mini XLR	Charger connector		
		USB	Connect to computer
TEMPERATURE			
Storage	0°C to + 60°C		
Operating	0°C to + 45°C		
POWER SUPPLY			
Module Voltage	DC 12 V (1 battery NIMH)	DC 5V by USB connector	
Charger Voltage range	AC 100-2240 V 50-60 Hz		
Power consumption	DC 400m A		
Battery capacity	8 hours		
DIMENSIONS AND MASS			
Dimensions	"160 x 160 x 100 mm 190 x 160 x 100 mm with the handle"	Dimensions	"100 x 50 x 50 mm 200 x 50 x 50 mm with antenna"
MASS	2.3 kg each	MASS	0.2 Kg

COMPUTER (OPTIONAL)	
SYSTEM	
Type	Rugged Tablet PC slate
Chassis/Housing	Magnesium alloy with protective rubber bumpers
Processor	1.2 GHz Intel Core Duo U2500 w/533MHz frontside bus and 2MB L2 cache
Graphics/Chipset	Intel 945GMS
Thermal Design Power	10 watts
OS	Windows XP Tablet PC Edition
Memory	2GB DDR2
Display	10.4-inch/1024 x 768 pixel TFT
Digitizer/Pens	Dual mode resistive and electromagnetic digitizer
Keyboard	Onscreen keyboard + optional external
Storage	Shock-mounted 2.5-inch 5400 rpm 80GB SATA hard drive
Expansions slots	1 PC Card Type I/II, 1 CF Card Type II
Communication	802.11a/b/g (Intel WiFi Link 4965AGN), Bluetooth Class 2 v 2.0 with EDR, GPS; optional WWAN (GSM/GPRS/HSDPA/WCDMA)
Interface	2 USB 2.0, 1 mini-USB, gigabit RJ-45, RJ-11, audio in/out, multi-IO port (contact pin with USB/RS232/Power signal) for cradle
RUGGEDNESS	
Ruggedness	Shock : MIL-STD-810F, Method 516.5, Procedure IV; Mechanical shock: MIL-STD-810F, Method 516.5, Procedure IV, 26 drops from 3 ft; Vibration: MIL-STD-810F, Method 514.5 Procedures I; ASTM 4169-99, Truck Assurance Level II, Schedule E; Altitude: MIL-STD-810F, Method 500.4, Procedures I: 15,000 ft; Ingress Protection: IP54, MIL-STD-810F, Method 506.4, Procedure I, 10 min per axis, 6 axes, 40 PSIG and no less than 4 in/hr; Operating Temperature: -4 to 140 degrees Fahrenheit; Humidity: MIL-STD-810F, Method 507.4 Procedures I&II
POWER SUPPLY	
Power	Li-Ion 11.1V, 7,200mAh, 79.2 watt-hour ("max. 7 hrs")
DIMENSIONS AND MASS	
Size	11.2" x 8.2" x 2.4" (with rubber bumpers)
Weight	2.3 kg. as tested (incl. battery and handle)

Tests

The network tester checks if a MIL-STD-1553 harness works properly and detects possible failures. It can pinpoint the nature and location of the possible failures.

The test consists in plugging the receptor to one stub and moving the generator from one stub to another stub. A light on the remote terminal indicates if the test of the stub passes (concerns the mobile test bench only). This avoids coming back to the receptor module to see the results displayed on the screen.



CONNECTION OF THE TEST BENCH TO THE DATABUS ASSEMBLY

Main possible failures

- › Cross-over wires on bus line or stub line.
- › Short circuits between the inner wires and the shield.
- › Short circuits between the two wires of pair.
- › Open circuit on the bus or stubs.
- › Bad coupling value on couplers (transformer and resistors).
- › Wrong value or absence of 1 or 2 terminators.

Electrical tests

To detect the possible failures the system uses the following electrical tests :

- › Electrical resistance (bus & stub).
- › Polarity (phase).
- › Attenuation.
- › Insulation control.

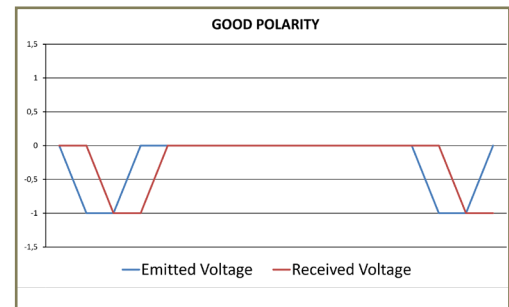
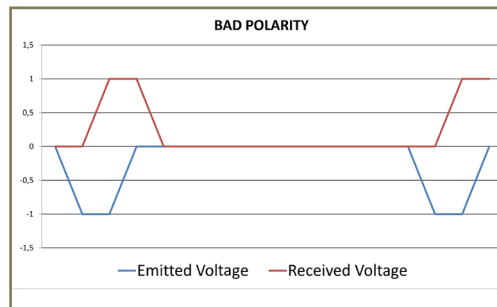
Electrical Resistance

The system can measure DC resistance in order to check :

- › Stub resistance : Standard requirement < 5 Ohms.
- › Parallel bus line resistance : The requirement depends on the topology of the bus (number of coupler, terminators or not). The manual user-guide gives the different requirements.
- › Presence of short circuits between shield and wires. This test is carried out with low voltage (12V DC max.). The measured value can help the operator to determine the origin of the failure. The value must be over 1.5 Kohms when there are no short circuits.

Polarity (phase)

- › The phase control allows detecting cross-over wires.
- › The polarity is controlled with negative pulse at 100 KHz. Sense of pulse (positive or negative) received on the receptor indicates the polarity.

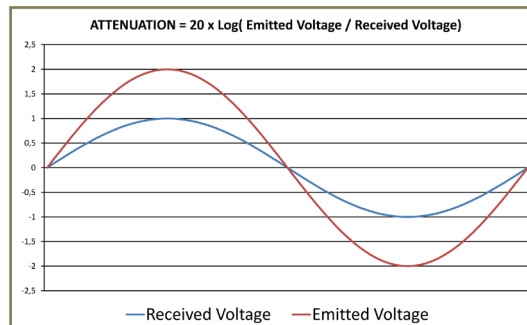


Attenuation

Attenuation varies from 12 to 16 dB and depends on the network configuration.

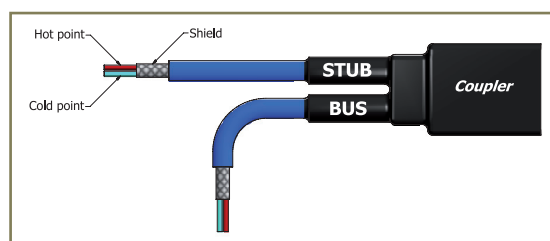
The number of stubs in the network, bus and stub lengths has to be entered into the system for the test. The system can calculate the theoretical attenuation which should be reached and propose it as a nominal requirement. The tolerance should be ± 1 dB but can be changed by the operator depending on the network configuration.

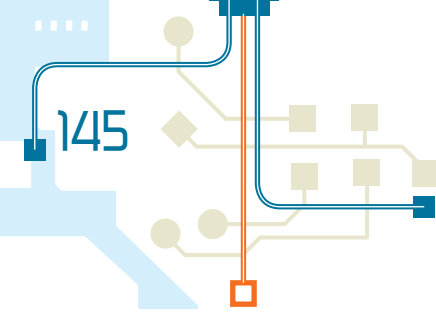
The attenuation is controlled with a sine wave at 1 MHz. The measurement is very precise as emitted and received voltages are controlled. The attenuation is the ratio between the voltage emitted on one branch and the voltage received on another branch.



Insulation Test

The insulation test allows detecting a short circuit between the hot point and the shield and between the cold point and the shield and between hot and cold points. The insulation test is carried out with low voltage.





DATABUS
NETWORK
TESTER

Warranty

AXON' CABLE warrants the network tester against defects in materials and workmanship for a period of one (1) year from the date of delivery (Warranty Period). AXON' is not liable for any damage to or loss of any programs, data, or other information stored on the network tester. Recovery or reinstallation of programs, data or other information is not covered under this Limited Warranty.

This warranty does not apply :

- (a) to batteries;
- (b) to damage caused by accident, abuse, misuse, misapplication, or non- AXON' products;
- (c) to damage caused by service performed by anyone other than AXON' ;
- (c) to a product or a part that has been modified without the written permission of AXON' ;
- or (d) if any AXON' serial number has been removed or defaced.

Please contact us for software updating.