XER AES/EBU-input Board

4/8-channel AES/EBU and S/PDIF Input Board

- Handles AES/EBU and S/PDIF audio
- XER-M version for supplying, controlling, and processing digital microphones complying with AES-42 Mode 1
- 4 stereo channels
- Transparent forwarding of all bits in AES/EBU format
- DSP built-in
- Adjustable gain (±20 dB) for each input signal, ultra-fast downstream limiter
- Phase inversion
- Internal test tone generator
- Sample-rate converters
- Supports legacy mode (96/192 kHz)
- Either XLR, RCA coaxial, TOSLINK optical, RJ45, D-Sub, or BNC ports
- OptoXLer support (option)
- Officially certified by Dolby® for Dolby E signal transmission

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The 4 × 2-channel AES/EBU input board handles AES/EBU and S/PDIF data and is available with either XLR, RCA coaxial, TOSLINK optical or BNC ports. In addition, versions featuring RJ45 and 15-pole D-Sub ports receiving all channels over a single port can be supplied for use in fixed installations.

The four stereo channels can also be configured as eight mono channels and be routed freely and independently on the NEXUS system.

XER-M Version for Digital Microphones

The XER-M version of the board supports digital microphones compliant with AES-42, Mode 1. It provides not only digital phantom power (DPP) but also microphone-specific signal processing features such as subsonic filters, pad, and limiting. The gain can be set within a range of -20 and 40 dB.

The standardized microphone parameters are viewed and/or set using the NEXUS control program. They include:

- Factory ID, model ID, and serial ID
- Synchronisation mode, pad, EQ settings, and polar pattern
- Signaling
- Wireless-microphone messages (»Low Battery«, »Link Loss«, »Squelch«)

Non-audio and Legacy Modes

The XER board detects data streams that do not contain Linear PCM audio. It allows for automatically muting this data (jumper setting); in this way, non-audio data can be transparently forwarded across the NEXUS system and can be output, for example, from a XET AES/EBU output board.

AES/EBU legacy-format audio (96/192 kHz) can also be fed to the XER inputs. The mono signal encoded with double sample rate on the two AES/EBU audio channels is decoded and made available on the NEXUS system by the XER board.

In addition, legacy data can be transparently forwarded and output, for example, from NEXUS systems using the same sample rate (e.g. 48 kHz).

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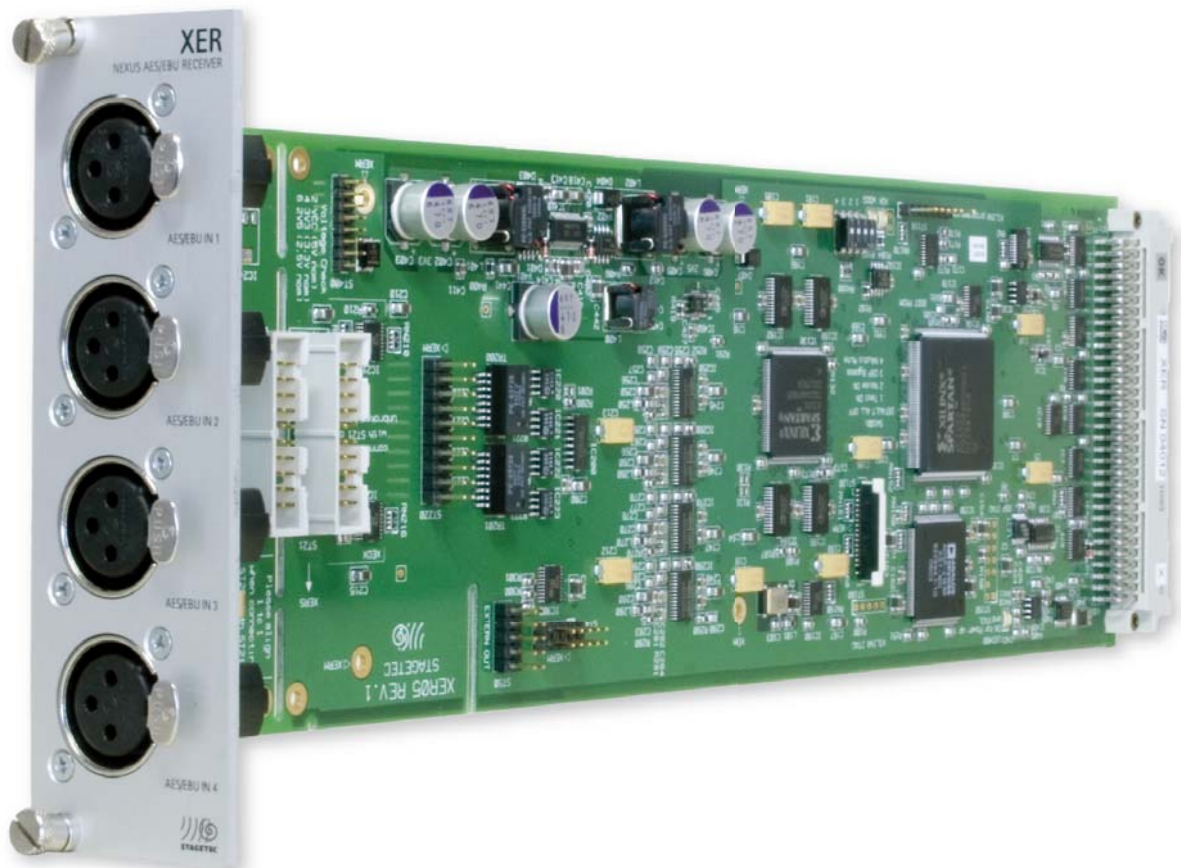
Of course, legacy-format data can also be converted to the current NEXUS system rate using sample-rate converters. They will then be available as normal mono signals on the entire system.

DSP Built-in

The integrated signal processor allows for digital gain adjustment immediately at the system input. This allows, for example, for matching signals with different headroom settings. The gain of each input signal can be set within a range of ±20 dB. In addition, the signal phases can be inverted.

Next, a fast preset limiter is implemented to prevent clipping of amplified signals. This ultra-fast limiter (attack time: 0 samples) only responds at a level of only -0.06 dBFS, so impacts on audio signals are impossible at normal levels.

Synchronisation

Each stereo input of the XER board can be used to synchronise the overall NEXUS system.

The board is equipped with sample-rate converters allowing asynchronous sources to be connected. The converters are selectively engaged and/or disabled manually or automatically for each stereo pair. A long evaluation phase ensures reliable operation in automatic mode.

Thanks to the new technology, the deterioration in audio-quality resulting from the use of sample-rate converters is significantly reduced. Now, the converters process the full AES/EBU audio resolution of 24-bits, allowing for a dynamic range of 140 dB(A).

On request, a sync line from a XET AES/EBU-output board to the XER AES/EBU-input board can be implemented, thus allowing for operation separate from the NEXUS system clock. With this special solution, the boards involved are interconnected using an extra cable. By using sample-rate converters, the audio can still be utilized on the NEXUS network.

Ancillary Data

With the sample-rate converters disabled, ancillary information can be transparently and entirely transferred in stereo mode on the NEXUS system. In addition, the NEXUS allows for re-generating ancillary data for synchronous and asynchronous sources using the XCPU board.

Various NEXUS output boards even allow for forwarding the input ancillary information or generating new data. Moreover, the XER-M version reads the channel status and other status data sent by the microphone.

Versions	
XER-X	4 × XLR-3 ports (female)
XER-M (Microphone)	4 × XLR-3 ports (female); also suitable for standard AES/EBU signals
XER-C	4 × RCA coaxial ports
XER-O	4 × TOSLINK optical/DNP ports
XER-RJ	1 × RJ45 port
XER-DSUB	1 × D-Sub terminal (female, 15-pole)
XER-BNC	4 × BNC ports
All versions are equipped with integrated sample-rate converters (to -SRC).	

Sample-Rate Converter - Audio Specs	
Word width	24 Bit
Sampling Ratio	1:8 (up), 7:1 (down)
Delay	0.7 to 3 ms max. (F_{Sin} = 50 kHz)
Dynamic range	140 dB (A) (@-60 dB input signal)
THD+N	–120 dB @ 0 dBFS, 20 Hz to F_{Sout}
Passband Ripple	±0.016 dB max. (@ 0.4535 F_{Sout})
Stopband Attn.	120 dB min. (@ 0.5465 F_{Sout})

XEOX

XER/XET-Option for AES/EBU–LWC-Converter

The benefits of transmitting AES/EBU signals via fibre-optic lines — such as spanning distances of up to 2,000 meters, insusceptibility to EMI, and full galvanic isolation of transmitter and receiver — are made available by the optoXLer optical converter by Connex. The optoXLer converts differential AES/EBU signals to optical signals and vice versa. This method allows for bit rates of up to 10 Mbps. The electronic converter components are incorporated in a modified XLR connector and are plugged directly into the XLR port. The optoXLer is available as a transmitter or receiver equipped with male or female XLR-3 terminals respectively.

Connectivity to fibre-optic lines is provided within the XLR adaptor using a F-SMA standard connector.

The optional XEOX module allows optoXLers to be used with NEXUS XET boards without external phantom powering. The module is simply plugged onto a terminal strip on one of the participating boards. Powering for optoXLers can be independently applied to each of the four AES/EBU ports using DIP switches.

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	All relevant specifications comply with the following standards: AES 3-1992/97, IEC 60985, EIAJ CP-1201, und AES 11-1997.
Data formats	AES/EBU Professional and Consumer formats (complying with EBU Rec. 3258, AES 3-1992/95, AES 11-1997, ANSI S4.40-1985, S/P DIF IEC 958 or DIN 60958)
Audio data	w / o SRC: 24 bits; w / SRC: 24 bits
Sample rates	w / o SRC: 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz; w / SRC: 30 to 200 kHz
Ancillary information	Evaluation of AES/EBU ancillary information: professional/consumer mode, audio/non-audio mode, emphasis mode, mono/stereo mode, copy protection status, CRC Status, original/copy
Error recognition	Errors: parity, confidence, biphase; PLL not locked, slipped sample
Non-Audio	Non-audio formats are transparently transmitted. DTS-CD, DTS-LD, and IEC61937 (AC3, DTS, and MPEG) are recognized.
Inputs	3 sources per port
XER-X, XER-DSUB, XER-BNC, XER-RJ inputs	4 stereo channels (8 mono channels) per board
	XLR-3 ports (female); 15-pole D-Sub terminal (female); BNC port or RJ45 (version-specific)
	free phase offset to system clock
	balanced; floating transformer isolation, 110 ohm impedance (BNC: 75 Ohm)
	detachable ground connection (using jumper)
XER-M (Mic.) inputs	Phantom-power DPP complying with AES-42, XLR-3 ports (female)
XER-O input	4 stereo channels (8 mono channels) per board
	TOSLINK optical / DNP, 100 kHz max.
	free phase offset to system clock
XER-C input	4 stereo channels (8 mono channels) per board
	RCA coaxial ports, gold-plated contacts
	free phase offset to system clock
	galvanically isolated, 75 ohm impedance
Dielectric strength	typ. ±7 V, –7 to 12 V max.
Differential input voltage	min 0.25 $|V_{PP}|$
	max 7 $|V_{PP}|$
Condition	Cinch RL=75W
	XLR, DSUB RL=110W
Input impedance	110 ohm @ XLR (typ.), 75 ohm @ RCA (typ.)
Channel configuration	phase inversion, limiter, gain, SRC, subsonic filter (XER-M only)

Limiter	Threshold	–0.06 dBFS
	Attack Time	0 Samples
	Hold Time	10 ms
	Release Time	0.5 s
	Ratio	Limiter
Gain	XER-M (Mic.)	–20 to 40 dB
	XER	–20 to 20 dB
Subsonic filter (XER-M)	Cutoff frequency: 40 Hz, 60 Hz, 80 Hz, Off	
Power supply	Voltage	+4.75 to 5.25 V
	Current	480 mA
Operating conditions	Temperature range	0 to +50 °C / 32 to 122 °F
	Humidity	90% (max.), non-condensing
Storage conditions	Temperature range	-35 to +70 °C / -31 to 158 °F
	Humidity	90% (max.), non-condensing
Physical specifications	General	board for 19" module frame; 3 U, 340 mm / 13.39"
	Front panel	4 HP (20.02 × 128.5 mm / 0.8 × 5.06"); XLR version: 8 HP (40.2 / 1.58")
	Required space	1
	Weight	0.26 kg

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