

- **Two 24-bit Analog Inputs**
- **Two 24-bit Analog Outputs**
- **+4 dBu or -10 dBV Balanced or Unbalanced**
- **24-bit/96 kHz AES/EBU or S/PDIF I/O**
- **Two Low-Latency MIDI Ports**
- **Low-jitter PLL Sample Clock**
- **Extensive Synchronization Capabilities**
- **Multiple Card Operation**
- **Independent 4-channel Operation**
- **Windows 95/98 MME, DirectX & ASIO Drivers**
- **Windows NT/2000 MME Drivers**
- **Macintosh ASIO Driver**
- **Mixer Application**
- **Completely Software Controllable**
- **Six-foot Balanced Audio Cable Set**
- **Two-foot MIDI/Clock Cable Set**
- **Half-size PCI Card**

Representing a new level in integration and professional capabilities, LynxONE is the perfect "front-end" for any studio quality audio or MIDI workstation. Whether an application requires uncompromising analog I/O, bit-perfect digital I/O, or 32 channels of low-latency MIDI, LynxONE is up to the task. LynxONE's compatibility with all popular Windows based audio editing and MIDI sequencing software allows users to choose their own working environments. Applications include critical audio recording and editing, CD mastering, restoration, audio for video, music composition, and MIDI sequencing.

The Vision

LynxONE was born from the desire to create a new standard in interface hardware by combining the latest technology with proven design theory and stable drivers for multiple operating systems. The result is a product that utilizes the latest generation of A/D and D/A converters, high-density Field Programmable Gate Arrays (FPGA), and other support circuitry to offer exceptional performance and integration at a good value. Unlike other multi-function cards, the performance of each component of the LynxONE does not suffer, but exceeds that of a single function analog, digital or MIDI device.

Pristine Analog I/O

The Lynx engineering team has utilized its years of experience designing low-noise analog audio circuitry in the design of the LynxONE's analog section - a task that is especially critical in a 24-bit system. Through careful scrutiny of every component in the analog signal path, LynxONE delivers exceptionally low-noise and distortion levels that rival the performance of studio equipment costing thousands more.

Based on the premise that fewer potential noise sources are better, the analog signal chain is relatively simple. It consists of a minimal number of surface-mount, low-noise active components and precision resistors. Its measured noise level complements the excellent characteristics of the 24-bit delta-sigma A/D and D/A converters.

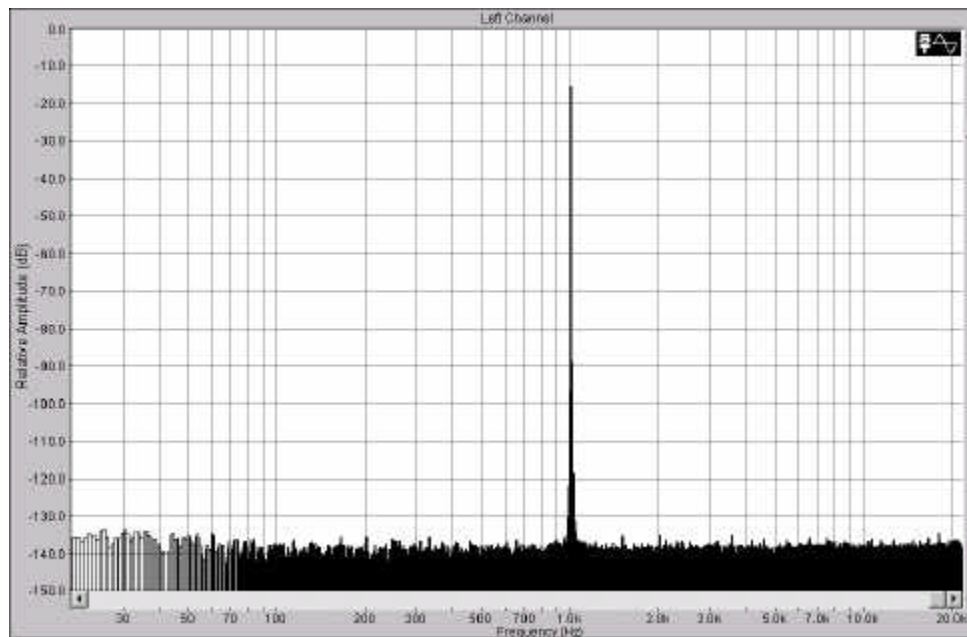
Differential amplifiers on the analog inputs and cross-coupled electronically balanced line drivers on the outputs provide high rejection of common mode RF and power line noise that is picked up on connected cables, which is especially important in computer-based studios. The robust outputs are

capable of driving the excessive capacitance of long cables and 600-ohm loads. Both balanced and unbalanced connections are supported.

Selection of either +4 dBu or -10 dBV nominal levels is accomplished through software control of gold-contact relays. Lower cost analog FET-based switching methods were not used due to their inherent distortion. Needless to say, manual installation of circuit board jumpers to select trim levels is not required. In either trim setting, a generous 16 dB of headroom is provided to easily handle musical peaks and to further boost the signal level above the studio noise floor.

Crucial to low-noise operation in a computer environment, is the rejection of computer related noises. LynxONE incorporates innovative PCB layout and circuit design techniques to combat these unwanted signals. Because of this, LynxONE offers 103dB of “real-world” dynamic range when installed in a typical computer.

As a testament to the analog performance of the LynxONE, the figure at the right depicts a +4 dBu signal passing through the entire analog signal path and the A/D and D/A converters. Notice the flat noise floor and lack of noise components above the -130 dBFS line.



Bit-perfect 96 kHz Digital I/O

When studio gear is connected digitally, the expectation is a perfect audio signal link down to the least significant bit. LynxONE delivers on this expectation by providing bit-perfect, 24-bit digital I/O at sample rates up to 96 kHz.

Supporting both AES/EBU and S/PDIF formats through software selection, LynxONE locks on to input signals from any studio device. Signals degraded by long cable runs are not a problem. LynxONE employs two phase-locked loop stages on its digital input that clean up incoming signals and offer excellent jitter rejection.

Both input and output are transformer coupled providing both common mode rejection to tackle studio noise and isolation that prevents ground loops.

Low-jitter Sample Clock

24-bit A/D and D/A converters require a stable, low-jitter clock in order to accurately sample and reproduce audio signals. LynxONE incorporates a custom phase-locked loop (PLL) based sample clock generator with extremely low jitter. In addition, the PLL has wide control registers to allow precise frequency tuning in minute increments and support a variety of clock sources.

Accurate Synchronization and Multiple Card Support

LynxONE is very adept as a synchronous slave or as a master timing source in any audio or video production studio. In slave mode, it will accurately lock to word clocks with frame-accurate phase. It will also lock to AES/EBU and S/PDIF signals, as well as other standard clock references. As a source, LynxONE generates a low-jitter word clock from its precision oscillator or from any one of the selected slave mode sources. LynxONE works especially well with digital video capture cards that include clock outputs for perfect A/V synchronization.

BNC connections provide clock I/O connections to external equipment. Likewise, internal clock connections to other computer cards are accommodated with LynxONE's board-mounted headers.

Speaking of other computer cards, if more analog or digital I/O channels are required, up to four LynxONE's can be connected to provide a phase-locked multi-track system!

Flexible Monitoring

Having the ability to easily monitor the recording inputs is mandatory during overdubbing sessions. LynxONE allows the selection of either the analog or digital inputs as the monitor source. This signal can be mixed with playback audio on either the analog or digital outputs or both simultaneously. In addition to providing flexible monitoring, this capability allows "stand-alone" A/D or D/A conversion completely on board LynxONE. Because mixing is performed in hardware, recording input-to-output delay is extremely low.

Independent 4-channel Architecture

Operation of the analog and digital inputs and outputs on the LynxONE is definitely not an either/or situation. They can be used simultaneously to provide up to four channels of recording and playback. The independent data streams associated with each I/O correspond to standard Windows multimedia devices. This architecture allows simple control of I/O routing using device selection menus available in most audio applications.

FPGA-Based I/O Processor Keeps Data Moving

Handling multiple streams of 24-bit audio data without a hiccup requires a dedicated real-time processor. LynxONE incorporates a proprietary I/O processing engine that routes and buffers data, manages I/O resources, and communicates with the host computer without the latencies and overhead associated with general purpose signal processors.

To accommodate unexpected latencies in a computer-based audio workstation, especially those caused by bus-hogging graphics cards, large 8 Kbyte sample buffers support each audio stream to maintain continuous glitch-free audio.

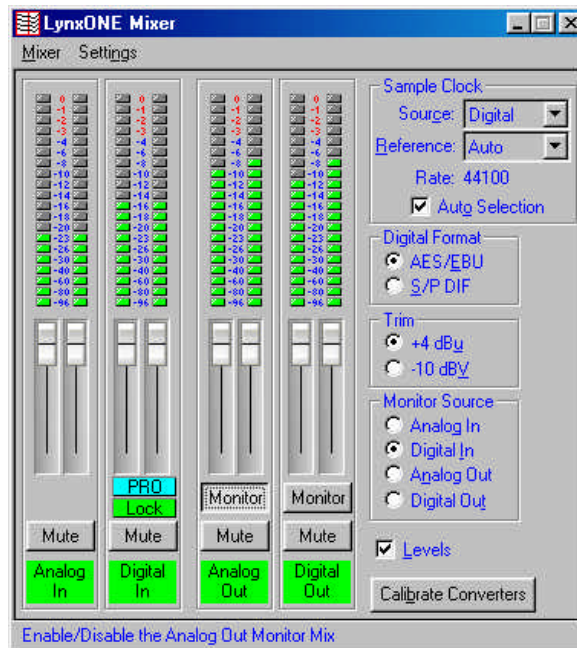
Low-Latency Dual MIDI Ports

LynxONE's two MIDI ports were not an afterthought during the design phase. They were designed from the ground up using FPGA technology. The ports are independent and support up to 32 MIDI channels, with each having both input and output. Deep 64-byte receive and transmit buffers prevent lost data.

Key to accurate timing for MIDI sequencing and playback and time code synchronization is low latency message passing to and from the MIDI ports and host computer. The LynxONE's MIDI ports include critical-message-handling technology that packs real time Note On, Note Off, and MTC messages for rapid transfers over the PCI bus.

LynxONE Mixer Application

Complete software control of LynxONE's features is provided with the LynxONE Mixer. As shown to the right, this application permits keyboard and mouse click control of volume, sample clock generator, digital I/O format, analog trim, and input monitoring. Peak level meters are also provided.



Drivers for any Windows Workstation and Multiple Platforms

For any computer-based audio product, hardware is only half of the equation. For this reason, half of the Lynx engineering team is devoted to device driver coding. Using our many years of experience across a variety of operating systems, we have designed rock-solid drivers for Windows 95/98/ME, Windows NT on Intel and DEC Alpha platforms, Windows 2000, and Macintosh.

In light of concerns about latency, we created an efficient data transfer mechanism in the LynxONE drivers that, working in concert with the fast response of the hardware, delivers excellent throughput without the sluggish response times commonly experienced in PC-based workstations. The LynxONE

ASIO 2.0 driver for Windows 95/98/ME and Macintosh support user settable latency from 0.72ms to 186ms at 44.1kHz sample rate.

The audio driver supports the standard Microsoft Multimedia Extensions (MME) interface for both Windows 95/98/ME and Windows NT/2000, which provides compatibility with all popular third party software. The Windows 95/98/ME driver also includes support for Steinberg's ASIO 2.0 interface as well as DirectSound 5.0 and above. The MIDI driver supports multiple clients to allow synchronization of several applications to a single MIDI source. The Macintosh ASIO 2.0 driver supports many popular third party applications using the ASIO 2.0 specification.

Simple Jumperless Installation

We designed the LynxONE so a user can be up and running in a matter of minutes. The installation procedure is simple and painless – no DMA to be configured, no interrupts or I/O's to set, and no jumpers to switch! LynxONE takes full advantage of the plug and play capabilities of the PCI Bus.

The LynxONE Setup program automatically determines whether to install the Windows 95/98/ME driver or Windows NT/2000 driver based on your current operating system.

Cables Included

A now for the kitchen sink... LynxONE includes two professional quality cables sets. The Audio cable is six feet in length and provides XLR connections for analog and digital I/O on shielded twisted pair cable. The two-foot MIDI/Clock cable supplies DIN and BNC connections for MIDI and clock I/O, again using shielded cable.

System Requirements

The minimum computer system required for the LynxONE is a 90MHz Pentium-class or Alpha processor with an EGA or VGA display and adapter, 16MB of RAM, Windows 95 or Windows NT 4.0 and one empty PCI Slot. We recommend at least a 166MHz Pentium-class or Alpha processor with a S-VGA display and adapter, 32MB of RAM, Windows 95 or Windows NT 4.0 and one empty PCI Slot.

Devoted Support Staff

Our support team is committed to providing the best service possible. They are well versed in the operation of the LynxONE, operating system configuration, and most popular audio and MIDI related applications. We offer quick email responses, typically within 12 hours. If you call us, a real live human will respond.

LynxONE Specifications

Analog I/O	
Number / Type	Two inputs and two outputs / cross-coupled electronically balanced or unbalanced, XLR connectors on Audio cable
Level	+4 dBu nominal /+20dBu max. or -10dBV nominal / +6dBV max., 600 Ω load on outputs
Input Impedance	Balanced mode: 24 k Ω , Unbalanced mode: 12 k Ω
Output Impedance	Balanced mode: 100 Ω , Unbalanced mode: 50 Ω
Output Drive Capability	600 Ω impedance, 0.16 μ F capacitance
A/D and D/A Type	Crystal Semiconductor, 24-bit, 128X oversampling, delta-sigma
Sample Rates	8 kHz to 50 kHz, including all standard rates with high-resolution adjustment
Bit Depth	8, 16, 24 or 32 bit file types
On-board Buffer Size	8 Kbytes X 2, for L/R input and output
Analog Performance (measured in 24-bit mode with card installed in computer)	
Frequency Response	20 – 20 kHz, +0/-0.35 dB
Dynamic Range	>103 dB, A-wtd., analog in to analog out using -60 dBFS measurement method
Signal-to-Noise	>99 dB, A-wtd., analog in to analog out
Channel Crosstalk	<-103 dB, analog in to analog out, 1 kHz signal @ -1 dBFS
Input THD+N	0.0022% typ., 1 kHz signal @ -1 dBFS, 22 – 22kHz BW, analog input to digital output
Output THD+N	0.0015% typ., 1 kHz signal @ -1 dBFS, 22 – 22kHz BW, digital input to analog output
Digital I/O	
Number / Type	One input and one output / AES/EBU or S/P DIF format, transformer coupled, XLR connectors on Audio cable
Sample Rates	32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz
Bit Depth	8, 16, 24 or 32 bit file types
On-board Buffer Size	8 Kbytes X 2, one each for input and output
MIDI I/O	
Number / Type	Two ports each with input and output Standard opto-isolated, 5-pin female DIN connectors on MIDI/Clock cable
Buffer Size	64 bytes, receive and transmit
Clock I/O	
Number	External: one BNC input and output on MIDI/Clock cable Internal: one input and output on board-mounted headers
Level / Impedance	TTL / 75 ohm
Input Frequency Range	25 kHz to 27 MHz
General	
PCI Bus	Version 2.1 compliant, Transfer rate: up to 132 Mbytes/sec
Power	+5V @ 400 mA, +12V @ 220 mA, -12V @ 95 mA
Size	5.0" H X 7.4" W X 0.75" D (half-size PCI card)
Shipping Weight	2.7 lbs. with cables
Certifications	CE and FCC Class B
Connections	
Audio Port	Bracket-mounted 25-pin female D-sub connector for L/R analog in, L/R analog out, digital in and out
MIDI/Clock Port	Bracket-mounted 15-pin high-density female D-sub connector for MIDI port 1 in and out, MIDI port 2 in and out, clock in and out
Cables	
Audio (included)	Six foot, 25-pin male D-sub to (3) male XLR and (3) female XLR connectors, shielded twisted pair cabling
MIDI/Clock (included)	Two foot, 15-pin high-density male D-sub to (4) 5-pin female DIN connectors with shielded twisted pair cabling and (2) female BNC connectors with 75 Ω coaxial cabling