

Lynx Studio Technology

Lynx Two Soundcard For PC And Mac

No expense has been spared in the design of Lynx Studio Technology's latest soundcard, which adds 192kHz capability to remarkable sound quality, bringing it into real competition with high-end, stand-alone converter boxes.



Martin Walker

Now that even sub-£200 entry-level soundcards are fitted with 24-bit/96kHz-capable converters, you might be wondering what manufacturers are going to come up with to tempt us to upgrade even further. Well, Lynx Studio Technology already have an answer, in the form of their Lynx Two 24-bit/192kHz Multi-channel Audio Interface. Of course, there's a lot more to increased audio quality than simply using converters with higher sample rate capability, but Lynx already have an enviable reputation in this area: when I reviewed the Lynx One in *SOS* November 2000 I found it to be possibly the best-sounding soundcard I'd ever reviewed.

The Lynx Two is available in three configurations, each of which has a total of eight analogue connectors as standard. The A model reviewed here has four ins and four outs, the B has two ins and six outs, while the C model has six ins and two outs. The one you choose will depend on what tasks you want it to perform; I suspect those into multi-channel recording will opt for C, while B users are more likely to be mixing in surround, running soft synths or using outboard rack effects.

All three models also provide comprehensive digital I/O facilities: a single digital in and out in either AES-EBU or S/PDIF format which also supports Dolby AC3 and DTS-format signals, along with timecode in and out, a very-low-jitter internal sample clock output, and a sync input, which is also capable of being locked to NTSC or PAL video signals. Lynx see the Lynx Two as ideal for CD or DVD authoring, multi-channel recording, mastering, video post-production, and broadcasting applications, and since the card itself supports up to 16 inputs and 16 outputs, various multi-channel expansion modules will be available shortly in ADAT, TDIF, and other formats for those with more ambitious requirements.

Hardware Overview

When I first encountered the Lynx Two in its packaging I was surprised by how heavy it was, but fortunately there were no two-inch-thick manuals inside to wade through. Instead, out popped the chunkiest collection of breakout cables I've seen to date. Like the Lynx One, the PCI card has just two D-type connectors on its backplate. All the analogue I/O emerges from an L2Audio 25-way D-type connector, which interfaces with a 1.8-metre-long multiway cable a full 14mm thick, terminating in eight

XLR plugs and sockets (the sex of which depends on which model you have). Despite its thickness, this is one of the silkiest and most malleable cables of this size I've had the pleasure of using in my studio, and ▶

SOUND ON SOUND

Lynx Studio Technology Lynx Two

pros

- Superb audio quality.
- Card supports up to 16-track recording and playback.
- Built-in sample-rate converter.
- Drivers support multiple cards locked to sample-accurate sync.
- Excellent expansion potential once planned modules are released.
- Far cheaper than rackmounted devices of similar specification.

cons

- Quality such as this doesn't come cheap.
- Mac drivers are not yet available.
- No GSIF-compatible drivers.

summary

The Lynx Two is the best-sounding soundcard I have reviewed to date, and for those who can afford it will be the foundation of a powerful yet versatile recording system, especially once the expansion modules are released.

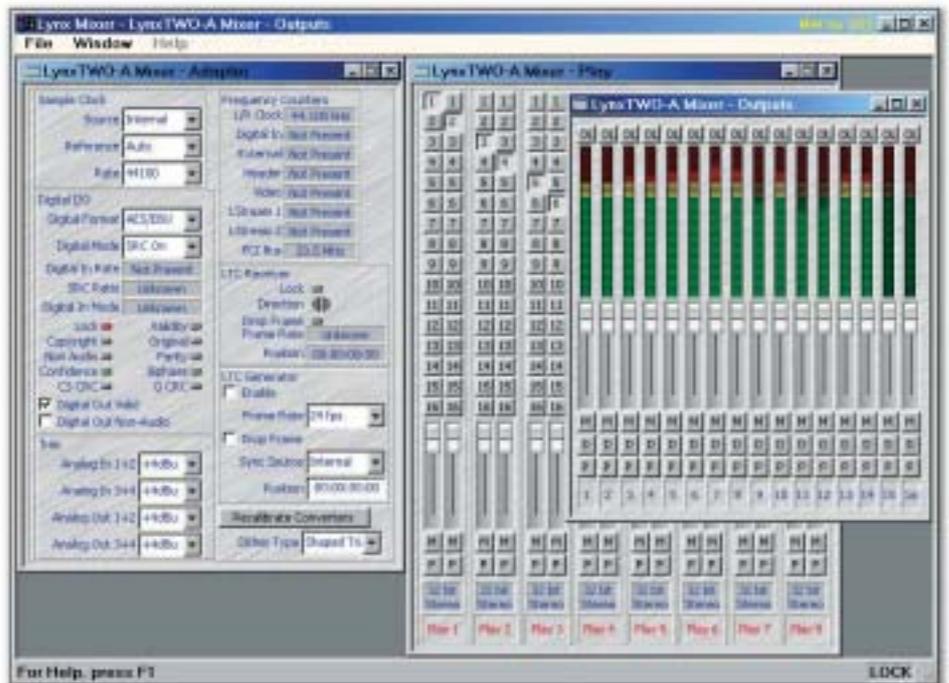
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you'd have no problems snaking it round tight corners.

The second, L2Sync cable assembly is more modest in girth, and comprises a 15-way D-type connector, four 0.6-metre-long cables terminating in BNC plugs for Clock Out, Sync In, LTC In and Out, and two 1.8-metre-long cables terminating in an in-line XLR socket and plug for Digital In and Out respectively. A pair of short XLR-to-phono extension leads is also provided in case you wish to interface these to an S/PDIF device, and there's also a ferrite cable clamp designed to be placed over the entire digital cable assembly nearest the 15-way connector, to comply with Class B FCC and CE radiated emission standards. This is either a last-minute addition, or something that Lynx didn't really want to fit as standard — I suspect the latter, since they claim that "installation of this clamp is only required for non-commercial or residential applications". In other words, professionals needn't use it.

The soundcard itself is slightly longer than many at 175mm, but is absolutely crammed with quality components. Like the Lynx One, it uses surface-mount active components and precision resistors for optimum performance. Extensive use of ground planes and power-supply filtering also keeps computer-related noise to a minimum, and the digital input and output are both transformer-coupled to combat earth loops. The A-D converters are AKM AK5394s with a 123dB dynamic range, while on the output side the D-A converters are model CS4396 from Crystal Semiconductor, with a dynamic range of up to 120dB.

There are two two-pin connectors on the card labelled Clock In and Clock Out to link multiple Lynx Two cards in sample-accurate sync, although of course you could instead



The Lynx Two not only provides superb audio quality, but also a comprehensive selection of digital options, plus the option of being expanded to full 16-channel recording and playback capability.

use the external clock cables to the same end. The drivers and mixer utility support up to four cards, with one as master and the remainder as slaves, although I wasn't able to test out this aspect myself. Each card also has a unique hardware serial number that is labelled on the rear. The *User Guide* claims that this will be displayed in the About page of the software mixer utility, but it didn't with mine. A further 14-pin keyed connector on the card is labelled LStream, and lets you connect one of the optional internal LStream Expansion Modules (see box).

Driver & Utility Software

The latest version 1.3 build 046 setup program and drivers for the Lynx Two support Windows 98, Me, NT 4.0, 2000 and XP, and provide MME, DirectSound, and ASIO 2.0 support. They comprise just four files

with a total size of 542K, and Lynx therefore ship them on a single floppy disk. While the Lynx One has Mac drivers, these weren't yet available for the Lynx Two at the time of my review, but should be released within the first half of this year for Mac OS 9.

While visiting the Lynx web site I found a firmware update program for the card released just a few days before Christmas. This adds various new features such as support for 8kHz sample rate and Global SyncStart to ensure that multiple devices can be started with sample-accurate sync, so I downloaded this to update the review card before I got started. Windows NT and 2000 owners should install the card before running the Lynx Two setup program, although unusually, Lynx recommend that Windows 95/98/ME users do the opposite, and run their Setup.exe file before installing

Specifications

- Analogue inputs: four (A model), two (B model), six (C model), electronically balanced or unbalanced, using female XLR connectors on flying leads.
- Analogue outputs: four (A model), six (B model), two (C model), electronically balanced or unbalanced, using male XLR connectors on flying leads.
- Analogue I/O levels: +4dBu nominal (+20dBu max), or -10dBV nominal (+6dBV max), software-selectable.
- Input impedance: 24k Ω balanced, 12k Ω unbalanced.
- Output impedance: 100 Ω balanced, 50 Ω unbalanced.
- A-D converters: AKM AK5394 24-bit.
- D-A converters: Crystal CS4396 24-bit.
- Dynamic range: 115dBA (input), 116dBA (output).
- Signal-to-noise ratio: 114dBA (input), 116dBA (output).
- Frequency response: 20Hz to 20kHz, +0/-0.05dB at 44.1kHz.
- Input THD + noise: 0.0006%, 22Hz to 22kHz.
- Output THD + noise: 0.001%, 22Hz to 22kHz.
- Supported bit depths: 8, 16, 24, and 32.
- Supported analogue sample rates: 8kHz to 200kHz with high resolution adjustment.
- Digital I/O: AES-EBU or S/PDIF, transformer-coupled, on XLR flying lead connectors.
- Supported digital sample rates: 32kHz, 44.1kHz, 48kHz, 88.2kHz, and 96kHz.
- Word clock: in and out using BNC connectors on flying leads.
- SMPTE timecode I/O: LTC In and out using BNC connectors on flying leads, supporting 24, 25, 29.97, and 30 frame rates (drop and non-drop).
- Sample-rate conversion: supports conversion ratios up to 3:1 on digital input, with 128dB dynamic range.

► the hardware. This ensures that the various driver files are already in the Windows/System folder when Windows discovers the card, and I had no problems with this approach.

The Lynx Two appears to software applications as 16 inputs and outputs, which are unambiguously labelled as 'LynxTWO-A Play 1' through to 'LynxTWO-A Play 8', and 'LynxTWO-A Record 1' through to 'LynxTWO-A Record 8'. Additional cards will show up as 'B', 'C', and so on. The Lynx Two mixer software is altogether more ambitious than that of the Lynx One, displaying a total of four separate windows inside the main application windows labelled Adapter, Record, Play, and Outputs. The Adapter window contains various digital and analogue settings, while Record, Play, and Outputs windows relate to the card's 32-channel, 32-bit digital mixer with 16 sub outputs.

For the 16 available Record channels (stereo Record 1 through to Record 8), the Record window provides source selection, peak-reading meters, a Mute button, and another to enable your choice of Dither type (more on this later). Each of the 16 has a total of 24 possible source signals: the four analogue inputs, loopback L and R, digital in L and R, or any of the eight LStream inputs from either the internal or external sockets if you have expansion modules installed.

It also features a monitor section with 16 possible physical outputs: four analogue outs, stereo loopback, stereo digital out, and any of the eight LStream 1 outputs. Multiple selections are permitted, so that you can route any signal being recorded to any number of these physical outputs. This section also includes mute and phase inversion buttons, and a fader. Usefully, a device format box and activity indicator beneath these buttons displays the bit depth and number of channels currently in use by any software application, as well as whether or not the relevant record input has been enabled.

The Play window provides a similar multi-button selector so you can route each one of the 16 Play outputs (stereo Play 1

through to Play 8) to any combination of 16 physical outputs, with exactly the same options as the Record monitor section, followed by exactly the same set of fader, mute, phase invert, device format, and activity indicator. The simplest window is Outputs, with peak-reading meters and a useful overload indicator, volume faders, mute, phase invert, and dither buttons for each of the 16 playback channels.

Adapter Window

The fourth Mixer window, Adapter, displays a number of different parameters. Sample Clock Source has far more settings than on most cards, since as well as Internal, it has Digital and External options to accept clock signals from the AES-EBU In or Sync In connectors, Header if sync-locked to another



The Lynx Two's audio I/O reaches the card through breakout cables attached to these two D-type ports.

Lynx Two card, Video if you are receiving an NTSC or PAL composite video signal from the Sync In connector, or LStream 1 or 2 if you have expansion modules connected to either the L2Sync or internal LStream ports. The Sample Clock Reference settings are identical to those of the Lynx One, with five options: Auto, 13.5MHz, 27MHz, Word, and Word256. The Auto setting is valid for both Internal and Digital sources, while the 13.5MHz and 27MHz options are for video dot clock arriving at either the header or External clock input, and the word clock options are for when you are using the External or Header sources. With the latest firmware update, Sample Rate can be set anywhere between 8kHz and 192kHz.

AES-EBU or S/PDIF can be used for digital I/O, and unlike many cheaper soundcards, those in the Lynx range provide full voltage and impedance switching, courtesy of gold-plated relay contacts. There's a useful real-time sample-rate converter on the digital input, with various options for both input and output, as well as readouts for such things as incoming sample rate, SRC ratio, Digital In Mode, the various header flags associated with it, and Frequency

Stated System Requirements

- Intel Pentium or 100 percent compatible processor or Apple Mac.
- Video Display with 1024 by 768 resolution.
- 32Mb RAM.
- Windows 98, Me, NT 4.0, 2000, XP, or Mac OS 9.

Counters for the various clocks. The SMPTE timecode reader and generator provides the usual frame rates, including drop frame options, and the Adapter window displays valid lock, direction, and drop frame status.

Each converter stereo pair has its own relay-switched +4dBu/-10dBV level setting, and there is also a global Recalibration button. Once your computer has thoroughly warmed up, you should run this to perform a fine trim of DC Offset levels. Finally, there are four Dither options for recording purposes. Your choice will be used when recording 8-bit or 16-bit files, or when a record fader is at any position other than full scale, but not when recording at 24-bit

with faders full up, when no DSP processing is used. I suspect the optimum dither setting for most purposes will be Shaped Triangular, which places most of the dither at higher frequencies. However, all of the mixer faders operate in the digital domain, adjusting levels just prior to

the D-A converters, so while they're extremely useful for monitoring purposes, the input faders should be left at their maximum positions if you don't want your audio dithered.

Overall I found the mixer utility extremely comprehensive and fairly easy to use. However, although I can see why Lynx designed it with four separate windows, it would be handy if you could launch them separately, rather than from inside one overall window, to keep your screen display cleaner.

Performance

Playback performance of the Lynx Two was exemplary, with a more smoother, more natural sound than my own Echo Mia, as well as noticeably better stereo focus. This is partly due to the much lower jitter levels of the Lynx Two's internal clock, and sure enough, clocking the Mia from the Lynx Two S/PDIF output tightened it up no end, which suggests that the sound of many existing cards could be improved by running them from an external high-quality clock.

Even when I did this, however, the Lynx Two sounded far more natural, particularly with vocals — and the more I listened, the more improvements I noticed. The most telling were sounds that I noticed for the

Test Spec

- Lynx Two soundcard running version 1.30 build 046 drivers.
- Intel Pentium III Coppermine 1GHz PC, Asus TUSL2-C motherboard with Intel 815EP chipset, 512Mb PC133 RAM, running Windows 98SE.
- Other soundcards installed: Echo Mia, Yamaha SW1000XG.
- Tested with: Steinberg Cubase VST/32 v5.1 r1, Steinberg Wavelab 3.04c build 67.

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▶ very first time in existing recordings, such as vocal inhalations and piano pedal noise in a quiet jazz recording. These converters really do expose every little detail, making them perfect for mastering.

As might be expected with a soundcard of this calibre, A-D background noise was almost nonexistent. With 16-bit recordings the normal -93.3dB RMS was measured, and when using 24-bit/44.1kHz noise levels this dropped to an amazingly low -116.5dB RMS, a full 7.5dB better than any other card I've measured to date! Opening out the bandwidth to 24-bit/96kHz caused it to rise slightly as expected to a still excellent -113.1dB RMS, while going the full hog and recording at 24-bit/192kHz yielded a figure of -109.6dB RMS. With the 192kHz sample rate, Lynx claim a full 100kHz analogue bandwidth, and all the recordings I made sounded extremely clean, although I doubt that you would hear the full benefits unless the rest of your studio gear was of world-class standard. It goes without saying that bit-for-bit copies were possible using the digital I/O with appropriate Adapter settings.

ASIO 2.0 zero-latency monitoring is available when running compatible software, and there are six buffer sizes available when using the ASIO 2.0 drivers. The default is 512 samples, but I found the best value for my Pentium III 1GHz system was 128 samples, providing an excellent 2.9mS latency at 44.1kHz. I did manage to drop down to 64 samples for a superb 1.45mS latency with only a few inputs and outputs active, although my CPU overhead was visibly rising by this point, simply due to the huge number of interrupts generated. I even managed to run in stereo at the lowest 32-sample setting with only occasional clicks and pops, but wouldn't



The Record Mixer window lets you select suitable input signals for each recording channel, as well as set up a complex monitoring mix to any combination of its various output sockets.

recommend this for normal use, since it almost doubled my CPU overhead. However, there's no denying that this is impressive performance!

I did manage the lowest 32-sample setting when running Native Instruments' *Pro 52* and *FM7* soft synths in stand-alone mode, although strangely, each time I changed the

buffer size I immediately received a 'Couldn't start ASIO' error message, followed by silence. However, restarting each application let me continue after each buffer change. I also managed a good 15mS latency in the same applications using the DirectSound drivers, but only a poor 60mS with the MME ones. There are currently no GSIF-compatible drivers for the Lynx Two.

I experienced no problems running the Lynx Two alongside my Mia and SW1000XG soundcards, and had only a few tiny niggles, mostly relating to the *User Guide*, which has obviously been rejigged from that of the Lynx One and still contains various factual errors, especially in its FAQ section. However, it is otherwise very well written, and contains a useful appendix showing how to wire up XLR-to-jack adaptor leads, should these be required.

Final Thoughts

Like the Lynx One before it, the Lynx Two proves that a soundcard with internal converters can provide superlative audio quality on a par with many stand-alone converter units if well designed with absolutely no compromises, and I suspect it might give world-renowned product ranges like those of Apogee a run for their money. It's certainly the best-sounding soundcard I've ever reviewed, but as you might expect, it doesn't come cheap at around £1000. With a milestone product like the Lynx Two, competition is understandably thin on the ground. I've yet to review another soundcard that can record at 192kHz, although I suspect that most users will stick with 96kHz or lower sample rates for most projects. If you need more simultaneous inputs or outputs, the various forthcoming LStream Expansion options will make the Lynx Two far more versatile, and may make it an alternative to the MOTU range, or to flagship models from M Audio and Echo. However, the real comparison should be with high-end stand-alone converter boxes, and by replacing the rack casing with two high-quality breakout cables, the Lynx Two provides audio performance on a par with rackmount gear costing considerably more. In short, I can't think of any other product that comes close! ☺

Expansion Modules

For those with more ambitious I/O requirements, Lynx are currently putting the final touches to a set of three LStream Expansion Modules, which take advantage of the twin LStream ports on the Lynx Two card. LStream is a proprietary standard high-speed serial port, supporting up to 16 inputs and outputs at up to 24-bit/96kHz.

The LStream 1 port is an integral part of the L2Sync backplate connector, and is designed for use with external modules. However, these won't prevent the digital I/O connections from being used, since each external module will feature a duplicate L2Sync port. Conversely, the LStream 2 port is internal, using a 14-pin header socket on the card itself. This will connect to a daughterboard, which then sees the outside world via a dummy backplate that you can fit into any unused card position, although the slot itself isn't used.

Three cards are mentioned on the Lynx web site. The first to be released will be the LS ADAT, which will provide 16-channel 24-bit ADAT optical I/O, and will be available in both external boxed and internal daughterboard versions. Lynx are expecting to ship this model sometime in the first quarter of 2002. Next to be released will be the LS AES, with eight-channel 24-bit/96kHz AES-EBU or S/PDIF digital I/O, followed by the LS TDIF, with eight-channel 24-bit TDIF I/O.

Individual inputs and outputs from either LStream port can be routed to any of the 16 inputs and 16 outputs of the Lynx Two mixer. So, for instance, using the LS ADAT module you might connect ADAT input channel 5 into LynxTWO-A Record 1 left, and then send it to Analog Out 4. It certainly sounds like a flexible system, and the various modules should eventually entice plenty more users to the Lynx Two system.

information

S Model A \$1095; Model B \$995; Model C \$1195.

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