User Manual

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1. Introduction

Thank you for choosing the Lynx AES16™ PCI audio interface. The AES16 has been designed to provide you with the highest quality professional audio performance available, offering unequalled AES/EBU channel capacity and routing flexibility
.

Even if you're an experienced audio professional, please take a few moments to read through this brief users' manual. It will help to streamline the installation procedure, and acquaint you with the AES16's superior feature set, allowing you to quickly realize the full potential of this powerful audio tool.

1.1 Overview

The AES16 turns your computer into a powerful digital audio workstation, giving you up to sixteen channels of professional AES/EBU digital input and output at sampling rates up to 192 kHz. Its integrated 32-channel software mixer provides zero-latency monitoring, with unprecedented control and matrixing flexibility. With support for Windows and Macintosh computers, the AES16 can store and recall an unlimited number of routing configurations and mixer scenes, providing you with a virtual digital patchbay.

The AES16 supports the latest single-wire AES/EBU 192 kHz standard for up to 16 channels of digital input and output, and is also compatible with existing dual-wire 96 kHz and 192 kHz devices. Up to four AES16 cards can be installed in a single host computer to deliver a total of 64 inputs and 64 outputs of ultra-high bandwidth audio performance.

With our exclusive SynchroLock™ technology, the AES16 provides unmatched tolerance to jitter when synchronizing to external clocks, making it an ideal solution for longer cable runs and other sources where noise may be an issue. The SynchroLock output can also provide a clean and accurate clock output for other audio devices.

The AES16 provides ultra low latency drivers for most Windows protocols including WDM, MME, ASIO 2.0, GSIF, DirectSound and Direct Kernel Streaming, and for Macintosh protocols including ASIO2.0 under OS9 and CoreAudio under OS X.

1.2 Features

16 channel "single-wire" digital I/O at sample rates up to 192 kHz

8 channel "dual-wire" digital I/O at sample rates up to 192 kHz

Eight stereo record and playback devices available to audio applications

Transformer-coupled 24-bit AES/EBU inputs and outputs available on XLR or DB25 cables

Eight channels of mastering-quality sample rate conversion available (on model AES16-SRC)

Sync to external AES/EBU signals or word clocks

SynchroLock™ technology provides superior immunity to jitter in clock sources

On-board zero-latency digital mixer provides extensive routing capabilities with patch-bay functionality

Optimized DMA engine offers extremely efficient PCI bus transfers

Low-latency drivers for Windows XP/2000 – supports WDM, MME, ASIO 2.0, GSIF, DirectSound, and Direct Kernel Streaming

Low-latency drivers for Macintosh – supports ASIO 2.0 for OS9 and CoreAudio for OSX

"Direct-connect" cabling available for digital mixers, recorders and converters from Yamaha, Sony, Tascam, Mackie, Wheatstone, Apogee, Benchmark Media and other manufacturers

Designed and manufactured in the USA by Lynx Studio Technology, Inc.

1.3 Before you begin

Before you begin using the AES16, we recommend you read through this brief manual and familiarize yourself with the installation and operational procedures of this device. It is highly recommended that you have a good working knowledge of Windows and/or Macintosh operating system basics, and an understanding of computer hardware basics. This information is widely available on the web and from various computer hardware and software manufacturers.

We also strongly recommend you familiarize yourself with the basics of digital audio and computer recording, and particularly with the basic functionality of your chosen audio software. A solid grasp of the operational fundamentals of your Digital Audio Workstation software and its user interface will go a long way toward enhancing your experience with the AES16.

1.4 In the box

The following items are included in your AES16 carton:

AES16 PCI card in cushioned antistatic bag
Two AES16 cables (CBL-AES1604 six foot cable with 8 XLR connectors). (Included with models AES-16XLR and AES16-SRC only.)
CD-ROM containing current drivers and this manual
Warranty registration card

If any items are missing or damaged, please contact your dealer or Lynx at www.lynxstudio.com.

1.5 System requirements

Below are listed the minimum hardware and Operating System requirements for compatibility with the AES16. It is important to note that most professional audio applications place significant demands on your computer's resources, and it is therefore recommended that you meet or exceed the recommended system requirements for your Digital Audio Workstation software, which will likely be greater than those listed for the AES16. Please refer to your audio software's documentation for more information.

Windows

Minimum system requirements:

Pentium II class computer or better
32 MB RAM
One empty PCI slot
PCI or AGP Graphics card
Video display with 1024 x 768 minimum resolution
Windows XP or Windows 2000

NOTE: In the case of Windows 2000, you must be running SP3 or later. For Windows XP, you must be running SP1 or later. Visit the Windows update web pages to make certain you have the most current updates and fixes supplied by Microsoft.

The AES16 is not supported under Windows 95, 98 or ME.

Macintosh

Apple Macintosh G4 or later
32 MB RAM
One empty PCI slot
PCI or AGP Graphics card
Video display with 1024 x 768 minimum resolution
Macintosh OS 9.2.2 or OS X (10.2)

NOTE: The AES16 is not supported under versions of MacOS earlier than 9.2.2 or OS X versions prior to 10.2 (Jaguar).

1.6 Nomenclature used in this manual

The following typographic conventions are used in this manual:

Underlined text indicates characters that are to be typed using the computer keyboard.

ALL UPPER CASE TEXT indicates the names of specific connectors

First Character Upper Case Text indicates Lynx mixer control names or menu options. Phrases, such as: Start > Programs > Lynx Studio Technology use the greater than symbol (“>”) to indicate multiple menu options or mouse selections.

1.7 Copyrights, etc

Windows, Windows XP, and Windows 2000 are trademarks of Microsoft Corporation.

Macintosh, MacOS, MacOS X and CoreAudio are trademarks of Apple Computer.

All other trademarks are property of their respective holders.

2. Installation procedures

The procedure for installing the AES16 requires that you physically install the AES16 card inside your computer before running the AES16 Setup Program. The Setup Program will install the required driver files and the Lynx mixer application, as well as configure your system to recognize the AES16.

2.1 AES16 Hardware Installation

Turn OFF the power to your computer system and disconnect the power cords.

Touch a metal plate on your computer system to ground yourself and discharge any static electricity.
Remove the cover from your computer chassis and select an empty PCI slot in your computer.

You should refer to your computer system documentation for any special instructions on installing expansion cards and peripheral equipment.

Unscrew and remove the slot cover from your selected PCI slot.
Insert the AES16 into the selected PCI slot and press it down so that the contacts are securely seated.
Secure the bracket of the AES16 card to the computer chassis using a chassis screw or retaining bracket.

Replace the computer chassis cover and reconnect the power cord.

Connect the Audio cables to the AES16. See the External Connections section in the AES16 manual for more information.

Refer to the installation procedure for your computer type and operating system from the following sections.

NOTE: If you are updating to a newer version of the AES16 drivers, please refer to the appropriate section on downloading driver updates from the Lynx Studio website.

2.2 Windows WDM Driver (Windows XP and Windows 2000)

The LynxTWO/AES16 WDM driver provides the greatest compatibility with today's most popular audio and production software. Included are the following driver types:
ASIO (Cubase, Nuendo, Sonar, Samplitude, Sequoia)
WDM/Direct Sound (Sonar, Samplitude, Sequoia, Media Player)
MME (Windows multi-media extensions)
GSIF (Tascam GigaStudio)

The WDM driver also supports multi-channel playback for use with Surround Sound or other multi-channel encoded material.

In some cases, users require our older, NT-4 based drivers for compatibility with their applications or context of use. Refer to Appendix # on pp## for installation information for the NT-4 driver family.

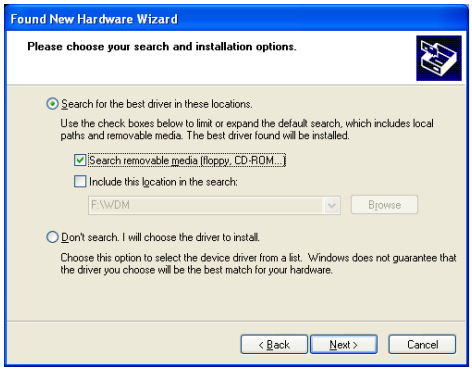
Insert Installation CD in CDROM Drive and Start Computer

The AES16 Installation CD contains all driver files mentioned in the subsequent installation steps, as well as the AES16 manual, driver release notes and test files. If you do not have a CDROM drive or need a more recent version, these files are available on our website at http://www.lynxstudio.com. If you have downloaded newer drivers than those included on your installation CD, please extract the driver to its default location, C:\Lynx. The following instructions can still be followed, simply type C:\Lynx as the location for driver files, rather than "removable media" as specified in these instructions.

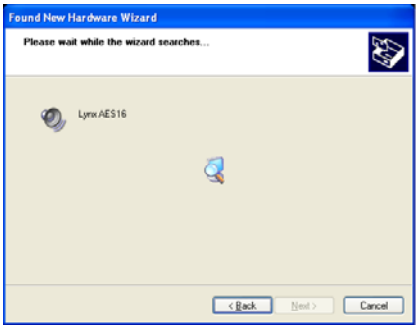
Installing the Windows WDM Driver

When you start Windows after installing the AES16 into your computer, the New Hardware Wizard will appear. Select "Install from a list or specific location" and click "Next >" to proceed. (NOTE: In Windows 2000, click "Next>" on the New Hardware Wizard welcome screen, on the Install Hardware Device Driver dialog box, choose "Display a list of the known drivers for this device" and click "Next>")

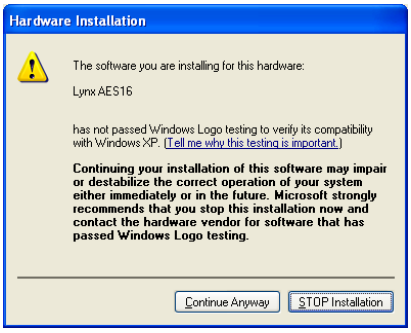
From the next window, select "Search removable media". Click "Next >" to proceed (NOTE: In Windows 2000 select "Sounds, video and game controllers" as a hardware type, and click "Next>". From the next screen click "Have Disk", then type in the drive letter of your CD-ROM drive, i.e. D:\, then click "OK". Select the AES16 or AES16-SRC from the list of choices and click "Next>".



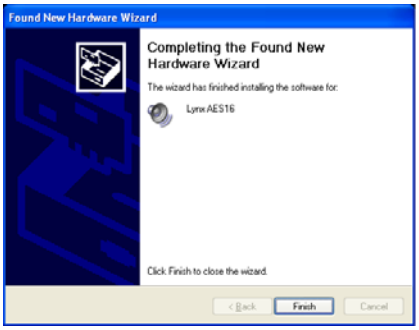
Windows will begin to search for the appropriate driver files:



You will receive a warning that the driver has not been digitally signed by Microsoft. It is perfectly safe to disregard this warning and select "Continue Anyway." (NOTE: In Windows 2000 click "Yes" to continue installation.)



The driver installation will continue. After several moments, the new hardware wizard will indicate that it has completed the installation. Click "Finish":

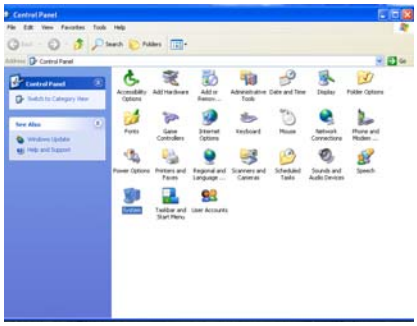


Reboot the computer. The AES16 Card and Lynx Mixer application are now ready to use.

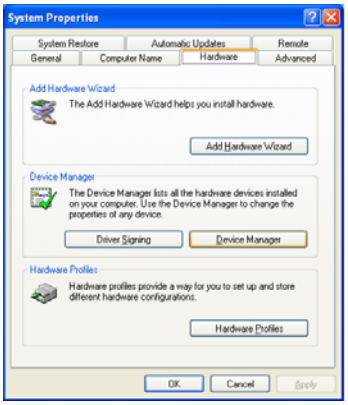
Uninstalling the AES16 WDM Device Driver and Mixer

From the start menu, click on "Control Panel." (NOTE: In Windows 2000 click on Settings> Control Panel.)

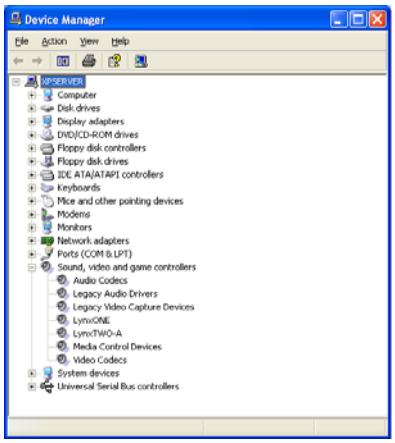
Click "System" to launch System Properties:



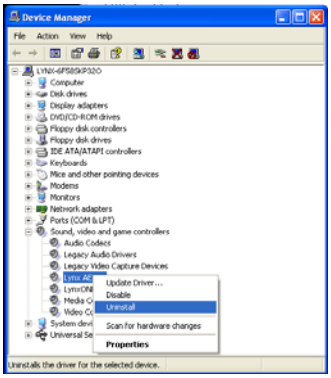
Choose "Device Manager" from the "Hardware" tab:



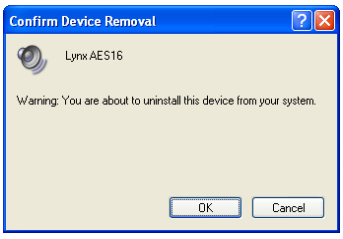
Expand the “Sound, video and game controllers” section of device manager be clicking its + sign:



Right click on “Lynx AES16” and choose “Uninstall”



Confirm device removal by clicking “OK”. (NOTE: In Windows 2000 click “Yes” when prompted to restart your computer.)

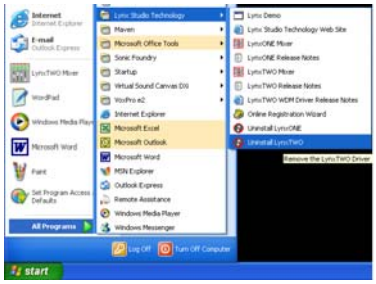


Reboot the computer.

Updating From the AES16 Standard NT4 Driver

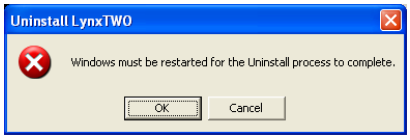
If updating from the standard NT4 driver, you will need to uninstall the NT4 driver before you can load the WDM driver.

From the start menu, click on "Lynx Studio Technology", and then click "Uninstall LynxTWO".



Choose "Uninstall" from the next screen that appears.

Restart the machine when prompted.

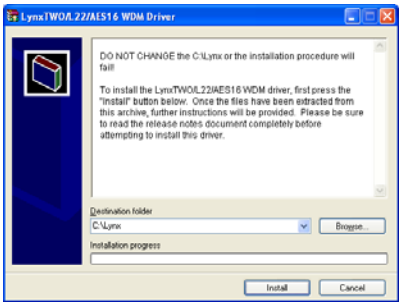


You can now install the WDM driver per instructions above.

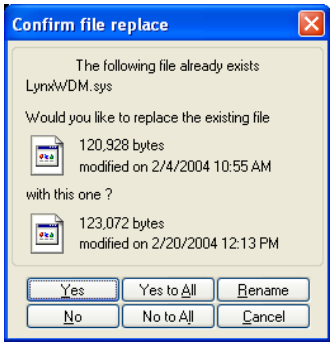
If updating from an existing WDM driver:

Navigate your web browser to: http://www.lynxstudio.com/download.html. Scroll to the WDM driver section and click on the appropriate file to download.

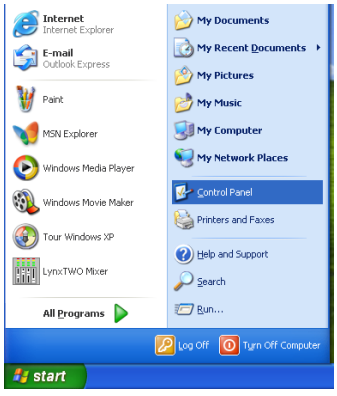
Double-click the downloaded file to decompress, and accept the default destination folder of C:\Lynx.



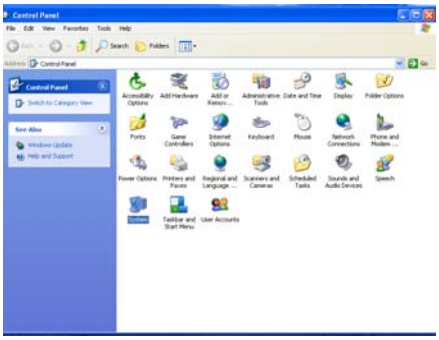
Click "Yes to All" when prompted to confirm the files to be replaced.



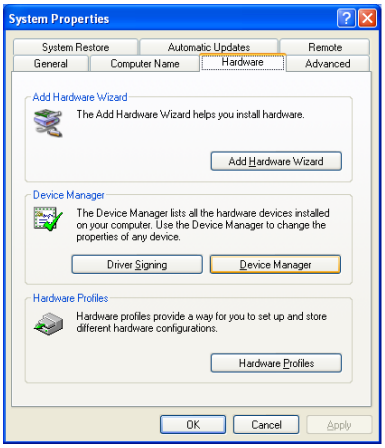
From the start menu, click on "Control Panel." (NOTE: In Windows 2000 click on "Settings > Control Panel."



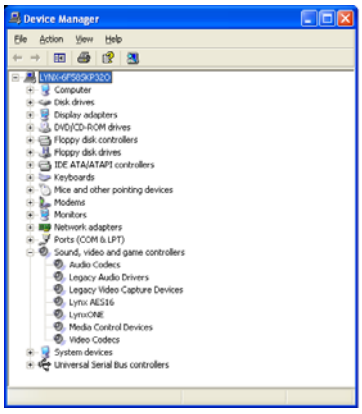
Click “System” to launch System Properties.



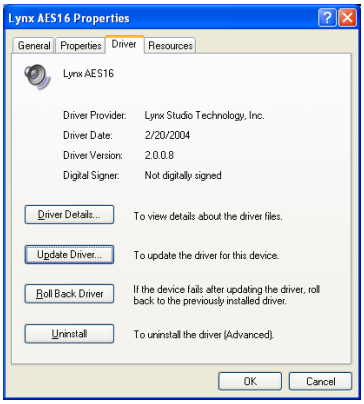
Choose “Device Manager” from the “Hardware” tab



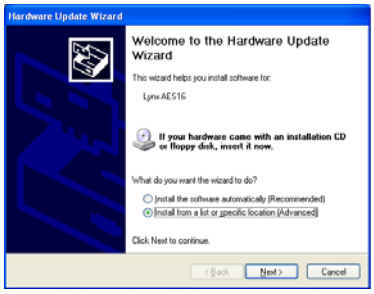
Expand the “Sound, video and game controllers” section of device manager be clicking its + sign



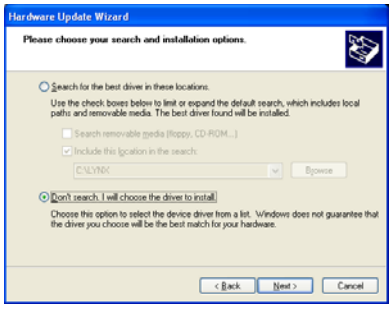
Double click the “LynxAES16” entry to launch the LynxAES16 Properties dialog box. Click the “Driver” tab, then click “Update Driver…”.



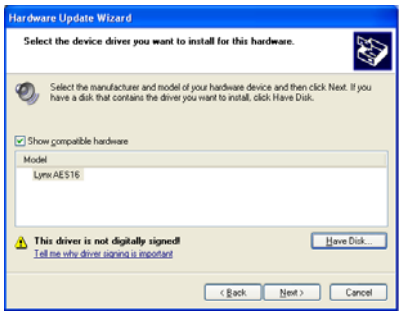
When the Hardware Update Wizard box appears, choose “Install from a list or specific location (Advanced)” and click “Next>.” (NOTE: In Windows 2000 click “Next>” on the Hardware Upgrade Wizard welcome screen.)



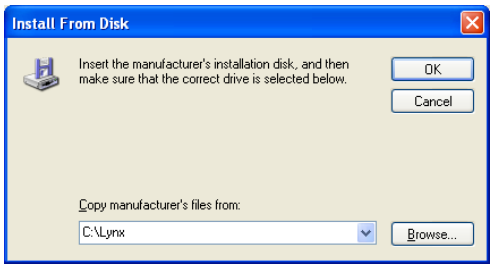
From the next window, select "Don’t search, I will choose the driver to install”. Click "Next >" to proceed. (NOTE: (In Windows 2000, choose “Display a list of the known drivers for this device…” and click “Next>).



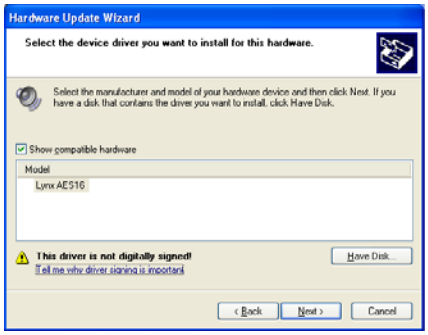
When prompted to select a device driver, click “Have Disk”.



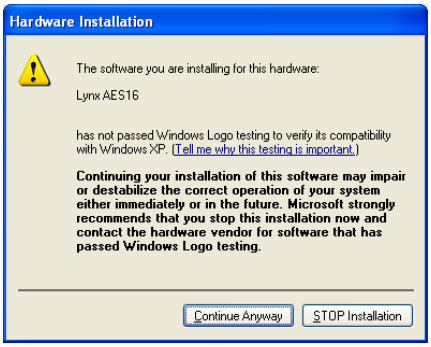
Next, you’ll be asked to insert the manufacturer’s installation disk into the drive selected (the default is A:\) – type “C:\Lynx” in the text box, and click “OK”.



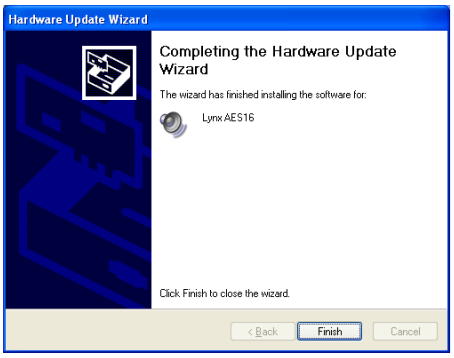
You will be prompted to select the device driver you are installing. “Lynx AES16” will be your only choice. Select it and click “Next>”. (NOTE: (In Windows 2000, choose AES16 from the list, then click “Next>”. Click “Next>” on the subsequent confirmation window as well).



You will receive a warning that the driver has not been digitally signed by Microsoft. It is perfectly safe to disregard this warning and click "Continue Anyway" to proceed with the installation. (NOTE: In Windows 2000 click "Yes" to continue installation.)

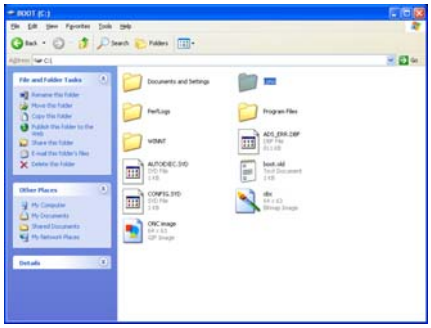


The driver installation will continue. After several moments, the Hardware Update Wizard will indicate that it has completed the installation. Click "Finish". (NOTE: In windows 2000 you will be prompted to restart the computer. There is one remaining step, so choose "No.")



Next, we need to update the Lynx Mixer. From the Start Menu, choose "My Computer." (NOTE: In Windows 2000 click the "My Computer" icon on the desktop.)

Double-click on the C: Hard Drive and look for the "Lynx" Folder. Double Click the folder to open it.



Right Click on the LynxApps file and click "Install"

The new Lynx driver and mixer are now ready to use.

2.3 Mac OS X

Insert Installation CD in CDROM Drive and Start Computer

The Installation CD contains all firmware and driver files mentioned in the subsequent installation steps, as well as the AES16 manual, driver release notes and test files. If you do not have a CDROM drive or need a more recent version, these files are available on our website at http://www.lynxstudio.com

Firmware Update

For Macintosh compatibility, the firmware stored in the on-board flash memory must be updated prior to use. This is required because the AES16 ships from the factory with Windows firmware installed. To update the firmware:

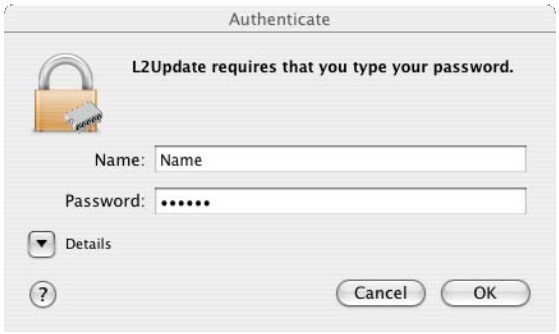
Locate the file **L2update_OSXsit** on the AES16 Installation CD and drag the file onto the computer desktop, or download the latest OSX firmware file from www.lynxstudio.com/download.html to the computer desktop.

Double-click on the **L2Update_OSX.sit** file to launch the Stuffit Expander. If a simple double-click does not launch the Stuffit Expander, you may need to launch Stuffit Expander manually, and then open the **L2Update_OSX.sit** file using the Open command in the File menu. Drag the **L2Update.app** file to the desktop, which will decompress the firmware updater, and then close Stuffit Expander. An L2Update program icon should now be on your desktop.

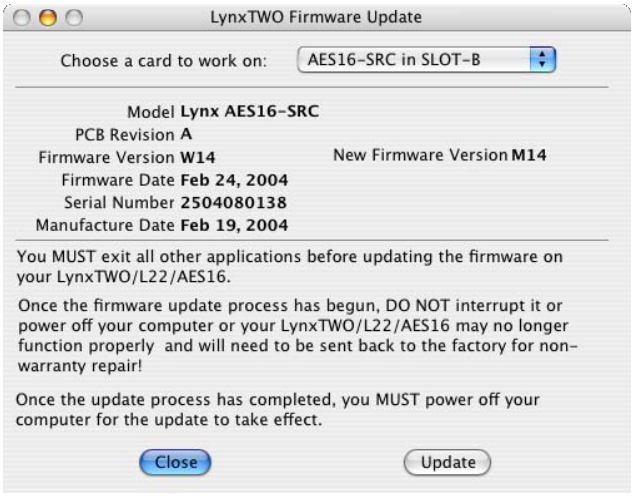
Make sure that no applications are open before running the firmware updater.

Run **L2Update** by double clicking on the **L2Update** program icon.

Enter your password in the Authenticate dialog box and click OK.



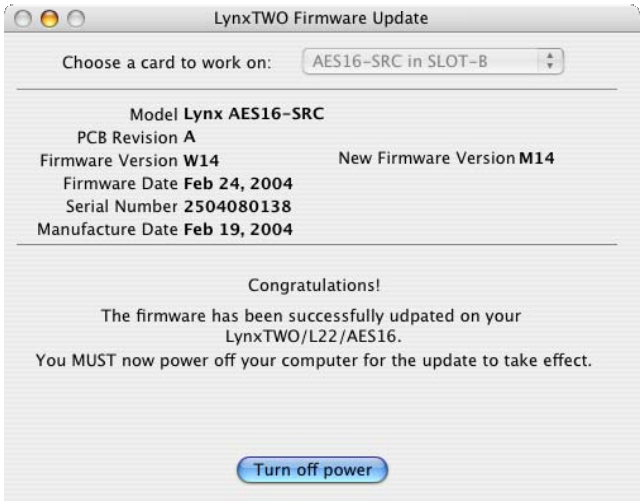
In a few moments, the "Lynx Two Firmware Update" dialog box should appear. Confirm that the correct Lynx Card model appears under "Model" (please note: pictured below is the SRC version), and also confirm that the Firmware Version and New Firmware Versions are NOT the same.



Select "Update" and click OK when prompted to confirm the Update.

While the firmware updater is programming the on-board flash memory, it is crucial that you do not power off the computer or interrupt the process in any way.

When the update is complete, you will be prompted to power off the computer.



After shutting down, wait for at least 10 seconds, then power the computer back on.

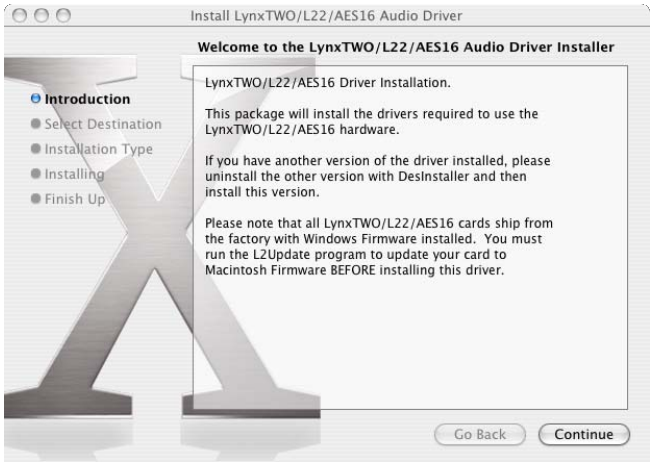
Install the AES16 Device Driver and Mixer

Locate the file **LynxTWO_OSX.sit** on the AES16 Installation CD and drag the file onto the computer desktop, or download the latest OSX driver file from www.lynxstudio.com/download.html to the computer desktop.

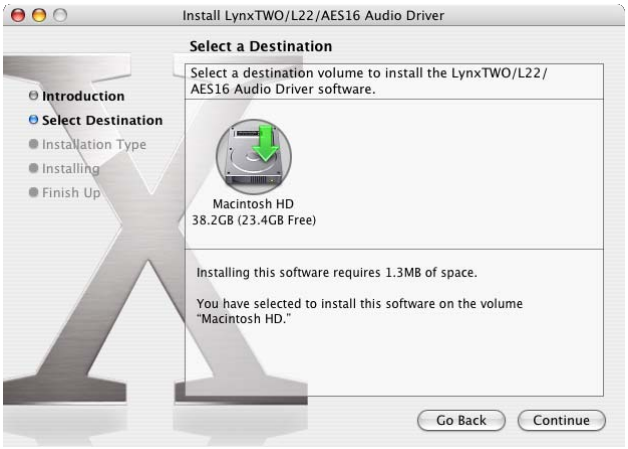
Double-click on the **LynxTWO_OSX.sit** file to launch the Stuffit Expander. If a simple double-click does not launch the Stuffit Expander, you may need to launch Stuffit Expander manually, and then open the **LynxTWO_OSX.sit** file using the Open command in the File menu. Drag the **LynxTWO_OSX.pkg** file to the desktop, which will decompress the driver file, and then close Stuffit Expander. A **LynxTWO_OSX.pkg** icon should now be on your desktop.

Double-click on the **LynxTWO_OSX.pkg** file. This will start the driver installation.

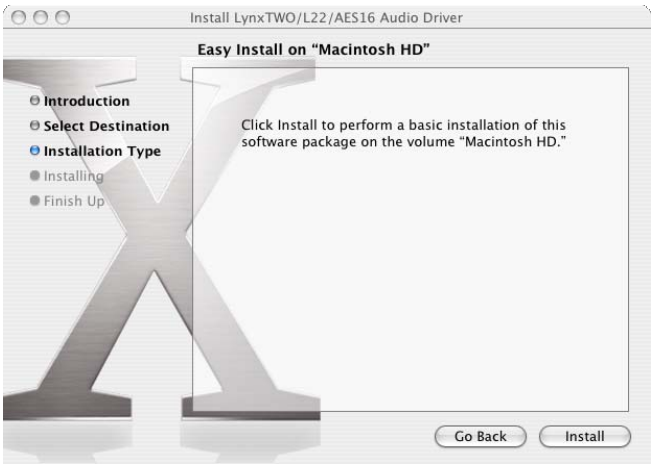
Click "Continue" at the "Install LynxTWO/L22/AES16 Audio Driver" dialog box.



When prompted to select a destination for the audio driver, click on "Macintosh HD" and then click "Continue".



Click “Install” on the next dialog box that appears.



Enter your password in the Authenticate dialog box and click OK.

Click “Continue Installation” in the next dialog box that appears

When the install is complete, you will be prompted to restart the computer.

NOTES: The OSX installation process installs both the CoreAudio driver and the Lynx Mixer application.

Uninstalling the LynxTWO Device Driver and Mixer

To uninstall the driver, you will have to use a third-party uninstaller like DesInstaller, which you can get from: http://www.macfixit.com/library/osxu.shtml. Follow the uninstaller's instructions to remove the LynxTWO_OSX.pkg.

Updating the LynxTWO Device Driver and Mixer

To update the LynxTWO driver with a newer version, simply follow the instructions for uninstalling the driver and then install the newer version per our Installation Instructions.

You may need to reconfigure the Lynx mixer and your recording application(s) after updating the driver.

2.4 Mac OS 9

Firmware Update

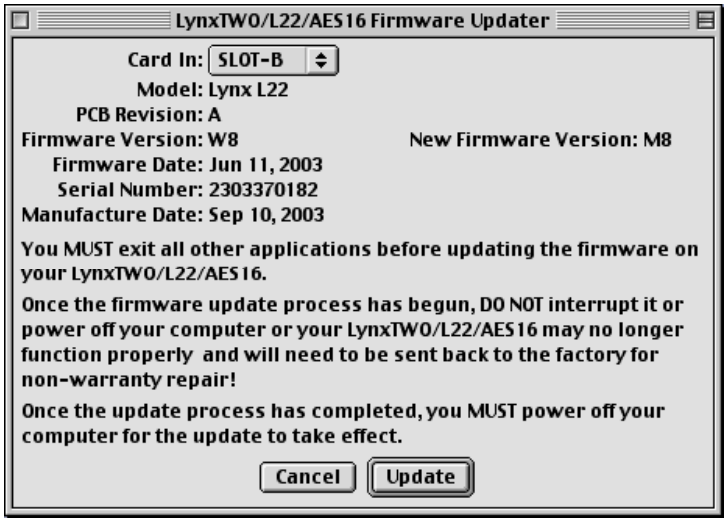
For Macintosh compatibility, the firmware stored in the on-board flash memory must be updated prior to use. This is required because the LynxTWO ships from the factory with Windows firmware installed. To update the firmware:

Locate the file L2updateXX.sit file on the LynxTwo Installation CD and drag the file onto the computer desktop, or download the latest OS9 firmware file from http://www.lynxstudio.com/download.html to the computer desktop.

Expand the firmware updater to the desktop using Aladdin Expander 5.0 or higher. An L2Update program icon should now be on your desktop.

Make sure that no applications are open before running the firmware updater. Run L2Update by double clicking on the L2Update program icon.

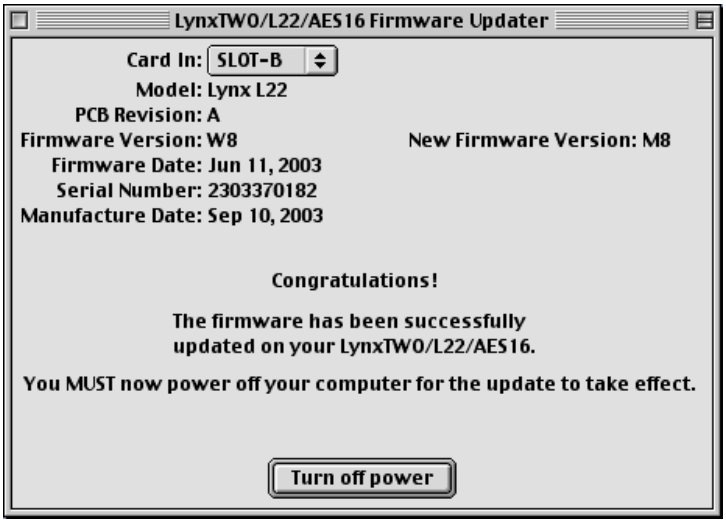
In a few moments, the "LynxTwo Firmware Updater" dialog box should appear. Confirm that the correct Lynx Card model appears under "Model", and also confirm that the Firmware Version and New Firmware Versions are NOT the same.



Select "Update" and click OK when prompted to confirm the Update.

While the firmware updater is programming the on-board flash memory, it is crucial that you do not power off the computer or interrupt the process in any way.

When the update is complete, you will be prompted to power off the computer.



After shutting down, wait for at least 10 seconds, then power the computer back on.

Install the LynxTWO Device Driver and Mixer

Locate the file **LynxTWO_XX.sit** file on the LynxTwo Installation CD and drag the file onto the computer desktop, or download the latest OS9 driver file from http://www.lynxstudio.com/download.html to the computer desktop.

Expand the driver file to the desktop using Aladdin Expander 5.0 or higher. A LynxTWO Mac ASIO Driver folder should now be on your desktop.

Open the LynxTWO Mac ASIO Driver folder and double click the "ASIO drivers" file to view the "LynxTWO" file
.
Locate the "ASIO drivers" folder inside your audio application's folder. Move the LynxTWO file into this folder.

Launch your audio application and choose the LynxTWO ASIO driver within the program. You can access the Lynx mixer program from within the ASIO control panel of your audio software.

Uninstalling the LynxTWO Device Driver and Mixer

To uninstall the driver, simply remove the LynxTWO file from the ASIO drivers folder of your audio application.

Updating the LynxTWO Device Driver and Mixer

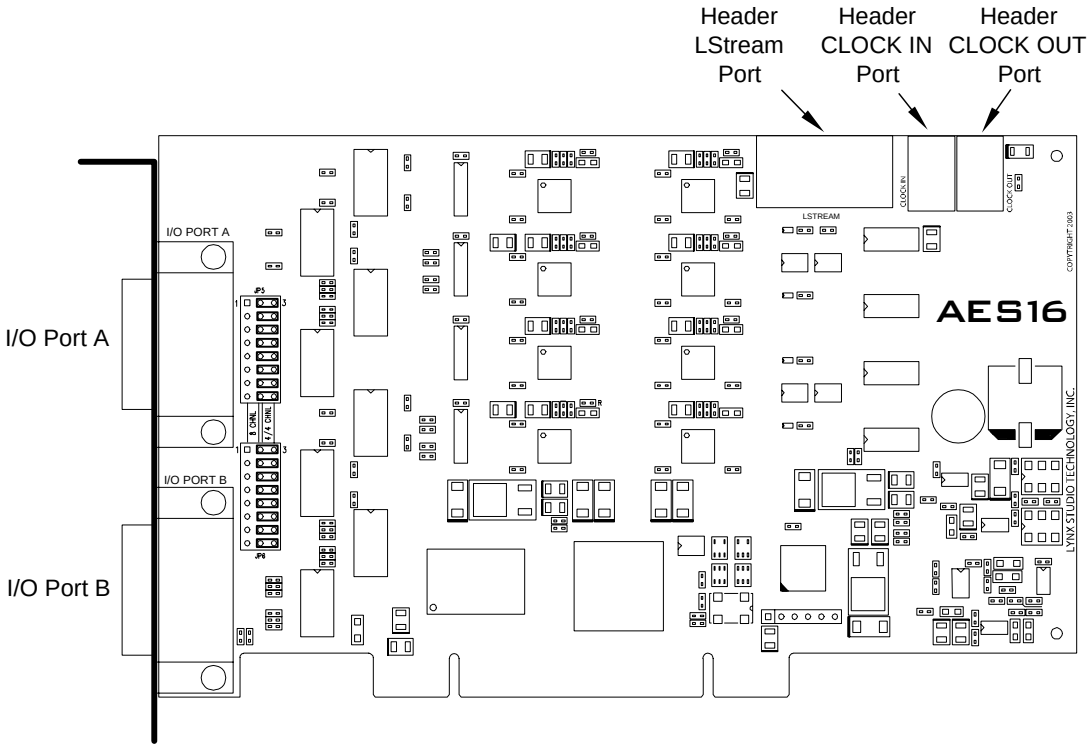
To update the LynxTWO driver with a newer version, replace the existing LynxTWO file from the ASIO drivers folder of your audio application with the newer LynxTWO file.

3. Hardware Connections

3.1 Digital audio I/O overview

The AES16 includes eight AES/EBU compatible inputs and outputs which provide sixteen channels of digital audio I/O. These signals are available on two bracket-mounted 26-pin high-density D connectors, labeled I/O Port A and I/O Port B as shown in the figure below.

To accommodate a wide range of studio equipment, the signal routing on each of these ports can be configured using the I/O Configuration jumpers to support either four inputs and four outputs or eight inputs or outputs. Refer to section 3.2, I/O Configuration Jumpers, for instructions on how to set these jumpers.



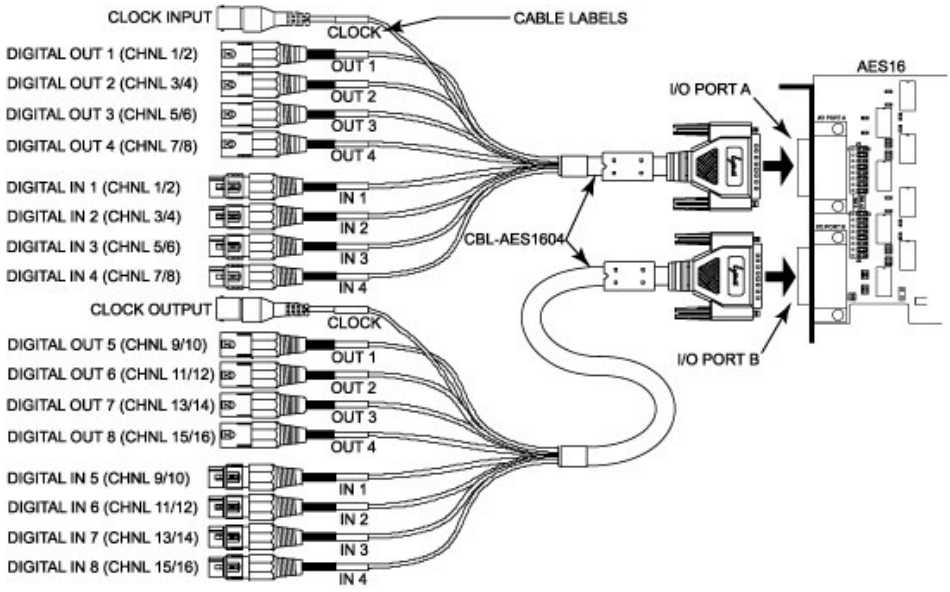
3.2 Connecting Cables

To minimize cabling issues, a variety of breakout cables are available for the AES16.

The AES16-XLR and AES16-SRC include two CBL-AES1604 break-out cables with XLR connectors for digital audio signals and female BNC connectors for clock input and output.

The XLR connectors on the CBL-AES1604 Cable, labeled IN 1, IN 2, IN 3, IN 4 and OUT 1, OUT 2, OUT 3, OUT 4 are used for AES/EBU digital audio connections.

The CBL-AES1604 connected to I/O Port A will be used for IN 1 through IN 4 and OUT 1 through OUT 4.
The CBL-AES1604 connected to I/O Port B will be used for IN 5 through IN 8 and OUT 5 through OUT 8.



Cable Connections for Included CBL-AES1604 break-out cables

You can also obtain the following optional cables:

CBL-AES1603 cable – provides connections to equipment with eight channel AES/EBU D-sub ports.

CBLAES1605 cable – prrovides connections to equipment with four input / four output AES/EBU D-sub ports (standard Yamaha pinout).

Referring to figure above, locate I/O Port A and the I/O Port B on the mounting bracket of the AES16. Insert the 26-pin male connector of the CBL-AES1603, CBL-AES1604 or CBL-AES1605 cable and tighten the thumb screws on the cable shell.

Lynx Part Number	Cable Description	Compatible Equipment	I/O Config. Jumper Position
CBL-AES1603	Male HD26 to Male DB25 for 8 AES in or out	Apogee AD16, AD16X, DA16, DA16X	8 CHNL
CBL-AES1604	Male HD26 to 4 Male XLR and 4 Female XLR	Any device with standard AES/EBU XLR connectors	4/4 CHNL
CBL-AES1605	Male HD26 to Male DB25 for 4 AES in and 4 AES out (standard Yamaha pinout)	All Yamaha equipment with DB25 digital I/O Apogee Rosetta 800, AD-8000 TC Electronics DSP 6000 Mackie HDR24/96, D8B	4/4 CHNL

AES16 Cable Compatibility Table

3.3 Clock Connections

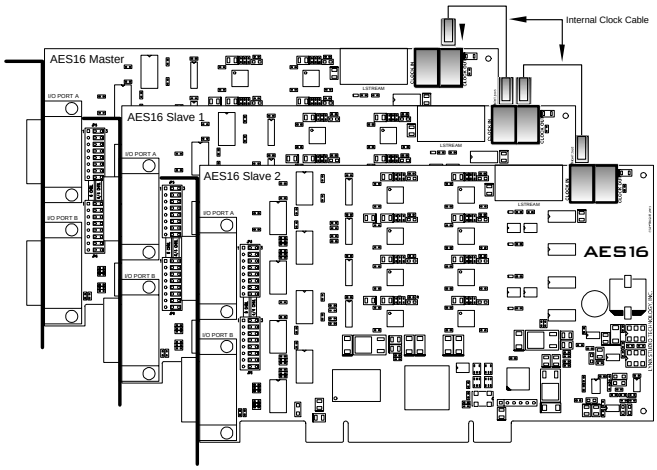
The BNC connector labeled CLOCK on the CBL-AES1604 Cable connected to I/O PORT A is a Word Clock Input, and is used to synchronize the AES16 with external equipment. The connector supports a TTL signal and should be connected with 75-ohm coaxial cable. Connect the this input to the clock output of an external device and select "External" as the Sample Clock Source in the Lynx mixer. Adjust the Sample Clock Reference to match the incoming clock type.

The BNC connector labeled CLOCK on the CBL-AES1604 Cable connected to I/O PORT B is a Word Clock Output that tracks the sample rate of the AES16. Connect this output to the word clock input of an external device.

NOTE: In any system with more than one digital device, there can be only one master clock. Whether you designate the AES16 as the clock master (slaving all other devices to it) or slave the AES16 to another clock master, it is important that only a single device act as clock master, to prevent the occurance of audible digital errors.

3.4 Header Connections

The Header connectors labeled CLOCK IN and CLOCK OUT are used to synchronize the AES16 with equipment located inside your computer. For systems containing multiple AES16's, these connectors are utilized to synchronize the sample clocks of each card.



Connecting multiple AES16 headers via internal cables

The connectors support TTL level signals and should be connected using the Lynx Internal Clock Cable (CBL-ICC), Lynx Universal Clock Cable (CBL-UCC) or similar 75-ohm coaxial cable.

Connect the CLOCK IN connector to the clock output of an internal device and select Header as the clock source in the Lynx mixer.

Adjust the clock Reference to match the incoming clock type.

The signal on the CLOCK OUT header is a word clock that tracks the sample rate of the AES16. Connect this output to the word clock input of an internal device or another AES16.

3.5 Common Studio Setups

Below are some illustrations of typical setups using the AES16.

External A/D and D/A with Word Clock

Need an illustration showing an external A/D and D/A box connected to an AES16 using XLR breakout cables. Include word clock out of A/D to clock in on AES breakout cable connection.

Digital Mixer

Need an illustraation of a digital mixer (eg. 01V96) connected to all 16 channels of the AES16 using 2 CBL-AES1605 cables.

Combined Use of XLR and DB25 Cable sets

Need an illustraation here too.

4. Getting Started

4.1 Windows Quick Audio Test

The installation of your AES16 can be tested using the LynxTWO Mixer and the Lynx Demo application included on the Lynx Installation CD. This is a quick way of verifying that the AES16 card is installed correctly and properly connected to your external equipment.

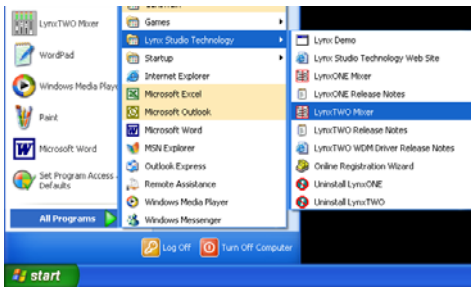
- Download the Demo32.exe application from www.lynxstudio.com/drivers, or locate this file on the Lynx Installation CD that came with your AES16.

- Download the "Dialtone.zip" file from www.lynxstudio.com/drivers, or locate "Dialtone.wav" on the Lynx Installation CD included with your AES16. Please note that the ZIP version found on the web site is a compressed file, and will require an extraction program such as WinZip to decompress the file (Windows XP can decompress .zip files without any additional application). Unzip the file Dialtone.wav to your computer's desktop.

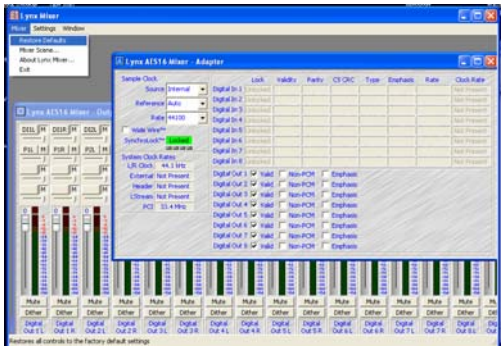
- Connect the outputs of the AES16 to a digital destination (digital mixer, DA converters, etc.) capable of delivering an audio signal for listening via headphones or speakers. Depending on your external equipment, you may be using the CBL-AES1603, CBL-AES1604 or CBL-AES1605 cables – please check section three of this manual for details on the proper connection of these cables to your equipment. Verify that Digital Out 1 of the AES16 is connected to your external equipment. This is the output used for this test.

- Before testing playback, the clock relationship between the AES16 card and your external device must be established. For this test, the AES16 acts as the clock master, while your external device is the clock slave. Consult the manual for your connected equipment to determine how to set it to receive sample clock from a digital input. Most digital devices offer several choices for sample clock status, with "Internal" generally being the default. If your device does not have the ability to receive its sample clock from a digital input, please consult the studio diagrams section of this manual for information on creating an alternate clock relationship with the AES16. Keep in mind that the sample clock source of the AES16 is set to "Internal" primarily to confirm the validity of your connections and installation – ultimately you should create clock relationships that make the most sense for your specific situation.

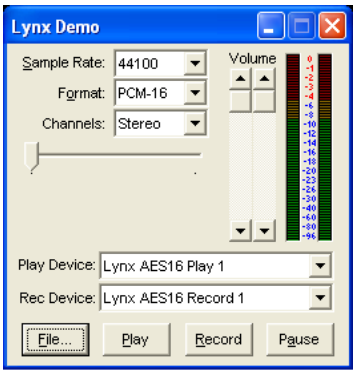
- Open the LynxTWO Mixer, which will be in the Lynx Studio Technology program directory (Start > All Programs > Lynx Studio Technology > LynxTWO Mixer.)



- Choose "Restore Defaults" from the Mixer menu. This will insure that the sample clock source is set to Internal, that the output levels are at maximum, and that no channels are muted.

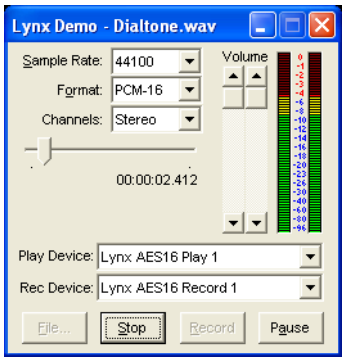


- Launch the Lynx Demo application by double-clicking the demo32.exe file. The Lynx Demo program should appear in the upper left corner of your screen. Make certain that the Play Device is set to Lynx AES16 Play 1.

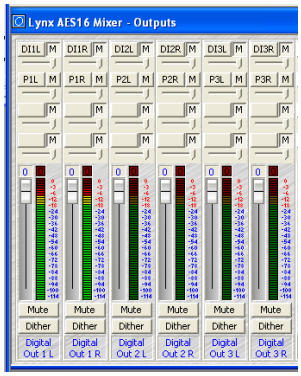


- Click "File" and navigate to the computer's Desktop, then select "Dialtone.wav" and click "Open."

- Click "Play." You should see the progress bar move from left to right.



- Check the Lynx Output mixer and confirm meter activity for Digital Out 1L and Digital Out 1R. If you have speakers or headphones connected to your destination device, you should hear audio as well as seeing meter activity.



If the test did not operate as described or you received any errors, please refer to Section 10, "Troubleshooting."

4.2 Mac Quick Audio Test

OSX

The installation of your AES16 can be tested unsing the LynxTWO Mixer and the Demo version of Bias Peak that was included on your AES16 Installation CD. This is a quick way of verifying that the AES16 card is installed correctly and is connected correctly to your external equipment.

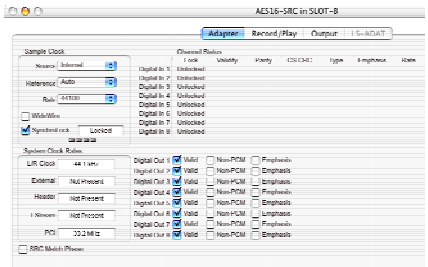
- Install the Bias Peak demo that is included on the AES16 installation CD, by clicking on the ######## file and following the installation instructions.

- Locate "Dialtone.wav" on the AES16 Installation. Drag the file to the computer's desktop.

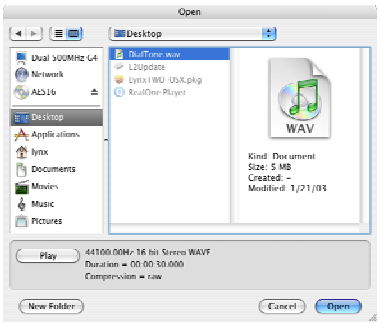
- Connect the outputs of the AES16 to a digital destination (digital mixer, DA converters, etc.) capable of delivering an audio signal for listening via headphones or speakers. Depending on your external gear, you may be using the CBL-AES1603, CBL-AES1604 or CBL-AES1605 cables - please check Section three of this manual for details on correctly connecting these cables to your equipment. Verify that Digital Out 1 of the AES16 is connected to your external equipment. This is the output used for this test.

- Before testing playback, the clock relationship between the AES16 card and your external device must be established. For this test, the AES16 acts as the clock master while your external device is a clock slave. Consult the manual for your connected equipment to determine how to set it to receive sample clock from a digital input. Most digital devices offer several choices for sample clock status, with "Internal" generally being the default. If your device does not have the ability to receive its sample clock from a digital input, please consult the studio diagrams section of this manual (page ?) for information on creating an alternate clock relationship with the AES16. Keep in mind that the sample clock source of the AES16 is set to "Internal" primarily to confirm the validity of your connections and installation – ultimately you should create clock relationships that make the most sense for your specific situation.

- Open the LynxTWO Mixer, which will be in the OSX sidebar. Choose the "Adaptor" tab, and verify that the Sample Clock Source is set to "Internal".

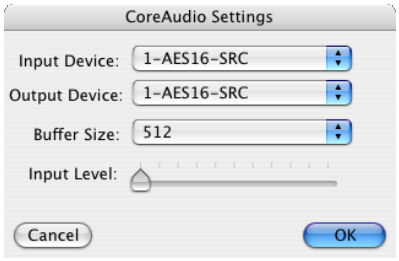


- Launch the Peak Demo application by clicking the Peak 4 icon in the OSX sidebar, or use Finder to launch Peak. Peak will prompt you to open an audio file, choose "dialtone.wav" on the desktop and click "Open".

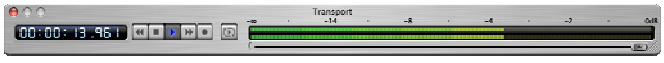


- In Peak, click "Audio Out" from the Audio menu. Verify that there is a check next to "CoreAudio…"

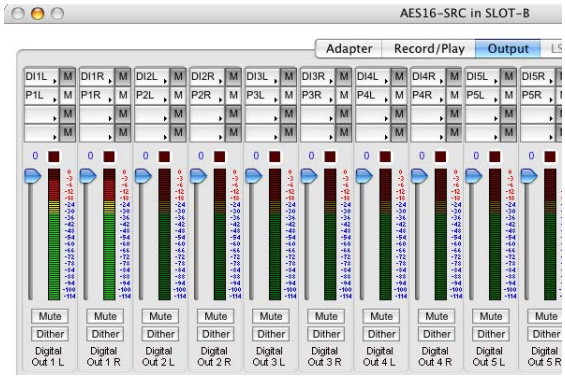
- Click "Hardware Settings…" from the Audio menu. Verify that the AES16 appears as the Output device. Click "OK".



- Click "Play" from the Peak transport. You should see meter activity and the counter progressing.



- Check the Lynx Output mixer and confirm meter activity for Digital Out 1L and Digital Out 1R. If you have speakers or headphones connected to your destination device, you should also hear audio and see meter activity.



If the test did not operate as described or you received any errors, please refer to the "Troubleshooting" section of this manual.

OS 9

The installation of your AES16 can be tested using the Demo version of Bias Peak that was included on your AES16 Installation CD. This is a quick way of verifying that the AES16 card is installed correctly and is connected correctly to your external equipment.

- Install the Bias Peak demo that is included on the AES16 installation CD, by clicking on the ######## file and following the installation instructions.

- Install the Bias Peak demo that is included on the AES16 installation CD, by clicking on the ######## file and following the installation instructions.

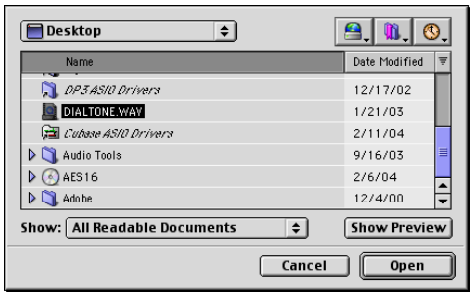
- Locate "Dialtone.wav" on the AES16 Installation. Drag the file to the computer's desktop.

- Connect the outputs of the AES16 to a digital destination (digital mixer, DA converters, etc.) capable of delivering an audio signal for listening via headphones or speakers. Depending on your external gear, you may be using the CBL-AES1603, CBL-AES1604 or CBL-AES1605 cables - please check the ##### of this manual for details on correctly connecting these cables to your equipment. Verify that Digital Out 1 of the AES16 is connected to your external equipment. This is the output used for this test.

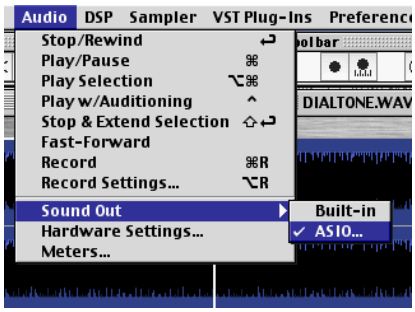
- Before testing playback, the clock relationship between the AES16 card and your external device must be established. For this test, the AES16 acts as the clock master while your external device is a clock slave. Consult the manual for your connected equipment to determine how to set it to receive sample clock from a digital input. Most digital devices offer several choices for sample clock status, with "Internal" generally being the default. If your device does not have the ability to receive its sample clock from a digital input, please consult the studio diagrams section of this manual (page ?) for information on creating an alternate clock relationship with the AES16. Keep in mind that the sample clock source of the AES16 is set to "Internal" primarily to

confirm the validity of your connections and installation – ultimately you should create clock relationships that make the most sense for your specific situation.

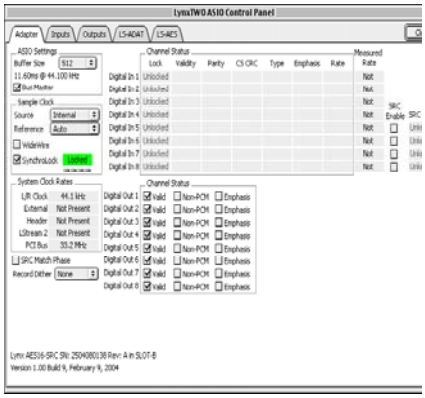
- Launch the Peak Demo application by clicking the Peak icon in the OS9 Applications Folder. Peak will prompt you to open an audio file, choose "dialtone.wav" on the desktop and click "Open".



- In Peak, click "Sound Out" from the Audio menu. Click "ASIO".



- Click "Hardware Settings…" from the Audio menu. This should launch the LynxTWO ASIO Control Panel. Verify that the Sample Clock Source is set to "Internal". Click "Close".



- Click the keyboard spacebar to begin playback of the dialtone audio file in Peak. You should see the cursor scroll from left to right. If you have speakers or headphones connected to your destination device, you should hear audio and see meter activity.

If the test did not operate as described or you received any errors, please refer to the "Troubleshooting" section of this manual.

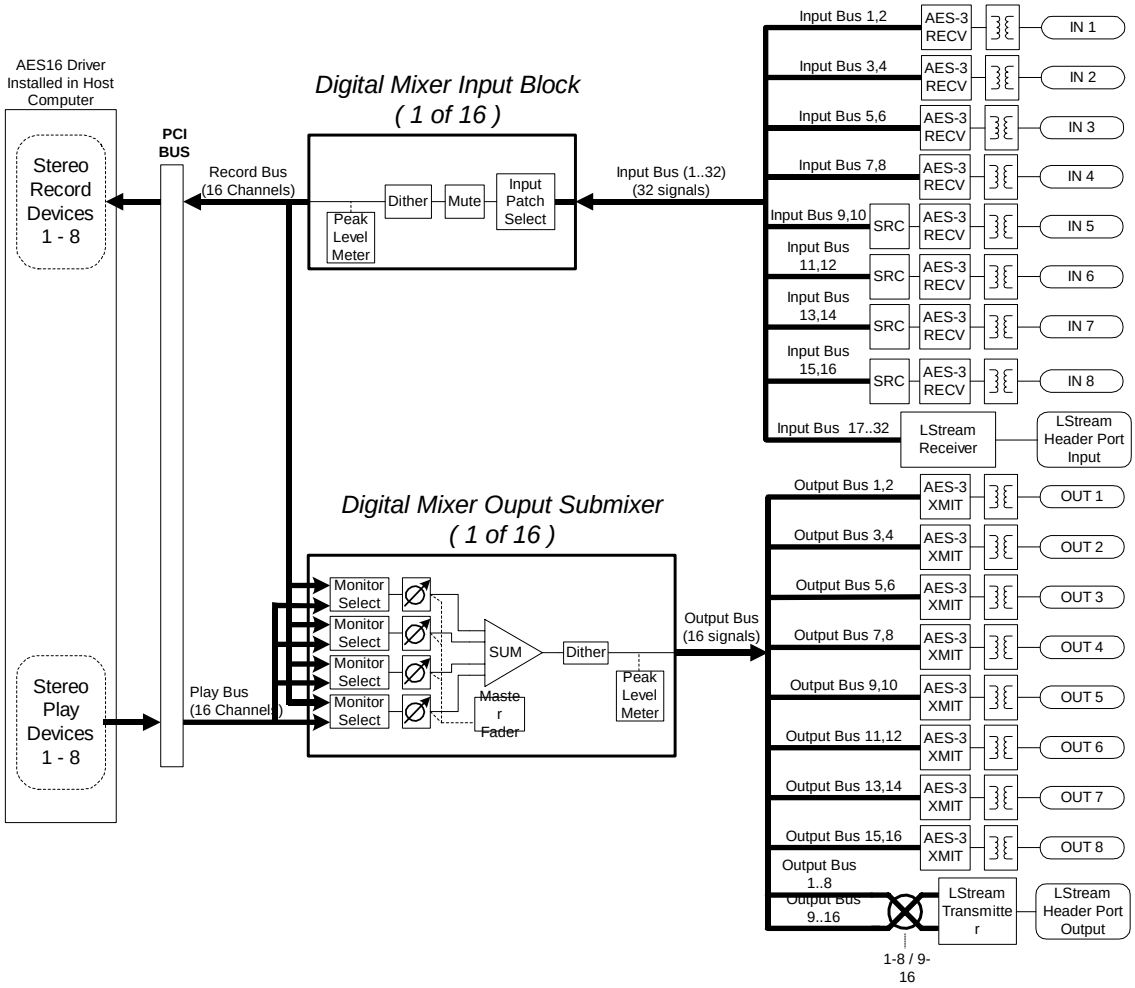
4.3 General Lynx Mixer Operation

With the AES16 and its drivers properly installed in your computer, you can begin to use its capabilities with any third party audio application running under Windows or ASIO compliant applications. In order for these applications to access the AES16 you must select one of the AES16 audio devices in an application's audio device configuration menu. Refer to Section 6, "Lynx Mixer Reference," for more information regarding device selection.

5. Operational Overview

5.1 Signal Flow

As shown in the signal flow diagram below, the AES16 with its on-board digital mixer provides extensive signal routing capabilities that can adapt to any studio requirement. The mixer is implemented using a proprietary digital signal processor (DSP) that is optimized to maintain low latency and high signal quality. The architecture of the digital mixer consists of 16 record channels and 16 play channels that are accessible to host applications as eight stereo record devices and eight stereo play devices. Submixers on each output provide low-latency mixing for record monitoring and output mixing



AES16 Signal Flow

Physical Inputs

Starting from the digital inputs in the upper right portion of the diagram, each AES-3 input signal is routed through a transformer for isolation before arriving at an AES-3 receiver. The receiver extracts a word clock, using a low jitter phase-locked loop, and signal data that is passed to the Input Bus of digital mixer.

On digital inputs 5 – 8 of an AES16-SRC the signal passes through a sample rate converter before merging with the Input Bus. This sample rate can be enabled or disabled under user control in the Lynx Mixer.

The LStream header on the AES16 is an expansion port that provides an additional 16 inputs from a Lynx LStream device, such as the LS-ADAT that offers 16 channels of ADAT lightpipe. The signals from the LStream header are routed through the LStream receiver, which feeds the Input Bus.

Digital Mixer Inputs

The digital mixer has 16 input blocks that receive data from the Input Bus and drive the 16 channels of the record bus. Each of these blocks has an input selector that allows selection any signal on the Input Bus. This selector allows flexible patching of any AES16 physical input signal to any of the 16 Record Bus channels. After the selector, the signal passes through a mute switch and then through the dither block, which offers three popular dither algorithms and bit-depth control. The output of the dither block is measured for peak level meters and feeds one of the Record Bus channels.

Software control of the digital mixer's input blocks is provided in the Record/Play page of the Lynx Mixer application. The input selector corresponds to the Input Source select buttons (above the faders for each record channel). Mute and dither controls are also provided for each channel on this page.

Record Bus, Play Bus, and Devices

The 16 channels of the Record Bus are derived from the outputs of the mixer input blocks. These signals are routed to the host computer via the PCI bus to the AES16 driver and also feed the output section of the digital mixer to provide zero latency record monitoring.

The AES driver installed on the host computer assigns the 16 channels from the Record Bus to eight stereo record devices as follows:

Record Bus Channel 1 feeds the left channel of Record Device 1
Record Bus Channel 2 feeds the right channel Record Device 1
Record Bus Channel 3 feeds the left channel Record Device 2
Record Bus Channel 4 feeds the right channel Record Device 2
(etc)
(etc)
Record Bus Channel 16 feeds the right channel Record Device 8

<NOTE: In ASIO apps…. add note here>

The Play Bus is derived from the 16 channels sent to the AES16 play devices from host applications. In other words, when an application is used to playback a file, the data from the file is sent to an AES16 play device. The AES16 driver routes this data to the Play Bus, which feeds the output section of the digital mixer. Similar to the Record Bus, the 16 channels of the Play Bus correspond to the AES16's eight play devices are follows:

Left channel of Play Device 1 feeds Play Bus Channel 1
Right channel of Play Device 1 feeds Play Bus Channel 2
Left channel of Play Device 2 feeds Play Bus Channel 3
Right channel of Play Device 2 feeds Play Bus Channel 4
(etc)
(etc)
Right channel of Play Device 8 feeds Play Bus Channel 16

<NOTE: In ASIO apps…add note here>

Digital Mixer Outputs

The 16 output signals of the digital mixer are derived from 16 four-input submixers. The Record Bus and Play Bus feed the submixer inputs, which each have an associated selector (labeled Monitor Select in the diagram) and volume control. The submixers use 40-bit accumulators to maintain signal accuracy. The output of the submixers are dithered to 24-bits using triangular PDF dither and then measured for peak level metering in the Lynx Mixer application.

This architecture allows each digital mixer output to be a mix of up to four signals derived from any AES16 input or any play device receiving data from a host application in playback mode. The benefits of this architecture include the ability to:
route any input to any or all outputs
route any play device data from an application to any or all outputs
mix any input with any play device for recording monitoring
create sub mixes for digital effect sends

Since all mixing and routing is hardware-based, so called "zero latency" is achieved.

Software control of the digital mixer outputs is provided in the Outputs page of the Lynx Mixer application. The Monitor Select function in the diagram corresponds to the Output Monitor Source buttons in the Mixer. The volumes controls for the submixer inputs are below these buttons. The master fader on the Outputs page of the Mixer adjusts all of the submixer input volumes. Mute and dither controls are also provided for each channel on this page. The dither button enables the output TPDF dither.

Physical Outputs

The physical outputs of the AES16 include eight AES-3 signals and the output of the LStream port. As shown in the diagram, the 16 channels of the Output Bus derived from the output submixers feed the physical outputs. Since there are 32 physical outputs (16 AES-3, 16 LStream) and only 16 signals on the Output Bus, data sent to the LStream output mimics data sent to the AES-3 outputs.

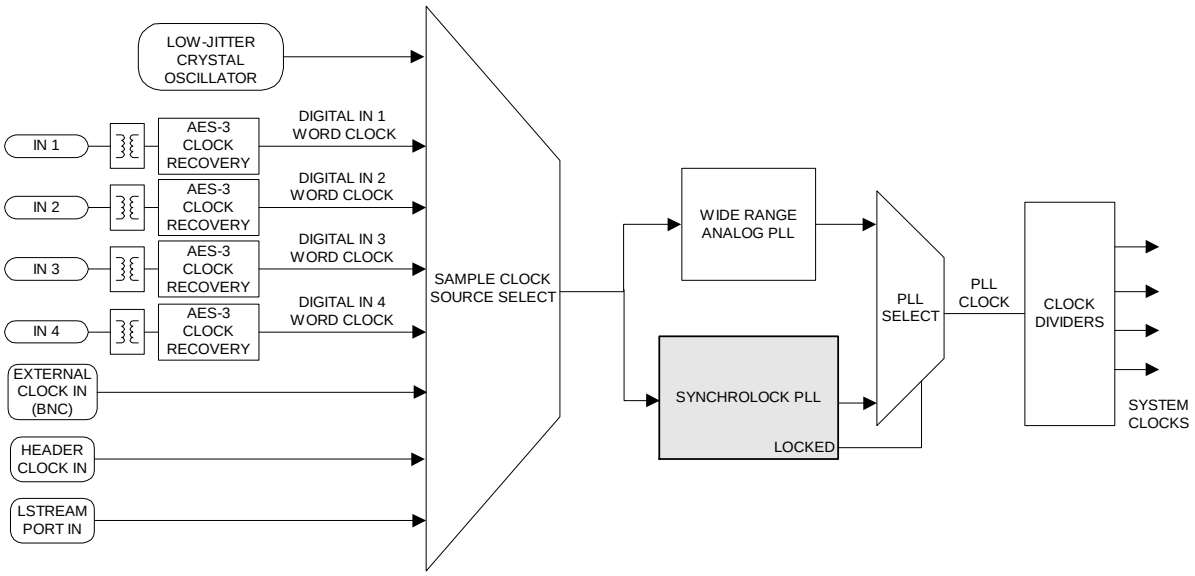
An AES-3 transmitter followed by an isolation transformer converts Output Bus signals to AES-3 signals.

An LStream transmitter formats data for the LStream output port. To provide more routing flexibility the "1-8 / 9-16 Select" function shown in the diagram allows routing of output signals to a bank of eight LStream channels. Output Bus signals 1-8 can be routed to LStream channels 9-16 if desired.

This control is available in the Settings menu of the Lynx mixer. <Bob, not currently in the Settings menu>

5.2 Sample Clock Generator

The AES16 utilizes a master sample clock generator to derive all clocks related to the digital audio sampling rate. As shown in the diagram below, the sample clock generator provides a selection of various clocks sources ands both a wide range and SynchroLock phase-lock loop (PLL).



Sample Clock Sources

The sample clock generator can derive its reference clock from both an internal and various external sources. Only one source can be selected at any given time. User control of the sample clock source selector is provided on the Adapter page of the Lynx Mixer application. The available clocks sources are:

On-board low-jitter oscillator (Internal)
Digital In 1- 4: word clock recovered from one of the first four AES-3 inputs
External Clock In: signal from the CLOCK IN BNC connector on the CBL-AES1604 break-out cable
Header Clock In: signal from the board-mounted header connector
LStream Port In: word clock from an LStream device connected to the LStream header port

Phase-lock Loops and Clock Dividers

A two-stage phase-lock loop system is used to generate a high-frequecny PLL Clock while attenuating jitter in the selected sample clock source. Refer to the SynchroLock section for a description of the operation of the PLL's. Clock dividers derive required system clocks from the PLL clock.

5.3 SynchroLock™

The AES16 incorporates SynchroLock clock synchronization technology to provide extreme tolerance to noisy external AES/EBU and word clock signals while generating an ultra-low jitter clock. This technology is especially useful for combating noise induced on cables in complex studio installations. SynchroLock provides clock synchronization while insuring bit-perfect digital transmission. When the AES16 is connected in an AES/EBU daisy chain, SynchroLock acts like a jitter firewall to prevent the propagation of jitter to downstream devices.

By coupling statistical analysis with low-noise clock generation techniques, SynchroLock is capable of attenuating jitter on incoming AES/EBU signals by a factor of 3000:1. Compare this to attenuation of 100:1 or less for professional quality analog phase-lock loops (PLL). SynchroLock can easily handle AES/EBU signals with jitter levels in excess of 800 nanoseconds.

The SynchroLock sample clock is a two-stage system that is comprised of a fast-locking analog PLL and digitally controlled crystal-based secondary stage. Due to extensive number crunching of the secondary stage, SynchroLock typically requires one to two minutes to achieve final lock. While the secondary stage is working, the fast-locking PLL loop maintains lock, but with much less jitter attenuation than the secondary stage. When the final lock state is achieved, the secondary stage is switched on line and becomes the system clock source. In some cases this switching process may cause a momentary disruption in digital I/O. Because of this, it is recommended that recording or playback not be started until the green LOCK

indicator in the SynchroLock status window is observed. This status window is located on the Adapter page of the Lynx Mixer.

SynchroLock works on any external word clock signal. By default, SynchroLock is active when the Sample Clock source is set to a clock source other than Internal. When the clock source is set to "External," "Header," or "Lstream" the Reference must be set to "Word." SynchroLock can be disabled in the settings menu of the mixer by clicking on "Settings > Advanced > SynchroLock," but this is not recommended.

SynchroLock is capable of locking to word clock frequencies within +/- 100ppm of 44.1 kHz, 48 kHz, 88.2kHz, 96 kHz, 176.4 kHz, or 192 kHz. Signals that fall outside of the lock range will cause the red RANGE indictor to appear in the SynchroLock status window.

6. Lynx Mixer Reference

The Lynx Mixer, which is installed during setup, provides software control of the features of the AES16 and a visual indication of audio signal level during recording and playback. It can be used dynamically to change operational settings of the AES16, but in most cases once the settings are configured for a particular studio installation they require no further adjustment.

Starting the Mixer

Windows: After installation, the Lynx Mixer icon, will appear on the Windows Quick Launch bar in the lower portion of your screen.

By clicking on this icon, the Lynx Mixer will launch. If you do not have the Windows Quick Launch bar activated, the Lynx Mixer can be started be selecting "Start > Programs > Lynx Studio Technology > LynxTWO Mixer."

Mac: After installation, the Lynx Mixer can be launched by clicking the LynxTWO Mixer icon in the OSX sidebar:

or by clicking the LynxTWO Mixer in the Applications folder.

In OS9, you can access the Lynx Mixer by clicking the ASIO control panel from within your audio application.

General Operation

If you are simply recording and playing digital audio without synchronizing to an external clock source, you can begin using the AES16 by simply selecting the AES16 audio devices in your application software.

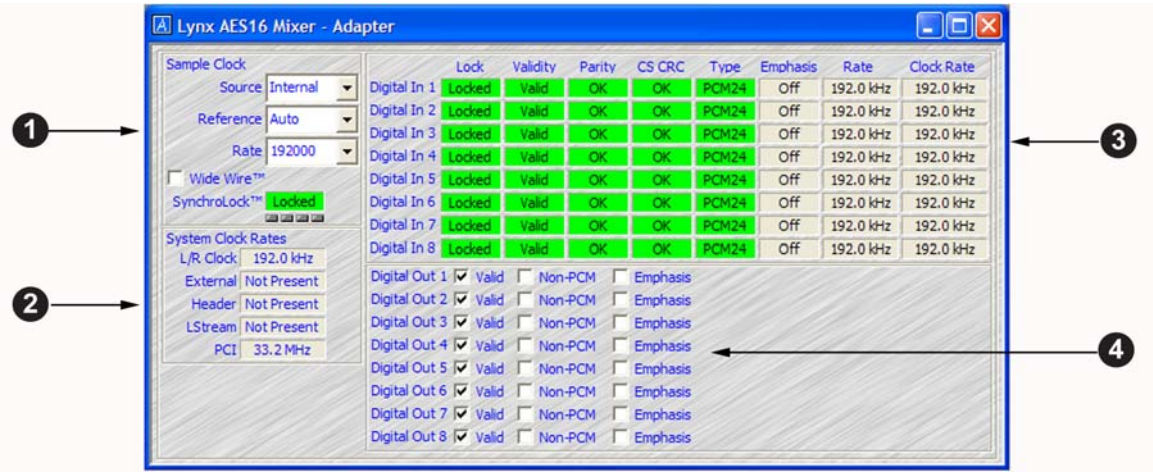
Typically, it is convenient to keep the Mixer running on your desktop to monitor signal levels or to allow immediate access to Mixer controls requiring dynamic changes. The Mixer can be forced to appear on top of other applications by selecting the "Always On Top" option in the Settings pull-down menu.

For further information about the Lynx Mixer controls refer to Section 5, "Lynx Mixer Control Panel" for a complete description.

Mixer Configuration Recall

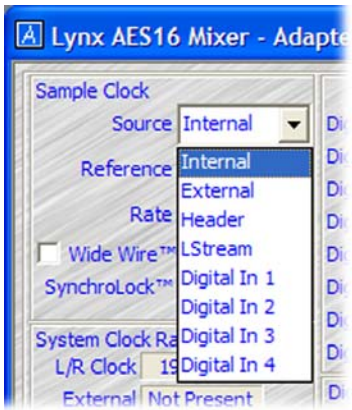
The state of the Mixer settings are saved each time your computer is shut down. The stored settings are automatically recalled the next time your computer is restarted.

6.1 Adapter Window



1. Sample Clock

Provides control of the Sample Clock and reference. All AES16 audio devices on a single card MUST have identical sample rates. Sample rates cannot be changed while AES16 is playing or recording.



Source

Internal – Clock derived from the on-board crystal oscillator.
External– Clock signal from the SYNC IN connector on the CBL-AES1604 cable.
Header– Clock signal from the board-mounted CLOCK IN header.
LStream– Clock signal from the LStream port.
Digital In 1 – Clock signal from the Digital 1 Input
Digital In 2 – Clock signal from the Digital 2 Input
Digital In 3 – Clock signal from the Digital 3 Input
Digital In 4 – Clock signal from the Digital 4 Input

Reference

Provides selection of the clock source reference type from one of the following:

Auto – Automatic selection. Valid for Internal, Digital, and Video clock sources.

13.5 MHz – 13.5 MHz video dot clock. Valid for External and Header clock sources.

27 MHz – 27 MHz video dot clock. Valid for External and Header clock sources.

Word – Word clock. Valid for External, Header, and LStream clock sources.

Word256 – 256 times word clock. Valid for External and Header clock sources.

Rate

Displays the current sample rate of the AES16.

WideWire

Allows selection of Dual-Wire mode. When checked, the AES16 is in dual-wire mode, for eight channels at 48 kHz to 192 kHz sample rate. When not selected, the AES16 is in single-wire mode for sixteen channels at all available sample rates.

SynchroLock

Shows the status of SynchroLock clocking system.

SynchroLock is Lynx Studio Technology's proprietary technology for attenuating jitter on clock inputs and providing a stable clock for all digital signals passed through the AES16. The SynchroLock status window and LED indicators show the current state of the SynchroLock system as described below. Prior to achieving lock, the four green LED's give an indication of the completion of various lock stages. For more information on SynchroLock, refer to the Section 5.3.

Working: In this state SynchroLock is analyzing the input clock signal and making adjustments to frequency and phase. This process typically takes two minutes to complete. The four LED's show progress towards final lock: One green LED denotes frequency lock to 3.2 ppm accuracy, two LED's denote frequency lock to 1.6 ppm accuracy, three LED's denote frequency lock to 0.6 ppm and the transition to the phase lock stage, four LED's denote the start of the phase lock stage. When phase lock has been achieved, the Yellow "Working" indicator changes to the green "Locked" indication.

Locked: Indicates the SynchroLock system has achieved final lock to an incoming clock signal. This indicator will also appear when the Sample Clock Source is set to Internal and the sample clock frequency is a multiple of 44.1 kHz or 48 kHz.

Range: Indicates that the selected external clock source is not within the SynchroLock lock range.

Disabled: Indicates that SynchroLock has been manually disabled using the SynchroLock control in the Settings menu: Settings->Advanced->SynchroLock.

2. System Clock Rates

Displays real-time frequency measurements for each of these clock sources.

L/R Clock: System sample clock
External: From SYNC IN connector
Header: From CLOCK IN connector
Lstream: From LStream port on AES Sync connector
PCI: Computer's PCI Bus speed

3. Digital Inputs

All of the headings except Clock Rate are merely status indicators showing the status of the incoming signal sent by each transmitting device. They do not perform any control or measurements functions.

Lock

Locked (Green) – Shows the digital receiver is locked to a valid AES/EBU source.

Unlocked (Grey) – The digital receiver is not locked to a valid AES/EBU source. When the unlocked indicator is shown, all of the fields to the right will be blank.

Validity

Valid (Green) – Indicates Validity of the incoming AES/EBU signal.

Invalid (Red) – The transmitting device has marked the data stream as invalid. An example might be a DAT that is hooked up to the AES16, but is not playing.

Parity

OK (Green) – Indicates normal operation with no parity errors.

Error (Red) – Indicates a Parity error in the datastream. Most likely a problem with a transmitting device or bad cable.

CS CRC (Channel Status Cyclic Redundant Check)

OK (Green) – Indicates normal operation with no errors in the channel status portion of the datastream.

Error (Red) – Indicates an error in the channel status portion of the datastream. This could be corruption in the channel stations portion. It could also mean that the transmitting device does not indicate a CRC device.

Type

Shows the type of datastream being transmitted by the external device. Typically PCM types are shown with green background and non-PCM types, such as Dolby AC3, have a yellow background. Here is a list of potential types:

PCM	PCM16	PCM18
PCM19	PCM20	PCM22
PCM23	PCM24	Non-PCM Dolby AC-3 Pause
MPEG1L1	MPEG1L2	MPEG2
MPEG2AAC	MPEG2L1	MPEG2L2
MPEG2L3	MPEG-4	
DTS I	DTS II	DTS III
ATRAC	ATRAC2/3	

Emphasis

Off or On indicate if Emphasis bits were turned on by the transmitting device.

50/15us (Green) – Curve of preemphasis.
J17 (Green) – CCITTJ.17 Emphasis detected.
Unknown (Green) – Emphasis is detected, but format cannot be ascertained.

Rate

Indicates the encoded channel status sample rate being sent by the transmitting device.

Possible values are: 32.0; 44.1; 48.0; 88.2; 96.0; 176.4; 192.0 kHz (all in Green) or Unknown (Red).

Clock Rate

Actual measurement of incoming sample rate. The Settings Menu offers a "High Resolution Clock Rate" option that provides three decimal places of accuracy instead of the default one decimal place.

When WideWire (dual-wire) is checked, this Clock Rate should read half of the encoded channel status rate described above. For example, when running at 192kHz and WideWire is checked, the Clock Rate should show 96.0 kHz.

4. Digital Outputs

Valid

When checked, the Validity Bit is turned on for this output to indicate valid audio data is being transmitted.

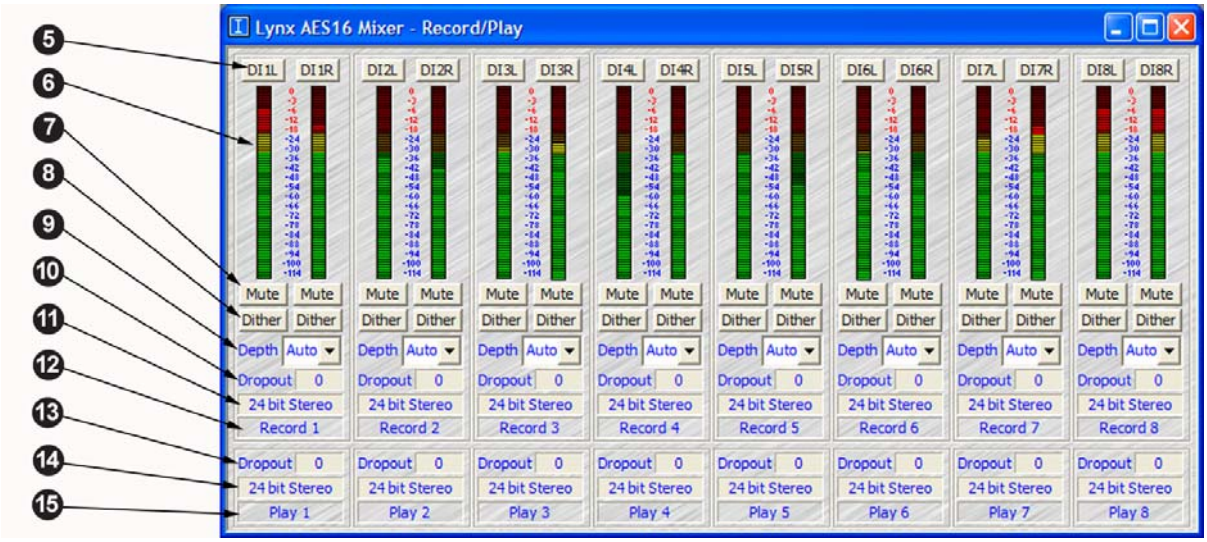
Non-PCM

When checked, the Non-PCM Bit is turned on for this output to indicate that a Non-PCM datastream (such as Dolby AC3 or DTS) is being transmitted.

Emphasis

When checked, the 50/15us Emphasis flag is turned on for this output.

6.2 Record/Play Window

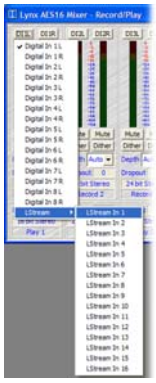


5. Record Device Source Selection Button

Controls routing of an input source to a recording device. Each device can derive its source from any one of the 32 available inputs (16 through I/O Port A and I/O Port B and 16 through the LStream port).

Pop-up input menu

Clicking on any of the input buttons above the channel meters allows you to select from all available input options.



In this example, the AES16 is paired with one LS-ADAT LStream card, connected via internal header ports.

Sixteen channels of LStream appear here. Maps to sixteen channels of LS-ADAT or eight channels of LS-AES.

6. Peak Meters

Displays the instantaneous level of audio being sent to the AES16 input.

7. Mute

Enables the mute function for the associated input.

8. Dither

Enables dithering for the associated input. The dither type is specified in the Settings menu.

9. Depth

Selects the bit depth for that channel. On the default Auto setting, bit depth is determined by the incoming digital source.

10. Dropout

Shows the actual number of data dropouts during recording.

11. Sample Format

Indicates 32, 24, 16 or 8-bit depth setting. Bit depth is set within the audio application for each record device, and is indicated here for reference only.

12. Record Device Status

For Record device 1 through 8. Shows Red if active.

13. Dropout

Shows the actual number of data dropouts during playback.

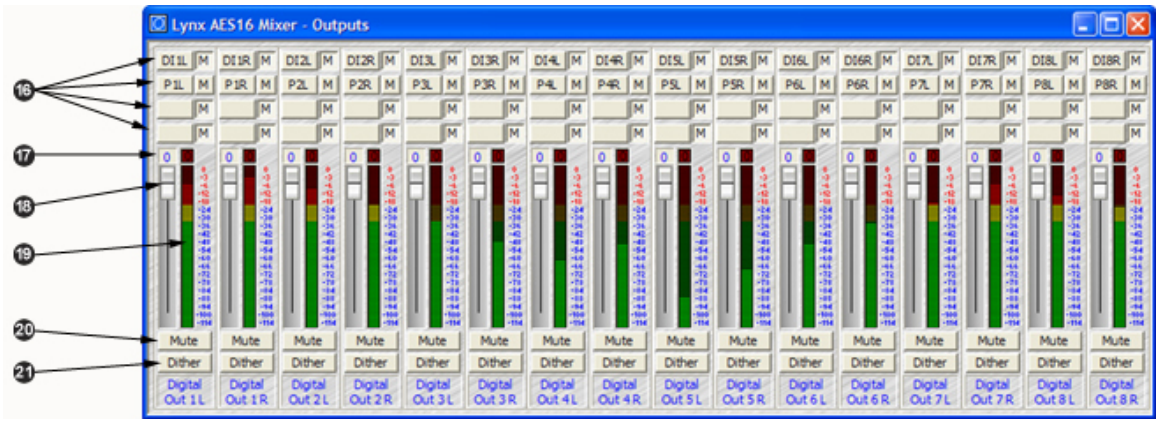
14. Sample Format

Indicates 32, 24, 16 or 8-bit depth setting. Bit depth is set within the audio application for each playback device, and is indicated here for reference only.

15. Playback Device Status

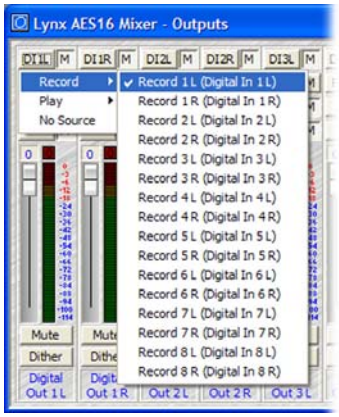
For Playback device 1 through 8. Shows Red if active.

6.3 Outputs Window



16. Mute

Any of four sources can be independently muted.



Output Monitor Source Buttons

Controls routing of record and playback sources to each of the 16 output channels. Each output is derived from the sum of the four sources associated with each button. Options include any Digital inputs, LStream inputs, or Play 1-8 L or R channels from Record/Play screen.

17. Overload indicator

Instantaneous overload indication of audio being played or monitored. Remains set until cleared by clicking on the control. (Overloads can occur only when more than one source is driving an output.)

18. Volume Faders

Controls digital attenuation of the audio being played or monitored. This control acts on the digital signals before D/A conversion.

With the volume fader at its maximum position, the vertical line within the fader turns black, no volume calculation is performed and the audio stream is unaltered.

This is the recommendedposition for critical recording and mixdown sessions in which the highest signal quality is required.

When the volume fader is not at its maximum or minimum position, the vertical line within the fader turns red to indicate that the volume control is active.

Volume Faders and Signal Quality

The faders in the Lynx Mixer perform digital attenuation on audio signals in the digital domain. The attenuation is applied to the digitized signals just prior to the D/A converters.

As with any digital signal processing function, the digital attenuation calculations used by the AES16 can introduce arithmetic errors that can add small amounts of noise to signals.

To insure the highest signal quality it is highly recommended that the faders be left in their maximum position during critical recording and playback. In this position, no attenuation calculations are performed.

19. Peak Meters

Displays the instantaneous level of the audio being played or monitored.

20. Mute

Enables a mute function for each associated output.

21. Output Dither

Enables the addition of triangular probability density dither for each associated output. Dither is recommended when more than one source is driving an output or when the volume fader is not at its maximum.

6.4 Mixer Menu

The Mixer menu, located at the top left of the screen, allows selection of global mixer functions.

22. Restore Defaults

Restores all user-selectable parameters to factory default settings.

23. Mixer Scene...

Allows saving and recalling of all user-selectable parameters to and from scene memory. When selected, a dialog box similar to the example on the right will appear. By default, Mixer Scene memory is empty. Once you have configured the mixer's routing and other parameters, you may save that configuration in memory as a mixer "Scene." Scenes may be recalled to quickly reconfigure the mixer.

Scene memory is global to all users on a single computer.

NOTE: When the computer is shut down, the current mixer state is saved, and when the computer is restarted, the mixer state is restored. This function is independent of the Mixer Scene memory.

Restore – To restore a scene from memory, select the scene name from the list, then click the Restore button. The scene will be instantly recalled from memory and all mmixer parameters will be restored to the saved state.

Save – To save a scene into memory, type the name of the scene into the Edit Window, then click the Save button. The current mixer parameters will be stored into scene memory. Selecting an existing scene name and clicking the Save button will overwrite that scene with the current parameters.

Delete – To delete a previously saved scene from memory, select the scene name from the list and click the Delete button. The Mixer Scene dialog box will remain open to allow further editing/deleting of scenes.

24. About Lynx Mixer...

Displays information about the Lynx mixer program and drivers.

Mixer/Driver Version

Displays the current driver version and build number.

Build Date: Displays the date the driver and mixer were released.

Adapter Name: Displays the name of the Lynx audio adapter installed. Up to four Lynx audio adapters may be shown.

Serial Number: Displays the serial number of the Lynx audio adapter installed.

PCB Revision: Displays the revision of the printed circuit board.

Firmware ID: Displays the firmware identification number.

Firmware Revision: Displays the firmware revision.

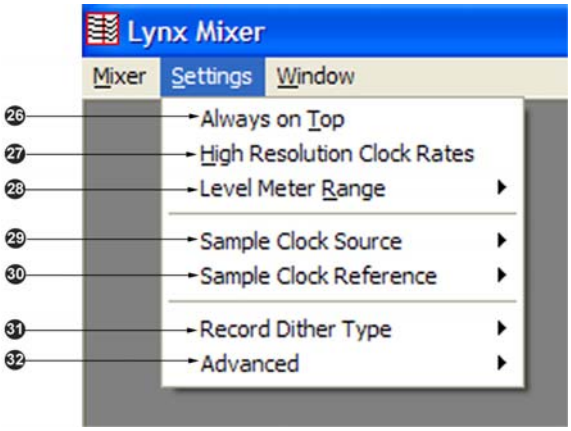
Firmware Date: Displays the date the firmware was released.

25. Exit

Closes the Lynx Mixer application.

6.5 Settings Menu

The Settings Menu at the top of the screen offers access to advanced settings and an alternative method of accessing commonly used functions that appear in the Adapter Window.



26. Always On Top

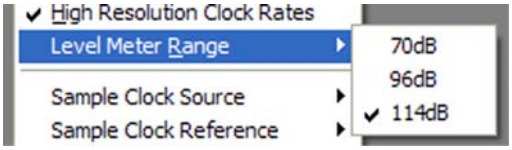
When checked, the Adapter, Record/Play and Outputs screens stay at the top of the screen for easy reference.

Unclicking this allows these AES screens to reside in the background, for easier access to other programs.

27. High Resolution Clock Rates

In the default mode (unchecked), the Clock Rate display on the Digital In portion of the Adapter window will show the clock rate to one decimal point (1/10th of a kHz). When checked, this measurement is shown to three decimal places (1/1000th of a kHz.)

28. Level Meter Bridge



The meters on the Record/Play and Output screens default to a range of 114 dB, providing the AES16's widest available range. For more critical monitoring, these meters can be reset to 96 dB or 70 dB ranges. This is a universal setting for all meters – it is not possible to set multiple ranges.

29. Sample Clock Source

This menu selection replicates the Sample Clock Source selection in the Adapter window (see Section 5.1), for added convenience. In some situations it may be preferable to access this parameter via this menu.

30. Sample Clock Reference

This menu selection replicates the Sample Clock Reference selection in the Adapter Window (see Section 5.1), for added convenience. In some situations it may be preferable to access this parameter via this menu.

31. Record Dither Type

Provides selection of the type of dither used on all record channels. The following options are available:

None – Dither is disabled. Volume processing utilizes rounding prior to truncation.

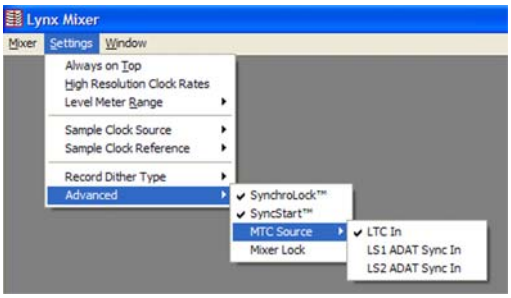
Triangular – Enables the addition of triangular probability density dither. Triangular is the preferred dither type in most cases.

Shaped Triangular – This type of dither is essentially a high-pass filtered triangular dither that places most of the dither energy at higher frequencies, making it less audible to the human ear.

Rectangular – This type of dither decreases the signal-to-noise ratio by 3 dB (less than triangular), but is less desirable because of its noise modulation effects.

32. Advanced

Provides access to several advanced menu functions.



SynchroLock™ - When checked, engages Lynx's SynchroLock jitter attenuation utility. Refer to Section 4.2 for more information.

SyncStart™ - When checked, enables the SyncStart feature, which provides sample accurate synchronization of multiple record and playback devices. Defaults to On.

MTC Source – Controls the source of MIDI Time Code sent to an application. The signal received from each source is automatically converted to MTC. The available sources are:

LTC In - Time code from the LTC IN connector
LS1 ADAT Sync In – Time code from an LS-ADAT connected to LStream Port 1 (on bracket connector)
LS2 ADAT Sync In – Time code from an LS-ADAT connected to LStream Port 2 (on internal header connector)

Mixer Lock – When checked, enables a locking feature that prevents changes to any of the mixer windows.

7. Using the AES16

This section describes how to set and perform common tasks with AES16.

7.1 Mixer Scene Storage and Recall

Once you have configured the mixer's routing and other parameters, you may save that configuration in memory as a mixer "Scene." Saved scenes may be recalled to quickly reconfigure the mixer.

When the computer is retarted after being shut down, the mixer will restart with its last-used configuration. This function is independent of the Mixer Scene memory.

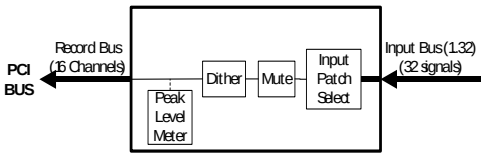
For more information on saving and recalling mixer scenes, refer to section 6.4, Mixer Menu.

7.2 Input Patching

The physical inputs of the AES16 can be patched to any Record Bus channel of the on-board digital mixer. This feature allows complete flexibility in routing inputs to tracks and record devices within software applications.

As described in Section 5 and shown below, the digital mixer has 16 input blocks, each with an Input Patch Select switch. The Input Bus originates from the physical inputs. The Record Bus feeds the record devices of the driver.

Digital Mixer Input Block
(1 of 16)



Access to the Input Patch Select switch is provided via the Input Source select buttons on the Record/Play page of the Lynx Mixer.

By clicking on one of these buttons at the top of a mixer channel strip, you can select from any of the available inputs and route the selected input to that record mixer channel.

Each mixer record channel can derive its source from any of the 32 physical inputs (16 AES-3 digital inputs and 16 LStream port outputs).

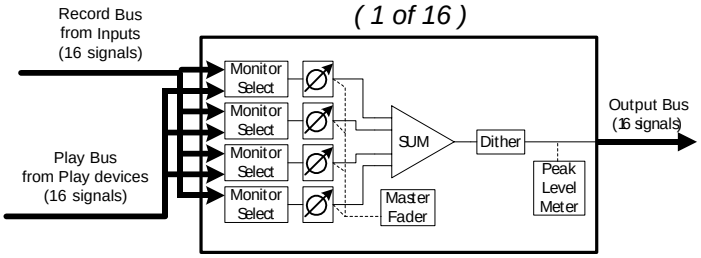
For more information on the Lynx Mixer input patching, refer to section 6.2, Record/Play page.

7.3 Monitoring

Low latency monitoring can be enabled using the AES16's on-board digital mixer. This method avoids delays caused be monitoring through applicaton software. The digital mixer can be setup manually using the Lynx Mixer application or within applications that support direct monitoring.

As discussed in Section 5, each ouput of the AES16 is derived from a four-input submixer. This submixer is shown below. The inputs to the submixers include both input signals and playback signals. Enabling record monitoring is simply a matter of selecting a desired input signal for mixing on a particular ouput.

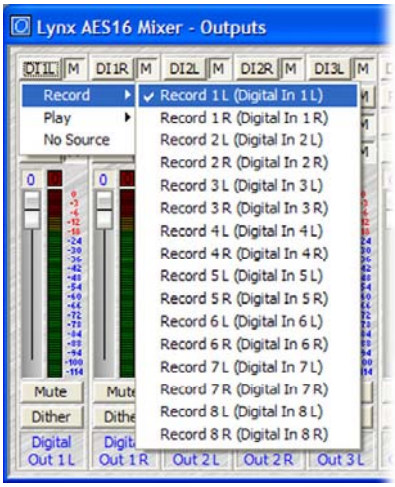
Digital Mixer Ouput Submixer
(1 of 16)



Manual setup using Lynx Mixer

The Outputs page of the Lynx Mixer provides access to the submixer connected to each physical output. Controls on this page allow manual setup of monitoring.

The four Monitor Select blocks shown in the submixer diagram correspond to the four Output Monitor Source buttons above the faders on each output channel of the Lynx Mixer. A mouse click on one of these buttons launches a menu of Record and Playback sources. Selecting a Record source cause in input signal to be routed to the output. Horizontal faders below these buttons correspond to the submixer input volume controls, , shown in the diagram.



In this example, Digital In 1 is being selected as a monitor source for Output 1 Left. The "M" button next to the Output Monitor Source button must be in the "out" position to unmute a monitor source. After the source is selected, a corresponding four-letter pneumonic will appear on the button.

Using Direct Monitoring in an ASIO application

The direct monitoring feature offered in many popular third party applications provides a means to enable low-latency monitoring supported by the AES16's on-board digital mixer. Instead of using the Lynx Mixer to manually enable monitoring as discussed in the previous section, controls within the application provide convenient access to this functionality.

Need to include in this section:
Explanation the driver's automatic use of output monitor sources (2 I believe) when direct monitor is enabled in an application.
Example in ASIO and OSX application

7.4 Playback routing and mixing

Blah blah blah

during playback.

For example, if a 44.1 kHz word clock is connected to the external clock input, the Sample Clock Source/Reference must be set to "External/Word" and the sample rate must be set to 44.1 kHz when a new file is being recorded in an application. Failure to do so will result in files being recorded at the wrong sample rate.

SynchroLock and jitter

Blah blah blah

blah blah blah

8. Working with Third Party Applications

8.1 Compatibility

The drivers included with your AES16 provide compatibility with all standard third party digital audio applications that communicate with Windows Wave audio, DirectSound, Audio Units and ASIO devices. A list of applications that have been tested for compatibility is provided on the Lynx web site at http://www.lynxstudio.com/swlist.html.

8.2 AES16 Devices

Third party applications communicate with the AES16 through its installed driver. The driver presents the AES16's audio capabilities to applications as standard multimedia, DirectSound or ASIO devices. Most, if not all, third party applications provide device selection in configuration, options, or preference setting windows or menus.

For two channel or stereo audio applications, a separate selection option is typically provided for the input or recording device and the output or playback device. Multitrack applications provide multiple input and output device selection menus or windows. Refer to the documentation included with your application to determine how to select audio devices.

With the AES16 properly installed in your computer, the digital audio devices will be available to applications, and their names will appear in their device selection menus as follows:

AES16 Record 1	AES16 Play 1
AES16 Record 2	AES16 Play 2
AES16 Record 3	AES16 Play 3
AES16 Record 4	AES16 Play 4
AES16 Record 5	AES16 Play 5
AES16 Record 6	AES16 Play 6
AES16 Record 7	AES16 Play 7
AES16 Record 8	AES16 Play 8

When more than one AES16 is installed in your system, the device names will contain a numeric adapter ID assigned by the operating system. For example, the analog output device on adapter 2 would be listed as "AES16 2 Record 1". Refer to the "Configuring Multiple AES16's" section below for more information.

8.3 Controlling Audio Bit Depth

Creating a audio file with a particular bit depth (or resolution) is controlled through an application's recording settings. These settings are typically adjusted in an audio device configuration menu or in a recording setup window just prior to recording. When recording is initiated the AES16 will generate audio samples of the desired resolution.

Bit depth control during playback of an audio file is also an application issue. When a file is played, the recorded bit depth is read from the file's header by the application. The application uses this information to set the resolution of the AES16.

The AES16 supports file types with 8, 16, 24, or 32 bit word widths. Note that 32-bit files contain 24-bit data with zero data in the least significant bit positions.

The Lynx Mixer application displays the currently selected bit depth for each device just above the device name in the Record window and the Play window.

8.4 Full Duplex Operation

The sixteen audio devices of the AES16 operate completely independent in terms of whether they are in recording or playback modes and their associated audio files. This implies that the devices can operate simultaneously and support the so-called "full duplex" mode where, for instance, the AES16 Record 1 device is recording while the AES16 Play 1 device is playing.

Although the devices act independently, when multiple devices are being used to record or play multiple audio files simultaneously, the AES16 driver has the capability to synchronously start all devices with sample accuracy. This is especially important for maintaining synchronization during playback of multiple devices and overdubbing.
By using all of the record and play devices, sixteen track recording and playback is possible. Again, control of this multi-channel operation is simply a matter of device selection in any compatible multitrack audio application.

9. Configuring Multiple AES16's

More than one AES16 card can be installed in a computer for additional audio channels. If required, all AES16's in a computer can be configured to maintain sample accurate synchronization during digital audio recording and playback.

Cards are synchronized in a master-slave arrangement. One card is selected as the master which provides the word clock source for the other slave cards in the system. From the master, the word clock signal is daisy-chained from one slave to the next.

Word clock signals can be connected internally using the CBL-ICC Internal Clock Cable, which is available from Lynx. The CLOCK OUT header of one card is connected to the CLOCK IN header of the next card. A separate cable is required for each slave card in the system. Alternatively, the CLOCK connectors on the CBL-AES1604 cables can be connected externally with a standard 75 ohm BNC cable.

9.1 Designating clock master and slaves

In order to select master and slave AES16's in a system, each adapter ID must be first physically associated with a AES16 installed in a computer slot. Windows 2000/XP or MacOS assigns the adapter IDs from the lowest slot number to the highest slot number. The procedure is as follows:

Connect at least OUT1 of each AES16 to your external mixing console or other equipment that will provide audio monitoring.
Choose an audio application that allows selection of wave audio devices for audio playback.
Select "AES16 1 Play 1" as the playback device.
Listen to the playback of any wave file and note which AES16 card is generating the audio signal. In this case, the card generating audio is adapter 1.
Repeat steps 3 and 4, for "AES16 2 Play 1", "AES16 3 Play 1", and so on until all AES16's in your system have been identified.

The next step is to choose which AES16 will act as a master. This choice is based on preference only, but for ease of connection it makes sense to choose a AES16 that is on one end of the PCI slot array on your motherboard.

Alternatively, if clock connections are made externally using the CLOCK connectors on the CBL-AES1604 cables, use BNC cables to make connections between cards in the same sequence as described above.

9.2 Adapter ID's

When multiple AES16 cards are installed in a computer they are automatically assigned unique adapter ID numbers. These adapter ID's provide a means to identify and communicate with each AES16 when using the Lynx Mixer application and to select audio devices in third party applications.

In the Lynx Mixer, the adapter that a user wishes to control is selected from the "Window" pull-down menu. In a system with four AES16's the adapters will be listed as follows:

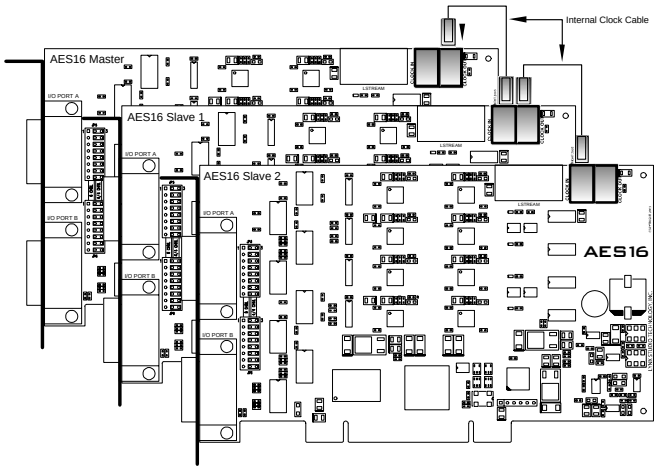
AES16 1 Mixer
AES16 2 Mixer
AES16 3 Mixer
AES16 4 Mixer

In each case, the adapter ID is the numeric character just before the word "Mixer" in each selection.

Most third party applications provide a setup or configuration menu for selecting a desired wave audio device for recording and playback. With multiple AES16's in a system, each device name will contain the adapter ID. For example, the first play device on adapter 2 would be listed as "AES16 2 Play 1".

9.3 Cable connections

Starting with the master AES16, insert the plug on one end of a Lynx Internal Clock Cable into the CLOCK OUT header, until it clicks and locks into place. This header is polarized to ensure the correct orientation of the cable plug. Insert the plug on the free end of the cable into the CLOCK IN header, on the nearest slave AES16. Connect each slave in a similar manner. Refer to the figure below:



9.4 Mixer settings

With the clock connections in place, the sample clock settings of each AES16 must be adjusted using the Lynx Mixer.

For the master AES16:

Select the master AES16 Adapter page from the Window pull-down menu.
Select a desired Sample Clock Source.
Select a desired Sample Clock Reference.

For each slave AES16:

Select the slave AES16 Adapter page from the Window pull-down menu.
Set the Sample Clock Source to Header if internal clock connections are used or External if external clock connections are used.
Set the Sample Clock Reference to Word.

10. Troubleshooting

Clicking, popping or crackling noises in your audio:

1. Check clock master settings. In any digital audio configuration, there can be one, and only one master clock. All other digital audio devices must be configured as slaves to the designated master clock. Since the AES16's SynchroLock™ technology provides an extremely stable and jitter-resistant clock, we recommend setting the AES16 as the master clock in your digital audio system.

2. Check buffer settings in your audio application software. Smaller buffer sizes are preferred because they reduce latency (the time it takes for an audio signal to travel through your audio software). In some cases, however, setting too small a buffer size can overtax your computer's processor, particularly when running multiple tracks and/or a number of DSP plug-ins. This can result in clicks and pops in your audio playback. Try increasing the buffer size and see if your playback performance improves.

Audio plays back at a faster or slower rate than expected:

This is usually the result of mismatched clock rates and multiple clock masters. For example, if you are playing back a file recorded at 44.1 kHz, but you have set the clock for 48 kHz, the file will play back faster and at a higher pitch than expected. Make certain you have set only one device as clock master.

No audio:

If you see signal appearing on the AES16's output meters, verify your output connections, making certain you have a valid signal flow from the AES16's outputs to your mixer or other D/A device, and from that device to your speakers.

If you see no signal appearing on the AES16's input meters, verify your connections, making certain you have valid signal flow from your digital audio source to the AES16's inputs.

11. Support

We are devoted to making your experience with AES16 trouble-free and productive.
If you have questions or comments regarding the operation of your AES16 please check the "Troubleshooting" section of this manual and the FAQ and Troubleshooting topics on the Support section of the Lynx web site at:

http://www.lynxstudio.com/support.html

11.1 Contact us

If you are unable to find information about your problem please send us a support request by filling out the form at:

http://www.lynxstudio.com/supportrequest.html

In your email message include the following information:
• The serial number of your AES16.
• Which operating system you are using.
• The type of computer you are using.
• The name of the application you are using.
• A detailed description of the problem including any error messages you received.

We will provide a response in a timely manner.

Telephone support is available by calling (949) 515-8265 from 9AM to 5PM Pacific Time, Monday through Friday, excluding Holidays. Please be sure to have the above information available before calling.

11.2 Registering your AES16

Lynx is committed to providing you with the best service possible. To help us serve you better, please be sure to register your AES16 using one of the following methods:

1. Fill out and mail the Warranty Registration Card included with your AES16.

2. Use the Online Registration Wizard. To start the wizard, click on Start > Programs > Lynx Studio Technology > Online Registration Wizard.

If you do not have an internet connection on the computer you installed your AES16 in, simply copy the REGISTER.EXE program from the C:\Program Files\Lynx Studio Technology folder to a computer with an internet connection and run REGISTER.EXE from there.

3. Register on the web at:
http://www.lynxstudio.com/support.html

Once you are registered you will automatically receive notifications of new products and upgrades.

11.3 Locating the Serial Number of Your AES16

To register your AES16, you must supply its serial number. The serial number is located on a label attached to the back of the card, and on the shipping carton.

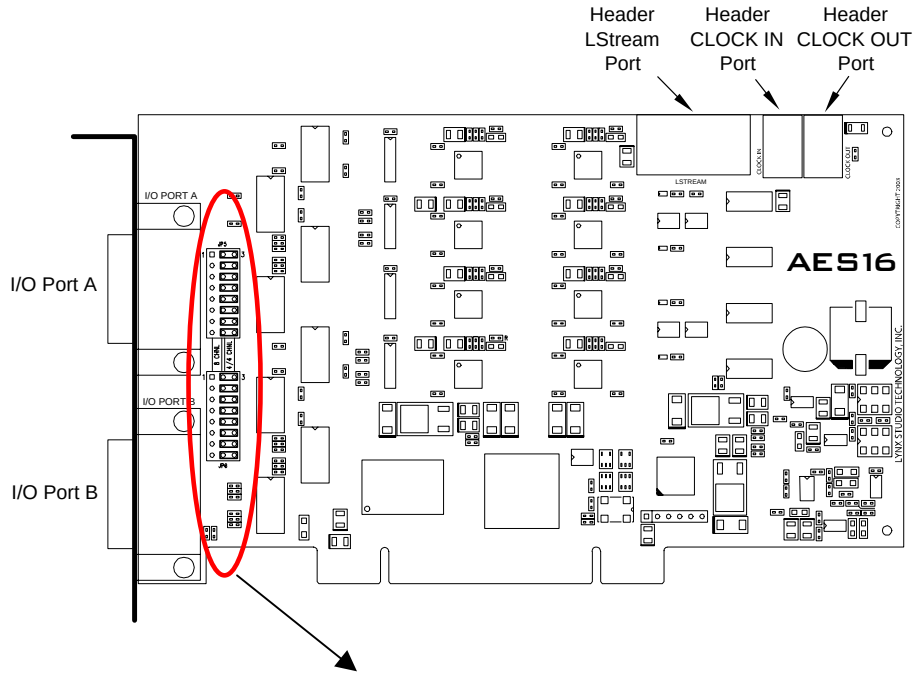
You can also determine the serial number of your card by selecting About Mixer in the Mixer menu of the Lynx Mixer.

When registering with the Online Registration Wizard, the serial number will be automatically entered.

12. Appendices

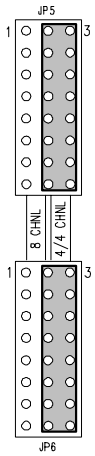
12.1 Configuring I/O jumpers

As stated earlier, I/O Port A and I/O Port B can be configured to support two different I/O routing modes. The routing mode is selected by the position of two 8-position I/O Configuration Jumpers on headers JP5 and JP6. The mode selected must be compatible with the AES16 breakout cable being used.

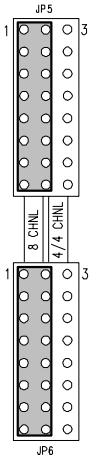


I/O Configuration Jumpers JP5 and JP6

For connections to equipment with D25 connectors supporting four AES/EBU inputs and outputs, both of the I/O Configuration Jumpers should be set to the 4/4 CHNL position on JP5 and JP6 as shown at right. This is the factory default position and is the position required for the CBL-AES1604 and CBL-AES1605 cables.



For connections to equipment with D25 connectors supporting eight channels of input or eight channels of output, the I/O Configuration Jumpers should be set to the 8 CHNL position on JP5 and JP6 as shown below. In this position, I/O Port A provides eight AES/EBU inputs and I/O Port B provides eight AES/EBU outputs. This is the required position for CBL-AES1603.



In either I/O Configuration mode, a clock input signal is available on I/O Port A and a clock output signal is available on I/O Port B. These signals are available on the BNC connectors on CBL-AES1604 breakout cable

12.2 Specifications

DIGITAL I/O	
Number / Type	Eight inputs and eight outputs, 24-bit AES/EBU format, transformer coupled
Channels	16 in/out in single-wire mode, 8 in/out in dual-wire mode
Sample Rates	All standard rates and variable rates up to 192 kHz in both single wire and dual-wire modes
Sample Rate Conversion	Eight channels available with support for conversion ratios up to 16:1. Dynamic range: 142 dB. Multiple-input SRC phase matching. AES16-SRC model only.
ARCHITECTURE	
Core	FPGA-based core contains custom PCI interface, data routing and formatting, device/stream control, digital mixing, clock routing and control, and DMA engine. 256 Kbytes of on-board RAM for data buffering. Support for field upgrades of firmware.
Audio Devices	Card is visible to host applications as eight record devices and eight play devices. Each device has two channels and can be used independently for multi-client functionality.
CLOCKING	
Sources	Digital inputs 1 – 4, external word clock (XLR model only) on BNC, internal word clock on header, on-board low-jitter crystal oscillator
SynchroLock	Multi-stage, VCXO-based clock generation system with high jitter attenuation. Wide mode tracks off-frequency clocks, narrow mode generates ultra-low jitter output for standard frequencies.
ON-BOARD DIGITAL MIXER	
Type	Hardware-based, low-latency
Routing	Ability to route any input to any or multiple outputs
Mixing	Up to four input or playback signals mixed to any output, 40-bit precision
Status	Peak levels to -114 dB on all inputs and outputs.
LSTREAM EXPANSION PORT	
Compatibility	Supports Lynx LStream expansion cards including the LS-ADAT 16-Channel ADAT I/O card
Type	High-speed serial, up to 16 channels @ 24-bits. 14-pin internal connector.
CONNECTIONS	
I/O Ports	Two bracket-mounted 26-pin high-density female D-sub connectors. Can be configured to support eight channel or four channel AES connections.
External Clock	75-ohm BNC word clock input and output provided on XLR breakout cables
Internal Clock	Two 75-ohm board mounted 2-pin headers for word clock input and output
SOFTWARE	
Windows Drivers	Windows 2000 / XP platforms: MME, ASIO 2.0, WDM, and DirectSound
Macintosh Drivers	ASIO 2.0 for OS9 and CoreAudio for OSX
Mixer Application	Multi-window GUI provides complete control of digital mixer and all hardware settings.
GENERAL	
PCI Bus	Version 2.2 compliant
Data Transfers	Up to 132 Mbytes/sec using custom 16-channel, zero-wait state, scatter-gather DMA engine. Bus mastering supported.
Size	5.0” H X 7.4” W X 0.75” D

	(standard half-size PCI card)
CABLES	
Included with AES16-XLR and AES16-SRC	CBL-AES1604 (qty 2): 26-pin high-density male D-sub to four female XLR's (AES inputs), four male XLR's (AES outputs), and two female BNC's (word clock I/O). Six- foot, 110-ohm shielded twisted pair cabling.
Optional cables for AES16 Standard Model	CBL-AES1603: 26-pin high-density male D-sub to 25-pin male D-sub. Supports either 8 channels of input or output. Compatible with Apogee AD16 and DA16. Twelve-foot, 110-ohm shielded twisted pair cabling. CBL-AES1605: 26-pin high-density male D-sub to 25-pin male D-sub. Supports 4 channels of input and output. Compatible with devices with standard Yamaha digital I/O pinout from Yamaha, Apogee, Mackie, and others. Twelve- foot, 110-ohm shielded twisted pair cabling. Other cables to be offered for connection to equipment from Tascam, Sony, and Digidesign

12.3 Safety instructions

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

.

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with nonapproved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment

12.4 EMC Certifications

FCC DECLARATION OF CONFORMITY

TRADE NAME:	Computer Audio Card
MODEL NUMBER:	AES16
COMPLIANCE TEST REPORT NUMBER:	Covered by European Standards Report #B30915V1
COMPLIANCE TEST REPORT DATE:	November 2, 2003
RESPONSIBLE PARTY (IN USA):	Lynx Studio Technology, Inc.
ADDRESS:	711 West 17th Street, Suite H3, Costa Mesa, CA 92627
TELEPHONE:	(949) 515-8265

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If the unit does cause harmful interference to radio or television reception, please refer to your user's manual for instructions on correcting the problem.

I the undersigned, hereby declare that the equipment specified above conforms to the above requirements.

Costa Mesa, California
January 1, 2004

Robert Bauman
Compliance Engineer

EC DECLARATION OF CONFORMITY

MANUFACTURERS NAME:	Lynx Studio Technology, Inc.
MANUFACTURER ADDRESS:	711 West 17th Street, Suite H3 Costa Mesa, CA 92627, U.S.A.
COMPLIANCE TEST REPORT NUMBER:	B30915V1
COMPLIANCE TEST REPORT DATE:	November 2, 2003
TYPE OF EQUIPMENT:	Information Technology Equipment
EQUIPMENT CLASS:	Residential, Commercial and Light Industry
MODEL NUMBER:	AES16
CONFORMS TO THESE STANDARDS:	EN50022: 1998, EN55024:1998 + A1:2001, CISPR 16:1993 IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11
YEAR OF MANUFACTURE:	2003

I the undersigned, hereby declare that the equipment specified above conforms to the above directives and standards.

Newport Beach, California
January 1, 2004

Robert Bauman
Compliance Engineer

13. License Agreement

This legal document is an agreement between you and Lynx Studio Technology, Inc. By opening the sealed board package, or written materials, you are agreeing to become bound by the terms of the agreement, which includes this License and Limited Warranty (collectively the "Agreement"). This Agreement constitutes the complete agreement between you and Lynx Studio Technology, Inc. If you do not agree to the terms of the Agreement, DO NOT OPEN the anti-static bag containing the AES16 board. Promptly return the unopened package and all other items using the original packaging to the location of purchase.

14. Warranty information

Lynx Studio Technology, Inc. ("Lynx") warrants this product to be free of defects in material and workmanship for a period of one year from the date of original retail purchase. This warranty is enforceable only by the original retail purchaser. To be protected by this warranty, the purchaser must complete and return the enclosed warranty card within 14 days of purchase.
During the warranty period Lynx shall, at its sole and absolute option, either repair or replace free of charge any product that proves to be defective on inspection by Lynx or its authorized service representative. In all cases disputes concerning this warranty shall be resolved as prescribed by law.
To obtain warranty service, the purchaser must first call or write Lynx at the address and telephone number printed below to obtain a Return Authorization Number and instructions concerning where to return the unit for service. All inquiries must be accompanied by a description of the problem. All authorized returns must be sent to Lynx or an authorized Lynx repair facility postage prepaid insured and properly packaged. Proof of purchase must be presented in the form of a bill of sale, canceled check or some other positive proof that the product is within the warranty period. Lynx reserves the right to update any unit returned for repair. Lynx reserves the right to change or improve design of the product at any time without prior notice.
This warranty does not cover claims for damage due to abuse, neglect, alteration or attempted repair by unauthorized personnel, and is limited to failures arising during normal use that are due to defects in material or workmanship in the product.
ANY IMPLIED WARRANTIES, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE LENGTH OF THIS LIMITED WARRANTY. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.
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This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.
This warranty only applies to products sold in the United States of America or Canada. The terms of this warranty and any obligations of Lynx under this warranty shall apply only within the country of sale. Without limiting the foregoing, repairs under this warranty shall be made only by a duly authorized Lynx service representative in the country of sale. For warranty information in all other countries please refer to your local distributor. Your warranty will be in effect and you will receive warranty information ONLY IF YOU REGISTER YOUR AES16 as described in the "Warranty Registration" section.

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AES16™ Installation and User's Guide
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