Hilo

MASTERING ANALOG TO DIGITAL / DIGITAL TO ANALOG CONVERTER

User Manual
Including March 2015 Version 7
Firmware and Feature Update

Purchase Date: _____

Dealer Name: _____

Dealer Telephone: _____

Hilo Serial Number: _____

LSlot Serial Number: _____

User Manual
Table of Contents

1 Introduction

Thank you for choosing Lynx Hilo for your audio needs. The device you have received has been precision engineered to provide the very best audio quality possible, coupled with an innovative, intuitive user interface, and a unique and powerful feature set. Hilo is one of the first pro audio devices on the market that utilizes a full-color LCD touchscreen for control, metering and configuration. Far from an unnecessary bit of "eye candy", the touch display allows quick routing and setup, as well as a variety of accurate metering and measurement tools. New features will be available in the form of downloadable firmware updates, keeping Hilo responsive to your needs for many years to come.

1.1 Overview

Hilo represents the zenith of Analog conversion, improving on Lynx's famous Aurora converters with state-of-the-art components and design techniques. The innovative design of the analog stage and converter topology allow ultra-low noise and distortion specifications, producing an unprecedented level of clarity and depth-of-image. Much more than a "me too" stereo converter, Hilo actually features three unique sets of analog outputs, each with their own Digital-to-Analog converters, and independent routing. Main Outs, Monitor Outs and Headphone Outs all can feature a unique combination of sources with independent level controls.

1.2 Features

Hilo also has an extremely generous set of Digital I/O options. Apart from AD/DA conversion tasks, Hilo is one of the most powerful digital format converters/routers on the market. Digital formats include stereo AES/EBU, Stereo S/PDIF Coaxial, Stereo Optical S/PDIF which is switchable to 8-channel ADAT lightpipe, and 16 channels of USB2 communication to a host computer. Any digital input can be routed to any analog or digital output, and all digital outputs can have unique combinations of source inputs.

The unique 480 x 272 pixel LCD touch screen display makes Hilo stand out from other pro audio converters. Never before has establishing parameters and routing channels been so quick and intuitive in a high-end converter. Not only are clear and accurate meters provided, but the user can select from several meter styles. The Hilo display and features can be updated via simple computer firmware update tools, easily accessible from the Lynx website. Hilo's feature set and display options will evolve in response to user feedback and the imagination of Lynx engineers.

Hilo is also a game changer in terms of flexibility. It is well suited for recording studio use, the home recordist, mastering, audio analysis, home theater/audiophiles, as well as field recording. With AC or battery-powered DC operation, Hilo can be used "for here" or "to go". With its lightweight, portable design, no longer does the discriminating user have to choose between top rung sound quality and convenience.

1.3 In the Box

Before proceeding with the Hilo setup, let's make sure that you received everything that was included with the purchase. In the Hilo box, you should find:
- Hilo AD/DA converter
- AC Power Cord
- Hilo User's Manual
- One 6' long Type-A to Type-B shielded USB 2.0 cable

1.4 Power and Safety Information

To prevent fire or shock hazard, do not expose this equipment to rain or moisture. Do not block any of the ventilation openings. Do not defeat the safety purpose of the grounding-type plug. A grounding type plug has two blades and a third grounding prong. The third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet. Protect the power cord from being walked on or pinched, particularly at the plugs, convenience receptacles, and the point where they connect to the Hilo. Unplug this device during lightning storms or when unused for long periods of time.

Hilo utilizes a state-of-the-art universal power supply. The power supply will auto-detect the voltage from 100V to 240V and conform appropriately. No manual voltage adjustment is necessary.

1.5 Rack-Mounting

Hilo can be mounted in standard studio equipment racks using an optional two-space rack shelf available from Lynx.

1.6   Operation Requirements

To operate Hilo successfully with your existing equipment, first let's verify that you have compatible elements for best results.

1.6.1   Audio Equipment Requirements

Hilo features a wide variety of audio I/O formats. Compatibility with these formats are, of course, only important for I/O ports that you intend to use.

- **Headphones:** The Hilo headphone jack (PHONES) is suitable for driving stereo headphones through a ¼" TRS connection. Any standard set of headphones should work with Hilo.
- **Line Inputs and Outputs:** Hilo can operate with balanced or unbalanced, line-level analog audio equipment (power amps, powered speakers, headphone amps, microphone pre-amps, mixing boards, etc.) operating at trim levels of +18 dBu; +20 dBu; +22 dBu; +24 dBu; +0 dBV; +2 dBV; +4 dBV and +6 dBV . The LINE INs and LINE OUTs use XLR connections.
- **Monitor Outputs:** The Hilo MONITOR outputs can operate with balanced or unbalanced, line-level analog audio equipment and use ¼" TRS jacks.
- **AES/EBU Inputs and Outputs**: The Hilo AES IN and OUT ports should work with any AES/EBU compatible device at standard sample rates between 44.1 kHz and 192 kHz. The AES ports utilize XLR connections.
- **SPDIF Inputs and Outputs**: Hilo supports coaxial (electrical) SPDIF connections on RCA jacks, or SPDIF Optical signals on TOSLINK connections.
- **ADAT Lightpipe:** Hilo's TOSLINK Optical connector (S/PDIF/ADAT OPT.) can be software switched between 2-channel SPDIF operation and 8-channel ADAT Lightpipe operation. When ADAT is selected, each input and output port supports up to eight channels at sample rates of 44.1 kHz and 48 kHz, four channels at sample rates of 88.2 kHz and 96 kHz, or two channels at sample rates of 176.4 kHz and 192 kHz.

1.6.2   Computer requirements

Hilo is configured to operate with Mac or PC computer systems via a USB connection. If one wishes to use this connection, check the system requirements below to insure compatibility.

It also 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 or audio playback software, which will likely be greater than those listed for Hilo. Please refer to your audio software's documentation for more information.

1.6.2.1   Windows
- Intel Core 2 @ 1.6 GHz, or AMD equivalent
- PC or laptop manufactured after January 2006
- 1GB RAM
- One functional USB 2.0 port
- Windows XP with SP3 (32-bit only), Windows Vista with SP2, Windows 7, Windows 8 or Windows 10

NOTE: Hilo's USB operation is not compatible with Windows 95, 98, ME or Windows 2000.

1.6.2.2   Macintosh OS X
- Any Intel Processor based MacPro or MacBook computer running OS X 10.6.4 or higher
- 1GB RAM
- One functional USB 2.0 port

NOTE: Hilo's USB operation is not compatible with OS 9 or OS X 10.6.3 or below.

1.6.2.3   iPad
- iOS 7 or higher (this excludes the original iPad)
- Apple iPad 2 or newer
- iPad camera kit for USB connection

1.7   Using this manual

To insure smooth sailing with your new product, we recommend reading through the entire manual before using Hilo. Thereafter, use the manual as a reference as needed when questions arise.

The following typographic conventions are used in this manual:

- ALL UPPER CASE TEXT refers to a specific parameter selection control (i.e. SYNC SOURCE) or a cable connection.
- Text in quotation marks indicates a parameter selection value or menu option (i.e. "EXT").
- Phrases, such as: Start > Programs > Lynx Studio Technology use the greater than symbol (">") to indicate multiple menu options or mouse selections within a software control context.

1.8   Registration

Lynx is committed to providing you with the best service possible. To help us serve you better, please be sure to register your Hilo.

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

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

2   Getting Started

Hilo was designed to be a product that is so easy to use that this section of the manual would scarcely be necessary. However, it is quicker to learn how the device works in one go, then to spend precious minutes figuring things out by randomly pressing buttons. We recommend reading this section thoroughly, before putting Hilo to serious use, if you can manage it.

2.1   Unpacking

Before setting up Hilo for use, remove it from the box and verify that the box contents described in section 1.3 are all present.

If so, connect the Hilo AC power cord to a grounded AC Outlet, or power distribution unit. Switch on the power switch on the back of Hilo (note: the | position on the power button is "On")

Next press the front panel standby switch and verify that Hilo powers up.

If it does not, verify that the selected AC power source is operational. If it is and the unit still will not power up, please contact Lynx technical support.

If Hilo DOES power up, move on to Set up…

2.2   Set up

Hilo was designed to be adaptable to a variety of operational environments: on a desktop for Audiophile enthusiasts, in an equipment rack for recording studios, over a mixing console for a mastering engineer, etc. If Hilo is to be used on a desktop or other flat surface, it is best to leave the pre-installed rubber feet in place. These are designed to prevent scratching of Hilo or the surface that it is set upon.

In a recording studio context, where space is at a premium, one may choose to rack mount Hilo. A rack kit for the Hilo is available from Lynx dealers, or from www.lynxstudio.com.

2.3   Cable Connections

Hilo features a treasury of I/O types, suitable to accommodate whatever audio devices you wish to integrate.
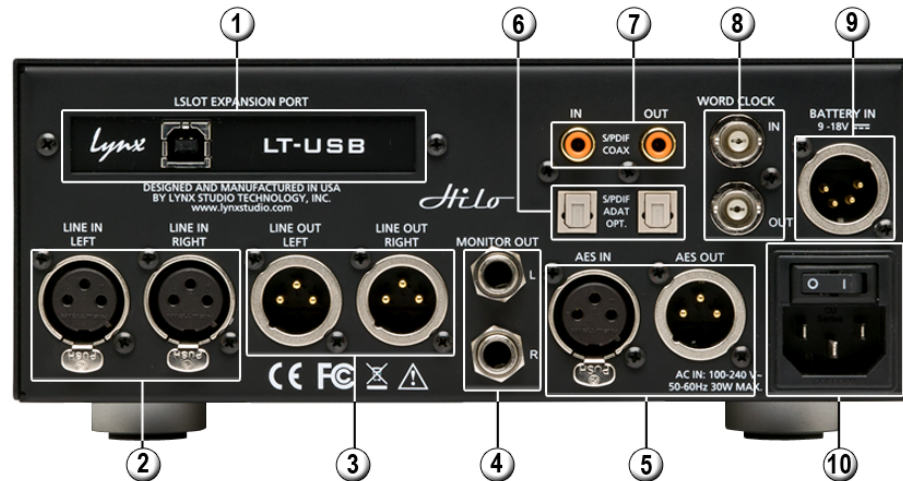
❶ USB 2.0 port
Use the included USB cable or equivalent to connect Hilo to a USB 2.0 equipped computer.
Cable Concerns: If using a third party cable, make sure that it is USB 2.0 compliant. 5 meters (16 feet) maximum.

❷ LINE IN
Use standard XLR cables (i.e. mic cables) to connect to a line level, balanced signal source. This input is not suitable for use with microphones, unless a microphone pre-amp is used to get mic-level signals up to line-level. Cable Concerns: If your signal source is unbalanced, consult Appendix to determine if your cables are wired correctly for use with Hilo. For unbalanced cables, 4.5 meters (15 feet) is the maximum recommended length.

❸ LINE OUT
Use standard XLR cables (i.e. mic cables) to connect to a line level, balanced signal destination. Cable Concerns If your signal source is unbalanced, consult Appendix to determine if your cables are wired correctly for use with Hilo. For unbalanced cables, 4.5 meters (15 feet) is the maximum recommended length.

❹ MONITOR OUT
Use standard ¼" cables. TRS if balanced, standard ¼" TS if unbalanced.
Cable Concerns: For unbalanced cables 4.5 meters (15 feet) is the maximum recommended length.

❺ AES IN/OUT
Use AES XLR cables (110 Ω). Insure that the connected device supports AES3 or AES/EBU. Cable lengths of up to 100 meters (328 feet) are acceptable.

❻ S/PDIF/ ADAT Optical
Use standard TOSLINK optical cables, of lengths up to 9 meters (30 feet).

❼ SPDIF Coaxial In Out
Use 75 Ω S/PDIF cable with RCA connections. Recommended maximum length is 6 meters (20 feet)

❽ Wordclock In/Out
Use standard 75 Ω wordclock cable with BNC connectors. Recommended maximum length is 9 meters (30 feet).

❾ Battery In
DC 4-pin XLR battery pack connector. Supports 9-18 volts DC. See Appendix 5.1 for more information.

❿ IEC Power connector
Use the included AC power cord

In Addition to the rear panel jack pack, there is one remaining cable connection on the Hilo front panel. The PHONES jack is a standard ¼" TRS connector, and is capable of driving the full range of stereo headphones available.

2.4   Initial Setup

It is important to set up Hilo in the proper order to avoid any speaker damage calamities. Follow these steps for the best results:

- Connect the AC power cord to Hilo and to a quality, surge-protected AC power source. Check the Power and Safety section of this manual for additional information.
- Connect cables from Hilo to whatever audio devices Hilo will be connected to. These could include powered speakers, mixing consoles, power amps, microphone pre-amps, effects processors, etc.
- Make sure volumes are turned down on connected equipment to avoid excessive level being sent to the equipment during setup.
- If the context of use is as a standalone AD/DA converter that will not be connected to a computer, skip ahead to section 3, and in particular section 3.4.8: Output Mix Routing Page, for appropriate routing assistance.
- If using Hilo with a Mac or PC computer, follow the installation procedure below.

2.5   Computer Set Up

All driver files and utilities mentioned in the subsequent installation steps are available on our website at:
http://www.lynxstudio.com > Support > Downloads
If a previous driver version is present, it will automatically be removed as part of the driver installation process.

Note: No driver installation is required for OS X or iOS, only for Windows.

2.5.1   Driver Installation for Windows XP, Vista or Windows 7/8/10

1. Power on Hilo with the USB cable disconnected. The Hilo driver should be installed prior to connecting the cable.
2. Download the most recent driver from the http://www.lynxstudio.com website and save the file to a convenient location.
3. Double-click the downloaded HiloSetup.exe file.
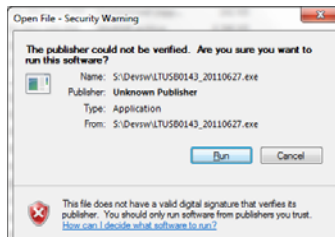
4. Click "Run" on the following screen to launch the installer.

5. Accept the "End User License Agreement" to proceed.
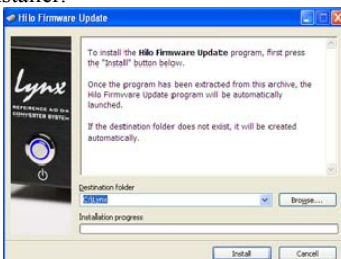
6. Click "Install" to accept the default directory for program files.
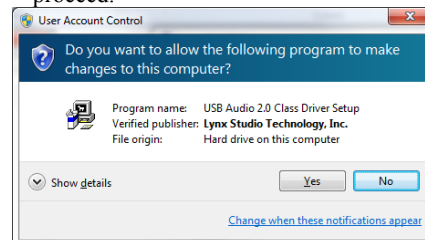
7. After some time the following prompt will appear to allow changes to your computer. Click "Yes" in order to proceed.

8. After some time, the Installation Wizard will appear. Choose "Next" to proceed.
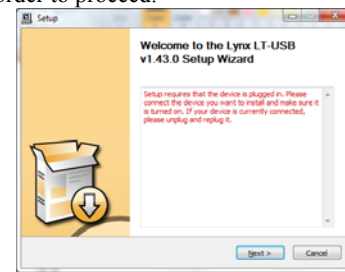
9. After a pause, you will be prompted to connect the USB device. Connect the USB cable from the Hilo to a vacant USB 2.0 port on your computer. Then click "Next".
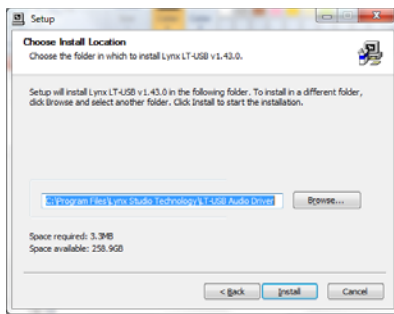
10. In a few moments, you will be prompted to accept the installation directory. Click "Install" to proceed.
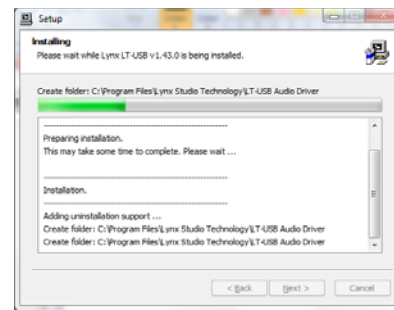
11. The driver files will be written to your hard disk.

12. When the installation completes, click "Next".

13. Click Finish when prompted.

You may receive a warning that the driver has not been digitally signed by Microsoft. It is safe to disregard this warning and select "Continue Anyway."

On some systems the Windows hardware wizard will launch post driver installation. In this case, run the wizard using the "Automatic Installation" option, accepting the defaults, until it completes. Skipping this step may cause the driver to function incorrectly.

2.5.2 Hilo Driver Devices – Windows Operating Systems

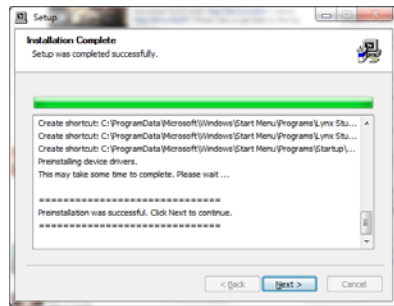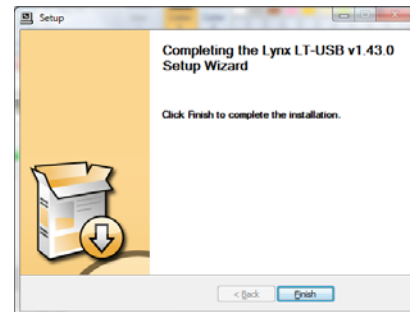Hilo was designed to provide maximum compatibility with the most popular audio and multimedia applications that use the Windows WDM (which includes both DirectSound and MME) and ASIO driver standards. It is crucial that the applications are set up correctly for optimal operation.

WDM was developed by Microsoft and is used most typically by media playback applications, such as Windows Media Player, iTunes, Quicktime Player, as well as the default format for media players like J River Media Center, FooBar, Media Monkey, etc.

ASIO was developed by Steinberg, and was designed to address the low-latency and high channel count needs of Pro Audio and Music Production. ASIO is an option for Audio Production applications such as Pro Tools, Cubase/Nuendo, Sonar, Samplitude/Sequoia, Audition, etc. These applications may also support MME or DirectSound, but when the option exists, we recommend using ASIO for the best performance.

2.5.2.1 WDM/Multimedia Applications

Hilo can be used as a playback device for most popular multimedia, home theater and consumer audio applications. Some such applications allow selection of specific playback devices. In these cases, one or two Hilo 8-channel play devices will be available to choose from, depending on whether Hilo is in 8 or 16 channel mode (see section 3.55- LT-USB Mode). These devices are labeled as "Lynx Hilo Speakers" and "USB Play 9-16". These are 8-channel devices capable of playing back multi-channel streams, like surround sound, but can also be easily used for stereo playback. When "Lynx Hilo Speakers" is selected as the play device, stereo audio will stream to Play 1+ and with "USB Play 9-16" stereo audio will stream to Play Device 9+10. It is generally advisable to choose "Lynx Hilo Speakers" with any WDM program, as this will insure that audio streams to every analog and digital output on Hilo. If you wish to route a stream to a particular output, you can choose "USB Play 9-16" and route that to the desired physical output from the Output Mix Routing Page, as described in section 3.4.8 Output Mix Routing Page.

When output device selection is not an option, it can be assumed that the application uses the Windows default audio device. In this case, "Lynx Hilo Speakers" or "USB Play 9-16"should be established as the system playback default from:

> With Windows XP navigate to:
> Start > Control Panel > Sounds and Audio Devices > Audio > Sound Playback: Default Device = "Speakers Lynx Hilo" or "USB Play 9-16".

With Windows Vista/Windows 7 Windows 8 and Windows 10 navigate to:
Right-click Start > Control Panel > Hardware and Sound > Sound > Playback. Right-Click "Speakers Lynx Hilo" or "USB Play 9-16" and choose "Set as default device".

2.5.2.2   ASIO Application

When using an application that supports the ASIO driver standard, one must specify the Hilo ASIO driver as the appropriate audio device. Once that is established, multiple stereo input and output devices will be available for use within the application. Please note: the LT-USB Mode from the Hilo "Tools" page will determine whether 8-channels or 16-channels of I/O are presented.

When using an ASIO compatible program, the appropriate ASIO device must be selected from a settings or options menu in the application. The correct choice would be "ASIO Lynx Hilo USB".

Many ASIO applications provide access to an ASIO Control Panel for the device being used. For Hilo, this button will launch the Hilo Control Panel, as detailed below.

2.5.2.3   Hilo Control Panel

The Hilo Control Panel provides access to operational parameters for the Hilo, including setting buffer sizes to control latency. Latency in an audio interface can be defined as the time required to process a sample from an application to the interface's audio output. A number of factors determine the achievable latency performance of a Hilo system: processor speed, operating system, sample rate, number of utilized record or play channels, system efficiency, etc.

Latency can be manipulated by changing the size of the buffers used to transfer data to and from the LT-USB card installed into Hilo.

The Hilo USB Control Panel provides access to buffer settings, both a Streaming Mode for WDM and ASIO, and also an ASIO Buffer Size control. This control panel can be launched from either the ASIO control settings within most audio applications or from "Start> All Programs> Lynx Studio Technology > "Hilo USB Control Panel".

There are three tabs in the Hilo Control Panel
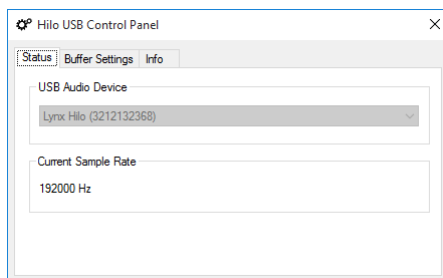
The STATUS page simply reveals the "USB Audio Device" (Lynx Hilo in this case), and the current "Sample Rate". The sample rate cannot be changed here, it is information display only.
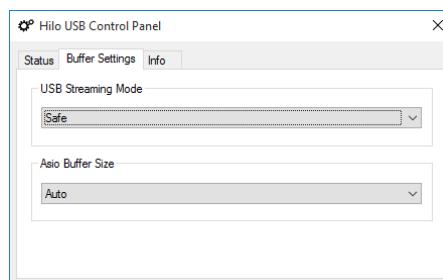
In the BUFFER SETTINGS page, the USB Streaming and ASIO buffer parameters control the size of the audio packets that are used to transfer audio to the LT-USB hardware. Smaller buffer sizes will give you lower latency.

However, if a buffer size is too small for the system or context, audio anomalies such as clicks and pops may occur. It is recommended to become familiar with altering the LT-USB buffer size to best suit the context of use.

When using ASIO based applications, both the Streaming and ASIO buffer sizes contribute to the overall latency of the system and interact in a cumulative fashion. It is not possible to set the stream buffer to a value smaller than that required for the ASIO buffer size.

When using WDM based applications, only the Streaming buffer size parameter contributes to the overall latency of the system. The ASIO buffer size is ignored. Most WDM applications also add a large amount of additional latency to ensure clean playback. For this reason, ASIO is the preferred driver model for pro-audio and low-latency situations.

To modify the latency, the "Streaming" buffer size must first be set. Choose the desired size and click "Apply". We recommend setting this value to "Low Latency" in order to have the greatest flexibility in ASIO buffer size selection. If clean audio is not possible in this state, increase the stream buffer size to "Standard". Once the Streaming size is set, you will have various options for the "ASIO" buffer size. Choose the appropriate size and click "Apply". The default state for this value is "Auto". Auto chooses a safe buffer size based on the stream buffer size selected and the sample rate being used. Once you have determined the smallest supported

Stream Buffer size, you typically *will not* have to change this again. The ASIO buffer size, however, may need to be increased or lowered from time to time depending on the context of use.

Once you determine the lowest achievable buffer size, *you will typically have to double the size each time you double the sample rate, but the effective latency will remain constant*. For example, if a system is capable of operating at a buffer size of 128 samples at 48 kHz, then for a 96 kHz project, the buffer size will likely need to be increased to 256 samples.
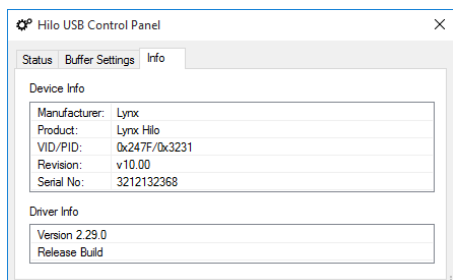
The third tab in the Hilo Control Panel opens the INFO page. This page simply reveals the connected product (again Hilo), the Revision of the LT-USB (its firmware version), serial number and driver build.

2.5.1   Installation for Macintosh OS X

Hilo will operate as a Core Audio device under OS X automatically without any driver installation required. Core Audio is the dominant audio driver model for OS X, and is used for media playback applications as well as Pro Audio applications.

Simply connect the USB cable from Hilo to your Mac OS X computer and Hilo will be immediately available for use. Please note that Hilo does require OS X version 10.6.4 or above.

2.5.1.1   OSX Audio Applications

Hilo can be used as a playback device for most popular multimedia, home theater and pro audio applications. Some such applications allow selection of specific playback devices. In these cases, a Lynx Hilo output device can be selected from the appropriate device selection menu.
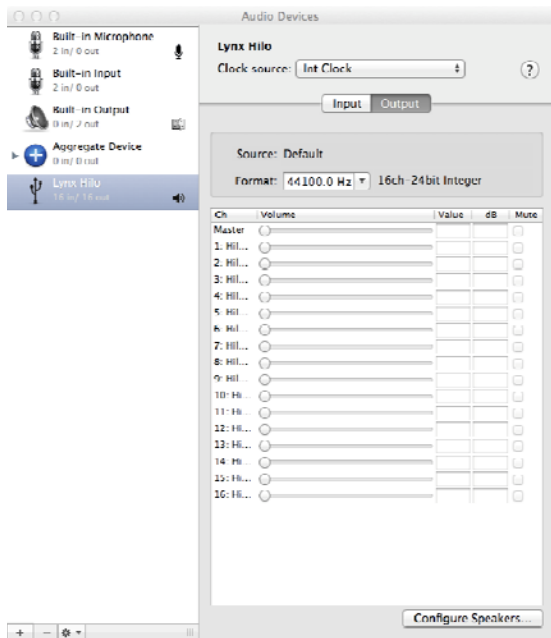
In cases where the playback software does not provide access to output selections, the default output devices for the operating system will be used. In OS X, the audio out default device can be established from Applications > Utilities > Audio MIDI Setup.

When the Lynx Hilo is selected as the output sound device, channels 1&2 are active by default. In this state, audio will be sent to ALL Hilo outputs simultaneously. If you wish to mute a stream to a particular output, you can do that from the Output Mix Routing Page, as describe in section 3.4.2 Output Mix Routing Page.

2.5.1.2   Controlling Latency by Changing the Buffer Size

Latency in an audio interface can be defined as the time required to process a sample from an application to the interface's audio output. A number of factors determine the achievable latency performance of a Hilo/LT-USB system: Processor speed; Operating system; Sample rate; Number of utilized record or play channels; System efficiency; etc.

Latency can be manipulated by changing the size of the buffers used to transfer data to and from Hilo. Core Audio buffer size controls are offered within most pro audio recording applications. With Hilo, buffer sizes typically range between 32 and 2048 samples.

Smaller buffer sizes will give you lower latency. However, if a buffer size is too small for the system or context, audio anomalies such as clicks and pops may occur. It is recommended to become familiar with altering the Hilo buffer size to best suit the context of use.

Once you determine the lowest achievable buffer size, *you will typically have to double the size each time you double the sample rate, but the effective latency will remain constant*. For example, if a system is capable of operating at a buffer size of 128 samples at 48 kHz, then for a 96 kHz project, the buffer size will likely need to be increased to 256 samples.

2.5.2   Installation for iPad

Hilo can connect to an Apple iPad with the camera kit. Hilo will operate as an audio device under iOS automatically without any driver installation required.

Simply connect the USB cable from Hilo to your iPad, and Hilo will be immediately available for use. There is no capability in iPad applications to select audio devices. Any audio that plays from the iPad will automatically be routed to the Hilo through the camera connection kit/USB cable.

3   Using Hilo

Hilo's Touch Screen gives it a key advantage over other converters. As all of the functions are controlled by the software that runs the touch screen, Hilo is not locked into just one way to work. We can add features. We can change the graphics. We can offer completely different user interfaces for different types of users. So the Hilo user interface in five years may be radically different than today's Hilo. In short, it will evolve. You can help us with this. As you have ideas, suggestions, complaints, comments, send them to hilo@lynxstudio.com. This email will go to the engineering, marketing and support staff who built this interface.

Hilo was designed for ease of use, without navigational clutter on the front panel.

The heart of the Hilo system is the 480 x 272 pixel front panel touch screen. This is where settings, routing, volume control and meters are displayed and managed. The Hilo screen is responsive to pressure. It may take a little getting used to the amount of pressure and accuracy required for the on-screen buttons to respond. Also, like any such device, Hilo employs navigational conventions that, although designed to be intuitive and require little or no explanation, may require a small learning curve initially.

3.1   On Power Up

Upon turning on Hilo, the first screen that you will see will be the METER page that was last selected when the unit was turned off. The dual Horizontal Meter set is shown below.

3.1.1   Headphone and Monitor Out Volume Control

If you turned Hilo off using the STANDBY switch on the front panel, all of your previous settings will be recalled. Your Headphone and Monitor Out levels will be the same as when you last used them.

Caution: *Be sure to check the volume level of the Headphone and Monitor before playing audio. You can do this by simply turning the Rotary Control. A level indicator will appear at the bottom of the screen.*
The Hilo PHONES Output has "jack sense", so that the headphone volume controls are only available when headphones are plugged in. If headphones are not plugged in, then the Rotary Encoder will only control the Monitor Out level. If headphones are plugged in,

then pushing in the Rotary Control knob will allow you to toggle between Headphone and Monitor Out Volume Controls by default. This can be changed from the KNOB SETTINGS button, see section 3.76; Knob Settings.

3.2　　Changing the Meter Page

At this time there are four metering options:

Analog VU
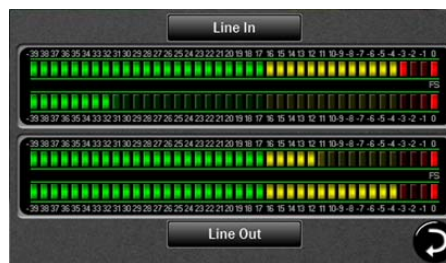
Horizontal Bar Style

All I/O
The "All I/O" Meter Screen now shows the active USB channels. Hilo can be toggled between USB 8-channel mode (the default) or 16-channel mode. 8-channel mode is appropriate for most users, supports sample rates up to 192 kHz and also DSD operation. 16-channel mode is most beneficial for users requiring more USB channels particularly when using Hilo's ADAT I/O. In 16-channel mode, the highest supported sample rate is 96 kHz. 8-channel and 16-channel mode can be toggled from the Tools menu.
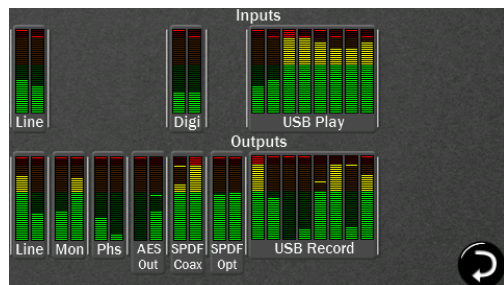
USB 8-Channel Mode (Hilo Default)

For use with USB at sample rates up to 192 kHz and for DSD playback.
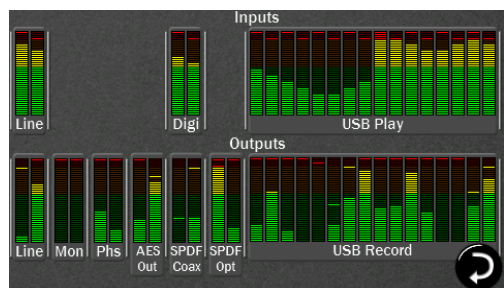
USB 16-Channel Mode

For 16 USB input and output channels at sample rates up to 96 kHz. Ideal for using the ADAT optical I/O on Hilo.

Note: If you are in 16-channel mode and turn DSD playback on, Hilo will automatically prompt you to switch to 8-channel mode to access the high sample rates required for DSD playback.

RTA
The Hilo RTA Meter is new for firmware revision 7. This is a professional 30-band Realtime Analyzer.
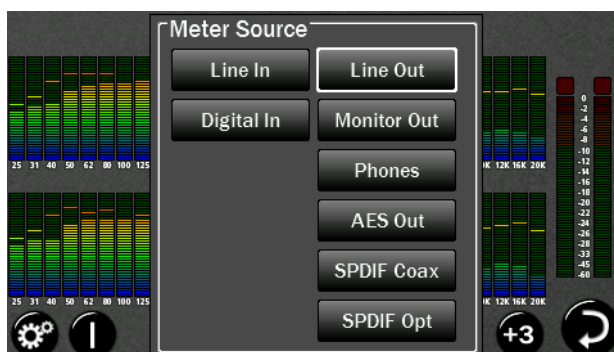
RTA view presents the user with a high resolution Analysis Tool. This is an expanded version of the RTA that is available for the Hilo touchscreen display.

The stereo 30 band Real-time Spectrum Analyzer (RTA) is a very useful diagnostic and reference tool. The Hilo RTA computes the RMS energy in 30 frequency bands for left and right channels of a selected stereo input or output every sample period. This is a brilliant tool for mixing, mastering and even system troubleshooting. The RTA display can be customized with several parameter controls. Tapping the icon, brings up the RTA parameter settings window. Options are:
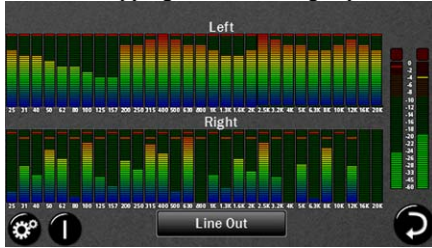
Peak Hold Reset: The Peak Hold controls can be set to Auto, or Manual. In Manual Mode the user can press "Reset" to capture the peak levels at any point in time.
Color Scheme: Allows the display to be toggled between the mono-chromatic "standard" display, and the multi-chromatic "Rainbow" display.
Scale: Allows boosting or cutting the program material in 3dB increments to get the best meter reading. Amount of cut or boost is displayed in the text to the right of the buttons. There are also +3 and -3 buttons on the right side of the display for the same purpose.

To change the meter type, tap the meters on the screen, and the Meter Type menu will appear:

Touch on the type of meter you would like to see. The new meter will instantly appear. If no selection is made, clicking anywhere on the Touch Screen outside of the menu will cause the menu to close.

3.2.1   Choosing the Meter Source

You can select any Input or Output Source to be shown on the Analog VU, Horizontal and RTA Meters.

3.2.1.1   For the Analog VU Meters:

Touch the Monitor Source Selection button that is centered at the bottom of the screen. Before touching the button, it will show the current selection. A Pop-up will appear with two sets of input sources on the left and six sets of output sources on the right.

Tap on the input or output source you need. The meter will reset and the Pop-up will close. The Monitor Source Selection button now shows your new selection. The Pop-up will remain on the screen until you either make a selection, or tap outside of the menu in order to close it.

3.2.1.2   For the Horizontal Meters:
This is the same process, but you can select different sources for each meter pair.

Touch the Monitor Source Selection button that is centered at the top of the screen for the upper meter set or the Monitor Source Selection button that is centered at the bottom of the screen for the lower meter set. Before the buttons are pushed, they will show the current meter selection. A Pop-up will appear with two sets of input sources on the left and six sets of output sources on the right. These are the same options as for the Analog VU meters. Tap on the input or output source you need. The meter will reset and the Pop-up will close.

Use the same procedure for the other meter set. The Pop-up will remain on the screen until you either make a selection, or tap outside of the menu in order to close it.

3.2.1.3   For the RTA Meters
Tap on the input or output source you need. The meter will reset and the Pop-up will close. The Monitor Source Selection button now shows your new selection. The Pop-up will remain on the screen until you either make a selection, or tap outside of the menu in order to close it.

3.2.1.4   For the All I/O Meters
With the All I/O meter page, no selection is needed as all input and output sources are shown. The All I/O page is useful for different reasons. When setting up your routing (explained later) this page gives you a global view of what input channels are active and which

outputs are receiving audio from at least one source. Please note that the ADAT I/O will not be visible in the All I/O page. The ADAT input meters may be seen in the Test Tone page.

3.3   Getting to the Menu Pages

The ![icon] in the lower right corner of any Meters page will send you initially to the Home page. Thereafter this will send you to the last Menu page that you accessed.

The bottom of the menu pages has five round buttons which allow you to navigate between menu pages.

The Meter button on the far left returns you to the active meter page. The four buttons on the right select menu pages, each with up to 8 functions.

These five buttons, when pressed, bring up the following pages:

	Meters	Immediately changes the screen to the last selected meter set.
	Display	Allows settings that customize the information and format of the LCD Screen.
	Information	Displays useful status about Hilo and its operation.
	Tools	Scene/routing memory and other, well, tools.
	Home	Basic settings and routing.

3.3.1   Menu Screen conventions:

When you engage a button, it "lights up", just as if you are pushing a button on a console. The last button touched or changed will always light up when that Menu page is selected.

Most buttons have a dual purpose. First they display the control's current setting. Second by touching them, you can select a different setting.

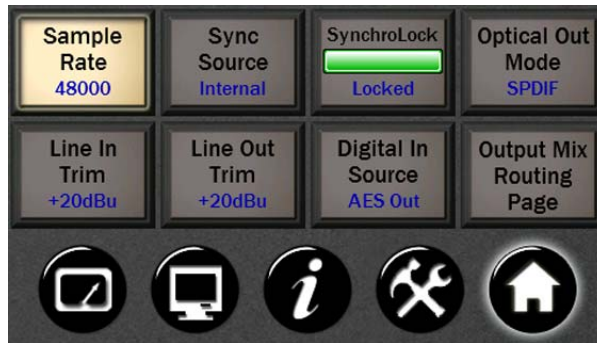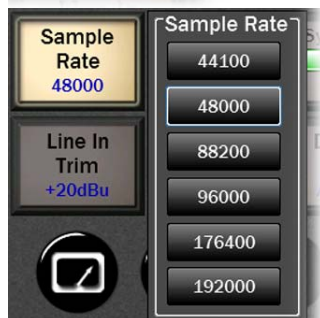## 3.4   Home Menu

3.4.1   Sample Rate

Hilo will display the sample rate that it is currently operating at. If clocked externally, this may be the sample rate being generated by the clock source. If clocked Internally, the sample rate may reflect the rate of audio being played or the rate requested from an audio software application.

If Hilo has the Sync Source set to Internal, then one can manually choose a sample rate by pressing the Sample Rate button and tapping on the desired rate, unless Hilo has a valid USB connection to a computer. In this case, the sample rate needs to be set from the active audio application or as a global setting in the OS.

Note: 176.4 kHz and 192 kHz are available only via USB when the LT-USB is set to 8 channel mode (on the Tools menu page).

3.4.2   Sync Source

This button will show the currently selected Sync Source.

When you push the Sync Source button, you may select any of six possible clock sync options. If a clock source is valid, a sample rate will appear next to that selection. For instance, if a clock source is connected to the Hilo word clock input, next to "Word Clock" there would appear the sample rate that the clock source is generating.
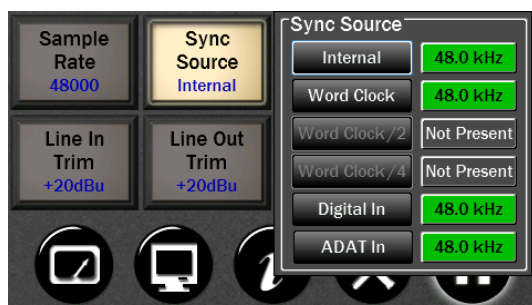
When the LT-USB is **NOT** connected to the computer, the Sync Source may be changed to one of the following four choices:

- Internal: Clock driven by the Hilo's crystal oscillator.
- Word Clock: Clock derived from the **WORD CLOCK** input.
- Wordclock/2 and Wordclock/4: These are currently not implemented in the Hilo firmware.
- Digital: Clock derived from the active digital input.
- ADAT In: Clock derived from the ADAT input. Once an ADAT signal is detected on the Optical Input, Hilo automatically switches the Optical input from S/PDIF to ADAT. In this mode, the additional ADAT inputs appear as available channels on the output mix routing page; meter source selection and the test tone page.

The box next to each clock source will display the clock rate when that port has a valid clock source attached. If that clock source is selected, that rate will become the current clock rate for Hilo. If Hilo detects that a specific Sync Source is not valid, that Sync Source button will be disabled and "Not Present" will be displayed next to it.

Please note: when Hilo is connected to a computer via USB, Sync Source can only be changed by disconnecting the USB cable. In this state the SYNC SOURCE button is crossed out, indicating a disabled parameter.

3.4.3   SynchroLock

Lynx's SynchroLock™ technology is a very effective form of jitter reduction for digital signals. Jitter is a type of clock error that may potentially result in distortion in an audio signal. SynchroLock reduces jitter by a factor of 3000:1 by using the Hilo's high resolution crystal oscillator to generate a clock signal that is phase locked to the external clock.

Compare this to attenuation of 100:1 or less for professional quality analog phase-lock loops (PLL) that are used by most Pro Audio devices. As long as the clock frequencies are within +/- 100ppm of Hilo's supported sample rates, SynchroLock will operate on the clock signal, and insure a low-jitter clock drives the Hilo and is also sent to devices downstream (i.e. clock slaves to the Hilo).

The SynchroLock operation is a two-stage process, starting with a fast-locking analog PLL to insure that there is clock sync immediately when a Sync Source or Sample Rate are selected, and concluding with the digitally controlled crystal-based secondary stage. It is normal for SynchroLock to take 1-2 minutes to achieve full lock.

There are four possible states for the SynchroLock button.

Locked

Either Hilo is operating off of its Internal clock, or SynchroLock has achieved full lock to the specified external clock source. In this state, playback and recording of audio is possible.

Working

Hilo is operating off of its Analog Phase Lock Loop to lock to the incoming clock signal, while the SynchroLock circuitry is performing analysis on the incoming clock signal. This may continue for 1-2 minutes. In this state, recording of audio is discouraged. Playback is acceptable, but it should be noted that there will be an audible glitch the moment that full lock is achieved. "Working" will occur every time a new Sync Source or Sample Rate is selected unless SynchroLock has been disabled or the Sync Source is set to Internal.

Range

This indicates that the selected external clock signal is operating outside of SynchroLock's usable range. If this state is persistent, it is advisable to stop using the clock source responsible.

Disabled

The SynchroLock circuitry has been disabled by the user. In this state, the Hilo will only clock via the Analog PLL when external Sync Sources are chosen. Pressing the SynchroLock button will toggle between Enabled and Disabled. Generally, disabling SynchroLock is not recommended for the best performance.

When Hilo is connected to a computer via USB, SAMPLE RATE and SYNC SOURCE are to be controlled from software, either globally in the OS or from within an audio application, and the SYNCHROLOCK state also should not be altered. Therefore, these three controls will appear "crossed out" whenever the connection to a computer is active. To change these settings manually, one would need to disconnect the USB cable or power down the computer.

3.4.4   Optical Out Mode

Hilo's Optical inputs and outputs can be used for either stereo SPDIF or 8 channels of ADAT (at 48 kHz). Hilo also supports the S/MUX protocol for ADAT Lightpipe operation at higher sample rates. The ADAT Ports support 4-channels at sample rates of 88.2/96 kHz, and 2-channels at sample rates of 176.4/192 kHz.

Output on Right.

This button shows the currently selected status of the Optical Output and allows the selection of either S/PDIF or ADAT. Pushing the button brings up the Pop up window to change the Optical Out mode.

3.4.5   Line In Trim
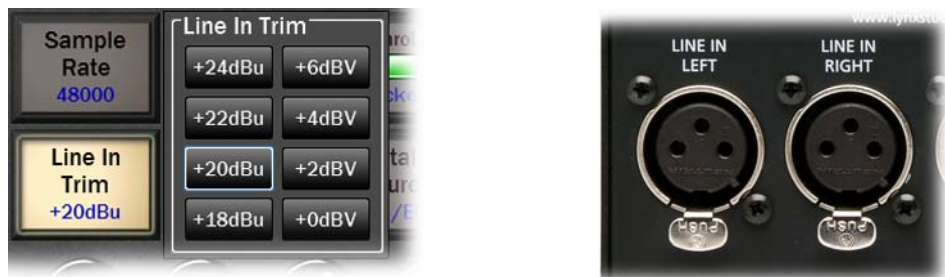
Line In Trim can be set to any of eight preset trim settings. The Line In Trim button shows the currently selected trim level, the same for the Left and Right inputs.

There are four Pro Level settings: +18 dBu; +20 dBu; +22 dBu; and +24 dBu. There are four additional levels most often used on Consumer Audio products: +0 dBV; +2 dBV; +4 dBV and +6 dBV.

When the button is pushed, a Selection Window pops up. Pushing the desired Level button resets the inputs and immediately indicates this on the Line In Button. You will typically hear a relay click from inside Hilo when a selection is made.

Note: These are 0dBFS (full-scale) level settings, as opposed to nominal levels.

Trim pots are available to fine tune these inputs. See Appendix 5.2 for more information.

3.4.6   Line Out Trim
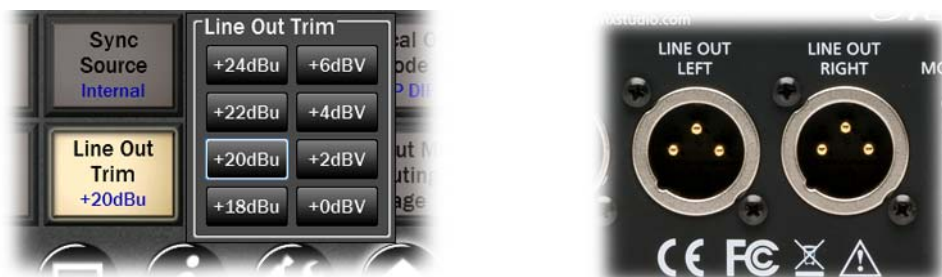
Line Out Trim can be set to any of eight preset trim settings, the same as for Line In.

This works exactly the same as the Line In Trim. Push the button and make your selection.

Note: Each Line In and Line Out Trim can be adjusted ±0.5 dB of the established trim settings using the trim pots that are located on the bottom of the circuit board. See Section 7.3: Setting Trim Pots for more information.

3.4.7   Digital In Source

Hilo offers a choice of AES or S/PDIF as the digital input source. With S/PDIF you have the option of Coax or Optical Inputs.

Before being pushed, this button shows the current selection. Upon pushing the button, you can select: AES; S/PDIF Coax; or S/PDIF Optical. If selecting SPDIF Optical, the Optical Out mode must be set to SPDIF. See Section 3.4.4.

Note: You do not need to make this choice for outputs, as all three digital outputs are independently available and assignable.

3.4.8   Output Mix Routing Page
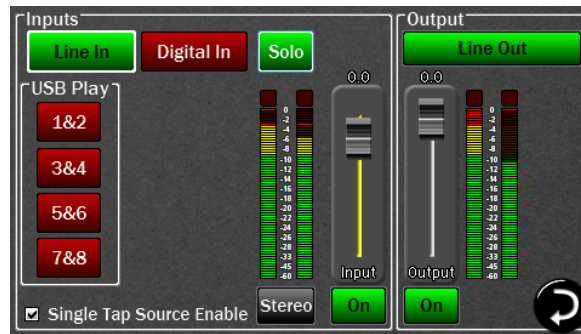
Now this is where it gets interesting. Although Hilo is, at first glance, a two channel AD/DA converter, it is really much more and this page gets down to the nitty gritty.

The Output Mix Routing page is where any combination of Hilo's inputs can be routed to any combination of Hilo's outputs. The principle here was to make the various I/O formats as independent as possible, very little is "hard-wired". This is not simple point-to-point patching. Multiple sources can be merged to a single output. Levels can be set and adjusted for all input sources and outputs. Sources can be mirrored to multiple outputs. Sources and outputs can be muted. This is why Hilo has an internal 32 x 32 channel mixer. This is where you get to use it.

First a few conventions:

    RED buttons mean that the associated signal source or output is OFF or MUTED.

    GREEN buttons mean ON or UNMUTED.

    A WHITE LINE around a button means this is the channel is in focus, and can be acted upon by the faders or ON/OFF switch below the fader.

As you can see, the page is divided into input sources on the left and outputs on the right. What we are seeing here is which input sources are assigned to the displayed output. We are not turning inputs On and Off, we are turning the connection between an input and output On or Off. Think of it as a patch cable.

The ON/OFF button on the Inputs side patches that input source to the active output. On the Output side, the On/Off button mutes or un-mutes the selected output.


In the Graphic above, we see the Line In as well as USB channels 1&2 being routed to the Hilo's Line Out.

3.4.8.1   Monitor Source Modes

The default state for each input source is stereo, with two channels of input, streaming through a two-channel output.

There are 4 different options for routing an input signal to an output. These selections pertain to the operation of a specific input source routed to a specific output. The setting is not global, and must be set for each output that is being used.
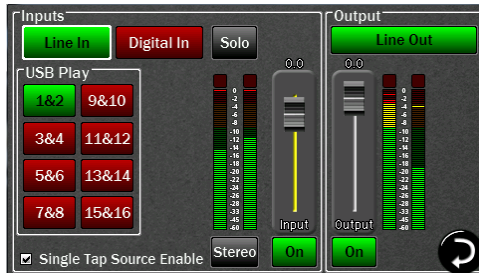
Select the Output channel that you wish to listen to, then press the desired input source (in this example, Line In).
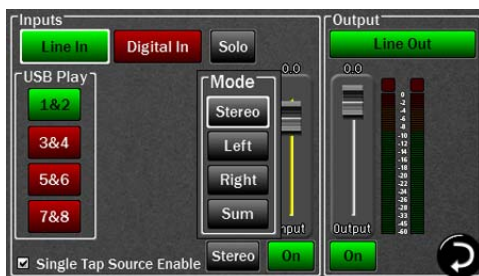
Then tap the Stereo button under the input meters. You can now choose between:
- Stereo (default).
- Left –audio from the Left input channel (in this case Line In Left) streaming to both output channels.
- Right –the Right input channel streaming to both output channels.
- Sum – combining both the Left and Right inputs into one Mono stream which is sent to both the Left and Right outputs equally. The summed signal is automatically attenuated by 6dB in order to reduce the possibility of digital clipping.
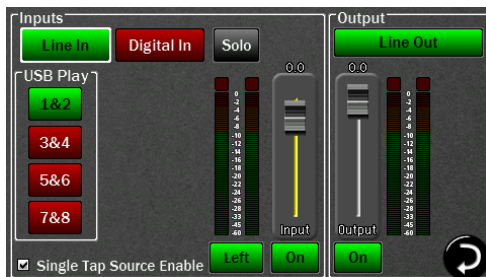
The chosen option is shown on the button at the bottom of the Input meters any time that input channel is selected.

Each input channel can be controlled and assigned independently for each output.

For example, you can have Line In "Summed" sent to the Monitor Output, while having Line In "Stereo" assigned to the Headphone Output. This flexibility allows complex routing to be achieved very easily.

3.4.8.2   Solo Button
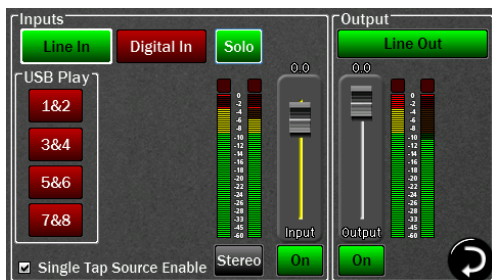
The Solo button allows any active input channel to be isolated. This allows very rapid comparison of sources, A/B switching, and a convenient way for troubleshooting audio anomalies.

Simply press the Solo button and it will engage and turn green with the word "Solo" blinking.

In this state, press any input source button and you will hear that audio exclusively. Pressing any other input source will instantly switch to the alternate source.

When done, tapping the Solo button returns Hilo to the previous state, where multiple input sources can stream to an output simultaneously.

3.4.8.3   Input Sources

This is for signals from the Analog Line In ports.

Of the three stereo digital formats: AES, SPDIF Coax and SPDIF Optical, only one can be active at a time. This is selected from the "Digital In Source" button from the Home menu.

These sources correspond to USB play devices that will appear in the host computer. Unlike most computer audio interfaces, with Hilo these sources are user routable for maximum flexibility.

Upon installation, each pair of computer play devices will be pre-assigned to physical outputs on Hilo. In addition, the first channel pair, USB 1+2, will deliver audio to every output on Hilo. This is very useful for initial set up, whether you are listening to the headphone out, a digital out, monitor outs, whatever – you will get audio when you choose 1+2 as the play device.

When Hilo is in 8-channel LT-USB Mode, USB channels 1-8 are visible and available.

When the 16-channel USB Mode is engaged, all 16 USB input and output channels are visible and available.
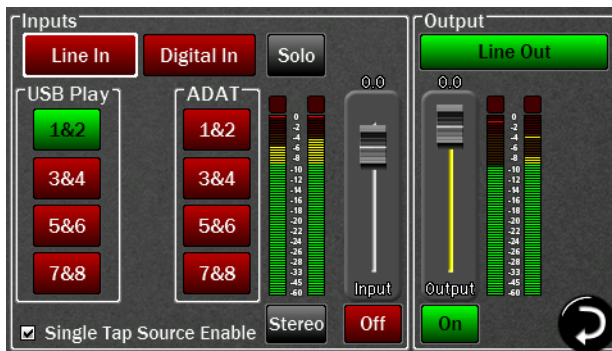
If a valid ADAT lightpipe signal is detected on the optical input, then the ADAT inputs are visible and available in stereo pairs.

The Default USB play routings are:

Line Out:	USB 1+2
Monitor Out:	USB 1+2 and 3+4
Phones:	USB 1+2 and 5+6
Digital Out XLR (AES):	USB 1+2 and 7+8
Digital Out Coax:	USB 1+2 and 11+12
Digital Out Optical:	USB 1+2 and 9+10
ADAT Out 1-8:	USB 1+2 and 9-16 (when Hilo is in 16-channel mode)

3.4.8.4 Outputs

You may have noticed that, with the exception of the USB play channels, all input sources are muted/off by default. The output sources are the opposite, all un-muted/on by default. To select an Output to assign input sources to, to mute, or to control its level, press the Output Selection button to reveal the Select Output menu:

Outputs are labeled clearly for selection.

Unlike with input sources, all three digital outputs are individually selectable, as are the ADAT Outputs.

Please note, if the Optical Out Mode on the Home menu is set to SPDIF, then the ADAT outputs will not be shown and cannot be selected. If the Optical Out Mode is set to ADAT, then the SPDIF OPT option will be grayed out and cannot be selected. Note - when one wishes to use ADAT I/O, it would be more typical to select 16-channel mode, so that the ADAT channels can be independent from the other Hilo outputs.

When the 16-channel USB Mode is engaged, all 16 USB input and output channels are visible and available.
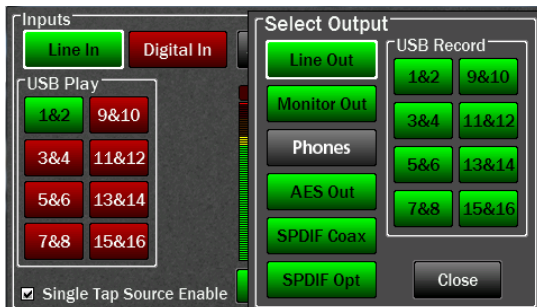
The Hilo Headphone Jack also has "jack sense" and can appear dynamically. When headphones are connected to the front panel Phones jack, then Phones is selectable as an Output choice. If headphones are NOT connected to the Phones jack, then the Phones selection is grayed out and not selectable.

The USB Record devices correspond to the input options that will appear in OSX or Windows recording software. As with the USB Play devices, there are default settings of Hilo inputs that stream to these record devices:

Line In:	USB Record 1+2
Digital In:	USB Record 3+4
Unassigned:	USB Record 5+6 and 7+8
ADAT In 1-8	USB Record 9-16

One may note that USB Play devices can be routed to USB record devices. This has interesting possibilities for anyone who wishes to record playback streams in the computer. For instance, one can be playing audio from the internet and record it into their DAW.

3.4.8.5   Analog and Digital Level Controls for Monitor and Headphones

When the Monitor Out and Phones Outputs are selected in the Output Mix Routing Page, you will see an additional button. For these two outputs you can control both the Digital output level and the Analog output level.

Analog Output Level – This is your primary monitoring level control. You can control this level / volume using the fader or the knob on the front panel.

Digital Output Level – Your default for this level is all the way on, at 0 dBFS. This provides the best possible signal to noise ratio, and therefore the best audio quality.

However, since Hilo offers you the option of routing several inputs to these outputs, you may overload the digital output and cause distortion. When this is the case, use the Digital Output control to lower the level feeding the D/A converter. Note, this control is NOT for setting the volume level of the Monitor or Phone outputs, but to attenuate the digital signal to reduce distortion. Once the digital overload has been lessened, you can set the listening volume with the Analog level control. Note: dither is enabled automatically when Digital attenuation is performed – this improves sonic performance and reduces digital artifacts.
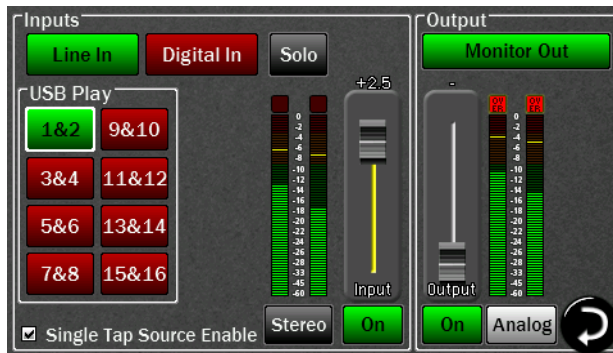
There is an overload at indicator at the top of these meters. When potentially distortion-causing clipping occurs, this indicator turns red and the associated text reads "OVER". For an input, the Over indicator will activate when there are three full-scale samples in a row, which indicates a high probability that clipping has occurred. For the outputs, the Over indicator is an accurate reflection of an actual overload condition and the attenuation should be performed on the input sources or digital outputs themselves when this occurs. The overload indicators will clear after 3 seconds when the overload condition stops.

Before we explore how to route sources, we need to take a look at the "Single Tap Source Select" button, because this impacts the way that sources are enabled.

3.4.8.6   Single Tap Source Select
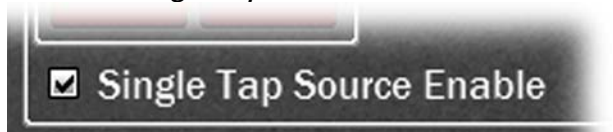
One of the advantages of the Touch Screen GUI, is that we can offer user-preferred options for the way onscreen buttons behave, a big advantage over standard, fixed-function hardware buttons. This is one such option.

1. **For this parameter, Checked is the default**. In this state, pressing an INPUT source button will instantly turn that source OFF to ON or ON to OFF, the same function as the ON/OFF button below the fader. This allows for quicker one-touch selection and muting of INPUT sources. However, the selected source will be present instantly with full volume on first press or a previously set volume level.
2. When Unchecked, pressing an input source will only bring that source into focus. One must then press the ON/OFF button to make the source active. The advantage is that you would have the opportunity to adjust the level of that source before it is sent to the output. This mode would be typical for live use, where making an input source live at full volume could have ear-shattering consequences.

For the remainder of this section, when mention is made of enabling sources whether this is accomplished by the **Single Tap** method (Single Tap Source Select = ON) or **Two Tap** (Single Tap Source Select = OFF) will be left up to the reader.

3.4.8.7 Selecting Monitor Sources

Let's look at the process of assigning input sources to Hilo's Outputs.

Let's say that we wanted to add Digital In as a source to route to the Line Out.

We could simply enable the Digital In with either a single-tap or double-tap and the page would now look like this.

In this state, audio streaming from USB Play 1&2 will be merged with audio streaming from the Digital Input. One must be cautious of the levels of each source in this case, as the combined signal strength could cause clipping to the output. If this occurs, it can be remedied by attenuating the faders for the input sources (USB Play 1&2 and Digital In), or by attenuating the associated output.

Now if we wish to listen to the Digital In signal through Line Out but NOT the USB Play 1&2 signal, we could turn the USB Play 1&2 button off, again via the one-tap, or two-tap method.

Using either method, the result would be Digital In as the only source feeding Line Out. It would look like this.

3.4.8.8 Adjusting levels of input sources and outputs

The Output Mix Routing page has two faders, one on the input side and one on the output side. In both cases the single fader controls the level for two channels of audio.

The fader on the input side adjusts the amount of signal from the input source that is in focus (with the white box around it) that is feeding the active output. It is not altering the input level itself (Hilo does not do this for sonic reasons), merely the amount of that input signal streaming to the output. This fader has a range of -95 to +12 over unity. The associated meter displays the input signal strength, so there will be no decrease in meter activity as the input source is attenuated.

The output fader adjusts the overall volume level of the output selected. With Monitor Out and Phones Out, the fader will adjust the ANALOG output level by default, ensuring the best sonic results. In cases where the listening level is correct, but there is clipping on those outputs because multiple sources are being summed together, the fader function can be switched to digital by pressing the Analog/Digital selection button in the output section. With this option, one can eliminate clipping from the digital side, and then adjust for the desired listening volume on the analog side. With all other outputs, the fader attenuates digitally. The output fader adjusts from -96 to unity. With digital attenuation, Hilo applies dither to reduce quantization noise and maintain low distortion.

There are two means to adjust the input source and output faders.

They can be adjusted directly on the touchscreen or with greater accuracy by using the rotary encoder knob. When the knob is used, pressing down will toggle the active fader from Input Source to Output.

The active fader will have a yellow fader track. In this graphic, the Output is the active fader.

3.4.8.9   Routing tutorial

These powerful routing features are probably best demonstrated with a real-world scenario. Let's pretend that the Hilo is being used for a recording session, where a keyboard part is being overdubbed on an existing project. The pre-recorded tracks are streaming through the USB Play 1&2 channels in the computer.

For cable connections, the keyboard signal is coming in **LINE INPUTS** 1&2. The recording engineer is listening to the **MONITOR OUTPUTS** feeding speakers in the control room. The performer is listening to headphones plugged into Hilo's **PHONES** jack.

Let's start by setting levels for the recording engineer. Start by selecting "Line Out" as the active Output:

We already have signal from USB Play 1&2 carrying the streams from the computer. Now let's add Line In as a source so there is the new keyboard parts along with the existing tracks.

The keyboard level is a bit hot compared to the mix. Let's attenuate the Line In signal by 10dB.

Now let's pull up the Phones Out to adjust the performer's levels. Again, USB Play 1&2 is pre-assigned as a source.

Now we'll add Line In, so the performer can hear their input signal.

This performer likes the levels of the backing tracks louder, but the overall level down a bit, so we'll nudge the USB Play source signal up by 6dB, and attenuate the Phones output by 10dB.

Now the performer and engineer each have their own monitor mix. Now we're ready to record, keeping in mind that the signals from the Line In will appear in the DAW software as USB Record 1&2.

As you can see, using variations on the sequence described above, that one can easily integrate outboard processors, and other sound sources into a recording session and maintain complete control over who hears what, and how loud each element will be.
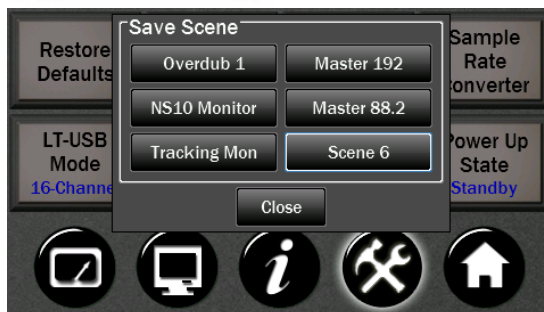
3.5   Tools Page

3.5.1   Restore Default Routing

This button restores the factory default settings, as covered in section 3.4.8.

3.5.2   Save Scene Button

Once you have created a specific routing/level set up that you may want to recall, here is where you would store it.

Hilo scenes store routing, clocking settings, level controls, sample rate conversion settings and more into an instantly recall-able "scene". The "Save Scene" button on the Tools page is where this occurs. Now you have the ability to name the scenes.

Once you have a set up that you want to save, press the SAVE SCENE button. Up to six scenes can be saved.

The new QWERTY keyboard screen will come up and you can name the scene using up to 13 characters
Input the Scene name using your fingers (or some pointed, non-abrasive pointer such as pencil eraser, pen end or even a chop stick). To clear the entire name, tap the Clear button. To backspace and clear one letter at a time, tap the Back button. Tapping the Cap button will capitalize the letters but keep the row of numbers. Tapping Shift capitalizes the letters and changes the numbers to commonly used symbols. Tap the Save button when finished.
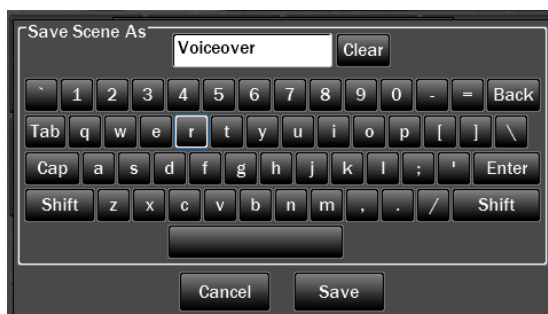
You have now stored your scene name, routing, level, meter, sample rate, sync source, trim, digital source, audio settings, UI options and optical mode information.

If you do not want to Save a scene, push the Cancel button at the bottom of the Pop up.

3.5.3   Recall Scene

This button lets you recall the Scenes that you have stored using the Save Scene button.

1. Push Recall Scene.
2. Up to 6 Scenes will be selectable on the Pop up.
3. Select the Scene you wish to reload.
4. The Scene will be instantly loaded with routing, level, meter, sample rate, sync source, trim, digital source and optical mode information.
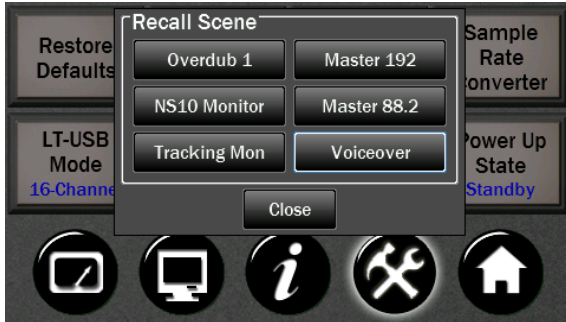5. If you do not want to Recall a scene, push the Close button at the bottom of the Pop up.

Note: If you Recall a Scene that is empty (not a previously stored Scene), this will restore the default settings.

3.5.4   Sample Rate Converter

Hilo features a powerful Sample Rate Converter for the AES and SPDIF Inputs. When active, the onboard SRC processor can support conversion ratios up to 16:1 with 144 dB dynamic range and -140dB THD+N. The SRC will convert signals on the active Digital Input up or down to the current Sample Rate.
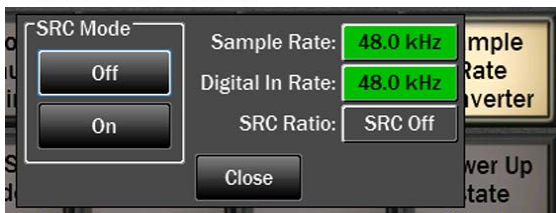
When the Sample Rate Converter button is tapped, SRC can be switched on or off, and information about the current sample rate, digital in rate, and the ratio of conversion, will be displayed if applicable.

Note: Even if the Current Rate and Digital In Rate are the same, sometimes it is useful to have SRC engaged so that the signal streaming to the digital input can be re-clocked. This is a useful state for digital devices that do not have the option to be a clock slave.

The SRC Mode is ON by default. When devices are connected to the Hilo digital inputs and valid clock synchronization is established between them, then it is recommended to turn SRC OFF to insure the best audio performance.

LT-USB Mode

The LT-USB that comes with Hilo has two modes of operation:
- 16 Channel operation – 16 input and 16 output channels at sample rates to 96 kHz.
- 8 Channel operation – 8 input and 8 output channels at sample rates to 192 kHz.

8 channel operation is the default.

Clicking on the button will toggle Hilo between 16 channel (96 kHz maximum) and 8 channel (192 kHz) modes. You should not change this mode while an audio application is utilizing Hilo. This control resets the LT-USB and all audio will stop. When you press the button, you'll see this warning screen:

Once your audio application is closed, you may press the Yes button and the channel mode will change. You will now see the appropriate number of record and play devices in your audio applications and operating system.

Note: if the LT-USB card is removed, then the LT-USB Mode button will no longer appear.

3.5.5   DSD Mode

DSD support was added with Hilo Firmware revision 5.

This allows Hilo to play DSD audio files received via USB, AES-3 or S/PDIF. Hilo supports the recently adopted DoP V1.1 standard which is a method for transferring DSD audio over PCM frames. Playback of DSD using this method is provided by a growing number of software vendors including Channel D and Audirvana for Macintosh, and JRiver Media Player for Windows.

Using the DSD application of your choice, connect your computer using the USB or Digital Input (AES IN; S/PDIF COAX IN or S/PDIF OPT IN). Before playing, make sure the DSD Mode button is set to Auto. In this mode DSD audio in DoP V1.1 is automatically detected on either USB input 1 & 2 or the selected Digital In Source. If DSD is detected on both of these sources, priority is given to USB input 1 & 2.

NOTE: When the DSD Mode is set to Off, incoming data will be processed as standard linear PCM data always. If DSD audio is received in this mode, low volume noise will be played.

DSD Routing: Upon detection of incoming DSD audio, the signal is automatically routed to the Line Outputs, Monitor Outputs, and Headphone Output. Routing to the remaining outputs of Hilo is not affected.
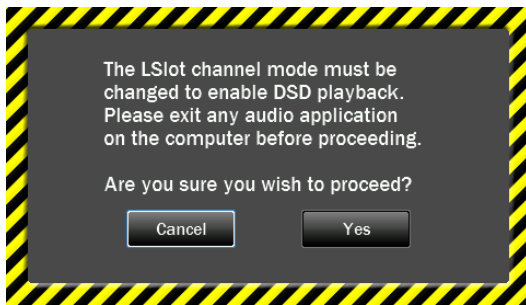
When switching into DSD Mode to "Auto", if Hilo is in 16-channel LT-USB mode, then a warning screen will appear. As DSD requires a sample rate of 176.4kHz available only in USB 8-channel mode, this screen will prompt you to switch to 8-channel LT-USB mode.

Tap Yes and Hilo will automatically reset to LT-USB 8-channel mode and be ready for DSD playback.

While DSD is playing, any page that has level meters will show a DSD logo instead of the meters. As soon as DSD playback is stopped, the level meter page will return.

3.5.6   Test Tone Function

Intended for system testing and calibration, Hilo's Test Tone provides a 1 kHz audio signal which can be sent to any output or combination of outputs. The tone level can be controlled in 0.5 dB increments from a new dedicated screen. For reference, the same screen also shows the input levels coming into Hilo.
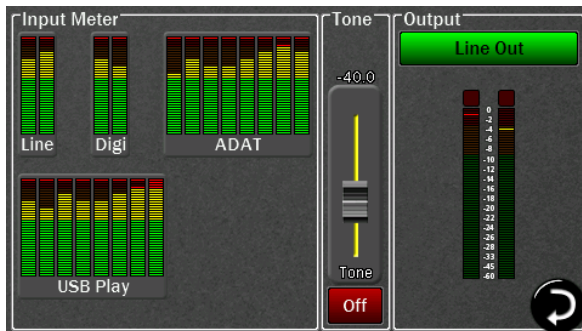
Using the menu button on the Output side (here selected as Line Out), choose the output to which you want to send the test tone.

Use the On/Off button to engage/disengage the test tone.

The initial level is set at -40 dBu. The fader and front panel rotary control allow you to adjust the level in 0.5 dB increments.

Multiple outputs can receive the test tone simultaneously.

Inputs Meters are shown to allow monitoring of any signal being received by the Hilo.

3.5.7   Power Up State

Hilo can be set to toggle between two Power Up states:

Standby: In this mode, when AC power is applied and the back panel power switch is in the ON position (show graphic), Hilo will be in Standby mode until the front panel STANDBY switch is pressed. Then the Hilo will power up and be ready for use.

On: In this mode, when AC power is applied and the back panel power switch is in the ON position, Hilo will power up and be ready for use. This is a typical setting when Hilo is placed in an equipment rack with a single master power switch for all of the equipment in the rack.

3.6　　　Information Page

There are several open buttons for future features.

Another advantage of the Touch Screen is that status information can be quickly accessed. This information tells you what is going on "under the hood" of Hilo and provides crucial data for trouble shooting in the field.

All Information pages will stay open until you tap "Close", or the Meter screen comes up based on the "Return to Meters" delay time established in the DISPLAY CONTROLS page.

3.6.1　Power

The Hilo may be powered either by AC power through the IEC Mains connector, or by DC power through the 4-pin BATTERY IN connector on the back panel.

AC power will indicated by "Mains AC" appearing in the Power indicator. The back panel power switch will control the AC power to the Hilo.

DC power will be indicated by "Battery" appearing in the Power indicator, with the measured voltage displayed below the Battery indicator. Please note when powering from DC power, the back panel power switch will turn of the AC power to the Hilo, however the Hilo will remain in the ON state as long as there is sufficient power provided on the DC power input.

3.6.2　Digital In Channel Status

This section displays status information pertaining to the Hilo's digital inputs. The data displayed indicates the quality of the AES/EBU connections as well as channels status data sent by a transmitting device. The information displayed in this section is very useful for troubleshooting digital input connection issues. For more information about AES/EBU channel status data, refer to the AES-3 specification available from the Audio Engineering Society web site at http://www.aes.org.

Lock
- **Locked (green)** Indicates the digital receiver is locked to a valid digital signal.
- **Unlocked (gray)**　　Indicates the digital receiver is not locked to a valid digital signal.

<u>Validity</u>
- **Valid (green)** Indicates the Valid channel status bit is set.
- **Invalid (red)** Indicates the Valid channel status bit is not set.

<u>Emphasis</u>
- **Off (gray)** Emphasis is off.
- **50/15us (green)**   50/15us pre-emphasis.
- **J17 (green)** CCITTJ.17 emphasis.
- **Unknown (green)**   Emphasis not indicated.

<u>Rate.</u>
Clock Rate displays a real-time measurement of the sample rates of the incoming signals. These measurements are very useful for evaluating and validating digital inputs when synchronization or clocking issues are encountered.

32.0; 44.1; 48.0; 88.2; 96.0; 176.4; 192.0 kHz (all in green) or Unknown (red)

Note: it is the responsibility of the transmitting device to send rate status that matches the actual rate of the audio data stream being sent. However, it is possible for a rate discrepancy to exist during a valid transmission.

3.6.3   Digital Out Channel Status Button
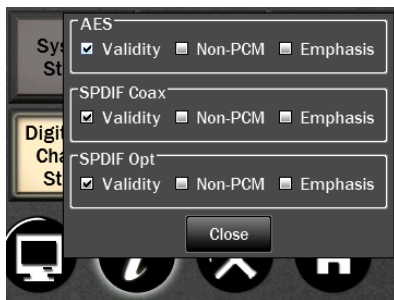
Several selections can be made from this page, as well as showing the current status of the Digital Outputs.

This section provides control of status bits embedded in the AES/EBU stream for each digital output. For more information about the use of these bits, refer to the AES-3 specification available from the Audio Engineering Society web site at http://www.aes.org.

For each of the three possible Digital Outputs (AES, SPDIF Coax, SPDIF Opt) you can select one or more:
- **Validity** This checkbox controls the state of the Validity bit. When checked, the Valid bit is turned on to indicate to the receiving device that the audio data being transmitted is valid. This is the default state.
- **Non-PCM**   This checkbox controls the state of the Non-PCM channel status bit. When checked, the Non-PCM bit is turned on to indicate that audio data other than linear PCM (such as Dolby AC3 or DTS) is being transmitted.
- **Emphasis** This checkbox controls the state of the emphasis channel status bits. When checked, the 50/15us emphasis mode is indicated in the transmitted channel status.

3.6.4   Frequency Counters
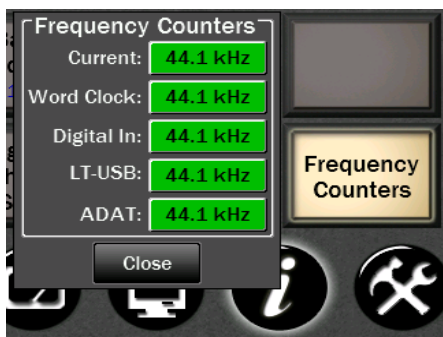
Also a Status button with no selections available. Measured settings will be shown on a Green button. If no signal is detected on an input, the button will be Gray and state "Not Present".

3.6.5   About Hilo

Also a status only button. This screen provides you with the hardware information for Hilo and the LT-USB card, including date of manufacture, hardware and software revision dates.
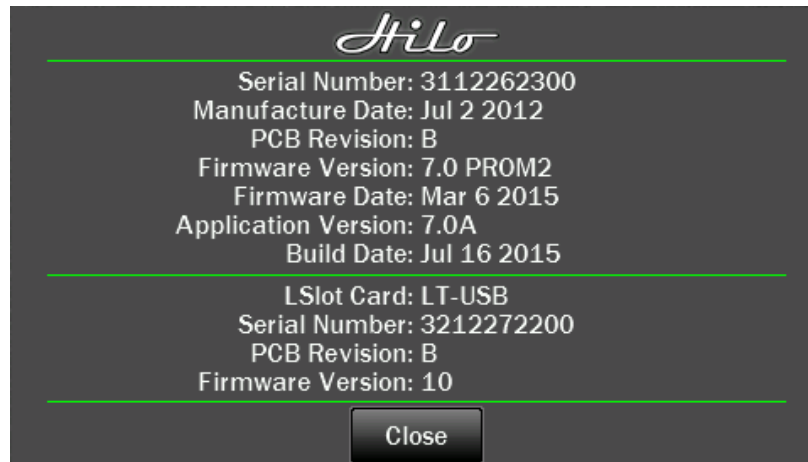
3.7   Display Controls

These controls allow you to customize how you want the LCD screen to work and what information you want it to show.

3.7.1   Backlight
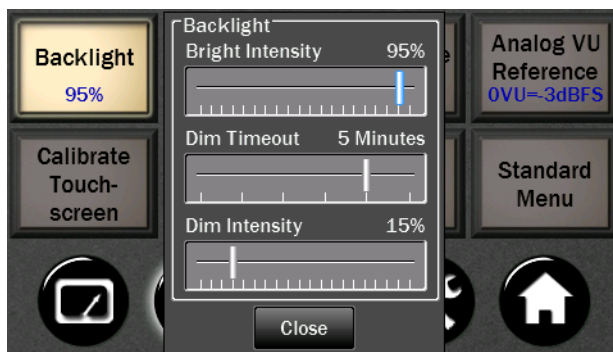
The new Backlight button allows the user to adjust Hilo's appearance by using the onscreen faders or Rotary control. You can now:

- Adjust Hilo's brightness intensity in a range of 5% to 100% in 1% increments - ideal for adapting to a variety of ambient light conditions.
- Enable and adjust the new Screen Dim function. Auto-Dim can be activated between 15 seconds to 5 minutes, or set to Never.

The Dim Intensity determines the brightness level when Dim is active. It can be set for as low as 0% (screen off) up to the default state of full brightness.

If the screen goes completely dark, Hilo will return to the established Brightness Intensity by touching the screen, moving or pressing the Rotary Control or pressing the front panel Power Switch.

3.7.2   Return to Meters

Hilo will revert to the Meters screen after some period of inactivity. The default period is 5 minutes. This is where you can change that delay time.

- Shows the current Menu Delay
- This sets the time that any menu, selection page, pop up menu or status page will stay active before the screen defaults back to the selected Meter page. *The only menu page that does not "time out" is the Output Mix Routing Page.*
- Pushing the button engages a horizontal fader that lets you set the delay to 15 seconds, 30 seconds, 1 minute, 2 minutes, 5 minutes, or Never.
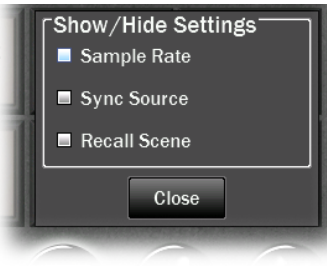- You may use your finger on the fader to set the delay time.
- You may also use the Rotary Control to set the delay time.

3.7.3   Show/Hide Settings

This button allows selection of what parameters, if any, will appear on the Meter pages. The choices are Sample Rate, Sync Source, and Scene Recall. When Scene Recall is selected, pressing the button will reveal any scenes stored in Hilo's memory. Sample Rate and Sync Source will only display the current values for those parameters if there is an active USB connection to the computer. If there is not an active USB connection to the computer, then these settings can be changed by pressing the appropriate button.

3.7.4   Analog VU Reference
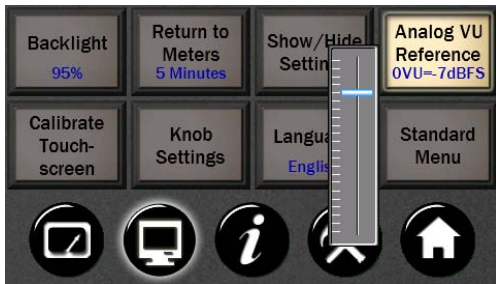
You can calibrate the Analog meters to set the 0 VU level.

Using the fader on-screen or the Rotary Knob, the 0 VU mark on the meters can be calibrated between -3dBFS and -24dBFS.

3.7.5   Calibrate Touchscreen

The LCD Touchscreen has a grid that detects when you touch it to select or change settings. If you find that the touch response gets slow or does not always engage properly, you may need to recalibrate the touch screen.
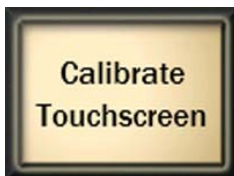
- Push the Calibrate Touchscreen button.
- The screen will go black and give you instructions for recalibrating the screen.

Simply follow the instructions and the previous screen will come up when done. Be sure to touch directly in the center of the target to give the most accurate touchscreen calibration.

With a touch screen it is easy to engage the wrong function by mistake. This screen allows you to back out of this command if you wish.

There are times when calibrating the touchscreen is necessary for optimum performance. However if this setting was selected unintentionally, now you can overrule the request and return to the Display Menu page.

3.7.6   Knob Settings
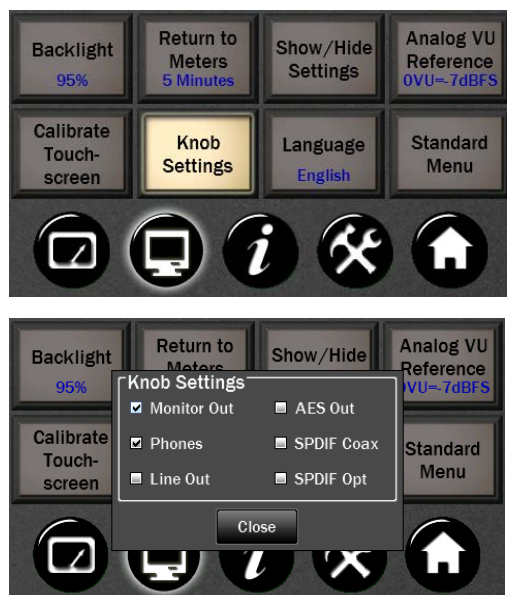
This menu allows you to select which outputs can be adjusted with the Hilo rotary encoder. By default, the Monitor Out and the Phones Out can be attenuated with the rotary encoder, and pressing in the knob will toggle between those two choices. If additional choices are selected from the Knob Settings menu, then pressing in the Rotary Encoder will toggle through all the Outputs that have been selected.

- Monitor Out and Phones Out can be de-selected by clicking in the adjoining checkboxes, and/or additional outputs can be selected with their adjoining check boxes.
- Up to three sources can be selected at one time.
- After the desired sources have been selected, turning the rotary encoder from any Hilo screen other than the Outputs Mix Routing page will change volume for the selected output and a level meter will show onscreen.
- Pressing in the Rotary Encoder Knob will toggle through the available choices.

3.7.7   Language

As of firmware revision 7, Hilo is now multi-lingual! From this button you can select between English, Spanish, German, French and Chinese (available in Hilo's purchased through the Lynx Chinese distributor only). All of the Hilo menus and parameters will now be in the language of your choice. Please note that the onscreen keyboard from writing Scene Names will still be in English. Also, restoring defaults and updating the firmware will restore the unit to English, and the language of choice will need to be re-selected.

3.7.8   Standard Menu

Some Hilo users prefer a simpler interface with only the essential controls being available. The Standard Menu button toggles between Standard Mode (simplified interface) and Advanced Mode (complete interface). The default is Advanced Mode. When Standard Menu is selected, the Hilo interface is reduced to 6 buttons and the METER selection icon.

As soon as Standard Menu is selected, the Hilo does a Restore Defaults to return all routing and volume controls to the default setting. This may result in the audio from a previously muted or attenuated source to come through the Hilo at full volume.

- The Backlight button allows control of the Hilo touchscreen appearance. See Section 3.7.1; Backlight.
- The About Hilo page is a status only button. This screen provides you with the hardware information for Hilo and the LT-USB card, including date of manufacture, hardware and software revision dates.
- The Line In and Line Out Trim buttons set the calibration level for the Hilo Line Inputs and Line Outputs. See Section 3.45 and 3.46 for more information about Trim levels.

- The Select Source button determines which signal source, will be streamed to ALL of the Hilo outputs. Choose between USB Play (play streams from the computer via the USB connection) or any of the other Audio inputs on the Hilo. Note: ADAT Lightpipe I/O is not available in Standard Mode.
- The Advanced Menus button returns the Hilo touchscreen to Advanced Mode.
- The METERS icon will return the screen to the Hilo METER display. The four METER options are still available from the METERs page.

If any Hilo parameters that only appear in Advanced mode have been altered, and then the Hilo was switched to Standard Mode, the alterations will no longer be active. For instance, if the RETURN TO METERS selection was set to "15 seconds" in Advanced Mode, when switched to Standard Mode the default state of "5 minutes" will be active. When returning to Advanced Mode, the default will continue to be active and an alteration will have to be manually selected.

4   Firmware Updates

Hilo contains firmware that is field-programmable via the USB bus. These updates improve performance and enhance functionality of Hilo. In some cases, the touch screen functions and appearance may change dramatically from firmware updates.

Additionally, the LT-USB card installed into Hilo has its own firmware. There are also updates for this card available that, similarly, can improve functionality and expand the feature set. Fortunately, both can be updated from the same downloadable application for Windows or Mac OS X. Here are the steps to insure that your Hilo is up to date and in top form:

1. Make sure that your Hilo has a valid USB connection to the computer. Windows users will need to make sure that current drivers are installed.
2. Visit www.lynxstudio.com and click Support > Downloads.
3. Select your OPERATING SYSTEM from the list, "Hilo" as the PRODUCT, and "All Types" for FILE TYPE. Click "Search".
4. Download the Hilo Firmware Updater. Double Click to launch it.
5. Follow the prompts (Windows Users need to accept the EULA) until you reach the Hilo Firmware Update screen. Verify that the "New Firmware Version" is higher than the "Current Firmware Version". If so, click "Update".
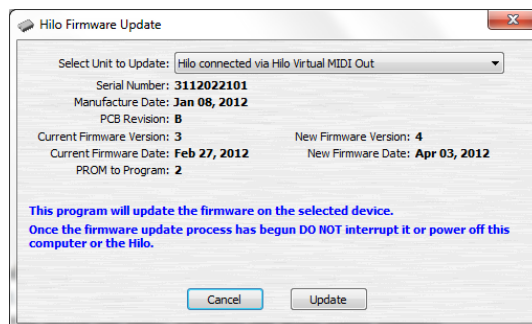
The Hilo LCD screen will display a warning screen that reads "Do not turn off the computer or the Hilo during the firmware updater process". There is also a progress bar.
6. When the Update is complete, you will be instructed to power down Hilo. Turn off the front panel standby switch. Then turn off the rear panel power switch. Wait three seconds, then power Hilo back up.
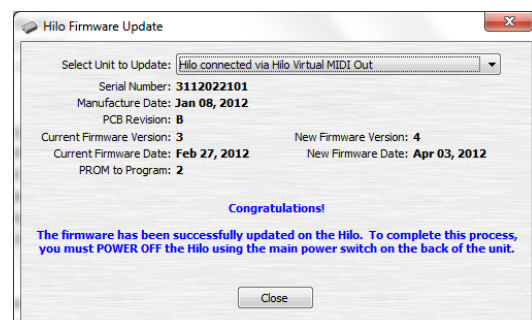
7. Now we need to update the LT-USB card inside of Hilo. Launch the Hilo Update application again. This time from the "Select Unit to Update" drop-down menu, choose "LT-USB".
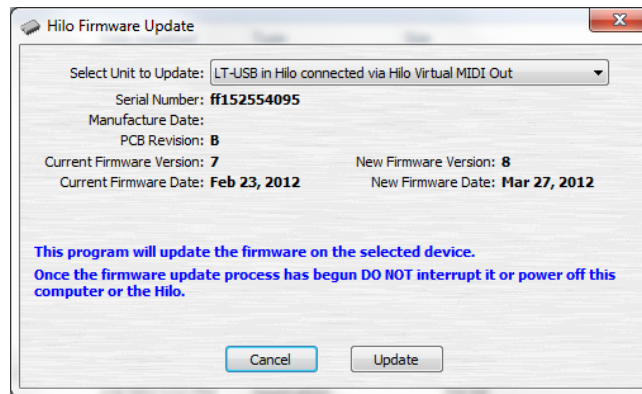
8. Verify that the New Firmware Version is higher than the Current Firmware Version. If so, click "Update".
9. When the updater is complete, close the pop-up window in your computer. Again, power cycle Hilo using the front panel standby switch, the rear panel power switch, wait three seconds, then turn the unit back on.
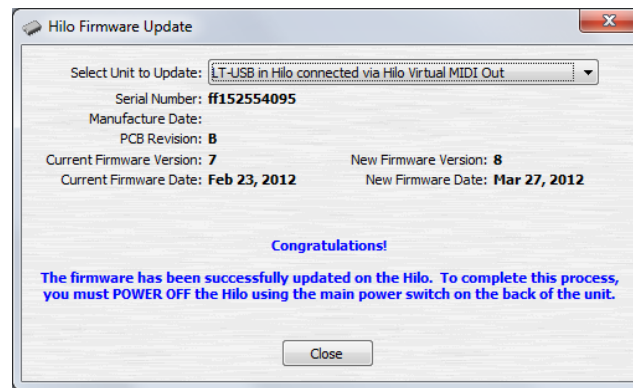
10. After programming, the computer may need to reload the driver. If you are prompted to do so, perform an automatic driver installation when prompted.

Also after programming, the settings you had on the unit previously, including saved scenes, may need to be re-established. This depends on the number and type of differences between the older firmware and the newer.

5   Hilo Remote Control Application

Hilo Remote is a software application that allows users to conveniently control the Hilo, change settings, and view its different meter options, from their computer. Settings on the Hilo display and in the Hilo Remote software will be identical in all regards, except for scene storage. Different scenes can be saved in the computer that hosts the Hilo Remote app, and on the Hilo itself. The Hilo Remote app is available for Macintosh OSX or Windows computer, and there is also a version available for Apple iPad that can be downloaded from iPad App Store (keywords Lynx Hilo).

In addition to running the Hilo Remote on the computer that the Hilo is connected to, it is possible to use Hilo remote from a computer or iPad that is connected to the host computer via WiFi or WLAN. This use requires the Lynx MIDI Re-Director tool. We will explore that solution, later in this section.

5.1   Hilo Remote for Windows

Hilo Remote is installed automatically with the Windows Driver. Additionally, the latest version can always be downloaded from the Lynx Studio website: Support > Downloads > Hilo. When downloading an updated version of Hilo Remote, check the posted system requirements before installing the software. In some cases, a specific version of the Hilo firmware may be necessary for the software to function correctly (see Section 4: Firmware Update for information about updating the Hilo firmware).

Once installed, the Hilo Remote can be launched from the Lynx Studio Technology Program group.

5.2   Hilo Remote for OS X

Hilo Remote for OS X can be downloaded from the Lynx website: Support > Downloads > Hilo. When downloading an updated version of Hilo Remote, check the posted system requirements before installing the software. In some cases, a specific version of the Hilo firmware may be necessary for the software to function correctly (see Section 4: Firmware Update for information about updating the Hilo firmware).

Once installed, the Hilo Remote can be launched from Applications

5.3   Hilo Remote for iPad

Hilo Remote for iPad can be downloaded from the App Store on your iPad. Search for "Lynx Hilo" and download the free Hilo Remote app or go to www.lynxstudio.com/hiloremote from your iPad. Hilo Remote for iPad requires Hilo firmware revision 7 or greater.

5.4   Using Hilo Remote

Hilo Remote is a single screen app for controlling the routing and various features of the Hilo. The software simply reveals and facilitates changes to the Hilo hardware, so the Remote will not launch if a Hilo is not connected to the computer and functional. In addition to the controls on the Main Window there are two menus with additional features.

The features are identical for the OS X and Windows versions. The iPad version does not allow for scene Open or Save.

5.4.1   Navigation Bar

The bar at the top of the Lynx Mixer main window, provides access to commonly used functions, and allows for customizing the displayed elements. Doing a "mouse over" will cause a pop-up to appear over each icon in the Navigation Bar, with a short description of the associated function.
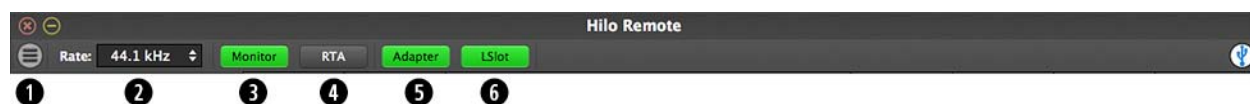
❶ **Main Menu**

This button launches the Hilo Remote Main Menu, where these additional controls and menus are available:
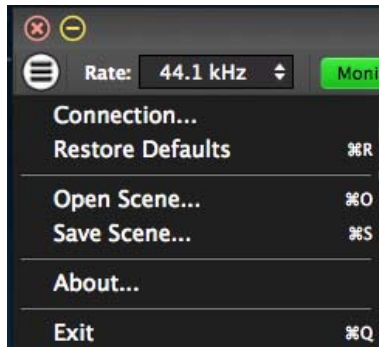
Connection:
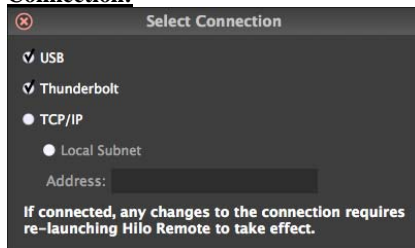
This page reveals the method that Hilo Remote communicates to the Hilo hardware. In the rare case that both a Thunderbolt Hilo AND USB Hilo were connected to the same computer, then the user could select which unit the software controlled. The TCP/IP selection would be used when Hilo Remote is installed on a computer other than the computer that is streaming audio to the Hilo. For instance, you can use an iPad or portable computer to run Hilo Remote while a desktop computer has the Hilo connected to it. Details about how to configure such a system are at the end of this section.

Restore Defaults:

This returns the Mixer (and Hilo hardware) to its factory default state. Routing, Sync Source, state of the Adapter and LSLOT panes, all can be impacted.

Restore defaults is an excellent troubleshooting tool. When things are not going as expected, this is a good first step to try.

Open Scene:

This feature allows user-defined mixer scenes to be restored. Mixer scene files can be saved to any directory on the computer's hard drive. After clicking "Open Scene" navigate to the directory where the desired scene file has been saved, highlight the file and click "Open". Please note: scenes saved from the Hilo Remote app are independent from the scenes saved on the Hilo touch screen.

Save Scene:

This feature provides the ability to save all user-selectable parameters. "Scenes" that contain the state of all device settings can be saved to a file on the computer hard drive. Recalling Scenes is a very quick and efficient way to revert Hilo to an appropriate state for different contexts of use.

Scene memory is global to all users on a single computer and is initially empty. There is no limit to the number of scenes that can be stored. After "Save Scene" is selected, A FILE NAME will need to be created and a directory selected for the mixer scene file to be written to. The current Hilo Remote 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.

To delete a scene simply delete the mixer scene file from the hard drive. Please note that scenes saved from the Hilo Remote app are independent from the scenes saved on the Hilo touch screen.

When the computer is shut down, the current state is saved. When the computer is restarted, the previous state is restored. This function is independent of Mixer Scene operation.

About:

This option displays information about the Hilo, driver, and firmware as follows:

- Hilo Remote Version and Build Date.
- Mixer/Driver Version: Displays the current mixer version and build number (Windows or TB Model only).
- Build Date: Displays the date the driver and mixer were released.
- Hilo Serial Number.
- Hilo Firmware Version and Firmware Release Date.
- LSLOT Device: Displays the installed Lynx LSLOT Expansion card, in this case the LT-USB.
- LSLOT Serial Number: Displays the serial number of the Lynx LSLOT Expansion card installed.
- LSLOT Hardware Rev: Displays the hardware version of the Lynx Expansion Card.
- LSLOT Firmware Version: Displays the firmware revision of the Lynx Expansion Card.

PLEASE NOTE: The "About" window may display different information than what is shown here, depending on your configuration and versions.

❷ **Rate Select**
This button displays the current sample rate of the Hilo and can also be used to select a desired sample rate when the Hilo is operating off of its Internal Clock. However, when on Internal clock, the sample rate is generally determined by the audio application being used, or the default sample rate settings in the operating system.

❸ **Monitor** and ❹ **RTA**
The Hilo Remote display can be customized by the user. The Default page view is the Monitor display. This page reveals meters and faders for all input and output channels, as well as controls for Sync Source, Trim Levels, I/O parameters, etc. Monitor view can be toggled to RTA view. RTA view reveals the Hilo 30-band Realtime Analyzer. The Monitor and RTA buttons allow the user to toggle between these two views.
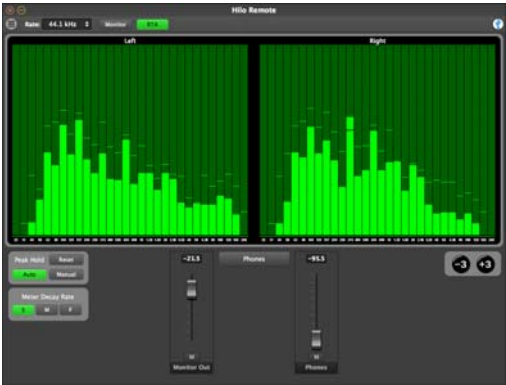
Monitor view will be explored in depth in the section below. RTA view presents the user with a high resolution
Analysis Tool. This is an expanded version of the RTA that is available for the Hilo touchscreen display
.
The stereo 30 band Real-time Spectrum Analyzer (RTA) is a very useful diagnostic and reference tool. The Hilo RTA computes the RMS energy in 30 frequency bands for left and right channels of a selected stereo input or output every sample period. This is a brilliant tool for mixing, mastering and even system troubleshooting

The RTA display can be customized with the following controls:

Boost or cut the program material in 3dB increments to get the best meter reading. Amount of cut or boost is displayed with a mouse over.	The Peak Hold controls can be set to Auto, or Manual. In Manual Mode the user can press "Reset" to capture the peak levels at any point in time.	The Decay Rate setting controls how quickly the peak hold indicators clear the screen. Choose between Slow (the default), Medium or Fast.	The source selection buttons allow the RTA to be used for any input or output on the Hilo. The faders allow analog volume control for the Monitor or Phones.
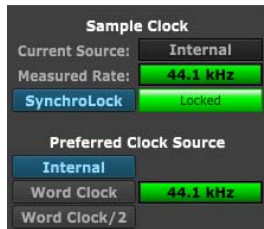
❺ <u>**Adapter**</u>

This button toggles whether the Adapter settings are visible from the Main window or not. The Adapter section, when visible, appears on the left part of the screen.

❻ <u>**LSLOT**</u>

This button toggles whether controls for the LSLOT Sources are visible from the Main window or not. LSLOT sources are relative to the connection method used by the Hilo, with a USB Hilo they would be the USB record and play devices in the computer. This section will show the Play Sources (signals coming FROM the computer) in the top row, and Record Sources (Signals going TO the computer) in the bottom row.

The settings in this section can be used to route Play streams to any of the Hilo's physical outputs, or to assign Record streams to carry signals from any of Hilo's hardware inputs. These settings can be used to mirror playback to multiple outputs, or to carry an input signal to multiple record devices.

We'll explore the routing logic and steps to use Hilo Remote for custom routing in the section below.

Now let's look at the Monitor page in greater detail:

5.4.2   Monitor Page
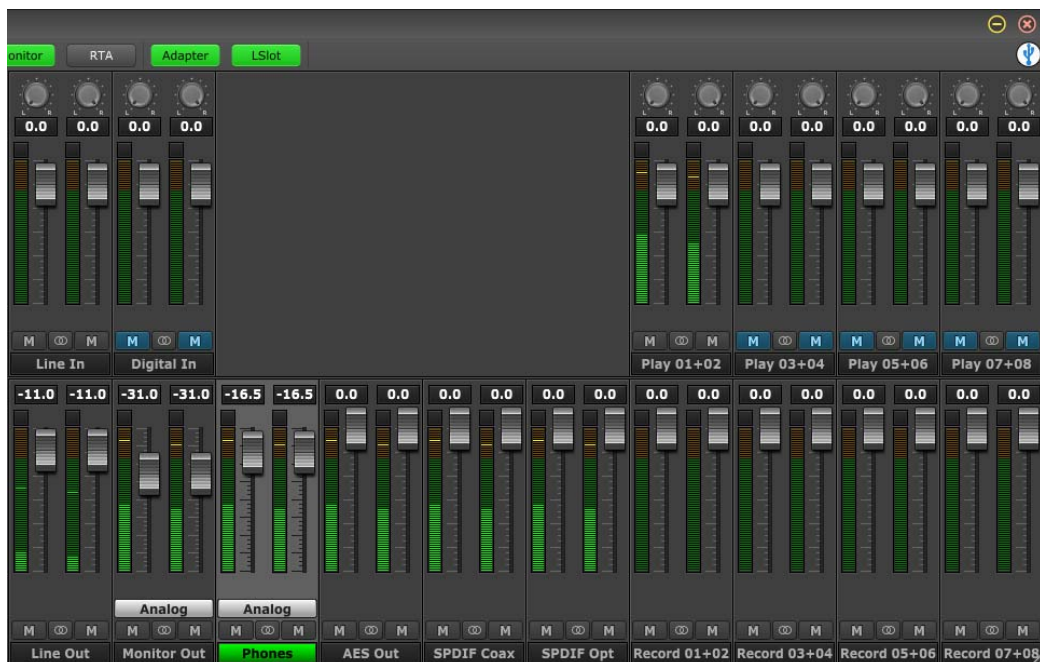
The Monitor page is where signals are routed, levels and pan settings are established, and meters can be viewed for all channels on the Hilo. It is visible whenever the "Monitor" button is green in the Navigation Bar. The section on the right, with the Play and Record devices, is only visible when the LSLOT button is green.

The upper row of faders are for the inputs. These are the physical inputs, Line In and Digital In, on the left, and Play streams from the computer on the right (again, only visible when "LSlot" is selected from the Navigation Bar). In 8-chanel mode, Play Devices 1-8 will appear here, and in 16-channel mode, Play 1-16 will appear, always grouped in stereo pairs. When a valid ADAT lightpipe source is connected to the Hilo ADAT Input, then the ADAT input channels will appear between the physical inputs and play devices, like this:

The purpose of this pane is to show input signal meter activity, allow assignment of physical inputs to record devices within the operating system, and manage the levels, routing, and pan positions of input signals being monitored through Hilo outputs.

The bottom row of the monitor page reveals the physical outputs, Line Out, Monitor Out, Phones Out, and the Digital Outputs. To the right, if the "LS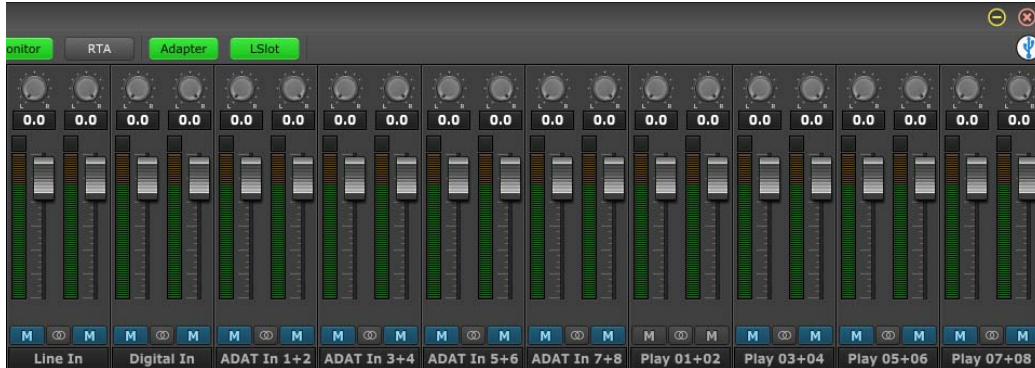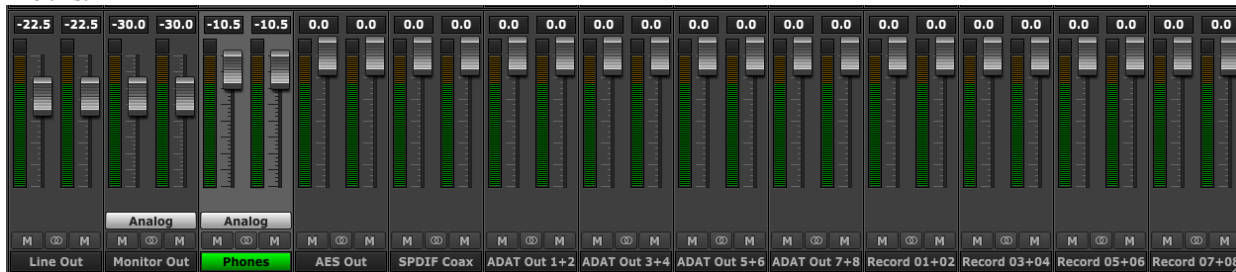LOT" button is green in the Navigation Bar, the Play streams from the computer will appear. Like with the Play Devices, in 8-chanel mode Record Devices 1-8 will appear here, and in 16-channel mode, Record 1-16 will appear. If the Optical Out Mode on the Adapter page is set to "ADAT", then the ADAT Outputs will appear between the physical outputs and the play streams, like this:

The Monitor Out and Phones channel strips have an additional button, just like in the Hilo's Output Mix Routing page (see section 3.4.8: Output Mix Routing Page). For these two outputs you can control both the Digital output level and the Analog output level. Clicking the button beneath the fader will toggle between Analog and Digital level controls.

Analog Output Level – This is your primary monitoring level control. Analog Monitoring is generally preferred for critical listening, as it has no effect on the depth resolution on the material being attenuated. Thus, analog is the default selection here.

Digital Output Level – For most critical listening contexts, the digital volumes are best left in their default position, with zero attenuation. However, since Hilo offers you the option of routing several inputs to these outputs, it is possible to overload the digital output and cause distortion. When this is the case, use the Digital Output control to lower the level feeding the D/A converter. Once the digital overload has been lessened, you can set the listening volume with the Analog level control.

To explore the controls available on the Monitor page, it makes sense to start with the outputs section, the row on the bottom. Each channel has the following elements in common:
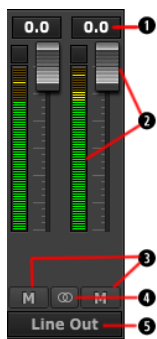
❶ Numeric Level Indicator
This Level Indicator displays the amount of attenuation, in dB, performed on the associated Output.

❷ Faders and Meters
The FADERS in the Outputs row are for attenuation of the output levels. Levels can be reduced in ½ dB increments with a click-drag of the mouse.

This is the rough equivalent to turning down the faders on a mixing board. If there are several sources assigned to that output, play and record sources, all will be attenuated when the faders are brought down. All faders, except Monitor Out and Phones when in "analog" mode, can be attenuated at the same time by holding down the CTRL key on the keyboard while click-sliding any single fader.

The METERS in the Outputs section show the level strength of the signals at the associated output. The Meters are post-fader, so there will be reduction in Meter level as the signal is attenuated.

❸ Mutes

The "M" Icon below the fader is for the Mutes. This switch Mutes or UnMutes the associated output.

When the "M" button is blue like this ![M], then the Mute is ON, and no signal will pass to the selected output. When the "M" button is gray, like this ![M], then the Mute button is OFF, and signal CAN pass to the selected output.

❹ Channel Link

In between the two Mute buttons for a pair of Inputs, is the channel link control: ![icon]. This control toggles the linked state for a pair of faders and mutes. If two channels ARE linked, then moving the fader for one of them will move both channels. Similarly, if one is muted then both will mute. If the faders between the channels are offset, when one is moved the other will snap to the same position.

Linked is the default state for pairs of inputs. To "un-link" a pair, click on the link icon and it will change to a single circle: ![icon]. In this state, the mute, fader and pan controls operate on a single channel independently.

❺ Output Button
This identifies the Outputs that are applicable to the fader and mute controls, and is also used to facilitate routing. Hilo Remote uses an Output oriented approach to routing. Clicking on an Output button, "selects" that output for sources to be assigned to it. When selected, the output label button is green. In this state, sources from the Record or Play sections can be un-muted, thereby set to stream to the "selected" output.

In the Mixer's default state, each output has one or more LSLOT play devices routed to it. All physical outputs (record streams excepted) have Play 1+2 assigned to it. When you click through to select different outputs, Play 1+2 will show as un-muted for all of them. In addition, some outputs have Play 1+2 as well as other Play pairs.

This is the default state for all Hilo physical outputs:
Line Out: Play 1+2
Monitor Out: Play 1+2 and 3+4
Phones: Play 1+2 and 5+6
Digital Out XLR (AES):   Play 1+2 and 7+8
      Digital Out Coax: Play 1+2 and 11+12
      Digital Out Optical: Play 1+2 and 9+10
      ADAT Out 1-8:   Play 1+2 and 9-16 (when Hilo is in 16-channel mode)

To add sources to an output, click an output button to select it and it will turn green. Then un-mute Record and/or Play sources from the Input Row. Signals from those sources will now stream to that output. When multiple sources are assigned to a single output, it is often necessary to attenuate the individual sources to prevent excessive level from causing distortion to the output.

In addition to allowing signal from an input or play stream to be routed to a desired output, these monitor sources can be panned and attenuated individually. To look into these features, let's have a closer look at the Input Section of the Monitor page (the top row).

❶ Pan Pot

The Pan Pot knob controls the pan position of the input as it is being monitored through an output. IT HAS NO EFFECT ON THE RECORDED SIGNAL. It is only pertinent to monitoring. You would only hear the results of the panning if an input signal was being monitored through Hilo's outputs.

When channels are linked, then the pan controls are linked as well. Moving the pan control to the left will make the linked channel's pan control move a corresponding value to the right. When the channels are unlinked, as when recording a mono source, then the pan control will move the signal anywhere with the stereo spectrum.

To change the pan position, click in the proximity of the pan knob and move the cursor from left to right, or right to left.

❷ Numeric Level Indicator

Displays the amount of attenuation performed on the associated record source. This is attenuation for the Monitor level of the signal; it has NO bearing on the level being recorded through an audio application. It is applicable to Monitoring Level only (how loud that signal source is through the output you are listening to).

❸ Faders and Meters

The METERS on the Input section show the level strength of the signals at the associated input. The METER level will reflect the signal that will be recorded into audio software. The METER will not reflect attenuation to the input signal as it is being monitored. When you lower the fader, the METER level will not change, however the change WOULD be reflected in the meters of the output this signal was routed to.

The FADERS are for attenuating the signal of the input as it is being hardware monitored. For instance, if you are routing a signal from LINE IN Left, through MONITOR OUT, and the input signal is too loud relative to the rest of the mix, you would lower the fader under LINE IN Left to correct that. The signal level being recorded for LINE IN Left will not change, but the level through the outputs as you are monitoring the performance will go down.

The Fader position is specific to the connection between the input and an output. So, using the example above, if you have attenuated the signal of LINE IN Left, through MONITOR OUT, but then you select LINE OUT from the Output Section, the fader for the LINE IN Left will return to whatever position is established for that connection.

To reiterate, the faders are for the level of a specific connection between an input and an output. It will not affect the level of the input source monitored through an output that is not selected, nor will it affect the level of the audio being recorded.

❹ Mutes

The "M" Icon below the fader is for the Mutes. This switch Mutes or UnMutes the input signal routed to an output. As with the faders, this control is specific to the patch point between the Input Source, and the selected output. It does not control whether the input signal itself is muted, or whether that input signal can be recorded.

When the "M" button is blue like this ▣ *, then the Mute is ON, and no signal will pass to the selected output. When the "M" button is gray, like this* ▣*, then the Mute button is OFF, and signal WILL pass to the selected output.*

Inputs are Muted by default. When an output is selected from the outputs pane, inputs need to be un-muted to become active. When an input source is no longer being monitored, then it is good practice to Mute it again so that unintended mic bleed or system noise is not corrupting the signal path.

❺ Channel Link

In between the two Mute buttons for a pair of Inputs, is the channel link control: ▣ . This control toggles the linked state for a pair of faders and mutes. If two channels ARE linked, then moving the fader for one of them will move both channels. Similarly, if one is muted then both will mute. If the faders between the channels are offset, when one is moved the other will snap to the same position.

The linked state also impacts the Pan controls. If one pan pot is moved to the left the other will move a corresponding amount to the right. For instance, if the left pot is set to -25, the right channel will pan to +25.

Linked is the default state for pairs of inputs. To "un-link" a pair, click on the link icon and it will change to a single circle: [◯] . In this state, the mute, fader and pan controls operate on a single channel independently.

❻ **Input Label**

This identifies the Input that is applicable to the fader, pan, mute and input select controls.

The MONITOR page can be used to create complex headphone mixes for an artist, allow mirroring of play streams to multiple outputs, even send completely different source material to different speaker pairs. Here are some visual examples of routing configurations that are possible:

In this example, the selected output is MONITOR OUT. We are sending signal from Play 1+2, existing tracks from a multi-track session.

In addition we are sending signal from the LINE INPUT left channel. The Line Inputs were "un-linked", and only the left channel is un-muted, so signal is passing only from the left channel. Note, that the pan position for LINE IN left is in the center, so the source will be heard equally through both channels of the MONITOR OUT.

The Play 1+2 streams are at zero attenuation, as is the Line In. Monitor Out is attenuated by 29dB.

This would be a common configuration for overdubbing into a project.

In this example, four stereo stems are sent from the DAW to the PHONES out.

The PHONES level is attenuated by 34dB. The stems also have varying levels, Play 1+2 is attenuated by 18dB, Play 5+6 by 11dB, whereas Play 3+4 and 7+8 are at unity

Here, all of the channels are linked as stereo pairs. Keep in mind, the settings in the Input row are relative to the Output selected. If Line Out is selected, the mute states, fader positions and channel link status of the input devices would be completely different.

This example shows a unique capability of the Hilo – the option to route a playback stream directly to a record stream. This is a great tool for capturing streaming audio from any source, without degradation.

To set this up, select the Record Device you wish to carry the signal to be recorded. In the graphic we chose "Record 1+2". Then un-mute the Play device carrying the audio to be recorded, in this case "Play 1+2".

Now when we play audio from the source, we can open a recording app, choose "Record 1+2" for input and record that signal digitally.

5.4.3 Adapter Section

The Adapter Section is where the clock settings for the Hilo are established and monitored, as well as Trim and Digital Format settings.
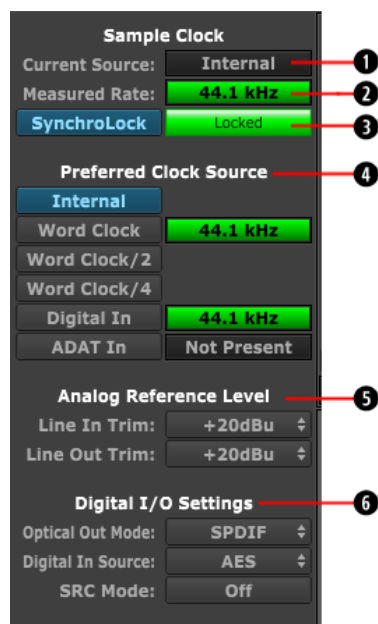
❶ **Current Source**
This displays the clock source that is active. This may differ from the selection in the "Preferred Clock Source" section, if an invalid or offline clock source had been chosen there.

❷ **Measured Rate**
Whether Hilo is operating off of its Internal Clock, or some External Clock Source, this button displays the sample rate that the onboard frequency counter is measuring.

❸ **SynchroLock**
This button can turn the SynchroLock clocking system On and Off. SynchroLock is Lynx's proprietary technology for attenuating jitter on clock inputs and providing a stable clock for all digital signals passed through the Hilo.

This button also shows the status of the SynchroLock clocking system. Prior to achieving lock, the four green LED's give an indication of the completion of various lock stages. During this time the wide range analog PLL maintains lock.

Working: In this state SynchroLock is analyzing the input clock signal and making adjustments to frequency and phase. This process typically takes one to two minutes to complete. The progress bar shows percentage remaining towards final lock: 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 SYNC SOURCE is set to "Internal".
Range: Indicates that the selected external clock source is not within the SynchroLock lock range.
Disabled: Indicates that SynchroLock has been turned off.

❹ **Preferred Clock Source**

This portion of the Adapter section provides control of Hilo's clock source. The default source is "Internal" and this is appropriate for the majority of users. Clock sources available to choose from are:

- Internal: Clock derived from the on-board crystal oscillator.
- Word Clock: Clock signal from BNC WORDCLOCK connector.
- Word Clock/2: This feature is not currently implemented.
- Word Clock/4: This feature is not currently implemented.
- Digital In: Clock derived from the active digital input.
- ADAT In: Clock derived from the ADAT input.

If the selected Preferred Clock Source is not also displayed as the Current Source at the top of the Adapter page, it would be for one of the following reasons:

1. The selected source is not present or the connected device is not generating a valid clock signal. In these cases, Hilo will operate from its internal clock until a valid clock signal is connected to the selected clock source.

2. The selected clock source is generating a sample rate outside of the Hilo's usable range (i.e. 22kHz). This can be corrected by setting the clock source to a supported sample rate (44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4kHz, 192kHz).

3. The Clock Source was selected when the Hilo Drivers were being accessed by some software application. In this case, the Preferred Clock Source will become the Current Source when the card is no longer being accessed.

❺ **Analog Reference Level**

This section is where the Trim levels can be set for the Hilo's Line Inputs and Line Outputs. Trims can be set to any of eight preset trim settings, and they are the same for the Left and Right channels.

There are four Pro Level settings: +18 dBu; +20 dBu; +22 dBu; and +24 dBu. There are four additional levels most often used on Consumer Audio products: +0 dBV; +2 dBV; +4 dBV and +6 dBV.
Note: These are 0dBFS (full-scale) level settings, as opposed to nominal levels.

When the trim button is clicked, a menu displays the choices. You will typically hear a relay click from inside Hilo when a selection is made.

Trim pots are available to fine tune these inputs. See Section 7.3: Setting Trim Pots for more information.

❻ **Digital I/O Settings**

This section is were settings specific to the Hilo's Digital I/O can be configured.

Optical Out Mode: This drop down can select operation of the Hilo's Optical Digital Output, The default is stereo SPDIF, but can be toggled to 8-channel ADAT Lightpipe mode.
Digital In Source: Hilo offers a choice of AES or S/PDIF as the digital input source, with AES being the default. With S/PDIF, there is the option of Coax or Optical Inputs. If selecting SPDIF Optical, the Optical Out mode must also be set to SPDIF.
SRC Mode: Hilo features a powerful Sample Rate Converter for the AES and SPDIF Inputs. When active, the onboard SRC processor supports for conversion ratios up to 16:1 with 144 dB dynamic range and -140dB THD+N. The SRC will convert signals on the active Digital Input up or down to the current Sample Rate. It is also useful for re-clocking signals from devices that cannot operate as a clock slave. The default state for the SRC is OFF.

5.5   Using Hilo Remote from a WiFi or WLAN connected computer.

In some cases it is useful to run the Hilo Remote from a computer other than the one that Hilo is streaming audio to and from. This could be for control over a dedicated media server, a situation where level changes are made while monitoring from the "sweet spot" using an iPad, or cases where audio is streamed from one computer to another and it is desirable to control the parameters of both from a single computer.

5.5.1   Requirements

The Hilo Remote Control software can be installed onto an OS X Mac with 10.6 or above, a Windows PC with Windows 7 or above, or on an iPad with iOS 7 or above. The Hilo Remote can be downloaded from the Lynx website: Support > Downloads > Hilo. For iOS, the Hilo Remote is available from the iPad AppStore (keyword : Lynx Hilo). In addition to Hilo Remote, the Lynx Redirector will also be required. This utility can be downloaded from lynxstudio.com > Support > Downloads > Hilo. In addition to the software, three basic hardware elements are required for Remote Control to work:

        1.) Host Computer (If a Windows computer, driver version 1.55 or above needs to be installed and functional)
        2.) Target Computer or Tablet
        3.) Router (Wi-Fi/WLAN)

The Host computer must be running LynxRedirector and be directly connected to the Hilo either via USB or Thunderbolt. Additionally, the Host Computer must be connected to your network router either via Ethernet cabling or over Wi-Fi (direct Ethernet cabling will provide the best performance). The Target Computer/Tablet running Hilo Remote must also connect to your network router either via Ethernet cabling or over Wi-Fi.

5.5.2   Initial Setup

First, make sure your Hilo is connected directly to the Host Computer and the driver is loaded (Hilo-USB does not need a driver to be loaded on OS X).

Next, make sure the Host Computer is connected to your network and has been assigned an IP address (this should happen automatically).

Launch LynxRedirector on your Host computer.

     If your Hilo is connected via USB, you will see a screen similar to this.

     If your Hilo is connected via Thunderbolt, you will see a screen similar to this.

You need only make a change to LynxRedirector if you have multiple Hilo's connected to the Host Computer.

Next, make sure your Target Computer/Tablet is connected to the same network as the Host Computer and has been assigned an IP address (again, this should happen automatically).

Finally, launch Hilo Remote on the Target Computer/Tablet. You should see the Wi-Fi connected icon on the right side of the toolbar:

You should also see the "Connected to" indicator with the IP address of the Target Computer/Tablet show up on LynxRedirector on the Host Computer.

You should now be able to control your Hilo using Hilo Remote on the Target Computer/Tablet.

5.5.3   Frequently Asked Questions

Q) After I have connected to the Host computer, my Hilo Remote keeps showing disconnected, why?

A) Hilo Remote will time-out and disconnect from LynxRedirector if it doesn't get a message from the Hilo for 3 seconds. This will

be shown in Hilo Remote as a disconnected Wi-Fi icon: . This can occur if you are out-of-range of your Wi-Fi router, or if there is heavy Wi-Fi traffic causing missed packets for Hilo Remote. Move closer to your router, or reduce the Wi-Fi traffic then Hilo Remote will automatically try and re-establish the connection.

Q) Can I run more than one copy of Hilo Remote?

A) The Hilo can only communicate with one copy of Hilo Remote at a time. If you launch Hilo Remote on the Host Computer, it may not be possible to also launch Hilo Remote on the Target Computer/Tablet. Exiting Hilo Remote will cause the Hilo to stop communicating with any other Hilo Remote that may be running. The second Hilo Remote will go into its "disconnected" state after 3 seconds and it will automatically try and reestablish communication with the Hilo.

Q) My Host Computer is on a different sub-net, or is completely different network, how can I connect?

A) Hilo Remote V1.0.0.6 and up allows you to specify the Host Computer's IP address using the Select Connection dialog on the Target Computer/Tablet:
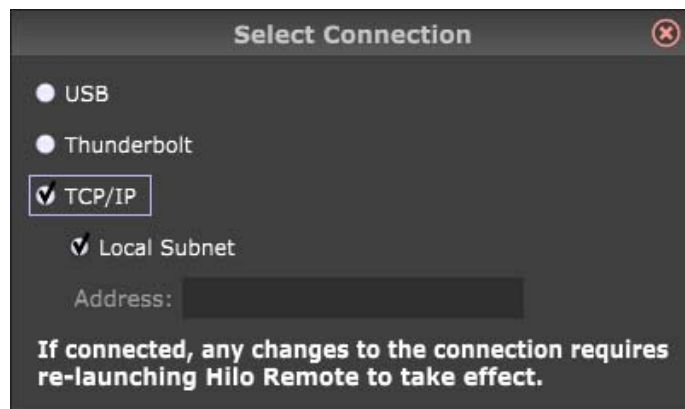
Simply uncheck the "Local Subnet" check-box, then enter the IP Address, Computer Name or Domain Name in the "Address:" field.
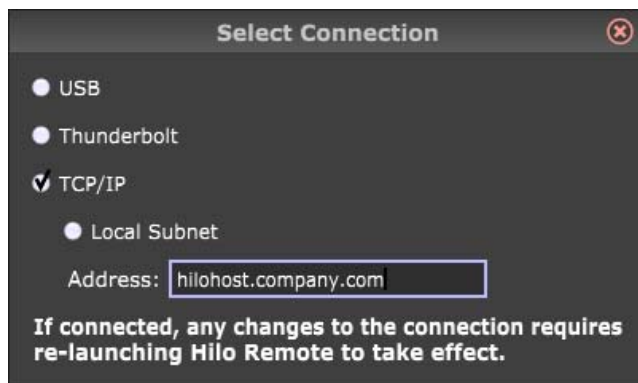
If the Host Computer is separated from the Target Computer/Tablet across a wide-area network (such as behind a router with NAT [Network Address Translation]), you will need to specify the router's IP Address and open port 5645 to forward to your Host Computer. Port 5646 is used to communicate between the Host Computer and the Target Computer/Tablet, so you would need to open port 5646 to forward to the Target Computer/Tablet.
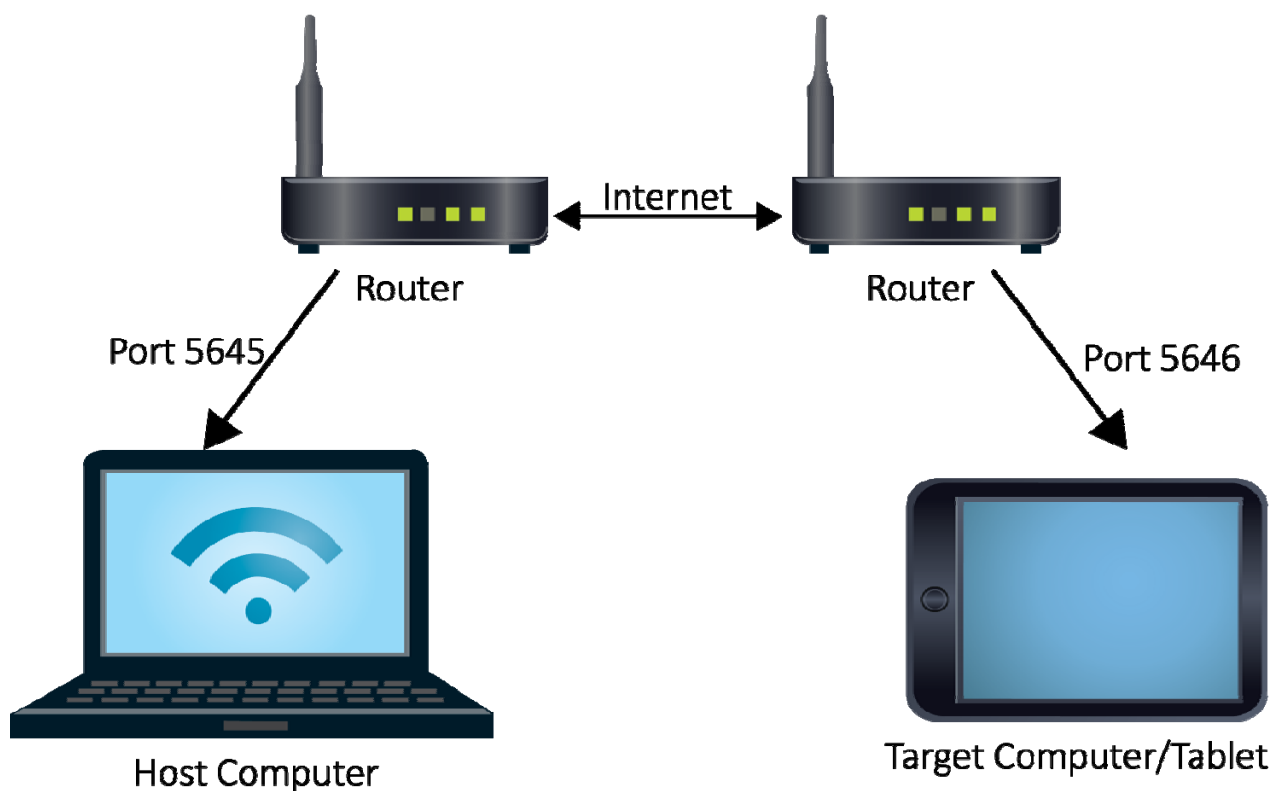
6   Support

We are devoted to making your experience with Hilo trouble-free and productive. If the troubleshooting and operational sections of this manual did not help resolve your questions, several support options are available to you:

6.1   Lynx Website Support Resources

Logging on to http://www.lynxstudio.com > Support, will provide several options for resolving your support issues:

Downloads
> A library of current firmware and driver files are available for download and installation. Check back regularly to insure that your Hilo is up-to-date.

Contact Tech Support
> For direct attention from the Lynx Technical Support Staff, registered users can submit a support ticket online that details their problem and steps they've taken to resolve it. Most Support Ticket submissions are responded to within 24 hours.

Frequently Asked Questions
> An extensive catalog of FAQs derived directly from our most common tech support inquiries. Our FAQ section is updated regularly and designed to allow users to find the answers to their most common questions quickly.

Lynx Support Forum
> An online Lynx users support forum provides a venue for customers to post questions and issues and receive responses from other users as well as Lynx technical administrators. Searching previous posts is often an excellent way to uncover valuable information about Hilo operation and troubleshooting.
> See http://www.lynxstudio.com/forum

Support Documents and User Manuals
> A library of useful "how-to" documents, troubleshooting aids and charts are available for 24/7 assistance. User Manuals are also conveniently available online for all Lynx products

Facebook Support Information Group
> Like us? Then Like us on Facebook to be alerted to the latest support, product and product information.

6.2   Telephone Support

Telephone support is available by calling +1 (714) 545-4700 extension 206 from 9AM to 5PM Pacific Time, Monday through Friday, excluding United States Holidays.

6.3   Registering your Hilo

Lynx is committed to providing you with the best service possible. To help us serve you better, please be sure to register your Hilo. Register on the web at: http://www.lynxstudio.com/register.html
Once you are registered you will automatically receive notifications of new products and upgrades.

6.4   Return Policy

If you have a unit that you suspect is defective or is malfunctioning contact Lynx technical support via one of the means described above for diagnosis. If the technician determines that the unit is faulty, they will issue an RMA number so you can send the unit in for repair. Units received without a valid RMA number will be refused. All RMA numbers are valid for 30 days from the date of issue.

7   Appendices

7.1   Methods of Connection

Hilo doesn't just sound great, it is impressively versatile as well. There are a number of ways to use Hilo in a wide variety of contexts.

7.1.1   USB 2.0

This is the method detailed in this manual, a single USB cable connection to a Mac or Windows computer

7.1.2   Thunderbolt

A Hilo/USB can be transformed into a Hilo/TB by removing the LT-USB card installing the Lynx LT-TB card instead. This allows a high-speed, single cable connection to the latest crop of Thunderbolt equipped Mac and PC computers. For detailed information about how this functions, refer to the Hilo/TB manual on the LynxStudio website.

7.1.3   ProTools Digilink

Unlike the Hilo/USB and Hilo/TB, adding ProTools Digilink compatibility to a Hilo requires purchasing the Lynx LT-HD card and replacing the LT-USB or LT-TB card in the Hilo. In this case, the LT-USB or LT-TB cards should be retained, as there is no way to update Hilo's firmware through the Digilink connection. When an update is available, re-installing the original card and connecting to the computer via USB or Thunderbolt will allow the updater to be run.

With an LT-HD card installed, the Hilo can be connected to a ProTools HD Native, HDX or PT|HD system with a standard Digilink cable (note: a Digilink to Mini Digilink adapter is necessary for use with the HD Native or HDX cards). In this state, Hilo will appear to the ProTools software as an HD I/O interface, with 16 channels of analog I/O. Distribution of channels will be the same here as it is with USB: the first pair of Playback channels is distributed to all outputs equally, then the remaining playback channels are distributed as follows:

Line Out:	Analog 1+2
Monitor Out:	Analog 1+2 and 3+4
Phones:	Analog 1+2 and 5+6
Digital Out XLR (AES):	Analog 1+2 and 7+8
Digital Out Coax: Analog 1+2 and Analog 11+12	
Digital Out Optical:	Analog 1+2 and Analog 9+10
ADAT Out 1-8:	Analog 1+2 and Analog 9-16

For operational specifics, please refer to the LT-HD manual on the lynstudio website: Support > User Manuals > Lynx LT-HD

7.1.4   Standalone

Hilo can operate with no expansion card installed, as a strictly standalone AD/DA converter/ format converter/ router / Sample Rate converter, etc. With the LT-USB card removed (as an example), the USB Play and Record devices will disappear from the Output Mix Routing page, and as metering choices. All routing and audio settings can still be controlled from the Hilo touch screen.

In general, it would be advisable to keep the LT-USB card installed even if one intends to use Hilo as a standalone device. USB would be the means to program with firmware updates, so removing it would prevent the option of keeping the unit updated. There is no specific advantage to removing the LT-USB card, other than that the USB Record and Play devices would no longer appear.

7.2   Battery Information

Hilo can operate off of a portable DC Battery Pack for field recording or whenever AC power is not available. The **BATTERY IN** connector is located directly above the AC connector on the Hilo back panel.

Battery Packs can be purchased from retailers of video cameras and other electronics equipment. Almost any lead acid or lithium battery should work as long as it has the following characteristics:
- 9-18 Volts. Typical choices are either 12V or 14V.
- A 4-pin XLR connector. The connection should have pin 4 hot, and pin 1 for ground. No other pins are connected. This is a standard configuration.
- Hilo consumes 22 Watts. Check with the battery's stated watt hours to determine operating time you can expect with a fully charged battery. For instance, a 60 watt-hour battery would provide up to 2.72 hours of operation.

7.3   Setting Trim Pots

As discussed in sections 3.4.5 and 3.4.6, Hilo's Line Inputs and Line Outputs can be set to Trim values of +18 dBu; +20 dBu; +22 dBu; +24 dBu; +0 dBV; +2 dBV; +4 dBV and +6 dBV. These trim positions are factory calibrated to these values within 1/100th of a dB. Trim levels can be selected from the Hilo Home Page. These set levels will satisfy the overwhelming majority of Hilo users.

In some cases, these levels may need to be tweaked to match the reference level of gear that is not calibrated as accurately. Also, in time and due to changes in temperature, it may be necessary to tweak trim levels to set them back to their original reference.

For this purpose, Hilo has ultra accurate, 25-turn trim pots accessible from the bottom of the chassis that can be used to adjust + or - .5dB from the established trim level. Here are the steps to calibrate via these trim pots:

1. Remove the plate from the bottom of Hilo. There are four screws that hold it in place. The front-right rubber foot will need to be removed to allow access to one of the screws. Locate the input and output trim pots on the underside of the Hilo main board.
2. Set the Line In and/or Line Out trim levels on the Hilo Home page to the value closest to your desired level.

3. It is best to use sine wave tones to adjust trims. If adjusting Input trim levels, send tones from an external device and measure the results in either software or a scope with digital inputs. It is best to avoid analog input routed to analog output paths for this kind of calibration. If adjusting Hilo Output Trims, send tones from a software source via the USB connection, or tones from an external device connected to one of Hilo's digital inputs routed to the Line Out. Make sure that the entire signal path is set to unity gain.
4. Adjust the trims clockwise to increase the gain on the inputs or outputs, or counter clockwise to decrease gain until the desired reference level is achieved.

Keep in mind that this variation will also be represented in other trim levels that are selected. For instance if a trim level of +22dB is active, and the trim pots have altered that to 22.25dB, if later a trim value of +24dB is selected from the Hilo, the resulting signal will be +24.25 dB.

7.4   XLR Connector Wiring and Adapters

This section describes the proper wiring of cables that can be used to adapt both the Analog and AES Digital XLR connectors on the Hilo.

7.4.1   Balanced Connections

The wiring method for balanced connections with XLR connectors to balanced TRS (¼" phone) connectors using shielded twisted pair cable (2 wire + shield) is as follows:

XLR Pin 1 (GND) to cable shield and to the TRS sleeve
XLR Pin 2 (+) to one signal wire and to the TRS tip
XLR Pin 3 (-) to the other signal wire and to the TRS ring
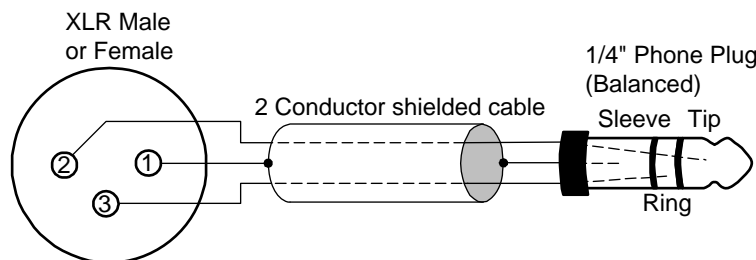
7.4.2   Unbalanced Connections with Twisted Pair Cable

The wiring method for unbalanced connections with XLR connectors to ¼" phone connectors (tip and sleeve only) using shielded twisted pair cable (2 wire + shield) is as follows:

    XLR Pin 1 (GND) to cable shield with no connection on the other end
    XLR Pin 2 (+) to signal wire and to the ¼" phone tip
    XLR Pin 3 (-) to the other signal wire and to the ¼" phone sleeve

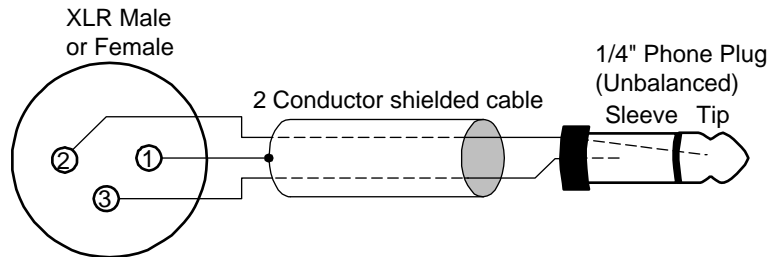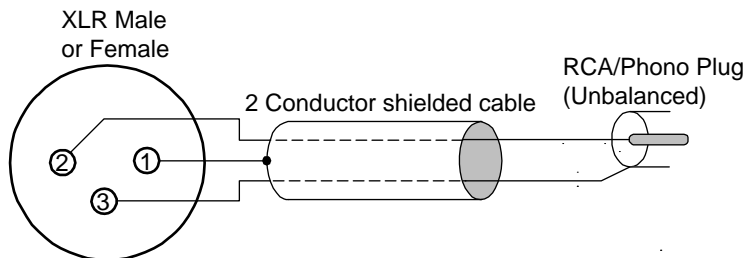The wiring method for unbalanced connections with XLR connectors to RCA/Phono phone connectors using shielded twisted pair cable (2 wire + shield) is as follows:

    XLR Pin 1 (GND) to cable shield with no connection on the other end
    XLR Pin 2 (+) to signal wire and to the Phono center pin
    XLR Pin 3 (-) to the other signal wire and to the Phono sleeve

7.4.3   Unbalanced Connections with Single Conductor Cable

In some cases it may be necessary to use single-conductor cable to adapt to unbalanced devices. These cables are considerably more susceptible to interference and grounding problems than the two conductor cables shown above. Two-conductor cables should be used whenever possible.

The wiring method for unbalanced connections with XLR connectors to unbalanced ¼" phone connectors (tip and sleeve only) using coaxial cable (1 wire + shield) is as follows:

    XLR Pin 1 (GND) no connection
    XLR Pin 2 (+) to signal wire and to the ¼" phone tip
    XLR Pin 3 (-) to the cable shield and to the ¼" phone sleeve

The wiring method for unbalanced connections with XLR connectors to unbalanced RCA/Phono phone connectors using coaxial cable (1 wire + shield) is as follows:

> XLR Pin 1 (GND) no connection
> XLR Pin 2 (+) to signal wire and to the Phono center pin
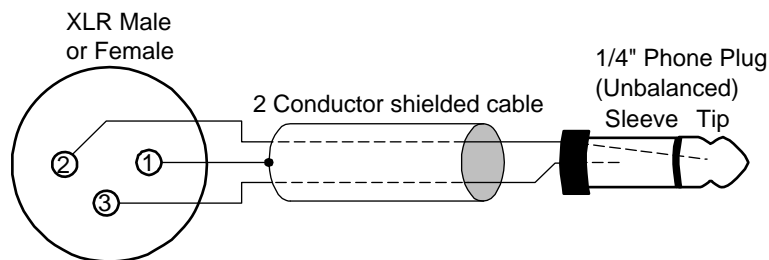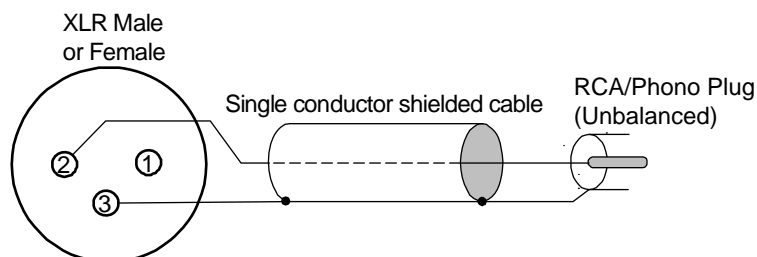> XLR Pin 3 (-) to the cable shield and to the Phono sleeve

7.5   Setting the Monitor Out Level Mode

By default, the Hilo Monitor Outputs are calibrated to a maximum of +10dBu. This is a standard reference level for powered monitors. If the Monitor Outputs are to be used with powered monitors or a power amp connected to passive monitors, then this setting is likely appropriate.

If instead, one wishes to connect the Monitor Output to some other professional line level device, then it may be desirable to set the Monitor Out to its alternate setting, which is +24dBu.
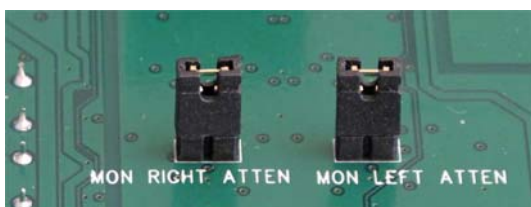
Monitor Output Level Default +10 dBu   Monitor Output Level Option +24 dBu
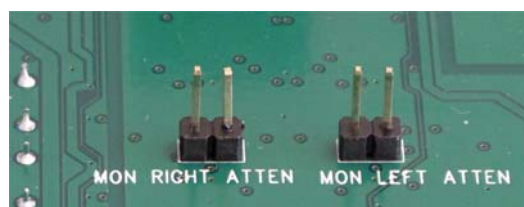
This setting is established with jumpers on the Hilo mainboard. To access them, remove the bottom plate on the Hilo (it will be necessary to remove one of the rubber feet to accomplish that). The pins in question are labeled Mon Right Atten (short for Monitor Output Right Channel Attenuation) or Mon Left Atten. Removing the jumpers sets the levels to the alternate +24dBu mode.

If the desired level is less than +24dBu (+22dBu) for instance, then you can additionally attenuate with the Hilo Monitor Out volume control.

8   Troubleshooting & User Tips

Q. Why are there circles and red lines through my Sample Rate, Sync Source and SynchroLock icons?
A. When Hilo is connected via USB, these controls lock out. Hilo will respond to Sample Rates changes that occur in your DAW. To make changes when not using your DAW, go to the Sound Control Panel in Windows or to AUDIO MIDI SETUP in a Mac.

Q. I want to change my Sync Source but it is locked out.
A. To change SYNC SOURCE when USB is connected, you must first disconnect USB from Hilo, set your SYNC SOURCE, then re-connect the USB cable.

Q. What does the white box around the Input Source mean?
A. That means that that Input is in "Focus". In other words, the Input Level Fader, Metering and ON/OFF state are for that selected (Focused) input. This is useful since you may have multiple Inputs feeding an Output and may want to check levels, etc. for one of them.

Q. I have multiple sources coming into Hilo and they are all mixing onto the same tracks in my DAW.
A. In the OUTPUT MIX ROUTING PAGE, select the Output (e.g. USB REC 1 &2) and make sure you do not have any unwanted Inputs being routed to that Output. To turn off an Input, tap the ON button so it becomes a red OFF or you can tap the Input (once if it is already in "Focus" or twice if it is not) until it turns red.

Q. My monitor level (or phones) is turned up but the audio is still very low.
A. Check the Input Level for the Inputs feeding that Output and make sure they are at a sufficient level. Also, for MONITOR OUT and PHONES, tap the "Analog" button (at the bottom of the Outputs field) to switch it to the Digital Level, and make sure that level was not turned down.

Q. My output level is turned down but the audio is distorted.
A. Check your Input Levels to your selected Output. The Input Source Level has the ability to be raised higher than "0" level and thus can add gain that may distort your output.

Q. I am mixing Inputs to my Monitors (or Phones , and the Output is distorting. I like the mix of the Inputs and I do not want to have to turn down each Input one at a time. What can I do?
A. Tap the "Analog" button (at the bottom of the Outputs field) to switch it to the Digital Level. This is the digital output level before it feeds the analog MONITOR and PHONES. Bring the Digital Level down until you are not hitting the "Overs" on the Output Meters.

Q. When do I use the Sample Rate Converter?
A. There are two situations where you would the SRC:
1) When your digital inputs to Hilo are coming in at a sample rate that differs from the sample rate of Hilo. Hilo will up-or-down sample the input signal to match itself and
2) If your digital sources are coming in at the *same* sample rate as Hilo, but your digital sources have no ability to clock slave to Hilo (e.g. consumer CD players). The SRC will re-clock the digital input signal to make sure it is in Sync with Hilo's clock.

Q. I am using a mono input into the Line In of Hilo. I have the Line In assigned to my Monitors and Phones Output but I am only hearing it one side (the side it is connected to). Why?
A. To monitor a mono input signal in the center of the stereo field, go to the Output Mix Routing Page and select the Input you would like to monitor (make sure the white box is around the Input so that it is "focused" or selected). Under the Input Meters is the MONITOR MODE select button. Tap that button to launch the menu of options. If your signal source is plugged into the Left Input of the selected source, then select "Left". If it is plugged into the Right Input, Select "Right". On the OUTPUT METERS you should now see your signal on the both the left and right sides. Note: The MONITOR MODE selection is active PER INPUT and PER OUTPUT. While this makes the feature very flexible, keep in mind you may need to select the correct mode for multiple outputs (such as MONITOR OUT and PHONES).

9   Specifications

Line In L/R

THD+N	-114 dB @1kHz, -1dBFS, 20kHz filter, +22dBu trim
Dynamic Range	121 dB, A-weighted, -60dBFS signal method
Frequency Response	± 0.01 dB, 20 – 20kHz
Crosstalk	140 dB maximum @ 1kHz, -1dBFS signal
Full-scale trim settings:	+ 0dBV, +2dBV, +4dBV, +6dBV, +18dBu, +20dBu, +22dBu, +24dBu
Female XLR connectors	

Line Out L/R

THD+N	-109 dB @1kHz, -1dBFS, 20kHz filter, +22dbu trim
Dynamic Range	121 dB, A- weighted, -60dBFS signal method
Frequency Response	± 0.02 dB, 20 – 20kHz
Crosstalk	-135 dB maximum @ 1kHz, -1dBFS signal
Full-scale trim settings	+ 0dBV, +2dBV, +4dBV, +6dBV, +18dBu, +20dBu, +22dBu, +24dBu
Male XLR connectors	

Monitor Out L/R

THD+N	-107 dB @1kHz, -1dBFS, 20kHz filter, volume at max
Dynamic Range	121 dB, A- weighted, -60dBFS signal method
Frequency Response	± 0.02 dB, 20 – 20kHz
Crosstalk	-135 dB maximum @ 1kHz, -1dBFS signal
Output level at max volume	+24dBu or +10dBu, jumper selectable
TRS connectors	

Headphone Out

THD+N	-107 dB @1kHz, -1dBFS, 20kHz filter, volume at max
Dynamic Range	121 dB, A- weighted, -60dBFS signal method
Frequency Response	± 0.02 dB, 20 – 20kHz
Crosstalk	-130 dB maximum @ 1kHz, -1dBFS signal
Output level at max volume	+19dBu
¼" phone jack on front panel	

Digital I/O

AES/EBU	Transformer-coupled on XLR connectors
S/PDIF I/O coax	Transformer-coupled on RCA jacks
S/PDIF I/O optical	On optical connectors
ADAT I/O	8 channels at 48 kHz when selected on optical connectors

Sample Rates

All standard rates up to 192 kHz using SynchcroLock sample clock generator

Synchronization Options

Internal	
External word clock I/O	75ohm TTL signal on BNC connectors
AES/EBU or S/PDIF inputs	

Computer Connectivity

Windows 32-bit and 64-bit drivers provided by Lynx
Macintosh OS X drivers provided by Apple

LSlot™ Expansion Port

Supports Lynx LSlot expansion cards with up to 32 input and outputs simultaneously

LCD Display

480 x 282 LCD Touch Screen

AC Power	110 to 230 VAC, 30 watts;
Battery Power	9-18 volts DC on 4-pin XLR
Size	8.50" wide x 3.25" tall x 10.00" deep
Shipping Weight	12 pounds

Certifications   CE and FCC Class B EMI, CE Product Safety

10 Certifications

10.1   FCC DECLARATION OF CONFORMITY

MANUFACTURERS NAME: Lynx Studio Technology, Inc.
MANUFACTURER ADDRESS: 190 McCormick Avenue
                                      Costa Mesa, CA 92626, U.S.A.
TELEPHONE   (714) 545-4700
COMPLIANCE TEST REPORT NUMBER: D11123R1
COMPLIANCE TEST REPORT DATE: January 12, 2012
TYPE OF EQUIPMENT: Professional A/D and D/A Converter
EQUIPMENT CLASS: Residential, Commercial, Light Industry, Urban Outdoors, Dedicated Studios
MODEL NUMBER: Hilo
CONFORMS TO THESE SPECIFICATIONS: CFR Title 47 FCC Part 15 Subpart B Class B per CISPR 22 Limits
TEST PROCEDURE: ANSI C63.4
YEAR OF MANUFACTURE: 2011

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 12, 2012

Robert J. Bauman
Compliance Engineer

10.2　CE EMC DECLARATION OF CONFORMITY

MANUFACTURERS NAME:　　　　　　Lynx Studio Technology, Inc.
MANUFACTURER ADDRESS:　　　　　190 McCormick Avenue
　　　　　　　　　　　　　　　　Costa Mesa, CA 92626, U.S.A.
TELEPHONE　　　　　　　　　　　(714) 545-4700
COMPLIANCE TEST REPORT NUMBER:　D20110Q1
COMPLIANCE TEST REPORT DATE:　　January 12, 2012
TYPE OF EQUIPMENT:　　　　　　　Professional A/D and D/A Converter
EQUIPMENT CLASS:　　　　　　　　Residential, Commercial, Light Industry, Urban Outdoors, Dedicated Studios
MODEL NUMBER:　　　　　　　　　Hilo
CONFORMS TO THESE SPECIFICATIONS: EN 55103-1:2009 for environment categories E1 – E4 which references the following
　　　　　　　　　　　　　　　　specifications:
　　　　　　　　　　　　　　　　　　　EN 55013:2001, EN 55014:2002, EN 55022:2006,
　　　　　　　　　　　　　　　　　　　EN 61000-3-2:2006, EN 61000-3-3:2008
　　　　　　　　　　　　　　　　EN 55103-2:2009 for environment categories E1 – E4 which references the following
　　　　　　　　　　　　　　　　specifications:
　　　　　　　　　　　　　　　　　　　EN 61000-4-2:2001, EN 61000-4-3:2008, EN 61000-4-4:2004,
　　　　　　　　　　　　　　　　　　　EN 61000-4-5:2006, EN 61000-4-6:2007, EN 61000-4-11:2004

YEAR OF MANUFACTURE:　　　　　　2011

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

Costa Mesa, California
January 12, 2012

Robert J. Bauman
Compliance Engineer

10.3　CE SAFETY DECLARATION OF CONFORMITY

MANUFACTURERS NAME:　　　　　　Lynx Studio Technology, Inc.
MANUFACTURER ADDRESS:　　　　　190 McCormick Avenue
　　　　　　　　　　　　　　　　Costa Mesa, CA 92626, U.S.A.
TELEPHONE　　　　　　　　　　　(714) 545-4700
COMPLIANCE TEST REPORT NUMBER:　D20118S2
COMPLIANCE TEST REPORT DATE:　　January 23, 2012
TYPE OF EQUIPMENT:　　　　　　　Professional A/D and D/A Converter
EQUIPMENT CLASS:　　　　　　　　Residential, Commercial, Light Industry, Urban Outdoors, Dedicated Studios
MODEL NUMBER:　　　　　　　　　Hilo
CONFORMS TO THESE SPECIFICATIONS: EN 60065:2002 + A1:2006 + A2:2010 + A11:2008 + A12:2011
YEAR OF MANUFACTURE:　　　　　　2011

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

Costa Mesa, California
January 23, 2012

Robert J. Bauman
Compliance Engineer

Hilo
One year Free Labor / One year Parts Exchange
This product must be returned to the factory for repair.

Who Is Covered?
You must have proof of purchase to receive warranty service. A sales receipt or other document showing when and where you purchased the product is considered proof of purchase. This warranty is enforceable only by the original retail purchaser. To be protected by this warranty, the purchaser must register online within 14 days of purchase.

What Is Covered?
Warranty coverage beings the day you buy your product. *For one year thereafter*, 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. All parts, including repaired and replaced parts, are covered only for the original warranty period. When the warranty on the product expires, the warranty on all replaced and repaired parts also expires.

What Is Excluded?
Your warranty does not cover:
- Labor charges for installation or setup of the product.
- Product repair and/or part replacement because of misuse, accident, unauthorized repair or other cause not within the control of Lynx.
- A product that requires modification or adaptation to enable it to operate in any country other than the country for which it was designed, manufactured, approved and/or authorized, or repair of products damaged by these modifications.
- Incidental or consequential damages result from the product, damage to property, damage based on inconvenience or on loss of use of the product, and, to the extent permitted by law, damages for personal injury. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.
- A product that is used for rental purposes.

To Get Warranty Service…
To obtain warranty service, the purchaser must first call or email Lynx at the email address or telephone number printed in Section 6 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.

Lynx Studio Technology, Hilo and the Hilo Logo are trademarks of Lynx Studio Technology, Inc. All other product or company names are the trademarks or registered trademarks of their respective owner.

NOTES

LYNX STUDIO TECHNOLOGY, INC.

www.lynxstudio.com