UltraLite™

User's Guide for Macintosh

MOTU

Contents

Quick Reference: UltraLite Front Panel

1. This XLR/TRS combo jack accepts either a mic cable or a cable with a quarter-inch plug. Both the low-impedance XLR jack and the high-impedance TRS jack are equipped with 24dB of front-panel trim control. The XLR (mic) input can be supplied with 48V phantom power via the Mic 1 front-panel switch. The Mic 1 three-way pad switch provides zero (down), 18dB (middle) and 36dB (up) pad settings for the XLR (mic) input as well.

2. These two Precision Digital Trim™ knobs provide 24dB of gain in 1dB increments for the front and rear panel Mic/ Instrument inputs. Both have preamps, so you can plug in just about anything: a microphone, a guitar, a synth, or even a +4 signal. Use the trim knob, three-way pad switch and input level meter in the LCD to calibrate the input signal level.

3. Controls the headphone volume. The LCD provides visual feedback for the headphone volume setting as you turn the knob.

4. The multi-purpose backlit LCD provides metering for all of the UltraLite's inputs and outputs. It also gives you access to the UltraLite's built-in mixer and other settings. There are four independent mix busses: MIX1 through MIX4. Each mixes all inputs (or any subset you wish) to a stereo output of your choice. To edit a mix, push the PAGE knob to enter mixer mode. Use the CURSOR knob to scroll to the Mix1 setting until it flashes and then turn the VALUE knob to choose the desired mix, or push it to cycle through the four mixes. Each mix has parameters (volume, pan, etc.) for each input: choose the parameter you wish to edit by turning the PAGE knob. The LCD

shows each UltraLite input (XLR/combo, TRS, and SPDIF), along with the current mix parameter setting for each input. To change a setting, scroll to it with the CURSOR knob and change it with the VALUE knob. The labels above and below the LCD refer to all of the UltraLite's inputs and outputs (both analog and digital).

5. This knob doubles as the main volume and the power switch. The UltraLite is powered by its FireWire connection to the computer. Push this knob to turn the UltraLite on; push and hold to turn it off. It is recommended that you always power off the UltraLite before unplugging the FireWire cable.

6. Use the CURSOR and VALUE knobs to edit CueMix DSP parameters and other UltraLite settings in the LCD.

7. This is a standard quarter-inch stereo headphone jack. From the factory, its output matches the main outs on the rear panel. But it can be programmed to mirror any other output pair (digital or analog). It can even be programmed to serve as its own independent output. Use the volume knob above to control its level.

8. The 48V phantom power switches provide phantom power for condenser microphones. Down is off; up is on. The PAD switches are three-way switches: down turns off the pad; the middle position provides an 18dB pad; the up position provides a 36dB pad.

Quick Reference: UltraLite Rear Panel
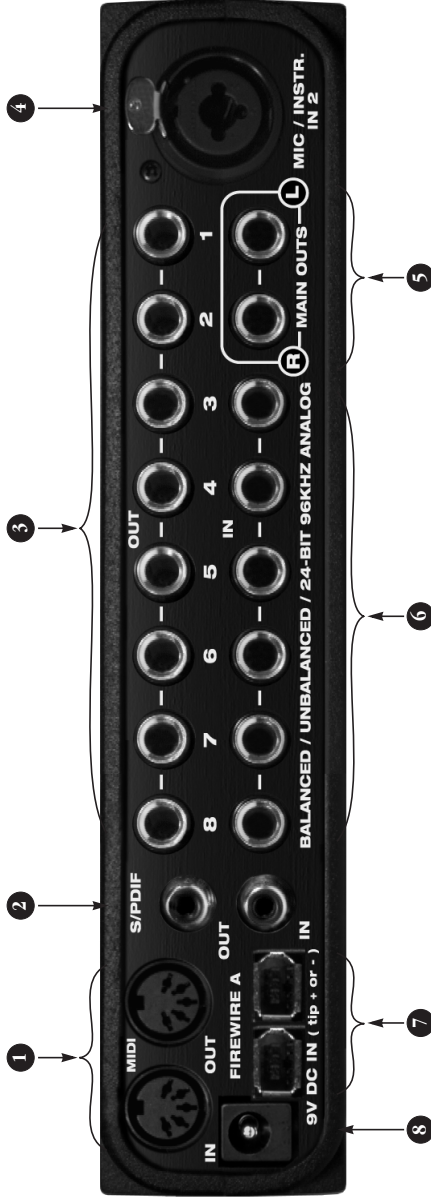
1. Connect a MIDI device here using standard MIDI cables. Connect the UltraLite's MIDI OUT port to the MIDI IN port on the other device. Conversely, connect the UltraLite's MIDI IN port to the MIDI OUT port on the other device. You can connect different devices to each port, such as a controller device to the IN port and a sound module to the OUT port. You can also daisy-chain MIDI devices, but be sure to manage their MIDI channels (so that they don't receive or transmit on the same channel).

2. These jacks provide stereo, 24-bit S/PDIF digital input and output at any sample rate up to 96kHz.

3. The UltraLite's eight analog outputs are gold-plated, balanced +4dB TRS (tip/ring/sleeve) quarter-inch connectors that can also accept an unbalanced plug. They are equipped with 24-bit, 128x oversampling converters.

4. This XLR/TRS combo jack accepts either a mic cable or a cable with a quarter-inch plug. Both the low-impedance XLR jack and the high-impedance TRS jack are equipped with 24dB of front-panel trim control. The XLR (mic) input can be supplied with 48V phantom power via the Mic 2 front-panel switch. The Mic 2 three-way pad switch provides zero (down), 18dB (middle) and 36dB (up) pad settings for the XLR (mic) input as well.

5. These two balanced, quarter-inch jacks serve as the UltraLite's main outputs. You can connect them to a set of powered studio monitors and then control the volume from the front panel volume knob. To hear disk tracks in your audio software on these main outs, assign the disk tracks (and master fader) to these main outs (*Main Out 1-2*). You can also use CueMix DSP to monitor live UltraLite inputs here as well.

6. These six analog inputs (3 through 8) are gold-plated, balanced TRS (tip/ring/sleeve) quarter-inch connectors that can also accept an unbalanced plug. The front panel LCD and MOTU CueMix Console software let you adjust them for either +4dB or -10dB input signals. They have 24-bit, 64x oversampling converters. These inputs do not have microphone preamps, so they are best used for synthesizers, drum machines, effects processors, and other instruments with line level signals.

7. Connect the UltraLite to the computer here using the standard 1394 FireWire A cable provided with your UltraLite. **Important note: it is best to turn off the UltraLite when plugging in the FireWire cable, as this avoids the possibility of static discharge, which can harm the electrical components in the UltraLite or your computer.** Use the second FireWire port to daisy-chain up to four MOTU FireWire audio interfaces to a single FireWire bus. You can also connect other FireWire devices. For details, see "Connecting multiple MOTU FireWire interfaces" on page 21.

8. This jack accepts any standard 10-24V DC power supply with either tip-positive or tip-negative polarity.

Quick Reference: MOTU Audio Setup
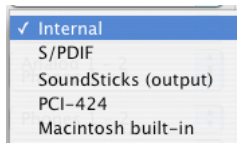
Determines the clock source for your UltraLite. If you're just using the analog ins and outs, set this to 'Internal'. The other settings are for digital transfers via S/PDIF or synchronization to other audio devices.

This menu lets you choose what you will hear from the headphone jack. To mirror the main outs, choose *Main Out 1-2*. Or you can mirror any other output pair. To hear the phones as their own independent output, choose *Phones 1-2*.
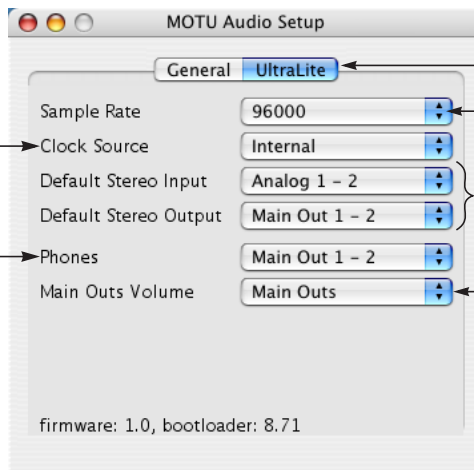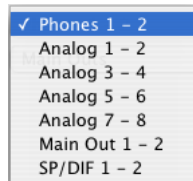
Click the tabs to access general MOTU FireWire interface settings or settings specific to the UltraLite (or other connected interface.)

Choose the sample rate for the UltraLite here.

Specifies the stereo input and output pair when the UltraLite is chosen for Mac OS X audio I/O.

Lets you choose what to control with the MAIN VOL knob on the front panel. You can control the stereo Main Outs on the rear panel, the S/PDIF stereo output, or analog outputs 1-6 or 1-8 for 5.1 or 7.1 surround output, respectively.
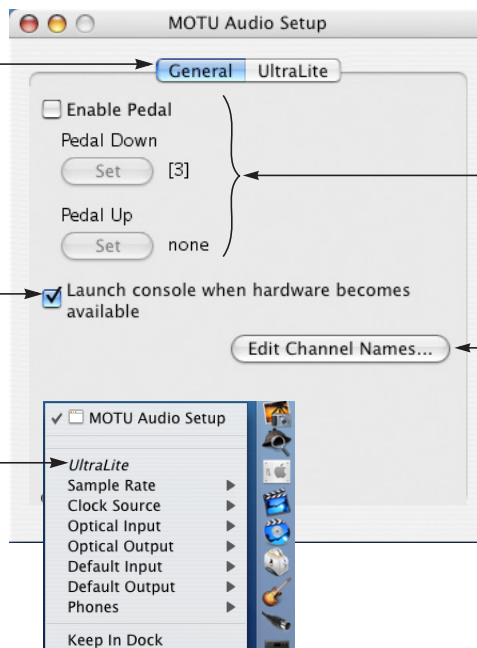
Click the General tab to access these settings.

Check this option if you would like the MOTU Audio Setup icon to appear in the application dock as soon as a MOTU FireWire interface is detected (switched on, plugged in, etc.)

In the standard Mac OS X fashion, the setup software appears in the dock when you launch it. If the *Launch console automatically* option is checked (as shown above), the icon appears as soon as you switch on your UltraLite interface. If you click and hold on the dock icon (instead of clicking it) or control-click, a menu of hardware settings appears as shown to the right. You can view and configure any hardware settings from this menu, without opening the setup software window.

If you have a foot switch connected to another MOTU FireWire interface, these settings let you map the foot switch to any computer keyboard key for both the up and down position. This setting does not apply to the UltraLite, which does not have a foot switch input.

This button opens another dialog that lets you assign your own customized names to each UltraLite input and output. For example, if you have a lead vocal mic plugged into input 1, you could name it "Lead Vox". Your customized names then appear in your host audio application (if it supports CoreAudio input naming).

7
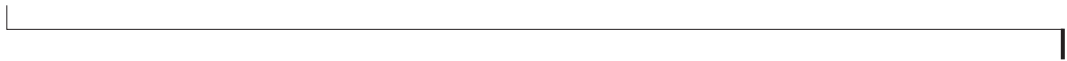
About the UltraLite

OVERVIEW

The UltraLite is a computer-based hard disk recording system for Mac OS X and Windows that offers 10 inputs and 14 outputs. Analog recording and playback is offered at any standard sample rate up to 96kHz. All inputs and outputs, both analog and digital, can be accessed simultaneously. The UltraLite is housed in a sturdy, compact enclosure that connects directly to a computer via a standard IEEE 1394 FireWire™ cable. The UltraLite offers the following:

■ Bus-powered operation

■ Two combo XLR/TRS mic/guitar inputs with preamps and 48V phantom power

■ Digital Precision Trim™ preamp gain adjustment

■ Six 24-bit analog TRS inputs

■ Ten 24-bit analog TRS outputs

■ S/PDIF digital I/O

■ MIDI I/O

■ Headphone jack with volume control

■ Main Out volume knob

■ CueMix™ DSP no-latency mixing & monitoring

■ Front-panel programming

■ Stand-alone mixing

With a variety of I/O formats, mic preamps and no-latency monitoring of live input, the UltraLite is a complete, portable "studio in a box" when used with a Macintosh or Windows computer. The UltraLite system includes AudioDesk™, full-featured audio workstation software for Mac OS that supports both 16-bit and 24-bit recording.

THE ULTRALITE REAR PANEL

The UltraLite rear panel has the following connectors:

■ Ten gold-plated, balanced +4dB quarter-inch (TRS) analog outputs (with 24-bit 96kHz converters)

■ One combo XLR/TRS mic/instrument input

■ Six gold-plated, balanced -10/+4 dB quarter-inch (TRS) analog inputs (with 24-bit 96kHz converters)

■ RCA S/PDIF in/out

■ Two 1394 FireWire jacks

■ DC power jack

■ MIDI IN and MIDI OUT jacks

10 inputs and 14 outputs

All UltraLite inputs and outputs can be used simultaneously, for a total of 10 inputs and 14 outputs:

Connection	Input	Output
Analog 24-bit 96kHz on bal/unbal TRS	6	10
Mic preamps 24-bit 96kHz on XLR/TRS combo	2	-
SPDIF 24-bit 96kHz digital	2	2
Headphone output	-	2
Total	**10**	**14**

All inputs and outputs are discrete and can be active simultaneously.

The headphone outputs can operate as an independent output pair, or they can mirror any other UltraLite output pair, such as the main outs.

Mic/instrument input

The two mic/instrument inputs (front panel and rear panel) are equipped with preamps and "combo" XLR/TRS jacks, which accept low-Z XLR microphone inputs or high-Z quarter-inch guitar/ instruments inputs. The total gain range for these preamps, including the three-way pad and 24dB trim, is 60dB. Preamp gain and pad can be controlled from the front panel digital rotary encoders/switches or the included MOTU CueMix Console™ software.

Analog

All six quarter-inch analog inputs are equipped with 24-bit 96kHz, 64x oversampling A/D converters. All eight analog outputs have 24-bit 128x oversampling D/A converters. All audio is carried to the computer in a 24-bit data stream. All ten analog outputs and six quarter-inch inputs are on balanced TRS +4dB quarter-inch jacks. All of these jacks can also accept unbalanced plugs.

The quarter-inch analog inputs are equipped with 18dB of trim, which can be adjusted for each channel individually via the CueMix Console software application or via the front panel LCD display.

S/PDIF

The UltraLite rear panel provides RCA "coax" S/PDIF input and output.

1394 FireWire

The two 1394 FireWire jacks accept a standard IEEE 1394 FireWire cable to connect the UltraLite to a FireWire-equipped Macintosh or Windows computer. The second jack can be used to daisy chain multiple interfaces — up to four MOTU FireWire interfaces — on a single FireWire bus. It can also be used to connect other FireWire devices without the need for a FireWire hub. The UltraLite has the ability to power itself from its FireWire connection to the computer.

MIDI I/O

The UltraLite's standard MIDI IN and MIDI OUT jacks supply 16 channels of MIDI I/O to and from the computer via the UltraLite's FireWire connection. Timing accuracy can be sample-accurate with host software that supports it.

Power supply

If you do not want the UltraLite to draw power from the computer, and AC power is available, you can power the UltraLite from any standard 10-18V, 12 watt DC power supply with any polarity (tip positive or negative).

THE ULTRALITE FRONT PANEL

Mic/instrument input

The two mic/instrument inputs (front panel and rear panel) are equipped with preamps and "combo" XLR/TRS jacks, which accept low-Z XLR microphone inputs or high-Z quarter-inch guitar/ instruments inputs. The total gain range for these preamps, including the three-way pad and 24dB trim, is 60dB. Preamp gain and pad can be controlled from the front panel digital rotary encoders/switches or the included MOTU CueMix Console™ software.

Phantom power

Individual 48V phantom power can be enabled for each preamp with the two front panel switches.

Three-way pad

An individual three-way pad can be enabled for each preamp with the two front panel switches. The independent three-way pad switch for each input provides zero (down), 18dB (middle) and 36dB (up) pad settings for the XLR jack. (The pad is not available on the TRS input.)

Digital Precision Trim™ rotary encoders

The two Digital Precision Trim™ detented rotary encoders provide preamp gain adjustment. When you turn these trim knobs, input gain can be

adjusted in 1dB increments, and the LCD display provides active numeric feedback as the adjustment is made.

Headphone output and main volume control

The UltraLite front panel includes a quarter-inch stereo headphone output jack and volume knob. The LCD display provides feedback. The MAIN VOL knob can be used to control the volume of the main out jacks on the rear panel. It can alternately be configured to control the S/PDIF outputs or TRS analog outputs 1-6 or 1-8 for 5.1 or 7.1 surround.

CueMix™ DSP no-latency on-board mixing

The CueMix DSP section of the front-panel provides access to the UltraLite's on-board mixing features, as well as global system settings. Together, these features provide complete stand-alone operation, without a computer. The UltraLite can mix all inputs to any output pair, and up to four such mixes can be independently programmed and simultaneously operated.

Backlit LCD display

Any UltraLite setting can be accessed directly from the front panel using the four rotary encoders and the 2x16 backlit LCD display. CueMix DSP settings such as input gain, panning, input level trim, phase invert, stereo pair grouping, mix output assignment and others are quickly accessed, clearly marked and easy to adjust. Sixteen presets can be created, saved, recalled and duplicated.

The LCD also provides activity metering for all UltraLite inputs and outputs.

16-BIT AND 24-BIT RECORDING

The UltraLite system handles all data with a 24-bit signal path, regardless of the I/O format. You can record and play back 16-bit or 24-bit audio files at any supported sample rate via any of the UltraLite's analog or digital inputs and outputs. 24-bit audio files can be recorded with any compatible host application that supports 24-bit recording.

AUDIODESK

AudioDesk is a full-featured, 24-bit audio workstation software package included with the UltraLite system (for Macintosh only). AudioDesk provides multi-channel waveform editing, automated virtual mixing, graphic editing of ramp automation, real-time effects plug-ins with 32-bit floating point processing, crossfades, support for many third-party audio plug-ins, background processing of file-based operations, sample-accurate editing and placement of audio, and more.

DIGITAL PERFORMER

The UltraLite system is fully integrated with MOTU's award-winning Digital Performer audio sequencer software package.

OTHER HOST AUDIO SOFTWARE

The UltraLite system includes a standard Mac OS X Core Audio driver for multichannel I/O with any audio application that supports Core Audio.

A COMPUTER-BASED SYSTEM

Regardless of what software you use with the UltraLite, the host computer determines the number of tracks the software can record and play simultaneously, as well as the amount of real-time effects processing you can apply to your mix. A faster computer with more RAM and faster hard drives will allow more simultaneous tracks and real-time effects than a slower computer with less RAM and slower hard drives. Today's fastest computers can typically play as many as 72 tracks or more.

CHAPTER 2 Packing List & Mac System Requirements

PACKING LIST

The UltraLite ships with the items listed below. If any of these items are not present in your UltraLite box when you first open it, please immediately contact your dealer or MOTU.

- One UltraLite I/O rack unit
- One set of removable rack ears
- One 1394 "FireWire" cable
- One UltraLite Mac/Windows manual
- One AudioDesk Manual
- One cross-platform CD-ROM
- Product registration card

MACINTOSH SYSTEM REQUIREMENTS

The UltraLite system requires the following Macintosh system:

- A G3/300MHz Power Macintosh or faster equipped with at least one FireWire port
- At least 256 MB (megabytes) of RAM (512 MB or more is recommended)
- Mac OS X (version 10.3 or later)
- A large hard drive (preferably at least 20 GB)

PLEASE REGISTER TODAY!

Please register your UltraLite today. There are two ways to register.

- Visit www.motu.com to register online

OR

- Fill out and mail the included product registration card

As a registered user, you will be eligible to receive on-line technical support email and announcements about product enhancements as soon as they become available. Only registered users receive these special update notices, so please, complete and mail this registration card!

Be sure to do the same for the included AudioDesk software, which must be registered separately. You can do so online or by filling out and mailing the included software registration card found at the beginning of your AudioDesk manual. Please be sure to register AudioDesk as well, so that you will be eligible to receive online technical support email and announcements about AudioDesk software enhancements as soon as they become available.

Thank you for taking the time to register your new MOTU products!

CHAPTER 3   Installing the UltraLite Hardware

OVERVIEW

Here's an overview for installing the UltraLite:

Take these precautions to prevent damage to your computer, the UltraLite and other equipment.

Connect the UltraLite to the computer.

Make analog and digital connections as desired.

Connect a controller, synth or control surface.

Choose from among several convenient options.

An example setup for computer-based mixing/FX.

Connect a DAT deck, effects processor or other device with digital I/O, but be sure to make the correct clock source settings.

Connect additional UltraLites or other audio interfaces.

IMPORTANT NOTE BEFORE YOU BEGIN!

Before you begin installing the UltraLite (or any bus-powered device), take these important precautionary measures to avoid damaging the sensitive electrical components in your computer, the UltraLite or other devices being connected:

■ Turn off the computer.

■ Turn off the UltraLite (push and hold the MAIN VOL knob.

■ Turn off the power of any other devices.

■ Touch the metal casing of the UltraLite to discharge any static electricity that you may be carrying just before the installation.

After you have made all of the necessary connections, as described in this chapter, turn on the devices in this sequence:

1. Turn on the computer.

2. Turn on the UltraLite.

3. Turn on other devices connected to the UltraLite.

CONNECT THE ULTRALITE INTERFACE

1 Make sure your computer and the UltraLite are switched off.

2 Plug one end of the UltraLite FireWire cable (included) into the FireWire socket on the computer as shown below in Figure 3-1.

☛ You can connect the UltraLite to an 800Mbit "FireWire B" port using a 9-pin to 6-pin FireWire B cable (not shown). However, the UltraLite will still operate at its specified 400Mbit (FireWire A) data rate.

3 Plug the other end of the FireWire cable into the UltraLite I/O as shown below in Figure 3-1.

Figure 3-1: Connecting the UltraLite to the computer.

CONNECT AUDIO INPUTS AND OUTPUTS

The UltraLite audio interface has the following audio input and output connectors:

- 10 balanced quarter-inch analog outputs

- 6 balanced quarter-inch analog inputs

- 2 XLR/quarter-inch "combo" analog inputs with preamps

- 1 pair of RCA S/PDIF in and out

Here are a few things you should keep in mind as you are making these connections to other devices.

Mic/instrument inputs

Connect a microphone, guitar, instrument or other analog input to the XLR/TRS combo jack with either a standard mic cable or a cable with a balanced quarter-inch plug.

Phantom power

If you are connecting a condenser microphone or other device that requires phantom power, move the 48V phantom power switch on the front panel to the up position (enabled).

Trim

Both the low-impedance XLR jack and the high-impedance TRS jack are equipped with 24dB of trim control. Use the digital trim knobs on the front panel to adjust the input level as needed for each input. The LCD provides visual feedback as you turn the trim knob. The UltraLite's input trims are digital controlled, so they allow you to make fine-tuned adjustments in precise 1dB increments. You can also adjust trim in the MOTU CueMix Console software. See "Input trim" on page 62.

Three-way pad

The XLR jack is equipped with a three-way pad, so "hot" signals are best connected via an XLR cable so that you can use the pad switch. Since the pad is not available on the TRS jack, hot signals connected via the TRS jack will probably overdrive

the input. The independent three-way pad switch for each input provides zero (down), 18dB (middle) and 36dB (up) pad settings for the XLR jack. When combined with the 24dB digital trim, the full gain range is 60dB. This is the difference between the minimum (trim at zero + pad at 36dB) and maximum (trim at 24dB + pad at zero) gain settings.

Combo jack summary
Use these general guidelines for the 48V phantom power, pad and trim settings on the two combo input jacks:

Input	48V	Pad	Trim
Condenser mic	On	As needed	As needed
Dynamic mic	Off	As needed	As needed
Guitar	Off	n/a	As needed
-10dB Line level via TRS	Off	n/a	As needed
-10dB Line level via XLR	Off	36dB	+12dB
+4dB line level (XLR only)	Off	36dB	Zero

Quarter-inch analog
The quarter-inch analog inputs (3-8) and outputs (1-8 plus main out) are balanced TRS connectors that can also accept an unbalanced plug.

The outputs are all referenced to +4dBu.

The reference level for the inputs can be adjusted over an 18dB range with the same general trim guidelines as shown earlier for the mic/instrument inputs. Trims for each input (or input pair) can be adjusted from the MOTU CueMix Console or the front panel. To learn how to adjust trim from CueMix Console, see "Input trim and phase invert" on page 61. To learn how to adjust trim from the font panel, see "PAGE" on page 37.

Separate main outs
The main outputs operate as an independent pair (they don't share signal with any other output pair). In a standard studio configuration, the main outs are intended for a pair of studio monitors, but they can also be used as regular outputs for any purpose. Their reference level is +4dB. Main out volume is controlled by the MAIN VOL knob on the front panel, although this knob can be configured to control other outputs instead.

S/PDIF
If you make a S/PDIF digital audio connection to another device, be sure to review the digital audio clocking issues, as explained in "Connecting and syncing S/PDIF devices" on page 21.

The UltraLite on-board mixer also supplies 12dB of digital trim for the S/PDIF input pair, which can be adjusted from CueMix Console or the front panel. To learn how to adjust S/PDIF input trim from CueMix Console, see "Input trim and phase invert" on page 61. To learn how to do it from the font panel, see "PAGE" on page 37.

CONNECT MIDI GEAR
Connect your MIDI device's MIDI IN jack to the UltraLite's MIDI OUT jack (Connection A below). Conversely, connect the MIDI device's MIDI OUT jack to the UltraLite's MIDI IN jack (Connection B).
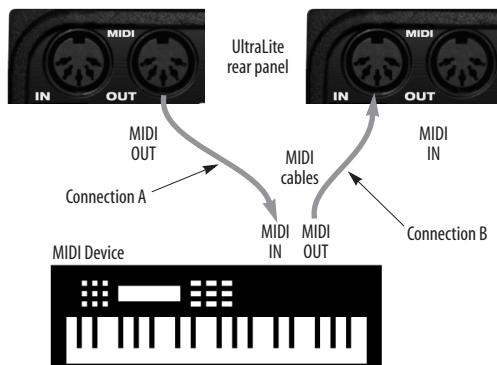
Figure 3-2: Connecting a MIDI device to the UltraLite.

One-way MIDI connections

MIDI devices that do not receive MIDI data, such as a dedicated keyboard controller, guitar controller, or drum pad, only need Connection B shown in Figure 3-2. Similarly, devices that never send data, such as a sound module, only need Connection A. Make both connections for any device that needs to both send and receive MIDI data.

Connecting additional gear with MIDI THRUs

If you need to connect several pieces of MIDI gear, run a MIDI cable from the MIDI THRU of a device already connected to the UltraLite to the MIDI IN on the additional device as shown below in Figure 3-3. The two devices then share the UltraLite's MIDI OUT port. This means that they share the same set of 16 MIDI channels, too, so try to do this with devices that receive on only one MIDI channel (such as effects modules) so their receive channels don't conflict with one another.
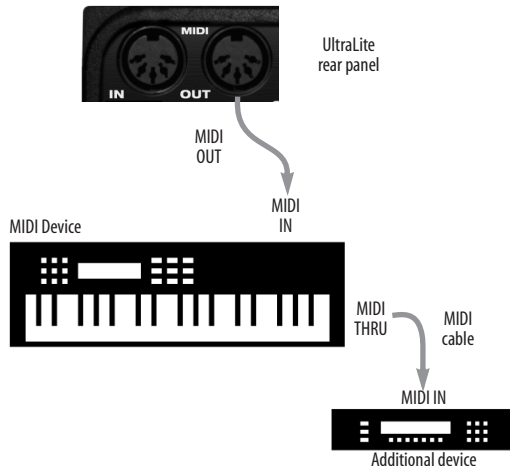
Figure 3-3: Connecting additional devices with MIDI THRU ports.

POWER OPTIONS

The UltraLite can draw power from two possible sources: the computer (via FireWire) or a DC power supply.

Bus power requirements

The UltraLite draws all the power it needs from the FireWire bus connection to the computer. However, the FireWire connection to the computer must meet all of the requirements discussed below.

6-pin FireWire connectors

The UltraLite can only draw power over the FireWire bus from a 6-pin to 6-pin cable, or a 6-pin to 9-pin (FireWire B) cable. It cannot draw power from a FireWire cable with a 4-pin connector, as shown below:
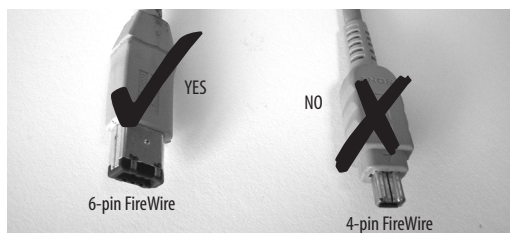
Figure 3-4: 4-pin FireWire connectors cannot be used for bus power.

When operating under bus power, daisy-chaining is not recommended

The UltraLite can be daisy-chained with other FireWire devices from a single FireWire connection to the computer. However, if the UltraLite is operating under bus power, this is not recommended. If you need to daisy chain the UltraLite with other devices on the same FireWire bus, power the UltraLite with a DC power supply (or battery). The other devices on the chain should also have their own power supply. In general, bus-powered FireWire devices should not be daisy-chained.

FireWire adapter products must be powered

If you are using a FireWire adapter (a third-party product that supplies one or more FireWire ports to your computer), it must have direct access to a power supply:

■ **PCI FireWire cards** — If you plan to connect the UltraLite to a PCI card and run the UltraLite under bus power, the PCI card must have a direct

connection to the power supply harness inside your computer. This is the same power supply harness to which you connect internal hard drives, CD/DVD drives, etc.

■ **PCMCIA slot adapters** — If you plan to connect the UltraLite to a PC card FireWire adapter (inserted in the PC card slot in your laptop), it must provide a 6-pin connection and it must also have its own power supply. Most commonly, these types of products have a DC power adapter. As you can see, however, this situation does not allow for remote battery operation, as the PC card adapter requires AC.

Examples of bus- powered operation
Here are a few typical examples of bus-powered UltraLite operation:

Bus power from a desktop computer
Your desktop computer is running off of its usual AC power connection, and the UltraLite draws power from the FireWire cable connected to the computer. There are no limits to running time.

Bus power from an AC-powered laptop
This scenario is identical to the desktop situation described above: the laptop is powered by AC, the UltraLite is powered via the FireWire bus and there are no limits to running time.

Bus power from a battery-powered laptop
The laptop is being powered by its own battery, and the UltraLite is being powered by its FireWire connection to the computer. So the laptop battery is supplying power to both the laptop and the UltraLite. This is the most compact and portable operating scenario. Running time is determined by the capacity of the laptop battery. For extended recording sessions, bring extra, fully charged laptop batteries.

DC power supply
If you do not want the UltraLite to draw power from the computer, and AC power is available, you can power the UltraLite from any standard 8-18 volt, 12 watt DC power supply with any polarity (tip positive or negative), and amperage as shown below.

Voltage	Amperage
9 volts	1.33 amps
12 volts	1 amp
18 volts	0.66 amps

Bus power versus DC power
When you connect a DC power supply, the UltraLite could draw power from either FireWire or the DC power supply. So which source does it use? The answer is: the source that is currently supplying the greatest voltage. But in practice, it doesn't really matter because the only situation in which you need to be concerned about the UltraLite's power draw is when you are operating it with a battery-powered laptop. And in this situation, the only available power is from FireWire. In all other situations, the computer has its own power, so it doesn't matter if the UltraLite is drawing power from FireWire or not.

Turning off the UltraLite
To turn on the UltraLite, push the MAIN VOL knob. To turn it off, push *and hold* the MAIN VOL knob. When the UltraLite is turned off, it is really in a sort of "sleep" mode, where it still draws just enough power to detect the power switch (a digital encoder) when the UltraLite is turned back on. But the amount of power that the UltraLite draws when it is turned off is so small that it has very little practical impact. If you are running a laptop under battery power, and you are in a situation where you are not using the UltraLite and you need every last bit of laptop battery power, unplug the UltraLite entirely from the computer.

A TYPICAL ULTRALITE SETUP

Here is a typical UltraLite studio setup. This rig can be operated without an external mixer. All mixing and processing can be done in the computer with audio software. During recording, you can use the UltraLite's CueMix™ DSP no-latency monitoring to listen to what you are recording via the main outs, headphone outs, or any other output pair. You can control monitoring either from the front panel or from the included MOTU CueMix Console software.
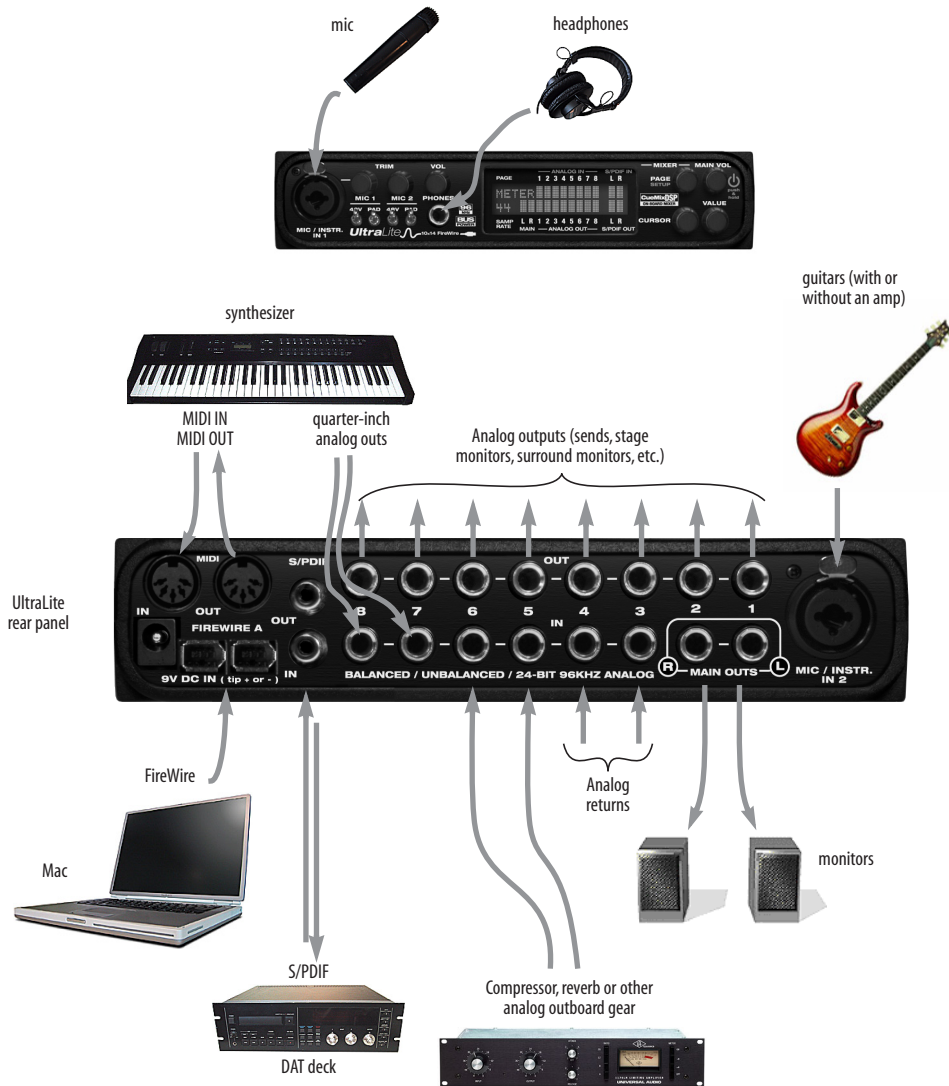
Figure 3-5: A typical UltraLite studio setup.

CONNECTING AND SYNCING S/PDIF DEVICES

DAT decks and other devices with S/PDIF digital I/O will sync to the UltraLite in via the S/PDIF connection itself. Just connect it to the UltraLite via the S/PDIF connectors. When the device records a digital audio signal (from the UltraLite), it will simply synchronize to the clock provided by the digital audio input.

On the other hand, when you transfer audio from the S/PDIF device into the UltraLite, you'll have to slave the UltraLite to its S/PDIF input.

UltraLite

S/PDIF

S/PDIF

S/PDIF device

UltraLite
Clock Source setting =
S/PDIF (when transferring from the other device to the UltraLite)

UltraLite
Clock Source setting =
Internal (when transferring from the UltraLite to the other device)
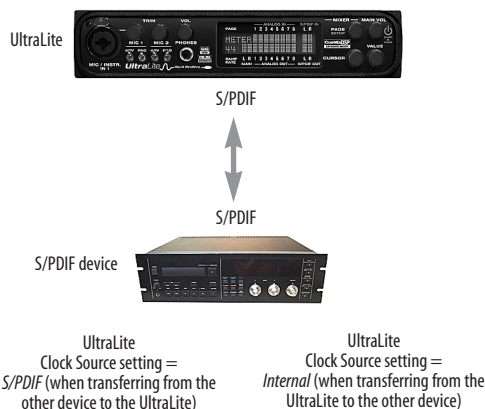
Figure 3-6: The setup for synchronizing a S/PDIF device with the UltraLite. Sync is achieved via the digital I/O connection itself. In this case, you have to choose S/PDIF as the UltraLite's clock source when recording from the other device.

CONNECTING MULTIPLE MOTU FIREWIRE INTERFACES

You can daisy-chain up to four MOTU FireWire interfaces on a single FireWire bus, with the restrictions described in the following sections. Most computers have only one built-in FireWire bus (even if it supplies multiple FireWire sockets). Connect them as follows:

Mac

FireWire

FireWire

FireWire

FireWire

FireWire

FireWire
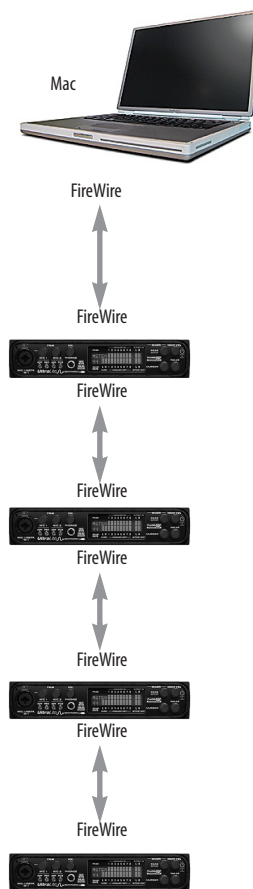
FireWire

FireWire

Figure 3-7: Connecting multiple UltraLite's (or other MOTU Audio interfaces) to a computer.

Multiple interfaces cannot be bus-powered

Do not run the UltraLite under bus power when connecting it with other devices to the same FireWire bus. See "Power options" and "Bus power requirements" on page 18.

Multiple interfaces in MOTU Audio Setup

MOTU Audio Setup displays the settings for one interface at a time. To view the settings for an interface, click its tab as shown below in Figure 3-8.
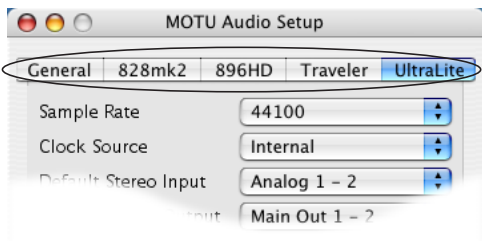
Figure 3-8: To view the settings for an interface, click its tab.

Synchronizing multiple interfaces

Mac OS X provides an advanced, flexible driver model that allows multiple Core Audio drivers to be active at one time, accessed by multiple applications simultaneously. For example, you can run both FireWire and PCI audio interfaces at the same time, accessing all of their inputs and outputs from your host audio application — or even multiple applications — simultaneously. You can even take advantage of Mac OS X's aggregate device driver feature (Mac OS X 10.4 or higher), which allows you to create a unified "meta device" out of several different audio interfaces. The aggregate device presents to your host software all of the inputs and outputs of the included devices.

An important feature of this flexible driver model is that multiple drivers can be synchronized to one another in order to remain resolved to each another. Without synchronization, the audio streams being handled by each interface might drift with respect to one another. For example, the audio tracks playing back through the UltraLite

might drift out of sync with the audio tracks playing back through your 2408mk3 PCI interface. Synchronizing them to each other ensures that they remain as tightly and continuously phase-locked as if they were operating as one unified interface.

Resolving to other Core audio drivers

So if you combine the UltraLite with other interfaces for the playback and/or recording of multiple audio streams (that must remain synchronized with each other), it is important to synchronize the UltraLite with the other device(s).

The MOTU FireWire driver has the ability to resolve to other Core Audio drivers. This allows the UltraLite, and other MOTU FireWire interfaces, to resolve to other audio interfaces running simultaneously on the same computer, such as the Mac's built-in audio, a PCI-424 core system, or even 3rd-party interfaces, without the need for external word clock connections between the devices. Doing so ensures that audio tracks being played or recorded by your MOTU FireWire interface will not drift apart from tracks on the other device during long playback or recording passes.

To synchronize multiple devices via the MOTU FireWire driver, choose one device (PCI, FireWire or otherwise) as the master clock and then slave the UltraLite and other FireWire devices to it. All interfaces will remain resolved to each other via the master interface.

Make the Clock Source settings for each interface as follows:

■ For the master interface, click its tab in MOTU Audio Setup and choose any clock source you wish (except any of the slave interfaces, of course).

■ For each slave interface, click its tab and choose the master interface from the *Clock Source* menu, as demonstrated below in Figure 3-9. This causes the slave interfaces to resolve to the master interface.
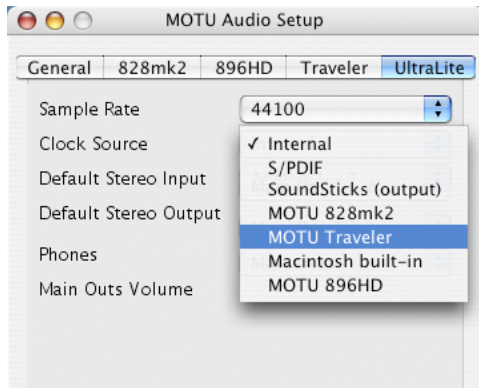
Figure 3-9: To resolve a MOTU FireWire interface to another Core Audio device, choose the other device from the Clock Source menu in MOTU Audio Setup. In this example, the UltraLite will slave to the Traveler.

If you have multiple UltraLites, choose one as the master, and set its Clock Source to *Internal*. Then, click the tab of the other UltraLites and set their Clock Source to the first UltraLite.

Connecting other MOTU FireWire interfaces

You can add an original MOTU 828 to the end of a FireWire daisy chain (because the 828 has only one FireWire port), or you can mix and match multiple 828's with other MOTU FireWire interfaces using a standard FireWire hub. You can also add 828mkII's or 896HD's, which have two FireWire ports convenient for daisy-chaining. Up to four interfaces can be combined on one FireWire bus.

Operating multiple FireWire interfaces at high sample rates

Four MOTU FireWire interfaces can operate at 44.1 or 48kHz on a single FireWire bus. At the 2x samples rates (88.2 or 96kHz), you can operate no more than three FireWire interfaces on a single FireWire bus.

Adding additional interfaces with a second FireWire bus

Third-party FireWire bus expansion products in the form of a cardbus ("PC card") adaptor or PCI card allow you to add a second FireWire bus to your computer. In may be possible to add additional MOTU FireWire interfaces connected to such a third-party product, depending on the performance of the product and the performance of your host computer.

Installing the UltraLite Mac OS X Software

OVERVIEW

SOFTWARE INSTALLATION FOR MAC OS X

Install the UltraLite software as follows:

1 Insert the MOTU Audio Installer disc and launch the installer.

2 Follow the directions that the installer gives you.

What does the OS X installer do?

The installer checks the computer to make sure it satisfies the minimum system requirements for your MOTU interface. If so, the installer proceeds with the OS X installation. Drivers are installed, along with MOTU Audio Setup, MOTU CueMix Console, and several other applications, summarized in the following table:

The UltraLite Core Audio driver

Core Audio is a term that refers to the software technology built into Mac OS X that provides all of its standardized audio features. More specifically, we use *Core Audio* to refer to Mac OS X's standard audio driver model. A *Core Audio driver* allows the UltraLite to establish audio input and output with any Mac OS X Core Audio-compatible software.

Once the UltraLite's Core Audio driver has been successfully installed (by the installer), and you have chosen it for use in your host audio software, the UltraLite will appear as a choice for audio inputs and outputs in your software.

All MOTU audio hardware, including our PCI systems and other FireWire interfaces, ship with Core Audio drivers that allow them to operate successfully with virtually all Mac OS X audio software.

Software component	Location	Purpose	For more information
MOTU FireWire Audio driver.kext	/System/Library/ Extensions	Provides UltraLite multi-channel audio input and output with all Mac OS X audio software	"The UltraLite Core Audio driver" on page 25
MOTU MIDI driver.kext	/System/Library/ Extensions	Provides UltraLite MIDI input and output for all Mac OS X MIDI software	"CoreMIDI and Audio MIDI Setup" on page 26
MOTU MIDI driver.plugin	/System/Library/ Audio/MIDI Drivers	Provides UltraLite MIDI input and output for all Mac OS X MIDI software	"CoreMIDI and Audio MIDI Setup" on page 26
MOTU Audio Setup	Applications folder	Provides access to all of the settings in the UltraLite and other MOTU FireWire interfaces. Required for UltraLite operation.	chapter 5, "MOTU Audio Setup" (page 29)
MOTU CueMix Console	Applications folder	Gives you complete control over the UltraLite's CueMix DSP feature, which provides no-latency monitoring and mixing of live inputs through your UltraLite system.	chapter 11, "MOTU CueMix Console" (page 59)
AudioDesk Workstation Software	Applications folder	Provides complete multi-track recording, mixing and processing. Optional.	AudioDesk User Guide
AudioDesk Demo Project	Anywhere you want	Provides a multi-track mix that you can open, play, and mix in AudioDesk. Optional.	AudioDesk User Guide

CoreMIDI and Audio MIDI Setup

CoreMIDI is the "under-the-hood" portion of Mac OS X that handles MIDI services for MIDI hardware and software. CoreMIDI provides many universal MIDI system management features, including MIDI communication between your UltraLite FireWire interface and all CoreMIDI compatible software.

Audio MIDI Setup is a utility included with Mac OS X that allows you to configure your UltraLite interface for use with all CoreMIDI compatible applications. Audio MIDI Setup provides:

■ A "virtual" studio on your Mac that graphically represents your MIDI hardware setup and that is shared by all CoreMIDI-compatible programs

■ A simple, intuitive list of your MIDI devices whenever you need it in any CoreMIDI-compatible program

Launching Audio MIDI Setup

1 Make sure your UltraLite interface is connected and turned on.

2 Launch the Audio MIDI Setup utility.

This can usually be found in /Applications/ Utilities. If it has been moved, just search for *Audio MIDI Setup*.

3 Confirm that the MIDI interface is present in the *MIDI Devices* tab of Audio MIDI Setup.

If the interfaces does not appear, or if it is grayed out, check your cable connections and click *Rescan MIDI*.
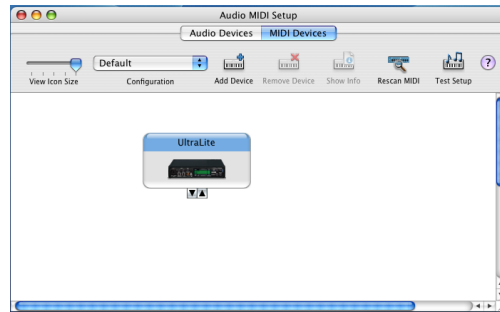
Figure 4-1: The UltraLite interface as it appears in the MIDI tab of Audio MIDI Setup.

Connecting MIDI devices to the UltraLite

Once your UltraLite interface appears in Audio MIDI Setup, you are ready to add devices, indicate how they are connected, and identify properties they may have for particular purposes. This information is shared with all CoreMIDI compatible applications.

To add a device in Audio MIDI Setup:

1 Click *Add Device*.
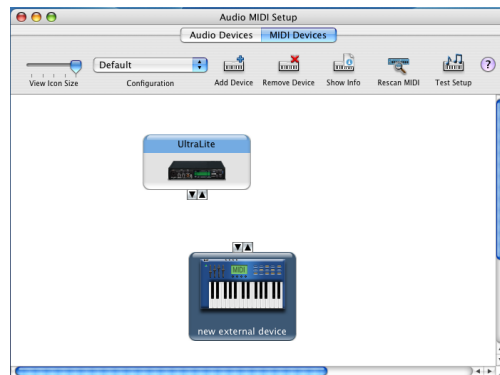
Figure 4-2: Adding a MIDI device.

2 Drag on its input and output arrows to draw connections to the UltraLite that match its physical connection.
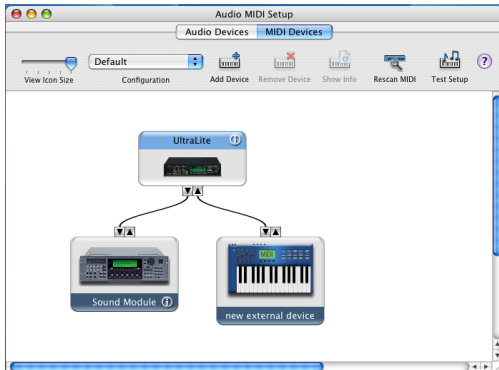
Figure 4-3: Connecting devices to the UltraLite. In this example, a controller keyboard is connected to the UltraLite's MIDI IN, and a sound module is connected to the UltraLite MIDI OUT.

3 Double-click the device to make settings, such as input and output channels, that further describe the device.
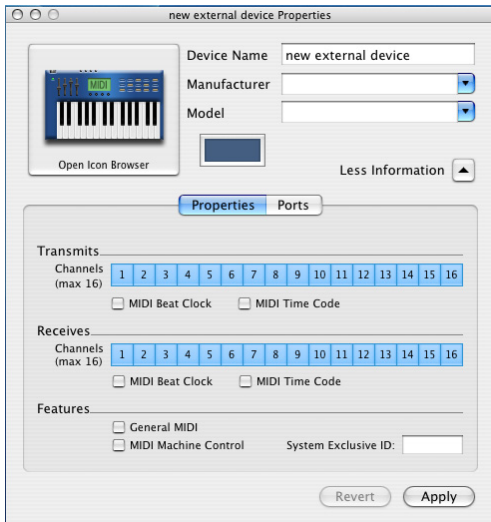
Figure 4-4: Device settings.

4 Repeat the above steps for each MIDI device connected to the interface.

5 When you are finished, quit Audio MIDI Setup.

Your configuration is automatically saved as the default configuration, and it is shared with all CoreMIDI-compatible software.

MOTU CUEMIX CONSOLE

This program provides a mixing console that gives you control over the UltraLite's no-latency CueMix DSP features. For details, see chapter 11, "MOTU CueMix Console" (page 59).

AUDIODESK WORKSTATION SOFTWARE

The MOTU Audio installer places AudioDesk in your system's Applications folder.

AudioDesk is an advanced workstation software package for the UltraLite that lets you record, edit, mix, process, bounce and master multi-track digital audio recording projects. Advanced features include real-time 32-bit effects processing, 24-bit recording, and much more.

See the AudioDesk manual included with your UltraLite system for details.

Figure 4-5: AudioDesk for Mac OS X.

MOTU Audio Setup

OVERVIEW

ACCESSING THE ULTRALITE SETTINGS

There are several ways to access MOTU Audio Setup settings:

■ Click the MOTU Audio Setup icon in the dock

■ Press on the MOTU Audio Setup dock icon to open the menu shown below, or control-click it to open the menu immediately

■ From within AudioDesk™ or Digital Performer™, choose *Setup menu>Configure Audio System>Configure Hardware Driver (Note: this dialog only provides access to basic settings such as sample rate and clock source. For access to all settings, use one of the techniques above.)*

■ In Cubase SX or Nuendo, open the Device Setup window, click *VST Audiobay* and choose *MOTU Audio* from the *Master ASIO Driver* menu. Then click the *MOTU Audio* item in the list and click the *Control Panel* button as shown below.

■ From the front panel LCD (see chapter 6, "UltraLite Front Panel Operation" (page 33)).

UltraLite tab settings

The UltraLite tab provides settings that apply to a specific UltraLite interface. If you have several UltraLites (or other MOTU FireWire audio interfaces) connected, you'll see a separate tab for each one.

General tab settings

The General tab provides settings that apply globally to all connected MOTU FireWire interfaces.

'ULTRALITE' TAB SETTINGS

Sample Rate

Choose the desired *Sample Rate* for recording and playback. The UltraLite can operate at 44.1 (the standard rate for compact disc audio), 48, 88.2 or 96 kHz. If you have a S/PDIF device connected to the UltraLite, make sure that it matches the UltraLite's sample rate.

☛ Mismatched sample rates cause distortion and crackling. If you hear this sort of thing, check the sample rate settings in your hardware and here in MOTU Audio Setup.

Clock Source

The *Clock Source* determines the digital audio clock that the UltraLite will use as its time base. The following sections briefly discuss each clock source setting.

Internal

Use the *Internal* setting when you want the UltraLite to operate under its own digital audio clock. For example, you may be in a situation where all you are doing is playing tracks off hard disk in your digital audio software on the computer. In a situation like this, you most often don't need to reference an external clock of any kind.

Another example is transferring a mix to DAT. You can operate the UltraLite system on its internal clock, and then slave the DAT deck to the UltraLite via the S/PDIF connection (usually DAT decks slave to their S/PDIF input when you choose the S/PDIF input as their record source).

If you would like help determining if this is the proper clock setting for your situation, see "Connecting and syncing S/PDIF devices" on page 21.
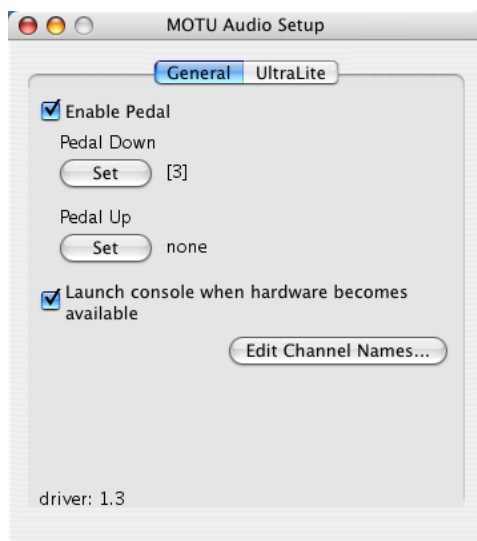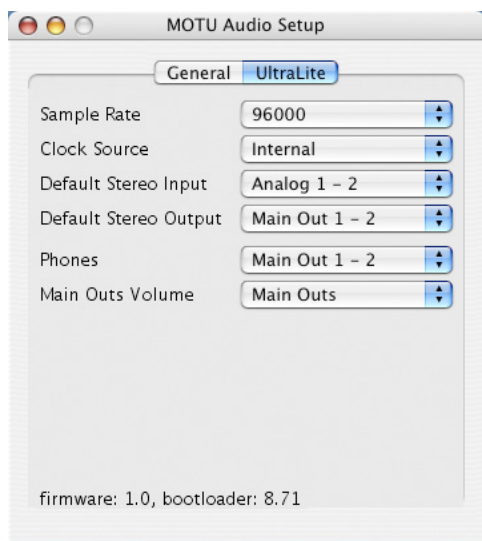
Figure 5-1: MOTU Audio Setup gives you access to all of the settings in the UltraLite hardware.

S/PDIF

The *S/PDIF* clock source setting refers to the S/PDIF RCA input jack on the UltraLite. This setting allows the UltraLite to slave to another S/PDIF device.

Use this setting whenever you are recording input from a DAT deck or other S/PDIF device into the UltraLite. It is not necessary in the opposite direction (when you are transferring from the UltraLite to the DAT machine).

For further details about this setting, see "Connecting and syncing S/PDIF devices" on page 21.

Macintosh built-in

Choose this setting to resolve the UltraLite to your Mac's built-in audio. Doing so will ensure that audio streams playing back from or recorded by the UltraLite will not drift apart from audio streams simultaneously played or recorded by the Mac's built-in mic, speakers or audio output. For complete details, see "Resolving to other Core audio drivers" on page 22.

Other audio devices (drivers)

The MOTU FireWire Audio Driver has the ability to resolve to other Core Audio drivers. Doing so will ensure that audio streams playing back from or recorded by the UltraLite will not drift apart from audio streams simultaneously played or recorded by the other devices. For complete details, see "Resolving to other Core audio drivers" on page 22.

Default Stereo Input/Output

In the System Preferences window, Mac OS X lets you choose third-party hardware such as the UltraLite for your Macintosh sound input and output. The system input and output can be used for alert sounds and general audio I/O for applications like iTunes, iMovie, etc.
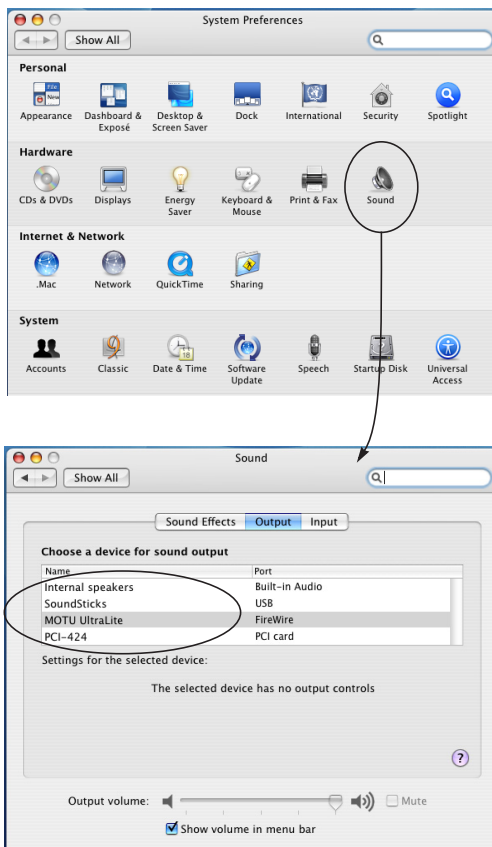
Figure 5-2: The Mac OS X sound preferences let you use the UltraLite for general stereo audio input and output for your Mac.

The *Default Stereo Input* and *Default Stereo Output* settings in MOTU Audio Setup (Figure 5-1 on page 30) let you specify the stereo input and output on the UltraLite to be used when it is chosen as the audio I/O device in the system preferences.

Phones

The *Phones* setting lets you choose what you will hear from the headphone jack. Choose *Main Out 1-2* if you'd like the headphone output to match the main outs. Choose *Phones 1-2* if you would like the headphones to serve as their own independent output, which you can access as an

independent output destination in your host audio software and as an output destination for the four on-board CueMix DSP mix busses.

Main Outs Volume

The Main Outs Volume setting lets you choose what to control with the MAIN VOL knob on the front panel of the UltraLite. Choose *Main Outs* to control the stereo main outs on the rear panel. Choose S/PDIF to control the S/PDIF stereo output. For surround setups, choose *5.1* to control analog outputs 1-6 or choose *7.1* to control analog outputs 1-8.

'GENERAL' TAB SETTINGS

Enable Pedal

This setting applies to other MOTU FireWire audio interfaces, but it does not apply to the UltraLite.

Launch console when hardware becomes available

Check this option if you would like the MOTU Audio Setup icon to appear in the application dock as soon as a MOTU FireWire interface is detected (switched on, plugged in, etc.)

Edit Channel Names

Click the *Edit Channel Names* button to open the Channel Names window (Figure 5-3). This window lets you edit the names of the UltraLite inputs and outputs, as they appear in your host audio software. For example, when you click on a menu that displays the UltraLite inputs (or outputs), you will see the names you specify in this window (e.g. "vocal mic", "lead guitar", etc.), instead of the default generic names ("Analog 1", "Analog 2", etc.)

☛ Not all Mac OS X audio software supports channel names. If not, you'll see generic port names in your host audio software.
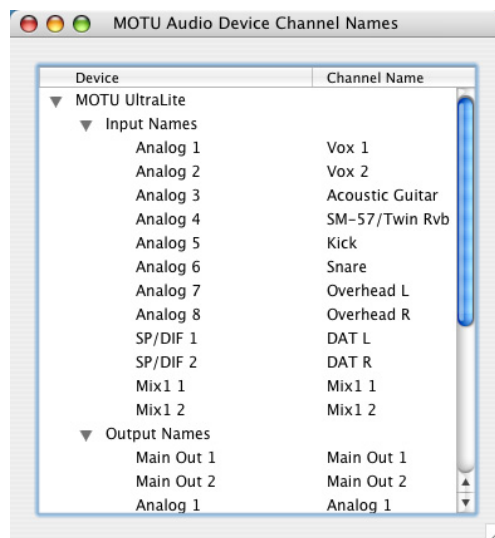
Figure 5-3: The Edit Channel Names window.
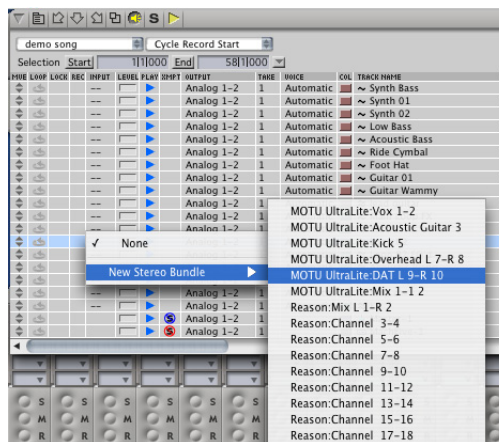
Figure 5-4: UltraLite channel names as they appear in Digital Performer.

CHAPTER 6   UltraLite Front Panel Operation

OVERVIEW

The UltraLite offers complete front-panel programming via six rotary encoders and a 2x16 backlit LCD display. All UltraLite settings can be accessed via these front-panel controls.

PUSH-BUTTON ROTARY ENCODERS

All of the knobs shown in Figure 6-1 are push-button digital rotary encoders. In many cases, you can either push the knob or turn it to make a setting or toggle the LCD display (depending on the encoder and setting).

MULTI-FUNCTION LCD DISPLAY

The LCD provides access to the many UltraLite settings, as well as visual feedback of the current parameter being modified.

Setup mode

In setup mode, the LCD displays basic settings, such as clock source, headphone output assignment and so on. These settings are covered in detail later in "Page/SETUP" on page 34.

Choose the mix parameter to edit here with the PAGE knob.

The top row shows settings for the 8 analog inputs and S/PDIF digital input.

Use the CURSOR knob to scroll to a channel and use VALUE to change its setting.

The bottom row shows settings for the 8 analog outputs and S/PDIF output

Figure 6-1: The UltraLite front panel controls.

Figure 6-2: In setup mode, the LCD displays a setup parameter in the top row of the LCD and the current setting in the bottom row.

Mixer mode

In mixer mode, the LCD displays the settings for the current UltraLite mix being shown in the display, as demonstrated in Figure 6-1 on page 33.

Parameter "zooming"

For many settings, the LCD temporarily "zooms in" to display a long-throw meter and alpha-numeric display to give you precise, real-time feedback as you adjust the setting. For example, if you change the headphone volume, the LCD will display a level meter and gain reduction reading that updates as you turn the volume knob. After a brief time-out, the display returns to its previous state before you turned the volume knob. The time-out period can be adjusted, as explained later in the section called "Fader View Time".

Figure 6-3: For many settings, the LCD "zooms in" on the setting as you adjust it.

MAIN VOLUME

Turning the MAIN VOL knob lets you control the volume of the rear-panel main outs. It can also be programmed to provide master volume control over S/PDIF output, or 5.1 and 7.1 surround output via analog outputs 1-6 or 1-8, respectively. See "Main Volume Assign" on page 35.
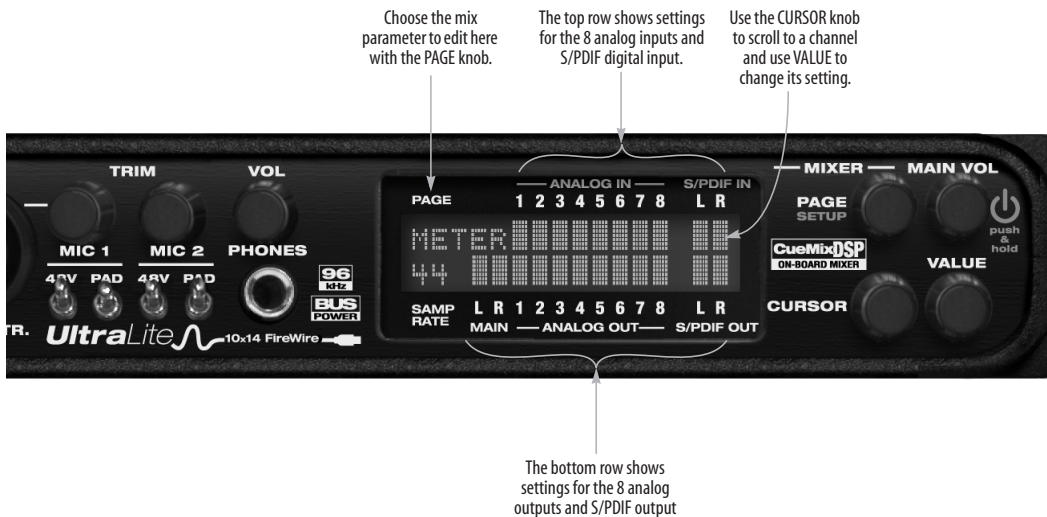
As explained in the previous section, the LCD provides detailed feedback as you turn the knob. To view the current setting without changing it, just push the knob (without turning it).

POWER SWITCH

Push the MAIN VOL knob to switch on the UltraLite. Push in and hold the MAIN VOL knob to turn it off.

PAGE/SETUP

Press the PAGE/SETUP knob to toggle between mixer mode and setup mode.

In mixer mode, the PAGE, CURSOR and VALUE knobs let you adjust the on-board mixing features. See "MIXER" on page 36.

In setup mode, turn PAGE to choose a setting and turn VALUE to adjust it. Press the VALUE knob to make the change to a setting. The CURSOR knob is also used to adjust some of the settings. The setup mode settings are briefly explained below.

Clock source

This sets the global clock source for the UltraLite and is the same as the *Clock Source* setting in MOTU Audio Setup as explained in "Clock Source" on page 30. If the UltraLite is currently connected to a computer, this setting cannot be changed from the front-panel LCD. It must be changed in MOTU Audio Setup instead. Or, you can disconnect the UltraLite from the computer to change the Clock Source from the front panel.

If the UltraLite is not currently connected to the computer, there are four sample rates available for the Internal clock setting (in kHz): Internal 44.1 (the standard rate for audio CDs), Internal 48, Internal 88.2 and Internal 96.

Fader View Time

The *Fader View Time* option lets you control the length of time that an adjusted parameter remains displayed in the LCD before the LCD returns to its previous state. For example, when you turn the MAIN VOL knob to adjust the main volume, you'll see a long-throw horizontal fader in the LCD, along with a numeric display of the current gain reduction. After you stop turning the knob, this fader remains displayed in the LCD for a moment before the LCD returns to its previous state. The Fader View Time option lets you control how long the adjusted parameter remains on the LCD after the knob stops turning.

Bus output

The *Bus Output* setting lets you choose the UltraLite output pair for each of the four CueMix DSP mix busses. Turn the CURSOR knob to choose a bus. Turn the VALUE knob to choose an output for the current bus. Push the VALUE knob to select the output. The output stops flashing to confirm that it has been selected.

Bus mute

The *Bus Mute* setting mutes and unmutes the current bus output. Use the CURSOR knob to choose the mix. Push the VALUE knob to mute or unmute the bus.

Phones Assign

The *Phones Assign* setting lets you choose what you hear on the headphone output. This is the same as the *Phones* setting in MOTU Audio Setup as explained in "Phones" on page 31.

Main Volume Assign

The *Main Volume Assign* setting lets you choose what to control with the MAIN VOL knob. The choices are: *Main Outs*, *5.1 (Analog 1-6)*, *7.1 (Analog 1-8)* and *SPDIF Out*. This is the same as the *Main Out Volume* setting in MOTU Audio Setup, as explained in "Main Outs Volume" on page 32.

Init Current Mix

The *Init Current Mix* setting lets you reset the current mix (or all four mixes). Use the CURSOR knob to choose the mix. All inputs get reset to unity gain (0 dB), pan center, etc.

Copy Bus Mix

Copy Bus Mix lets you copy all of the settings for the currently displayed mix. Turn the CURSOR knob to choose a mix. Push the VALUE knob to copy it. You can then paste the settings to another mix as explained below. The word *Done* appears briefly to confirm that the mix settings have been successfully copied.

Paste Bus Mix

After you copy mix settings (explained above), *Paste Bus Mix* lets you paste the copied mix settings to another mix. Turn the CURSOR knob to choose a mix. Push VALUE to paste. The word *Done* appears briefly to confirm the paste. The following mix parameter are included in the paste operation: Gain, Pan, Solo, Mute, Trim and stereo pairing. The following mix parameters are not pasted: Bus output, Bus mute and Bus gain.

Save/Name Preset

The *Save/Name Preset* setting lets you name and save up to sixteen separate UltraLite presets. A preset holds all of the current CueMix DSP mix settings for all four mix busses. Setup parameters

are not included. The name can have up to 12 characters. Here is a summary of how to name and save a preset:

To do this:	Do this:
To change the currently flashing character	Turn the CURSOR knob.
To jump to capital letters, lower case letters, numbers or symbols	Turn the VALUE knob.
To save the preset.	Push VALUE. If you are asked to replace existing preset, push VALUE again to replace it, or turn it to select a different preset.

Load preset
After you've saved one or more presets, *Load Preset* lets you recall them. Turn the VALUE knob to choose a preset. Push VALUE to load it. The word *Loaded* appears briefly to confirm the operation.

All Notes Off
The *All Notes Off* setting sends a MIDI *All Notes Off* message, as well as a MIDI note-off message for every note on every MIDI channel. This stops any stuck notes that are currently playing. Push VALUE to initiate the All Notes Off operation.

Factory Defaults
The *Factory Defaults* setting restores the UltraLite factory settings. Push VALUE to initiate the operation, and then when the LCD asks "Are you sure?", push VALUE to execute it.

MIXER
The UltraLite on-board CueMix DSP mixer provides four stereo mix busses, named MIX1, MIX2, MIX3 and MIX4, respectively. Each mix bus (also referred to as a "mix") independently mixes all inputs (or any subset of your choosing) down to one UltraLite output pair of your choosing. For example, you could assign MIX1 to the main outs, MIX2 to analog outputs 1-2 and MIX3 to the headphone outs. You can then independently assign any input to any mix. An input can even be included in two or more mixes simultaneously at different input levels.

Current mix bus   Master fader for the current mix bus.
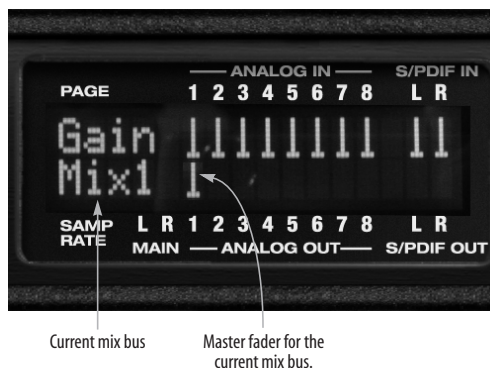
Figure 6-4: In mixer mode, the LCD displays the mix settings for the mix bus currently being displayed in the LCD.

Choosing a mix bus
When the LCD display is in mixer mode, use the CURSOR knob to scroll to the current mix bus (Figure 6-4) and then turn the VALUE knob to choose the desired mix bus, or push the VALUE knob repeatedly to cycle through the four mix buses.

Bus master fader
To change the output level for the current mix, use the CURSOR knob to scroll to the fader displayed just to the right of the mix bus name (Figure 6-4) and then use the VALUE knob to adjust it.

PAGE

When the LCD display is in mixer mode, the PAGE knob cycles through the mix parameters listed below. Use the CURSOR knob to scroll to a particular channel (until it flashes) and use the VALUE knob to change its setting:

Mix parameter	Range	Comments
Gain	OFF, -84 to 0 dB	Each channel displays a small fader. Push the VALUE knob to toggle between OFF and unity gain (0dB).
Pan	-64 to +64 Zero = pan center	Push the VALUE knob to jump to pan center. Stereo pairs (explained below) are panned hard left/right by default.
Solo	"s" or blank	Push the VALUE knob to toggle between soloed (S) and not soloed (blank), or turn the knob to toggle.
Mute	"m" or blank	Push the VALUE knob to toggle between muted (m) and unmuted (blank), or turn the knob to toggle.
Trim	zero to +24dB for inputs 1-2 zero to +18db for inputs 3-8 zero to +12dB for S/PDIF	This setting applies universally across ALL mix busses for each input or input pair. Push the VALUE knob to toggle between the minimum and maximum setting. For the Mic inputs (1-2), 24dB of gain is provided, and this trim setting can also be adjusted with the dedicated front panel trim knobs for the two mic inputs. For analog (TRS) inputs 3-8, 18dB of gain is provided. For the S/PDIF input pair, 12 dB of gain is provided.
Inv (Phase invert)	"i" or blank	This setting applies universally across ALL mix busses for analog inputs 1-8. Push the VALUE knob to toggle between phase-inverted (i) and not phase-inverted (blank), or turn the knob to toggle.
Pair	"[ ]" or blank	This setting applies universally across ALL mixes. Push the VALUE knob to toggle a stereo input pair between separate mono inputs (blank) or a stereo pair ("[ ]"). Or turn the knob to toggle. When a pair of inputs are linked, all of their mix settings become linked (gain, solo, etc.) except for pan. When the pair is first created, pan is set to hard left and hard right, but the channels can then be further modified independently. When a pair is unlinked, the channels are set to pan-center.

Mix parameters that apply across all mixes

The last three mix settings (Trim, Phase Invert, and Stereo Pair) apply across all mixes because they have to do with the nature of the input itself. For example, if you have an input that requires +10dB of boost, then you'll want the boost to apply to all mixes.

Working with stereo pairs

When you group a pair of inputs as a stereo pair, all of their mix settings become linked, and whenever you scroll to either channel, both channels will flash to indicate that they will operate as a linked stereo pair. Note that when a pair is first created, pan is set to hard left and hard right, but the channels can then be further modified independently. When a pair is unlinked, the channels are set to pan-center.

CURSOR / VALUE

When the LCD display is in mixer mode, the CURSOR knob scrolls left and right over the 10 inputs displayed in the LCD. The current input flashes. The VALUE knob changes the current mix parameter for the currently flashing input. In some cases, such as Gain and Pan, the LCD will "zoom" to the enlarged horizontal fader while you adjust it with the VALUE knob. After you stop adjusting, the LCD will return to the mixer display.

STAND-ALONE OPERATION

All settings, including all mix settings and global settings, are saved in the UltraLite's memory, and they remain in effect even when the UltraLite is not connected to a computer. This allows you to use the UltraLite as a stand-alone 8-bus mixer. You can make adjustments to any setting at any time from the front panel.

CHAPTER 7   Digital Performer

OVERVIEW

This chapter provides a brief overview of Digital Performer's basic I/O and synchronization operation with the UltraLite hardware.

SETTING UP YOUR SYSTEM

As described in chapter 4, "Installing the UltraLite Mac OS X Software" (page 25), the Digital Performer and MOTU UltraLite software installers will properly install and update everything for you.

THE ULTRALITE SETTINGS

Choose the UltraLite as your audio input output device by choosing *Configure Audio System>Configure Hardware Driver* from the Setup menu. This window shows some of the UltraLite settings, such as sample rate and clock source, but to access all of the UltraLite settings, open MOTU Audio Setup, as shown in Figure 5-1 on page 30.

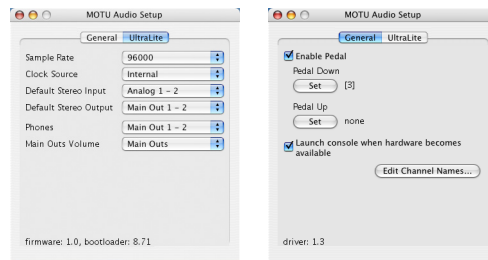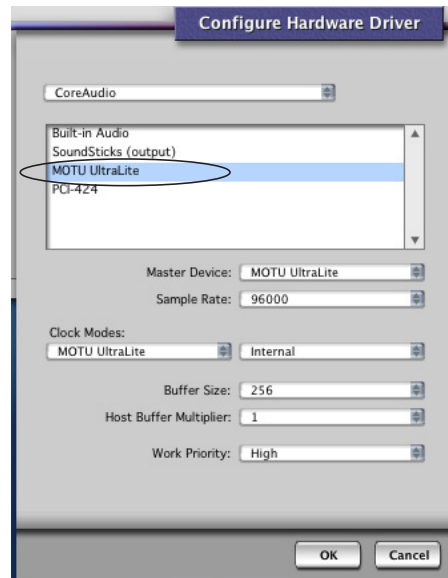*Figure 7-1: Choose Setup menu> Configure Audio System> Configure Hardware Driver to open the dialog shown above and access the UltraLite Core Audio driver. To access the rest of the UltraLite settings, open MOTU Audio Setup.*

For complete details about the UltraLite settings, see chapter 5, "MOTU Audio Setup" (page 29). The following sections provide a brief explanation of each UltraLite setting for use with Digital Performer.

Sample rate

Choose the desired overall sample rate for the UltraLite system and Digital Performer. Newly recorded audio in Digital Performer will have this sample rate. Imported audio or soundbites in existing files that do not match this sample rate will be displayed in the Soundbites window with a red 'X' on its move handle to indicate that it cannot be played.

Clock Source

This setting is very important because it determines which audio clock the UltraLite will follow. If you have a S/PDIF digital audio device connected to the UltraLite, or if you are not sure about the clock source of your setup, be sure to read "Connecting and syncing S/PDIF devices" on page 21 and "Clock Source" on page 30.

Buffer Size

The *Buffer Size* setting can be used to reduce the delay — or *monitoring latency* — that you hear when live audio is patched through your UltraLite hardware and Digital Performer. For example, you might have MIDI instruments, samplers, microphones, and so on connected to the analog inputs of the UltraLite. If so, you will often be mixing their live input with audio material recorded in Digital Performer. See chapter 10, "Reducing Monitoring Latency" (page 53) for complete details.

Phones

This UltraLite setting lets you choose what you'll hear from the headphone jack. For example, if you choose *Main Out 1-2*, the headphones will duplicate the main outs. Or you can choose any other output pair. If you choose *Phones 1-2*, this setting makes the headphone jack serve as its own independent output pair. As a result, you'll see *Phones 1-2* as an additional audio destination in Digital Performer's audio output menus.

BE SURE YOU HAVE ENOUGH VOICES

Go to the Setup menu and choose *Configure Audio System>Configure Studio Settings*. Then check to make sure you have enough mono and stereo audio voices to cover the 10 channels of input and 14 channels of output provided by your UltraLite.

TRIMMING THE MIC/INSTRUMENT INPUTS

The UltraLite mic/instrument inputs provide trim knobs on the front panel. To calibrate an audio input:

1 Record-enable a track in Digital Performer.

2 Choose the desired UltraLite mic input for the track.

3 Open the Audio Monitor window.

4 As you feed signal to the input, adjust the input's corresponding trim knob on the front panel of the UltraLite until peaks in the level meter are as high as possible without clipping (hitting zero dB).

WORKING WITH ULTRALITE INPUTS AND OUTPUTS

Once you've enabled the MOTU FireWire Audio driver as explained earlier in "The UltraLite settings" on page 39, UltraLite audio inputs and outputs will appear in Digital Performer's audio input and output menus.

Phones 1-2

If you've chosen to treat the UltraLite headphones as an independent output, you'll see *Phones 1-2* in Digital Performer's output menus. Audio tracks assigned to this output pair will be heard on the headphone jack only. For further explanation, see "Phones" on page 31.

Mix1 1-2

In Digital Performer's audio input menus, you'll see an UltraLite input called *Mix1 1-2*. This input source delivers the output of CueMix DSP "MIX1" (the first mix bus of the four on-board no-latency

monitor mixes in the UltraLite) back to your computer. This input serves, for example, as a convenient way for you to record the UltraLite's MIX1 monitor mix back into Digital Performer (for reference and archiving purposes). Further, if you are sending audio from Digital Performer to the same output pair as MIX1, you can choose to either include or exclude the audio from the computer in the stream being sent back to Digital Performer. For details on how to do this, see "Mix1 Return Includes Computer" on page 65.

☛ Warning: the Mix1 1-2 input can cause feedback loops! DO NOT assign this input to a track that shares the same UltraLite output pair as MIX1.

24-BIT OPERATION

Your UltraLite hardware fully supports Digital Performer's 24-bit recording capabilities, including both analog and digital 24-bit recording. If you would like to record and play back 24-bit audio files, go to the Setup menu, choose *Configure Audio System>Configure Sample Format*, and choose 24-bit recording as the sample format. This setting is saved with the Digital Performer project.

MIDI I/O VIA THE ULTRALITE MIDI PORTS

Once you've followed the procedure for enabling the UltraLite's MIDI features as explained in "Software installation for Mac OS X" on page 25, the UltraLite MIDI ports will appear as a input source and output destination in Digital Performer's MIDI I/O menus.

PROCESSING LIVE INPUTS WITH PLUG-INS

If you patch a live input (such as MIDI synthesizer) through a plug-in effect in Digital Performer, you might hear a slight delay. There are several ways to reduce this delay. For details, see chapter 10, "Reducing Monitoring Latency" (page 53).

EXCHANGING PROJECTS WITH AUDIODESK

DP4 can exchange projects with AudioDesk. To open an AudioDesk project in Digital Performer, open it in same way you would a DP project. To export a project to AudioDesk, use DP4's Save As command and choose the AudioDesk 2.0 file format.

AudioDesk

OVERVIEW

This chapter provides a brief overview of AudioDesk's basic I/O and synchronization operation with the UltraLite. For complete information about all of AudioDesk's powerful workstation features, see the AudioDesk manual included with your UltraLite.

SETTING UP YOUR SYSTEM

As described in chapter 4, "Installing the UltraLite Mac OS X Software" (page 25), the MOTU Audio software installer will properly install everything for you, including AudioDesk.

THE ULTRALITE SETTINGS

Choose the UltraLite as your audio input output device by choosing *Configure Audio System>Configure Hardware Driver* from the Setup menu. This window shows some of the UltraLite settings, such as sample rate and clock source, but to access all of the UltraLite settings, open MOTU Audio Setup, as shown in Figure 5-1 on page 30.
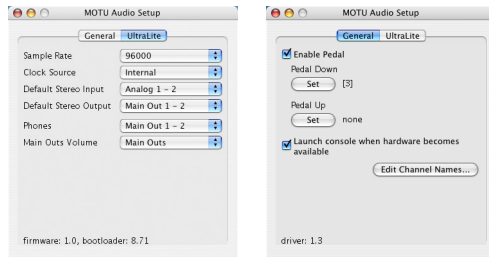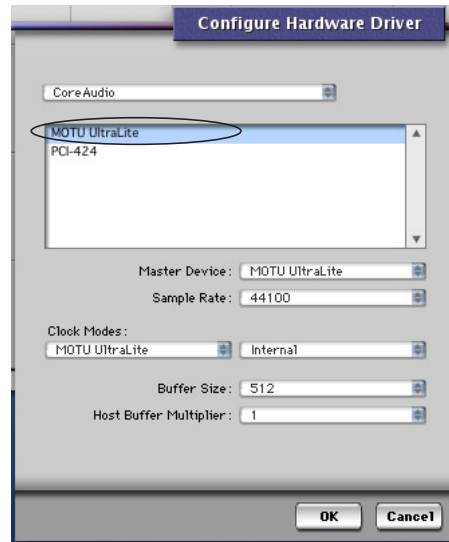

Figure 8-1: Choose Setup menu> Configure Audio System> Configure Hardware Driver to open the dialog shown above and access the UltraLite Core Audio driver. To access the rest of the UltraLite settings, open MOTU Audio Setup.

For complete details about the UltraLite settings, see chapter 5, "MOTU Audio Setup" (page 29). The following sections provide a brief explanation of each UltraLite setting for use with AudioDesk.

Sample rate

Choose the desired overall sample rate for the UltraLite system and AudioDesk. Newly recorded audio in AudioDesk will have this sample rate. Imported audio or soundbites in existing files that

do not match this sample rate will be displayed in the Soundbites window with a red 'X' on its move handle to indicate that it cannot be played.

Clock Source

This setting is very important because it determines which audio clock the UltraLite will follow. If you have a S/PDIF digital audio device connected to the UltraLite, or if you are not sure about the clock source of your setup, be sure to read "Connecting and syncing S/PDIF devices" on page 21 and "Clock Source" on page 30.

Buffer Size

The *Buffer Size* setting can be used to reduce the delay — or *monitoring latency* — that you hear when live audio is patched through your UltraLite hardware and AudioDesk. For example, you might have MIDI instruments, samplers, microphones, and so on connected to the analog inputs of the UltraLite. If so, you will often be mixing their live input with audio material recorded in AudioDesk. See chapter 10, "Reducing Monitoring Latency" (page 53) for complete details.

Phones

This UltraLite setting lets you choose what you'll hear from the headphone jack. For example, if you choose *Main Out 1-2*, the headphones will duplicate the main outs. Or you can choose any other output pair. If you choose *Phones*, this setting makes the headphone jack serve as its own independent output pair. As a result, you'll see *Phones 1-2* as an additional audio destination in AudioDesk's audio output menus.

BE SURE YOU HAVE ENOUGH VOICES

Go to the Setup menu and choose *Configure Audio System>Configure Studio Size*. Then check to make sure you have enough mono and stereo audio voices to cover the 10 channels of input and 14 channels of output provided by your UltraLite.

TRIMMING THE MIC/INSTRUMENT INPUTS

The UltraLite mic/instrument inputs provide trim knobs on the front panel. To calibrate an audio input:

1 Record-enable a track in AudioDesk.

2 Choose the desired UltraLite mic input for the track.

3 Open the Audio Monitor window.

4 As you feed signal to the input, adjust the input's corresponding trim knob on the front panel of the UltraLite until peaks in the level meter are as high as possible without clipping (hitting zero dB).

WORKING WITH ULTRALITE INPUTS AND OUTPUTS

Once you've enabled the MOTU FireWire Audio driver as explained earlier in "The UltraLite settings" on page 43, UltraLite audio inputs and outputs will appear in AudioDesk's audio input and output menus.

Phones 1-2

If you've chosen to treat the UltraLite headphones as an independent output, you'll see *Phones 1-2* in AudioDesk's output menus. Audio tracks assigned to this output pair will be heard on the headphone jack only. For further explanation, see "Phones" on page 44.

Mix1 1-2

In AudioDesk's audio input menus, you'll see an UltraLite input called *Mix1 1-2*. This input source delivers the output of CueMix DSP "MIX1" (the first mix bus of the four on-board no-latency monitor mixes in the UltraLite) back to your computer. This input serves, for example, as a convenient way for you to record the UltraLite's MIX1 monitor mix back into AudioDesk (for reference and archiving purposes). Further, if you are sending audio from AudioDesk to the same output pair as MIX1, you can choose to either

include or exclude the audio from the computer in the stream being sent back to AudioDesk. For details on how to do this, see "Mix1 Return Includes Computer" on page 65.

☛ Warning: the Mix1 1-2 input can cause feedback loops! DO NOT assign this input to a track that shares the same UltraLite output pair as MIX1.

24-BIT OPERATION

Your UltraLite hardware fully supports AudioDesk's 24-bit recording capabilities, including both analog and digital 24-bit recording. If you would like to record and play back 24-bit audio files, go to the Setup menu, choose *Configure Audio System>Configure Sample Format*, and choose 24-bit recording as the sample format. This setting is saved with the AudioDesk project.

MIDI I/O VIA THE ULTRALITE MIDI PORTS

Once you've followed the procedure for enabling the UltraLite's MIDI features as explained in "Software installation for Mac OS X" on page 25, the UltraLite MIDI ports will appear as a input source and output destination in AudioDesk's MIDI I/O menus.

PROCESSING LIVE INPUTS THROUGH PLUG-INS

If you patch a live input (such as MIDI synthesizer) through a plug-in effect in AudioDesk, you might hear a slight delay. There are several ways to reduce this delay. For details, see chapter 10, "Reducing Monitoring Latency" (page 53).

EXCHANGING PROJECTS WITH DIGITAL PERFORMER

To open AudioDesk Version 2 (or Version 1) files in DP4, just use DP4's Open command. (No conversion is required beforehand in AudioDesk.) To export a Digital Performer project to AudioDesk, use Save As in Digital Performer's File

menu and choose the *AudioDesk 2.0* file format. Then open the resulting AudioDesk 2.0 document in AudioDesk.

AUDIODESK AND MIDI SEQUENCING

AudioDesk can play audio as a background application, allowing you to run a sequencer at the same time in the foreground. However, there is no way to continuously synchronize — or *resolve* — a sequencer with AudioDesk, so the two programs will eventually drift out of sync, even if you manage to start them at the same time. If you'd like to do integrated MIDI sequencing, your best bet is Digital Performer, which offers pretty much all of the same features as AudioDesk, along with powerful, state-of-the-art MIDI sequencing. Talk to your authorized MOTU dealer for details about upgrading from AudioDesk to Digital Performer.

Other Mac OS X Software

OVERVIEW

The UltraLite provides multichannel audio and MIDI input and output for all Mac OS X audio applications, including Apple's Logic Pro, Logic Express, SoundTrack Pro and GarageBand. Other third-party software applications are also supported, such as Ableton Live, Propellerhead Reason, Steinberg Cubase and others.

INSTALLING THE ULTRALITE MAC OS X DRIVERS

To install the UltraLite's Mac OS X audio and MIDI drivers, just run the installer on the MOTU Audio installer CD as detailed in chapter 4, "Installing the UltraLite Mac OS X Software" (page 25).

PREPARING MIDI INPUT AND OUTPUT

If you will be using the UltraLite's MIDI input and output ports, be sure to follow the procedures in "CoreMIDI and Audio MIDI Setup" on page 26.

RUN MOTU AUDIO SETUP

Before you run your host audio software, launch MOTU Audio Setup to configure your UltraLite hardware. MOTU Audio Setup lets you configure your audio interface.
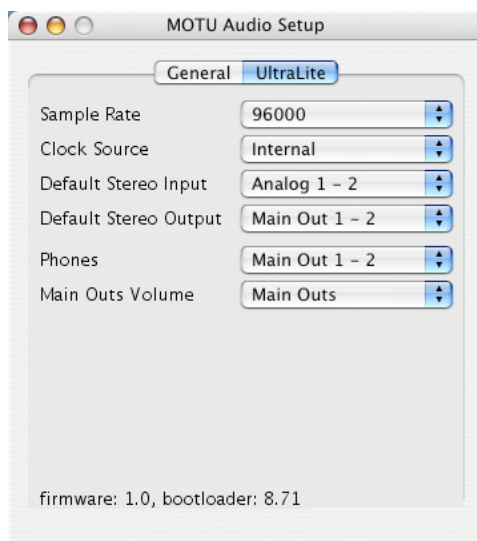

Figure 9-1: MOTU Audio Setup.

For complete details about the UltraLite settings, see chapter 5, "MOTU Audio Setup" (page 29). The following sections provide a brief explanation of each UltraLite setting for use with Logic and other Mac OS X audio software.

Sample rate

Choose the desired overall sample rate for the UltraLite system and your host audio software. Newly recorded audio will have this sample rate.

Clock Source

This setting is very important because it determines which audio clock the UltraLite will follow. If you have digital audio devices connected

to the UltraLite via S/PDIF, or if you are not sure about the clock source of your setup, be sure to read "Connecting and syncing S/PDIF devices" on page 21 and "Clock Source" on page 30.

Phones

This UltraLite setting lets you choose what you'll hear from the headphone jack. For example, if you choose *Main Out 1-2*, the headphones will duplicate the main outs. Or you can choose any other output pair. If you choose *Phones*, this setting makes the headphone jack serve as its own independent output pair. As a result, you'll see *Phones 1-2* as an additional audio destination in your host audio software's audio output menus.

CHOOSING THE MOTU FIREWIRE CORE AUDIO DRIVER

Once you've made the preparations described so far in this chapter, you're ready to run your audio software and enable the MOTU UltraLite Core Audio driver. Check the audio system or audio hardware configuration window in your software. There will be a menu there that lets you choose among various drivers that may be in your system. Choose the MOTU UltraLite from this menu.

Logic Pro and Logic Express

In Logic Pro and Logic Express, go to the Preferences window, click the *Audio* tab, click the *Driver*s tab and click the *Core Audio* tab as shown in Figure 9-2. Choose the *MOTU UltraLite* from the Driver menu. For information about the *I/O Buffer Size* setting, see "Adjusting the audio I/O buffer" on page 55.
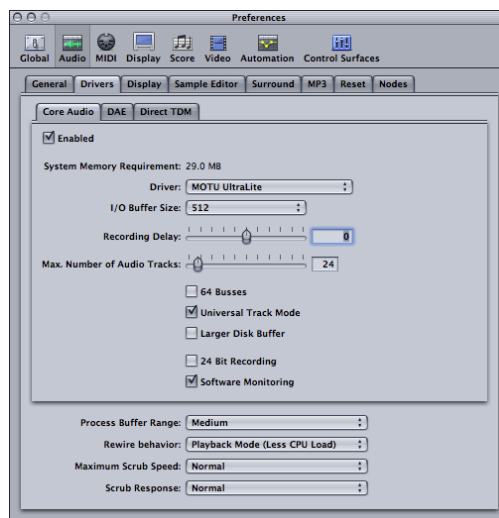

Figure 9-2: Enabling the UltraLite in Logic Pro or Logic Express.

Soundtrack Pro

In Soundtrack Pro, access the preferences window, click the Recording tab and choose *MOTU UltraLite* from the *Input* and *Monitor* menu as shown below in Figure 9-3.
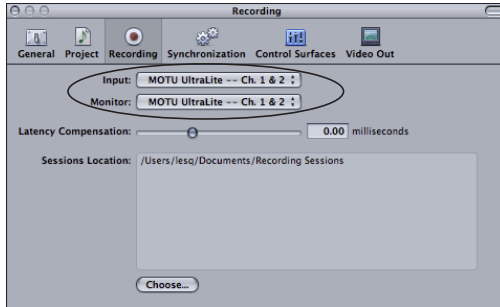

Figure 9-3: Enabling the UltraLite in Soundtrack Pro.

Garage Band

In Garage Band, go to the *Audio/MIDI* preferences and choose *MOTU UltraLite* from the *Audio Output* and *Audio Input* menus as shown below in Figure 9-4. For information about the *Optimize for* setting, see "Adjusting the audio I/O buffer" on page 55.
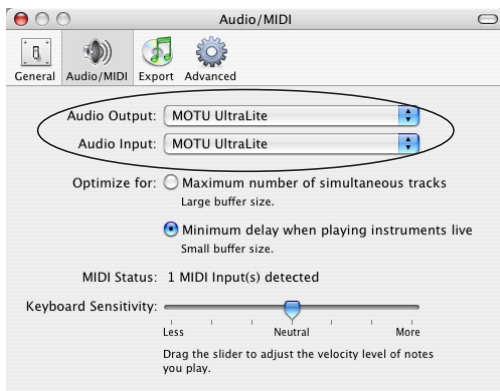
Figure 9-4: Enabling the UltraLite in Garage Band.

Live

In Ableton Live, access the preferences window and click the *Audio* tab. Choose *CoreAudio* from the *Driver Type* menu. Choose the *MOTU UltraLite* from the *Input Audio Device* and *Output Audio Device* menus as shown below in Figure 9-5. For information about the *Buffer Size* setting, see "Adjusting the audio I/O buffer" on page 55.
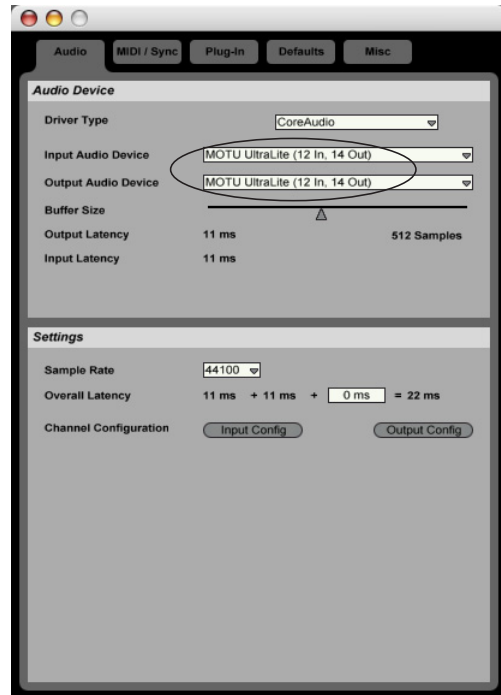

Figure 9-5: Enabling the UltraLite in Live.

Reason

In Propellerhead Reason, go to the Preferences window, choose *Audio* preferences from the menu and choose *MOTU UltraLite* from the *Audio Card* menu as shown below in Figure 9-6. For information about the *Buffer Size* setting, see "Adjusting the audio I/O buffer" on page 55.
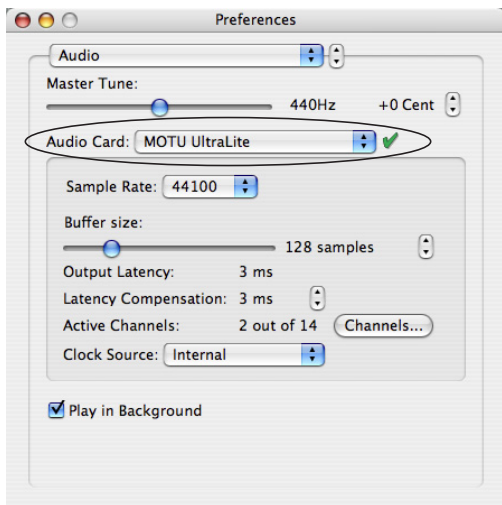

Figure 9-6: Enabling the UltraLite in Reason.

Cubase SX and Nuendo

Go to the Devices menu and choose *Device Setup*. Click the *VST Audiobay* item in the Devices list and choose *MOTU UltraLite* from the *Master ASIO Driver* menu as shown below in Figure 9-7. Activate the inputs and outputs within Cubase or Nuendo as usual. For information about the *Audio Buffer Size* setting, see "Adjusting the audio I/O buffer" on page 55.
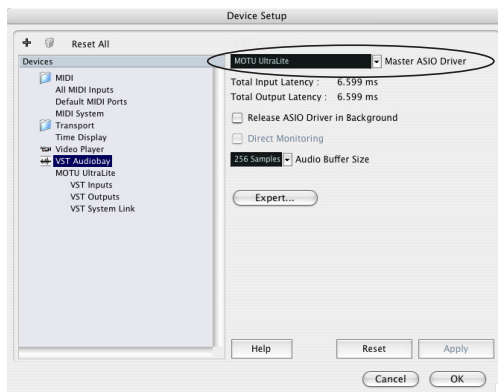

Figure 9-7: Enabling the UltraLite audio driver in Cubase SX.

Other audio software

For other audio applications, the procedure is similar to that shown above. Consult your owner's manual for further information.

AUDIO INPUT AND OUTPUT NAMES

The UltraLite Core Audio driver supplies text string labels for its inputs and outputs to clearly identify each one, and you can even customize the names as explained in "Edit Channel Names" on

page 32. But some applications do not display these labels. For example, in Cubase SX, the UltraLite outputs are numbered like this:
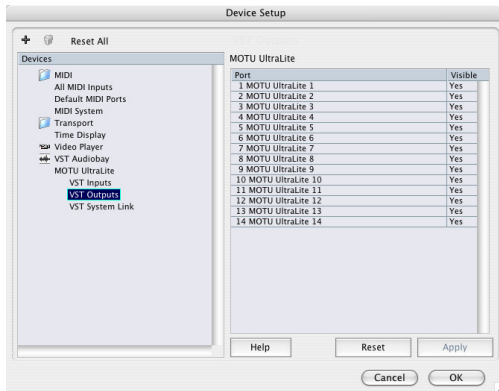

Figure 9-8: Some applications number the UltraLite inputs and outputs, but don't display which outputs they refer to.

Most programs will likely address this issue in future updates. In the meantime, here is how you can identify each input and output. Inputs are always listed in the same order as follows:

Input	Number of Channels	List position	Comment
Analog Mic	2	1-2	-
Analog TRS	6	3-8	-
SPDIF	2	9-10	-
Mix1 return	2	11-12	See "The 'Mix1' input pair" below.

Outputs are listed in this order:

Output	Channels	List position
Main	2	1-2
Analog	8	3-10
SPDIF	2	11-12
Phones	2	13-14

The 'Mix1' input pair

The *Mix1* input pair delivers the output of CueMix DSP "MIX1" (the first mix bus of the four on-board no-latency monitor mixes in the UltraLite) back to your computer. This input serves, for example, as a convenient way for you to record the UltraLite's MIX1 monitor mix back into your host audio software (for reference and archiving purposes). Further, if you are sending audio from your host audio software to the same output pair as MIX1, you can choose to either include or exclude the audio from the computer in the stream being sent back to the computer. For details on how to do this, see "Mix1 Return Includes Computer" on page 65.

☛ Warning: the Mix1 input can cause feedback loops! DO NOT assign this input to a track that shares the same UltraLite output pair as MIX1.

Phones 1-2

If you've chosen to treat the UltraLite headphones as an independent output, they appear in your host software as an independent output pair. Audio tracks assigned to this output pair will be heard on the headphone jack only. For further explanation, see "Phones" on page 31.

NUMBER OF CHANNELS

If your host audio software requires that you specify the number of audio voices or channels you will be using, be sure to choose enough channels to cover the 10 inputs and 14 outputs provided by your UltraLite.

PROCESSING LIVE INPUTS WITH PLUG-INS

If you patch a live input (such as MIDI synthesizer) through a plug-in effect in your host software, you might hear a slight delay. There are several ways to reduce this delay. For details, see chapter 10, "Reducing Monitoring Latency" (page 53).

CHAPTER 10   Reducing Monitoring Latency

OVERVIEW

Monitoring latency is that slight delay you hear when you run an input signal through your host audio software. For example, you might hear it when you drive a live mic input signal through a reverb plug-in running in your audio sequencer.

This delay is caused by the amount of time it takes for audio to make the entire round trip through your computer, from when it first enters an UltraLite input, passes through the UltraLite hardware into the computer, through your host audio software, and then back out to an UltraLite output.

If you don't need to process a live input with plug-ins, the easiest way to avoid monitoring latency is to use the UltraLite's CueMix DSP feature to patch the input directly to your monitor outs via the UltraLite audio hardware. This is just like bussing inputs to outputs in a digital mixer. For details, see "CueMix DSP hardware monitoring" on page 57.

If you *do* need to process a live input with plug-ins, or if you are playing virtual instruments live through your UltraLite audio hardware, you can significantly reduce latency — and even make it completely inaudible, regardless of what host audio application software you use. This chapter explains how.

It is important to note that monitoring delay has no effect on when audio data is recorded to disk or played back from disk. Actual recording and playback is extremely precise.

MONITORING LIVE INPUT

There are two ways to monitor live audio input with an UltraLite: 1) through the computer or 2) via CueMix™ DSP hardware monitoring. Figure 10-1 below shows method 1, which allows you to add effects processing such as reverb and guitar amp effects via plug-ins in your audio software. See the next section, "Adjusting the audio I/O buffer" for details about how to reduce — and possibly eliminate — the audible monitoring delay that the computer introduces.

Figure 10-2 on page 55 shows how to use CueMix™ DSP hardware-based monitoring, which lets you hear what you are recording with no monitoring delay and no computer-based effects processing. (You can add effects later, after you've recorded the live input as a disk track.) See "CueMix DSP hardware monitoring" later in this chapter for

details on how to use CueMix DSP with your audio software, or with the included MOTU CueMix Console software.

If the material you are recording is suitable, there is a third way to monitor live input: use both methods (Figure 10-1 and Figure 10-2) at the same time. For example, you could route vocals to both the computer (for a bit of reverb) and mix that processed signal on the main outs with dry vocals from CueMix DSP.

1. Live input (from mic, guitar, etc.) enters the MOTU interface.

2. Mic signal goes immediately to the computer (dry, with no effects processing).

3. Mic signal is 'patched thru' back to the audio interface with reverb or other plug-in effects, if any.

4. Mic signal (with plug-in processing, if any) is routed to the main outs (or other outputs that you've specified in the software).
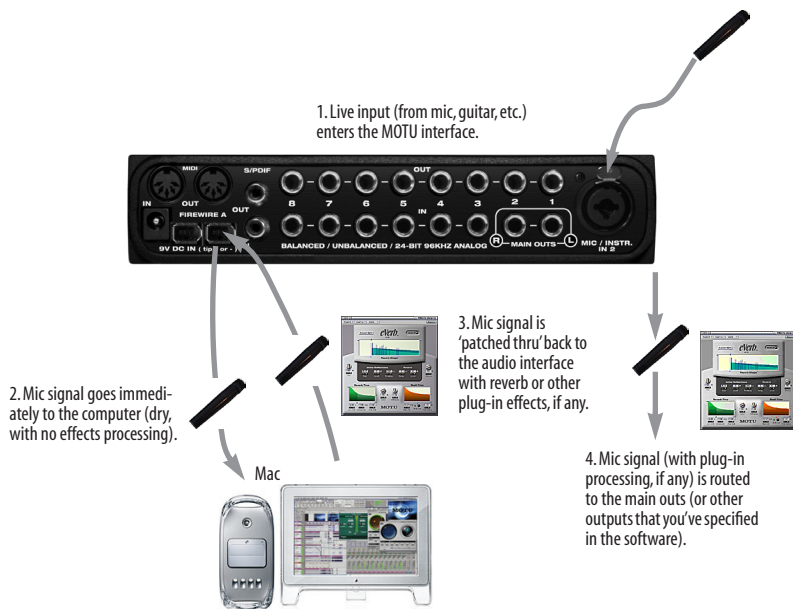
Mac

Figure 10-1: There are two ways to monitor live audio inputs with an UltraLite: 1) through the computer or 2) via CueMix™ DSP hardware monitoring. This diagram shows method 1 (through the computer). When using this method, use your host software's buffer setting to reduce the slight delay you hear when monitoring the live input, but don't lower it too much, or your computer might get sluggish.

ADJUSTING THE AUDIO I/O BUFFER

A *buffer* is a small amount of computer memory used to hold data. For audio interfaces like the UltraLite, buffers are used for the process of transferring audio data in and out of the computer. The size of the buffers determines how much delay you hear when monitoring live inputs through your audio software: larger buffers produce more delay; smaller buffers produce less.

Under Mac OS X, audio I/O buffer size is handled by the host audio application (not the UltraLite Core Audio driver). Most audio software applications provide an adjustable audio buffer setting that lets you control the amount of delay you'll hear when monitoring live inputs or processing them with software plug-ins. Below are a few examples.
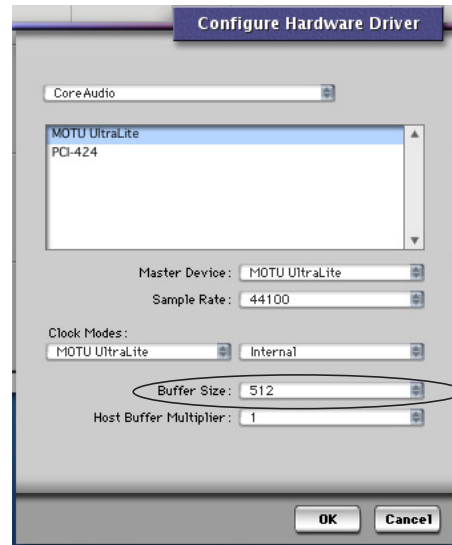
Figure 10-3: In Digital Performer and AudioDesk, choose Setup menu> Configure Audio System> Configure Hardware Driver to open the dialog shown above and access the Buffer Size setting. Refer to your Digital Performer or AudioDesk manual for information about the Host Buffer Multiplier setting.

1. Live input (from mic, guitar, etc.) enters the MOTU interface.

2. CueMix™ DSP immediately patches the live mic signal directly to the main outs (or other output), completely bypassing the computer (dry, with no effects processing).

3. Mic signal is mixed with the main outs, and you can control the volume (relative to the rest of the mix) with the mic's fader in CueMix Console.
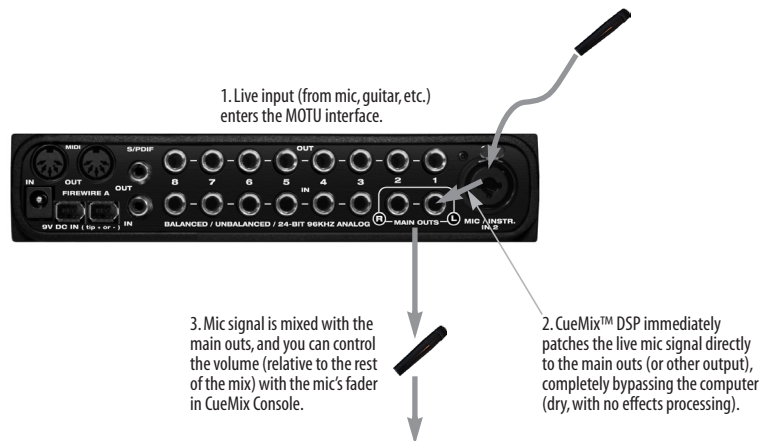
Figure 10-2: This diagram shows the signal flow when using CueMix™ DSP no-latency monitoring. Notice that this method does not allow you to process the live input with plug-ins in your audio software while it is being monitored. You can, however, add effects later — after recording the live input as a disk track. CueMix™ DSP lets you hear what you are recording with no delay and no computer-based effects.
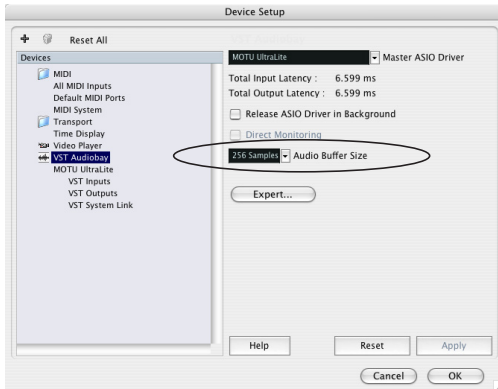
Figure 10-4: In Cubase SX or Nuendo, choose Devices menu> Device Setup and click VST Audiobay to access the window above and the Audio Buffer Size setting.
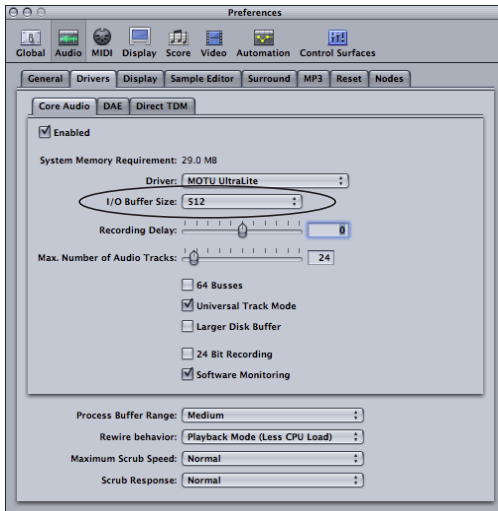

Figure 10-5: In Logic Pro or Logic Express, go to the Audio Driver preferences to access the Buffer Size option shown above.

Lower latency versus higher CPU overhead
The buffer setting has a large impact on the following things:

■ Patch thru latency

■ The load on your computer's CPU

■ Possible distortion at the smallest settings

■ How responsive the transport controls are in AudioDesk, Digital Performer or other audio software

The buffer setting presents you with a trade-off between the processing power of your computer and the delay of live audio as it is being patched through your software. If you reduce the size, you reduce patch thru latency, but significantly increase the overall processing load on your computer, leaving less CPU bandwidth for things like real-time effects processing. On the other hand, if you increase the buffer size, you reduce the load on your computer, freeing up bandwidth for effects, mixing and other real-time operations.

Figure 10-6: When adjusting the buffer size to reduce monitoring latency, watch the 'processor' meter in Digital Performer or AudioDesk's Performance Monitor. If you hear distortion, or if the Performance meter is peaking, try raising the buffer size.

If you are at a point in your recording project where you are not currently working with live, patched-thru material (e.g. you're not recording vocals), or if you have a way of externally processing inputs, choose a higher buffer size. Depending on your computer's CPU speed, you might find that settings in the middle work best (256 to 1024).

Transport responsiveness
Buffer size also impacts how quickly your audio software will respond when you begin playback, although not by amounts that are very noticeable. Lowering the buffer size will make your software respond faster; raising the buffer size will make it a little bit slower, but barely enough to notice.

Effects processing and automated mixing

Reducing latency with the buffer size setting has another benefit: it lets you route live inputs through the real-time effects processing and mix automation of your audio software.

CUEMIX DSP HARDWARE MONITORING

The UltraLite has a more direct method of patching audio through the system. This method is called *CueMix DSP*. When enabled, CueMix activates hardware patch-thru in the UltraLite itself. CueMix DSP has two important benefits:

■ First, it completely eliminates the patch thru delay (reducing it to a small number of samples — about the same amount as one of today's digital mixers).

■ Secondly, CueMix DSP imposes no strain on the computer.

The trade-off, however, is that CueMix DSP bypasses your host audio software. Instead, live audio inputs are patched directly through to outputs in the UltraLite itself and are mixed with disk tracks playing back from your audio software. This means that you cannot apply plug-ins, mix automation, or other real-time effects that your audio software provides. But for inputs that don't need these types of features, CueMix DSP is the way to go.

On the other hand, if you really need to use the mixing and processing provided by your audio software, you should not use CueMix DSP. Instead, reduce latency with the buffer setting (as explained earlier in this chapter).

TWO METHODS FOR CONTROLLING CUEMIX DSP

There are two ways to control CueMix DSP:

■ With MOTU CueMix Console

■ From within your host audio software (if it supports direct hardware monitoring)

You can even use both methods simultaneously.

Using MOTU CueMix Console

If your host audio software does not support direct hardware monitoring, you run MOTU CueMix Console side-by-side with your audio software and manage your monitor mix in CueMix Console.

CueMix Console allows you to create up to four separate UltraLite monitor mixes, or any other desired routing configurations. These routings are independent of your host audio software. For complete details, see chapter 11, "MOTU CueMix Console" (page 59).

Controlling CueMix DSP from your audio software

Some audio applications allow you to control CueMix DSP monitoring from within the application (without the need to use CueMix Console). In most cases, this support consists of patching an UltraLite input directly to an output when you record-arm a track. Exactly how this is handled depends on the application.

The following applications are among those that support direct control over CueMix DSP:

■ Digital Performer

■ AudioDesk

CueMix DSP routings that are made via host applications are made "under the hood", which means that you won't see them in CueMix Console. However, CueMix DSP connections made inside your host audio software dovetail with any other mixes you've set up in CueMix Console. For example, if your host application routes audio to an output pair that is already being used in CueMix Console for an entirely separate mix bus, both audio streams will simply be merged to the output.

Follow the directions below in the section that applies to you.

Controlling CueMix DSP from within AudioDesk or Digital Performer
To turn on CueMix DSP in AudioDesk and Digital Performer:

1 From the Setup menu, choose *Configure Audio System>Input Monitoring Mode*.

2 Choose the *Direct hardware playthrough* option, as shown below in Figure 10-7.

3 From the Studio menu, choose *Audio Monitor*, and enable Audio Patch Thru (the button with the headphone icon on it).

Once enabled, CueMix DSP monitoring is tied with Digital Performer or AudioDesk's *Audio Patch Thru* feature: when you record-enable a track, the track's input is routed directly to its output (via CueMix DSP in the UltraLite hardware). For example, if you record-enable a track called *guitar* in your DP or AudioDesk project, and its audio input assignment is *Analog in 2*, and its audio output assignment is channels 7-8, CueMix DSP no-latency hardware monitoring will automatically be set up from analog in 2 to outputs 7-8.

Controlling CueMix DSP from within other software
Consult the manual for your software.
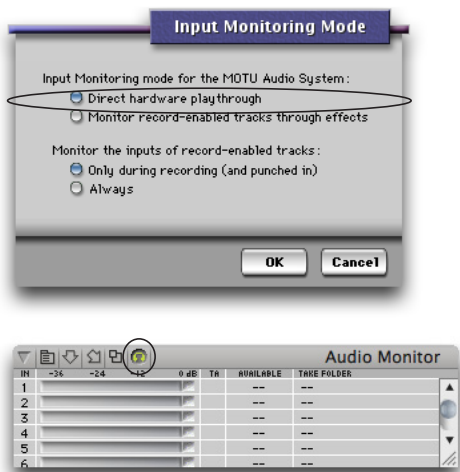
Figure 10-7: Enabling CueMix DSP in AudioDesk or Digital Performer.

MOTU CueMix Console

OVERVIEW

MOTU CueMix Console provides access to the
flexible on-board mixing features of the UltraLite.
CueMix lets you route any combination of inputs to
any stereo output pair. These mixes can be set up
entirely independently of your host audio software.
CueMix allows you to set up four completely
independent mix configurations with the
UltraLite. You can also save and load mix configu-
rations.

CueMix Console can be used independently of
host audio software, or together with it. CueMix
mixing dovetails with the direct monitoring
(hardware patch thru) features of your host audio
software, allowing you to seamlessly mix in both
environments.

Figure 11-1: CueMix Console is a virtual mixer that gives you control over the UltraLite's on-board mixing features.

ADVANTAGES OF CUEMIX MONITORING

CueMix Console provides several major advantages over monitoring live inputs through your host audio software:

■ CueMix has no buffer latency. Thanks to the UltraLite's DSP chip, CueMix provides the same throughput performance as a digital mixer.

■ CueMix imposes absolutely no processor drain on the computer's CPU.

■ CueMix routing can be maintained independently of individual software applications or projects.

■ CueMix routing can operate without the computer, allowing the UltraLite to operate as a portable, stand-alone mixer.

CueMix Console does not provide effects processing. For information about using your audio software's native plug-ins together with CueMix, see chapter 10, "Reducing Monitoring Latency" (page 53).

CUEMIX CONSOLE INSTALLATION

CueMix Console is installed with the rest of your UltraLite software.

CUEMIX CONSOLE BASIC OPERATION

CueMix console is simple to operate, once you understand these basic concepts.

Four mixes

CueMix provides four separate mixes: Mix1, Mix2, Mix3 and Mix4. Each mix can have any number of inputs mixed down to any UltraLite output pair that you choose. For example, Mix1 could go to the headphones, Mix2 could go to the main outs, Mix3 could go to a piece of outboard gear connected to analog outputs 7-8, etc.

Many inputs to one output pair

It might be useful to think of each mix as some number of inputs all mixed down to a stereo output pair. CueMix Console lets you choose which inputs to include in the mix, and it lets you specify the level and pan for each input being fed into the mix.

Viewing one mix at a time

CueMix Console displays one mix at a time. To select which mix you are viewing, click its tab at the bottom of the window, as shown in Figure 11-1. The mix name appears in the tab. Double-click the name to change it.

Each mix is completely independent

Each mix has its own settings. Settings in one mix will not affect another. For example, if an input is used in one mix, it will still be available in other mixes. In addition, inputs can have a different volume, pan, mute and solo setting in each mix.

Some channel settings apply across all mixes

The settings at the top of the CueMix Console window (above the channel section) apply to all mixes. These settings include the *Input Trim* and *Phase Invert* for each input (Figure 11-1 on page 59).

Widening the CueMix Console window

To view more input faders at once, drag the grow box (Figure 11-1) to the right.

WORKING WITH A MIX

Each mix has the following components:

■ A stereo output with master fader

■ Name

■ Master mute (to enable/disable the entire mix)

■ Any number of mono or stereo inputs

■ Pan, volume, mute and solo for each input

These elements are visually grouped together in the lightly shaded area in the lower half of the CueMix Console window.

Viewing a mix

To view a mix, click its tab at the bottom of the window, as shown in Figure 11-1. The mix name appears in the tab.

Naming a mix

Double-click the mix name in the tab.

Master mute

The master mute button (Figure 11-1) temporarily disables (silences) the mix.

Master fader

The master fader (Figure 11-1) controls the overall level of the mix (its volume on its stereo output). Use the individual input faders to the left to control individual input levels.

Output level meters

The OUT level meters show you the output for the mix's physical output, which may include audio from your host audio software. The clip indicators clear themselves after a few seconds.

Input section

The channel strips to the left of the master fader represent each input in your UltraLite. Use the input scroll bar to view additional inputs.

Input mute/solo

To add an input to a mix, or remove it, click its MUTE button. To solo it, use its SOLO button. To toggle these buttons for a stereo pair, hold down the command key while clicking either channel. The Solo indicator LED (Figure 11-1) lights up when any input is soloed (including inputs that may currently be scrolled off-screen).

Input volume and pan

Use the input fader and pan knob (Figure 11-1) to adjust these settings for the input in the mix. Again, all settings within the gray-shaded channel strip area belong to the mix currently being viewed. Note that an input can have different settings in different mixes.

To adjust the volume or panning for a stereo input pair, hold down the command key while dragging the fader or knob for either the left or right input.

SHORTCUTS

Hold down the following modifier keys as shortcuts:

Shortcut	Result
Shift key	Applies your action to all inputs in the mix.
Command key	Applies your action to the stereo input pair
Option key	Applies your action to all busses
Double-click	Returns the control to its default value (pan center, unity gain, etc.)

COPYING & PASTING (DUPLICATING) ENTIRE MIXES

To copy and paste the settings from one mix to another:

1 Select the source mix (Figure 11-1) and choose Copy from the file menu (or press command-C).

2 Choose the destination mix and choose Paste from the file menu (or press command-V).

MESSAGE CENTER

The Message Center displays fly-over help for items in the CueMix Console window. It also displays messages regarding the overall operation of the UltraLite.

INPUT TRIM AND PHASE INVERT

The input trim and phase invert settings at the very top of the CueMix Console window (Figure 11-1) affect each input globally, across all mixes and for

audio being routed to the computer. For example, if you phase invert an input, your host software will receive the inverted signal for that input as well.

Input trim

The input trim range is 24dB on the two mic inputs (Analog 1-2). For all other inputs (TRS analog and S/PDIF), the trim range is 18dB. This is the same trim setting as can be made from the front panel, as explained in "PAGE" on page 37.

Phase invert

All inputs, both analog and digital, can be phase inverted. This setting (Figure 11-1). This is the same phase invert setting as can be made from the front panel, as explained in "PAGE" on page 37.

MIX1 RETURN INCLUDES COMPUTER

The *Mix1 return includes computer output* item in the CueMix Console File menu refers to the *Mix1* bus that the 828mkII driver provides as an input to host audio software. This input source delivers the output of CueMix DSP "MIX1" (the first mix bus of the four on-board no-latency monitor mixes in the 828mkII) back to your computer. This input serves, for example, as a convenient way for you to record the 828mkII's MIX1 monitor mix back into your host audio software (for reference and archiving purposes).

When the *Mix1 return includes computer* menu item is checked, any audio being sent from your audio software on the computer to the same output as Mix1 will be included in the Mix1 return bus. When it is uchecked, computer output is excluded.

This menu item is essentially a pre/post switch for the computer audio insert to the stream of audio going to Mix1's 828mkII output pair (and also back to the computer).

SHOW METER IN DOCK ICON (MAC OS X ONLY)

This CueMix Console File menu item, when checked, causes the CueMix Console dock icon to display a small level meter that mirrors the main output meter for the current mix being displayed in CueMix Console.

PHONES MENU

The Phones menu allows you to choose what you will hear on the headphone output, just like the Phones setting MOTU Audio Setup. However, this menu provides one extra option that is exclusive to CueMix Console: *Follow Active Mix*. This menu item, when checked, causes the headphone output to mirror the output of the current mix being viewed in CueMix Console. For example, if you are currently viewing Mix3 (the Mix3 tab is active), the headphones will mirror the Mix3 output (whatever it is assigned to).

SAVING AND LOADING PRESETS

As explained earlier in "Save/Name Preset" on page 35, the UltraLite can store up to 16 presets in its on-board memory. A preset includes of all CueMix DSP settings for all four mix busses, but it excludes global settings like clock source and sample rate.

The Load Preset and Save Preset commands in the CueMix Console File menu let you name, save and load presets in the UltraLite.

SAVING AND LOADING PRESETS TO/FROM DISK

The *Save* and *Load* commands in the CueMix Console File menu allow you to save UltraLite presets to and from your hard drive. This allows you to save an unlimited number of UltraLite presets on disk. (Use the *Load Preset* and *Save Preset* commands to get presets from — and save them to — the UltraLite itself.) Click the Save

button to save the current configuration; click the Load button to open an existing configuration that you have previously saved on disk.

EDIT CHANNEL NAMES

Choose Edit Channel Names from the CueMix Console File menu to open a window that lets you customize the names of the UltraLite's inputs and outputs. Your custom names appear in CueMix Console (in the input name strip as shown in Figure 11-1 on page 59) and in the input and output menus of your host audio software. For details, see "Edit Channel Names" on page 32.

TALKBACK AND LISTENBACK

CueMix Console provides *Talkback* and *Listenback* buttons. Talkback allows an engineer in the control room to temporarily dim all audio and talk to musicians in the live room. Conversely, Listenback allows musicians to talk to the control room.

Hardware setup

Figure 11-2 below shows a typical hardware setup for Talkback and Listenback. For Talkback, set up a dedicated mic in your control room and connect it to a mic input on your MOTU Audio interface. For Listenback, set up a dedicated listenback mic in the live room for the musicians and connect it to another mic input. For talkback output, set up a headphone distribution amp or set of speakers in the live room, and connect it to a pair of outputs. For example, you might connect a headphone distribution amp to analog outputs 7-8 on your MOTU FireWire audio interface, as demonstrated below in Figure 11-2 on page 63.
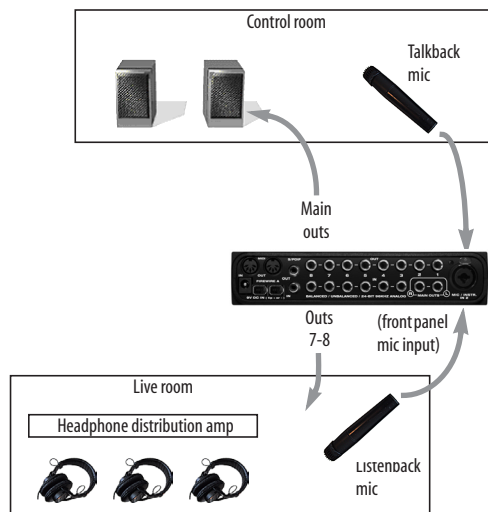
Figure 11-2: Typical hardware setup for Talkback and Listenback.

CueMix Console setup

To set up Talkback and/or Listenback in CueMix Console, choose *File menu> Talkback settings> Configure Talkback/Listenback* to open the window shown in Figure 11-3:
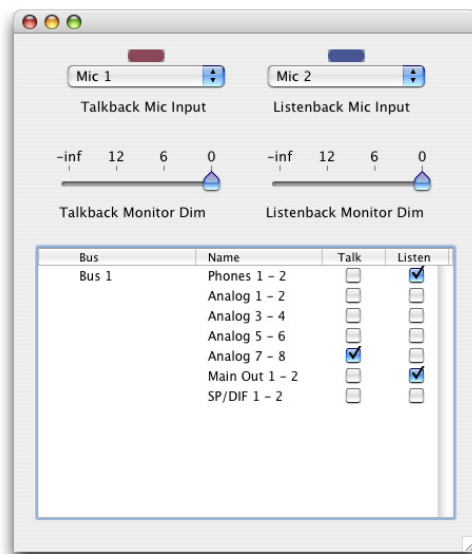
Figure 11-3: Configuring Talkback and Listenback.

Talkback / Listenback Mic Input

Choose the audio input to which your Talkback and/or Listenback mic is connected. These inputs are labeled with a purple and blue swatch, respectively, just above the channel fader.

These labels identify the Talkback and Listenback mic inputs.
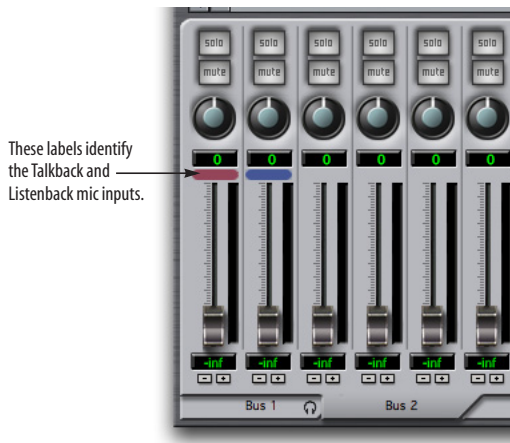
Figure 11-4: The purple label identifies the Talkback mic input; the blue label indicates the Listenback mic. Use the input fader to control the mic volume.

Talkback / Listenback Monitor Dim

Choose the amount of attenuation you would like to apply to all other audio signals (besides the talkback volume) when Talkback and/or Listenback is engaged. To completely silence all other audio, move the slider all the way to the left (-Inf).

Talk / Listen signal routing

As shown in Figure 11-3, check the boxes next to the outputs on which you'd like to hear the Talkback mic and/or Listenback mic. For example, as demonstrated in the diagram in Figure 11-2, to hear the Talkback mic on the headphones in the live room, check the *Analog 7-8* check box in the *Talk* column as demonstrated in Figure 11-3. To hear the Listenback mic on the main monitors in the control room, check the *Main Out 1-2* check box in the *Listen* column, also demonstrated in Figure 11-3.

Engaging/disengaging Talkback and Listenback

To engage Talk back or Listenback, press on the Talk or Listen buttons and then release to disengage. Talkback and/or Listenback is engaged for as long as you hold down the mouse button. Option-click to make the buttons "sticky" (stay engaged until you click them again — so you don't have to hold down the mouse). If you would like to engage both Talkback and Listenback at the same time, enable the *Link* button.

Figure 11-5: The Talkback and Listenback buttons.

Controlling Talkback and Listenback volume

To control the volume of the Talkback and/or Listenback mics, adjust their input fader in CueMix Console. This fader controls the volume of the input, regardless of which bus mix is being displayed in the CueMix Console window. In other words, once an input has been designated as a Talkback or Listenback input, its fader becomes global for all CueMix buses.

PEAK HOLD TIME

The input level meters in the UltraLite LCD display support peak/hold metering, where the meter segment for the highest level recently measured on the input remains illuminated for a brief period of time while the rest of the LEDs below it remain fully dynamic. The *Peak Hold Time* sub-menu (File menu) lets you control how long the level meters in the LCD remain illuminated before going dark again.

MIX1 RETURN INCLUDES COMPUTER

The *Mix1 return includes computer* item in the CueMix Console File menu refers to the *Mix1* bus that the UltraLite driver provides as an input to host audio software. This input source delivers the output of CueMix DSP "MIX1" (the first mix bus of the four on-board no-latency monitor mixes in the UltraLite) back to your computer. This input serves, for example, as a convenient way for you to record the UltraLite's MIX1 monitor mix back into your host audio software (for reference and archiving purposes).

When the *Mix1 return includes computer* menu item is checked, any audio being sent from your audio software on the computer to the same output as Mix1 will be included in the Mix1 return bus. When it is ucheched, computer output is excluded.

This menu item is essentially a pre/post switch for the computer audio insert to the stream of audio going to Mix1's UltraLite output pair (and also back to the computer).

SHOW METER IN DOCK ICON

This CueMix Console File menu item, when checked, causes the CueMix Console dock icon to display a small level meter that mirrors the main output meter for the current mix being displayed in CueMix Console.

PHONES MENU

The Phones menu allows you to choose what you will hear on the headphone output, just like the Phones setting in MOTU Audio Setup. However, this menu provides one extra option that is exclusive to CueMix Console: *Follow Active Mix*. This menu item, when checked, causes the headphone output to mirror the output of the current mix being viewed in CueMix Console. For example, if you are currently viewing Mix3 (the Mix3 tab is active), the headphones will mirror the Mix3 output (whatever it is assigned to).

CONTROL SURFACES MENU

CueMix Console can be controlled from an automated control surface such as the Mackie Control™. Use the commands in the *Control Surfaces* menu to enable and configure this feature.

Application follows control surface

When checked, the *Application follows control surface* menu command makes the CueMix Console window scroll to the channel you are currently adjusting with the control surface, if the channel is not visible when you begin adjusting it. The same is true for the bus tabs: if you adjust a control in a bus that is not currently being displayed, CueMix Console will jump to the appropriate tab to display the control you are adjusting.

Share surfaces with other applications

When the *Share surfaces with other applications* menu command is checked, CueMix Console releases the control surface when you switch to another application. This allows you to control your other software with the control surface. Here's a simple way to understand this mode: the control surface will always control the front-most application. Just bring the desired application to the front (make it the active application), and your control surface will control it. When you'd like to make changes to CueMix Console from the control surface, just bring CueMix Console to the front (make it the active application).

When this menu item is unchecked, your control surface will affect CueMix Console all the time, even when CueMix Console is not the front-most application. In addition, you will not be able to control other host audio software with the control surface at any time (because CueMix Console retains control over it at all times). This mode is useful when you do not need to use the control surface with any other software.

Mackie Control Surfaces

CueMix Console includes support for the following control surface products:

- Mackie Control™

- Mackie HUI™

- Mackie Baby HUI™

Use the sub-menu commands in the *Mackie Control Surfaces* menu item to turn on and configure control surface support, as described briefly below.

Enabled

Check this menu item to turn on control surface operation of CueMix Console. Uncheck it to turn off control surface support.

Configure…

Choose this menu item to configure your control surface product. Launch the on-line help for specific, detailed instructions for configuring CueMix Console for operation with your control surface product.
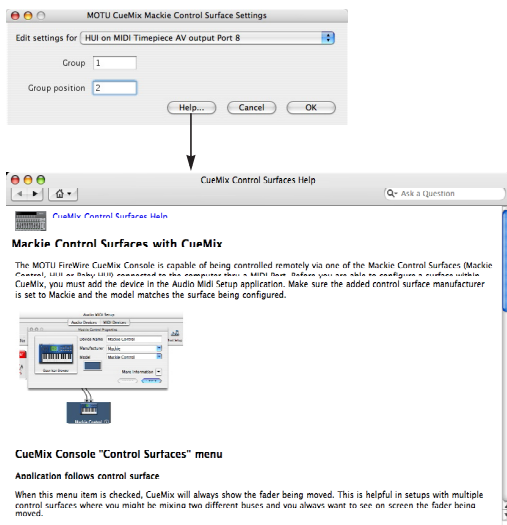
Figure 11-6: Refer to the extensive on-line help for details about configuring CueMix Console for operation with your control surface product.

Other HUI-compatible control surfaces

Any control surface that has the ability to emulate a HUI should be compatible with CueMix Console. Just add a Mackie HUI to Audio MIDI Setup and put the control surface hardware into HUI emulation mode. Consult the manual for the control surface for details about how put it into HUI emulation mode.

Other control surface hardware products

If you install other control surface drivers written for CueMix Console, they will appear as separate menu items at the bottom of the Control Surfaces menu, with the same sub-menu items described above.

CHAPTER 12   Troubleshooting

Things seems like they are working fine, but the UltraLite then just drops off line, and the computer can't see it anymore on the FireWire bus.
This is a common symptom when the problem is that the UltraLite is not getting enough power. Check the power source for the UltraLite. Make sure that the power connection meets the requirements outlined in "Power options" on page 18.

Can't authenticate AudioDesk
When installing software off the CD-ROM, the OK button does not become active until you have entered in your name and a valid keycode. Your name must contain at least 3 characters, and you must enter the keycode exactly as it appears in your AudioDesk manual (on the inside of the back cover). If you continue to have difficulties, try repairing Mac OS X disk permissions using *Disk Utility*.

Clicks and pops due to hard drive problems
If you have checked your clock settings and you are still getting clicks and pops in your audio, you may have a drive related problem. Set your Clock Source to *Internal* and try recording just using the analog inputs and outputs of the UltraLite. If you encounter the same artifacts you may want try using another drive in your computer. Clicks and pops can also occur when the drive is severely fragmented, the disk drivers are outdated, or if you are using a SCSI accelerator that is not optimally configured for working with audio.

Connecting or powering gear during operation
It is not recommended that you connect/ disconnect, or power on/off devices connected to the UltraLite while recording or playing back audio. Doing so may cause a brief glitch in the audio.

Monitoring - How to monitor inputs?
Please refer to the documentation for the audio application that you are using. If your application does not support input monitoring, you will need to use the UltraLite's hardware-based CueMix DSP monitoring feature. Please see chapter 10, "Reducing Monitoring Latency" (page 53).

Controlling monitoring latency
See chapter 10, "Reducing Monitoring Latency" (page 53).

CUSTOMER SUPPORT
We are happy to provide customer support to our registered users. If you haven't already done so, please take a moment to complete the registration card included with your UltraLite. When we receive your card, you'll be placed on our mailing list for free software updates and information about new products.

REPLACING DISKS
If your UltraLite software installer CD becomes damaged and fails to provide you with fresh, working copies of the software, our Customer Support Department will be glad to replace it. You can request a replacement disc by calling our business office at (617) 576-2760 and asking for the customer service department. In the meantime, you can download the latest drivers from www.motu.com.

TECHNICAL SUPPORT
If you are unable, with your dealer's help, to solve problems you encounter with the UltraLite system, you may contact our technical support department in one of the following ways:

■ Tech support hotline: (617) 576-3066 (Monday through Friday, 9 am to 6 pm EST)

- Tech support 24-hour fax line: (617) 354-3068

- Tech support email: techsupport@motu.com

- Web site: www.motu.com

Please provide the following information to help us solve your problem as quickly as possible:

- The serial number of the UltraLite system. This is printed on a sticker placed on the bottom of the UltraLite rack unit. You must be able to supply this number to receive technical support.

- A brief explanation of the problem, including the exact sequence of actions which cause it, and the contents of any error messages which appear on the screen.

- The pages in the manual which refer to the parts of the UltraLite or AudioDesk with which you are having trouble.

- The version or creation date of the system software you are using to run the Macintosh.

We're not able to solve every problem immediately, but a quick call to us may yield a suggestion for a problem which you might otherwise spend hours trying to track down.

If you have features or ideas you would like to see implemented, we'd like to hear from you. Please write to the UltraLite Development Team, MOTU Inc., 1280 Massachusetts Avenue, Cambridge, MA 02138.