LiSa v2.5

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manual by Matthew Ostrowski

Introduction to LiSa

What is LiSa?

LiSa (Live Sampling) is a real-time audio manipulation environment that runs on any Macintosh or Mac OS-Compatible computer with a Power PC Processor. The program can use either the 16-bit AD/DA converters of these platforms or any Sound Manager or ASIO compatible audio interface. This combination turns the Mac into a versatile audio sampling machine. Complete program control is possible via MIDI, allowing the user to work with this system in performance.

LiSa was designed to fulfill the needs of musicians who work with sampled and manipulated sounds and need more flexibility than is generally available in a traditional sampler. Not only can sounds be recorded and played back quickly and easily in a performance situation, LiSa's architecture gives you direct access to the samples in memory, allowing much more sophisticated manipulation of samples than is possible in traditional samplers, both hardware- and software-based. In addition, LiSa offers a variety of algorithms for processing sampled sounds, and is very well suited for a broad variety of delay applications.

Version 2.5

The 2.5 release of LiSa contains many improvements and changes over the previous releases, some visible, and some not. They include:

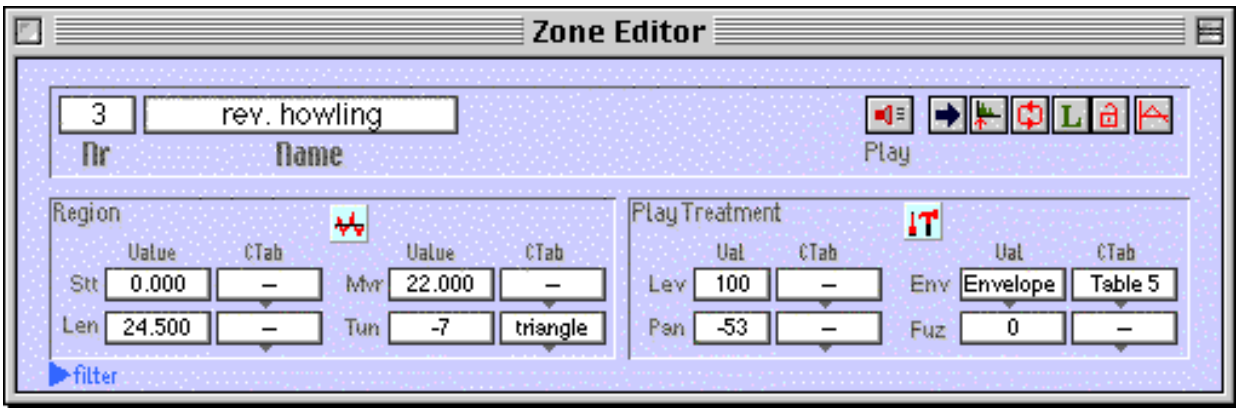
- **Improved Sound Quality**. The internal sound playback algorithms have been improved, giving better sound quality overall, especially at lower transpositions.
- **ASIO Support**. LiSa now supports soundcards using ASIO drivers, supporting up to 8 channels of input and output.
- **Sample Editor**. The Sample Editor window allows for better and more accurate placement of sounds in the Sample Buffer.
- **Filters**. Playback Zone filters now have multiple modes.
- **Improved GUI**. LiSa's look has been changed, using standard Mac windows. The user interface has had many improvements, including improved drag-and-drop, more consistent window management, and better access to parameters via popup menus.
- **Pitch Trackers**. LiSa can now take pitch input information and transform it into MIDI.
- **Environments Menu**. With this menu, you can store up to 9 window arrangements, making it easier to work with LiSa's many windows.
- **MIDI Processors**. This new set of functions allows you to map keyboard events into controller events, and vice versa
- **MIDI Snapshots**. This gives you the ability to take a snapshot of LiSa's entire MIDI state, and allows you to use a single controller to 'morph' between different states.

New in Version 2.5:

New features of particular interest to users of older versions are flagged with the notification to the left.

The LiSa Interface

Windows



New in v. 2.5

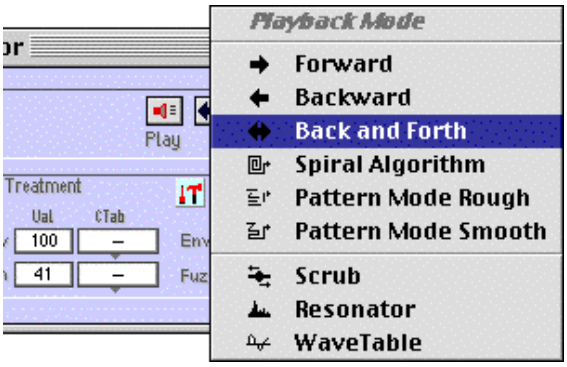
The entire overall look of LiSa has been changed drastically since earlier versions. Although they are much more like standard Macintosh windows, there are a few differences that are worth taking a close look at for LiSa novices and experts alike.

Lisa's Windows are more or less like standard Macintosh windows, with the main difference that with the exception of the Sample Editor, they cannot be resized. Generally, you will be working with several windows simultaneously, and there are two important things to keep in mind with LiSa's windows:

- All windows are active at all times. You can directly click and work in any open window without having to bring it to the front first. Generally you need to click on a window once to activate it before you can change parameters, but this is not the case in LiSa.
- It is nevertheless important to keep in mind which window is topmost. That is the window with the stripes in the title bar, and will always be the window that you last clicked. All edit operations and keyboard scrolling controls affect the topmost window.

Subdivisions of windows usually have a set of related data input controls in them, or some set of related information. They are called *panes*.

Popup Menus and Numericals



Most of the data that you enter into LiSa's windows will be via either popup menus or numericals. In general, numericals appear as simple rectangular boxes, and popup menus appear either as icons or as boxes with a triangle on their bottom edge.

Using Numericals

A numerical is a box containing a number or text that can be changed from either the mouse or the keyboard. Values in a numerical can be changed three different ways:

- **Scrolling**: Position the cursor in the box and hold down the mouse button. If the cursor is in the top half of the box, the displayed values will increase; if in the bottom half, they will decrease. The cursor will change to an arrow to indicate the direction of movement, and the numerical will continue to change as long as the mouse button is held down.
- **Dragging**: Click anywhere in the box, hold the mouse button down, and move the mouse forward or backward to increase or decrease the value. This is somewhat faster than scrolling.
- **Typing**: Click once in the box, which will select it, type, and hit Return or Enter.

Numericals and Time descriptions

Time can be displayed in two ways in LiSa: either by seconds and milliseconds, or by number of samples. You can toggle between these two options by using the **Show Length in Seconds/kSamples option in the Options menu. When viewing in seconds, you can set time values with a precision of one millisecond. If you need to be 100% accurate, you can set time in samples, down to the individual sample. A numerical can't hold the often gigantic numbers required for counting through a large buffer in samples, so when displaying time in samples, they have two modes:**

Note that once a numerical is selected, you have to deselect it in order to change its aspect with the shift key.

Counting by *kilobytes* (kB) of samples (that's 1024 samples, or about .02 of a second), or by individual samples (a very tiny bit of a second). When you have **Show Size in kSamples** selected, you will normally see time displayed in kB of samples.

If the number is in normal type, that means the time selected is an even number of kB of samples; that is to say that the total number of samples in the numerical is evenly divisible by 1024. If it is in **bold**, that means that there are samples left over – the total number of samples in the numerical is not divisible by 1024.

To fine-tune this number, press the shift key, and the number of samples left over in the numerical will appear. This is the fine-tune aspect of the numerical. To change this number select the numerical while the Shift key is depressed. You can release the Shift key at this point, and the numerical will remain selected. Scroll or type as usual.

Dual Numericals

In some cases, a numerical may be used to set more than one parameter. In these cases, mentioned in the manual as they appear, holding down the Shift key will reveal the second parameter. These dual numericals are never related to precise time values, and do not relate to the situation described above.

Editing Functions

The standard Macintosh editing functions (**Cut**, **Copy**, **Paste**, and **Undo**) are implemented in different ways in different windows. All numericals and text boxes in Editor windows, if selected, can be copied and pasted into any other numerical for any other Editor. Undo will also work normally in a selected text box.

If no numericals in an editor window are selected, selecting **Copy** will copy the entire data structure (Envelope, Zone, whatever) to the clipboard. This can then be pasted into a new structure of the same type. All parameters, including the name, will be copied over.

The Environments menu

New in v. 2.5: Environments

When working with LiSa, with its plethora of windows, it can get a bit annoying to constantly be navigating between large numbers of open windows. Often, while working on one particular aspect of your Setup, such as sample editing, you will need one set of windows open, but another for setting MIDI connections. The Environments menu is designed to ease your work in this respect. Each Preset can have up to 9 environments.

When you create a new Environment, LiSa will remember which windows are open, and their position on your screen. You can create up to nine environments for each of your preferred work situations. Environments are saved with your Setup.

Menu Functions:

New Environment. Memorizes the current window arrangement, and adds a new Environment to the menu.

Replace Current Environment. The window arrangement of the current Environment will be replaced by the current on-screen window arrangement. Each Preset can have its own Current Environment, as well as a set of 9.

Environment <n>. Selects a new Environment. The currently selected Environment will be bulleted.

Fundamentals of LiSa

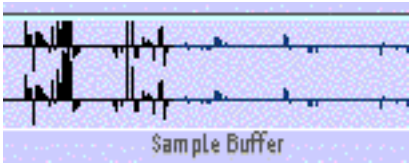
Overall Structure

LiSa's general architecture is divided into *Setups*, *Presets*, and *Zones*. Data that LiSa uses is stored in *Libraries*. The file you load when you start up a program is a Setup. Each Setup is comprised of up to 128 Presets, which are the immediate sound and control environments you work in when editing

or performing with LiSa. A Preset is comprised of up to 2048 Zones, which contain all the actual information regarding sample performance and manipulation, plus a set of MIDI controller and keyboard connections to direct how MIDI will affect your sounds.

Sound in the Computer

LiSa, like all samplers, works by loading sounds into a contiguous chunk of RAM, known as a *buffer*. The key difference between LiSa and traditional samplers is that you have direct access to all parts of the Sample Buffer via MIDI. All sounds loaded into LiSa are stored in one large buffer; one sound lined up after the other.

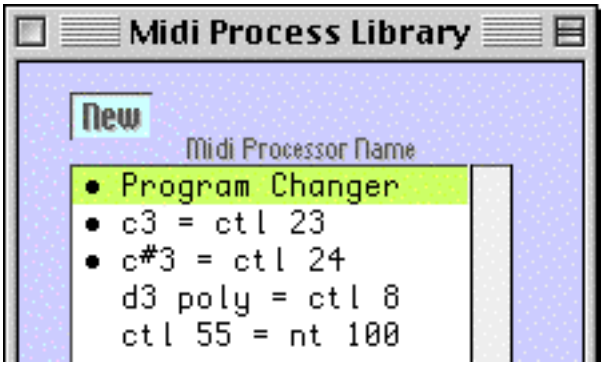


You access this buffer by creating Zones. A Zone is comprised of three aspects: A *keyrange* (or range), a *function*, and a *sample region*, or region. Zones are activated (played) by MIDI 'note on' messages.

- The **range** is the key or keys (MIDI notes) that activate the Zone. These are specified in the Assignment Window. The same Zone can be assigned to different keyranges in different MIDI channels.
- The sample region is the physical area of the Sample Buffer on which the Zone operates. It can be all or part of the buffer, and its exact size and location can be either set permanently or controlled via MIDI. These initial parameters are set in the Zone Editor window.
- A **function** is what the Zone does to the Zone's region. Playing back, recording, and loading sounds from disk are all examples of functions.

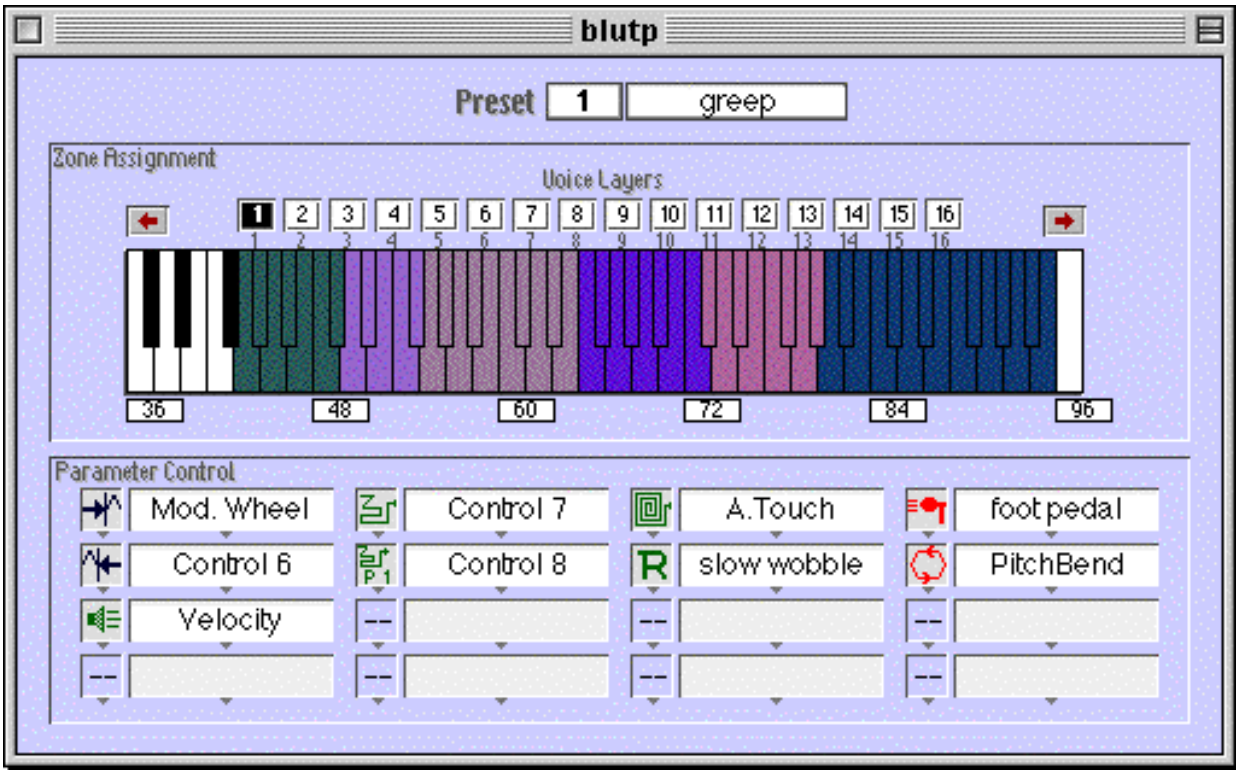
When a Zone receives a note on message in its keyrange, it does its thing, whatever that may be. A typical Preset would be comprised of some number of Zones for playback, recording sounds live, and loading samples from disk.

Libraries



All of the data LiSa uses in a Setup – Zones, samples, tables, and so on, are stored in a set of *Libraries.* They are independent data banks, and can be shared between Setups.

The Assignment Window



The Assignment window provides you with the basic information about your Preset, the actual 'instrument' you work with at any given moment.

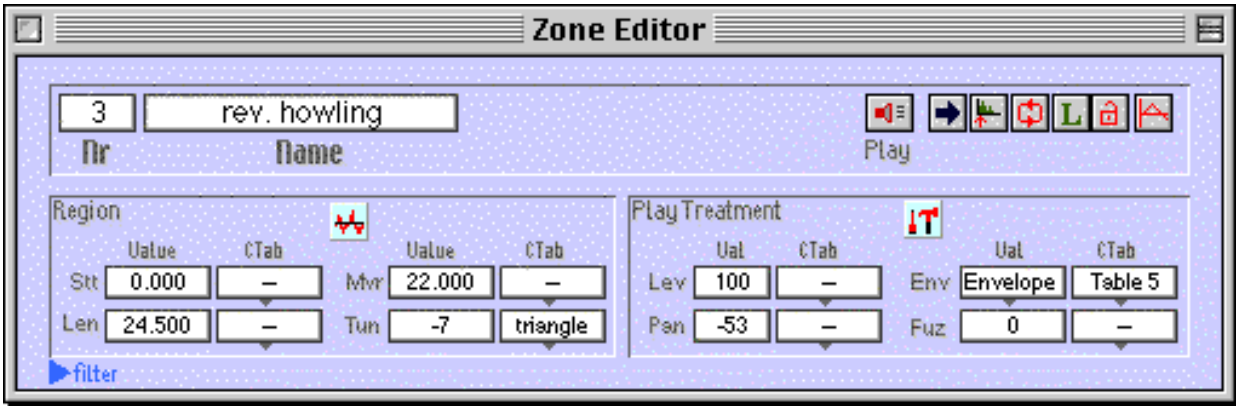
In the title bar of the window, you can see the name of the currently loaded Setup – this is your open file. The two numericals at the top of the window contain the name and number of your currently loaded Preset. Every Preset has both a name and a number, which is the number of the Program Change Message that loads it. A Setup can contain up to 128 Presets.

Below, with the keyboard inside, is the Zone Assignment pane. Here is where you assign Zones to a keyrange for activation, and assign MIDI channels.

At the bottom of the window is the Parameter Control pane. This is your 'patchbay' for MIDI and internal modulation control.

Each Preset is comprised of up to 16 Voice Layers (see Voice Layers and MIDI Channels, p. 85), indicated by the row of numbered buttons above the keyboard. Each Voice Layer can respond to a different MIDI channel, and have a different set of key assignments and Parameter Control options. When nothing is selected in the Assignment Window, selecting **Copy** from the **Edit** menu will copy the entire Voice Layer to the clipboard, from which it can be pasted into a Voice Layer in the same, or another, Preset.

The Zone Editor



The Zone Editor is one of the most important parts of LiSa. It is the window in which you determine both the function and the sample region of a Zone. Its exact appearance will vary depending on the kind of Zone that you are editing.

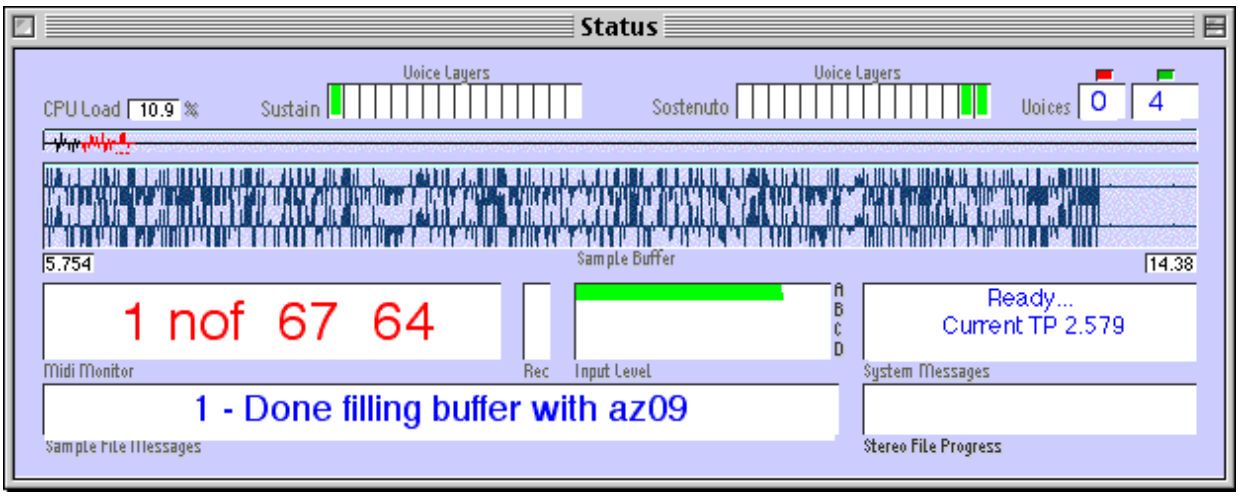
As in the assignment window, you can see the name and number of the Zone on top. Unlike Presets, these numbers have no particular meaning – they are LiSa's catalog numbers.

To the right of the Zone name is a row of icons. When clicked, they reveal a series of popup menus, which determine the function of the Zone (record, playback, etc.) and the *modes* of that function. A Zone that plays a sample backwards has the same function (Playback) as one that plays it forwards, but with a different mode.

The Region pane is where the sample region of the Zone is set. In some functions this pane will include other options such as tuning. These parameters are usually MIDI controllable.

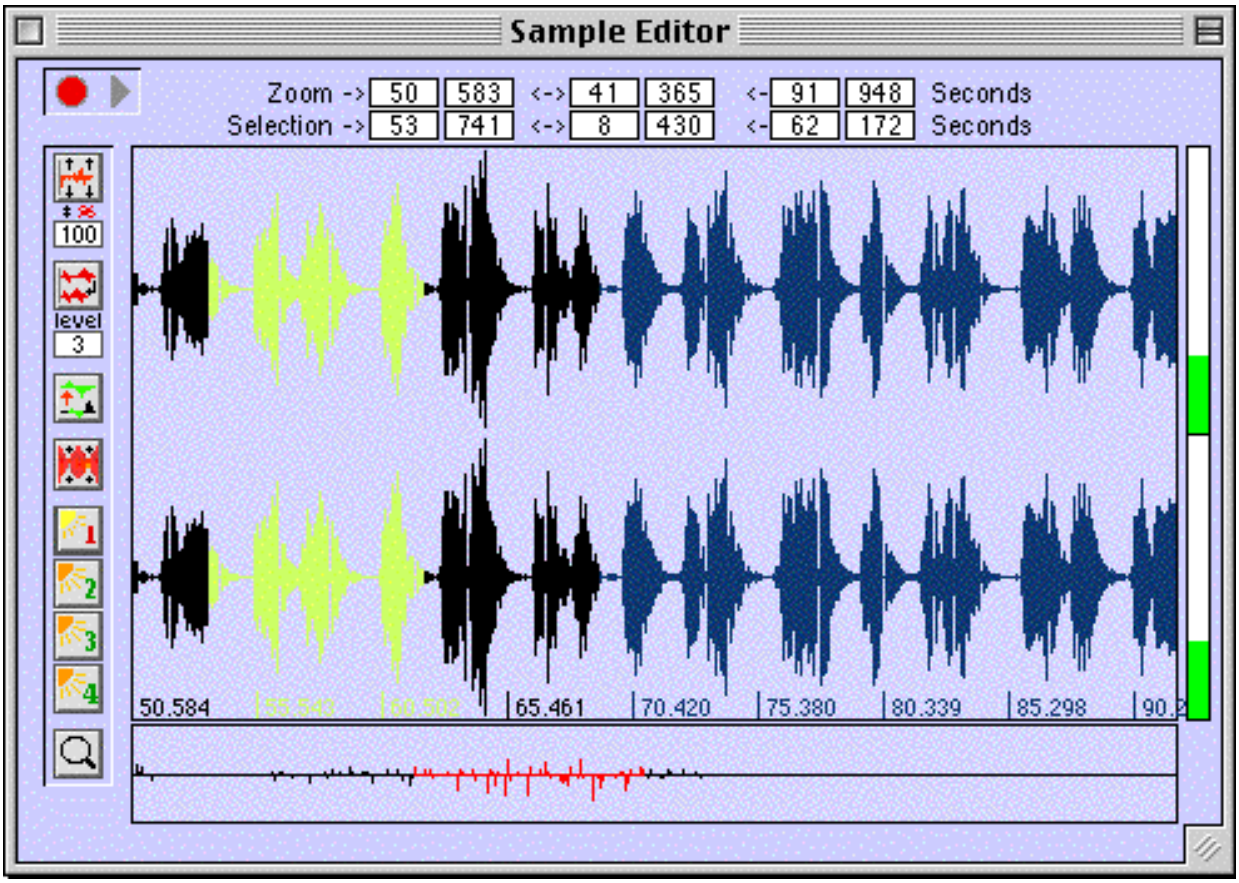
The Treatment pane contains parameters specific to the Zone's function, and the parameters available can change a great deal depending on the function of the Zone. It can contain such things as input and output levels, processing parameters such as distortion, or the name of a file to be loaded.

The Status Window



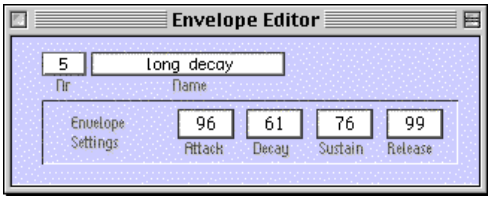
This is the main window for performance and real-time information. It is dominated by the Sample Buffer pane, which shows the sounds you are working with. It also shows current MIDI input, processor load, and other miscellaneous information.

The Sample Editor

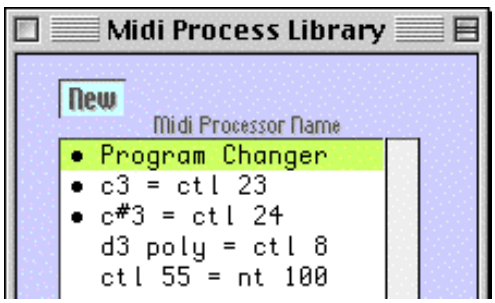


The Sample Editor window is where you can design your selection of samples for use in performance. Samples can be dragged to the Editor from the Sample Library, edited, and resaved to your hard drive as new samples.

Libraries and Editors



All of the data used in LiSa is stored in Libraries: Zones, Envelopes, Tables, Controllers, Patterns, MIDI Processes and Snapshots, and Samples. We have already encountered the Zone and Sample editors, and the others will be explained in future chapters. Double-clicking on an item in a Library will open up the associated editor, or you can open the editors from the **Windows** menu.



Setting up LiSa

Hardware

LiSa will run on all desktop and laptop Macintosh PowerPC computers that have a G3 or G4 processor. On older systems, LiSa may work very slowly or not at all. An external MIDI interface is also required for connection to your keyboard or other MIDI controller. This can be connected to the USB port, or, on older machines, either the modem or the printer port.

To take full advantage of LiSa, it is also necessary to have some kind of MIDI instrument. In this manual we will assume you have a velocity-sensitive keyboard with pitchbend, a modulation wheel, and aftertouch.

Memory

LiSa requires at least 16 MB of RAM to operate, so a total of at least 64 MB of RAM is recommended for your computer. The sounds used by LiSa are stored in RAM, so the more RAM you have available above and beyond that, the longer your Sample Buffer can be.

Recommended memory assignment (in the Information panel for LiSa) is 40875 kB. Memory you assign to LiSa's buffers will also be included in this number, so it needs to be fairly large. For every additional MB of RAM you assign to LiSa, you will increase your available buffer space by approximately 6 seconds. If you have assigned more memory to LiSa than your machine has available, you will probably get a dialog at startup indicating that OMS is not installed. This is because LiSa eats the memory that OMS would normally take, and once LiSa has opened, OMS can't find the memory it needs. If you get this warning and know you've installed OMS, quit LiSa. Select it in the finder, and choose **Get Info...** from the **Special** Menu in the Finder. From there, you can resize the memory to a lower value in the Information panel, and open it up again. If that does not help, open the Preferences folder in your computer's System folder and throw away the file 'LiSa Prefs'.

System settings and Audio Drivers

LiSa is compatible with Mac OS 8.1 to 9.2.2 for Power PC; however, make sure that Sound Manager version 3.3 or higher is installed regardless of your hardware or system version.

Check your 'Memory' control panel. Virtual memory should be off.

Audio Setup

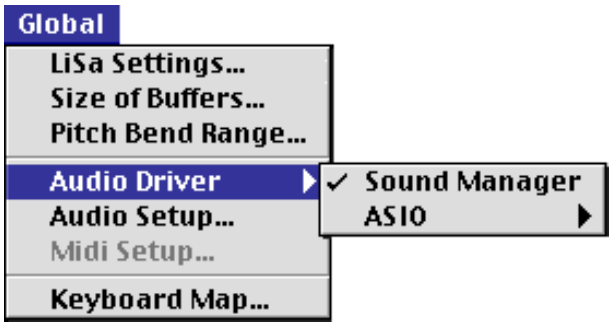
New In v. 2.5: LiSa now operates entirely in stereo.

Lisa has undergone two major transformations in its audio handling: It now operates entirely in stereo, both input and output, and it also supports third-party audio hardware which uses either ASIO or Sound Manager drivers. Setup for both systems is described below

Installing ASIO Drivers

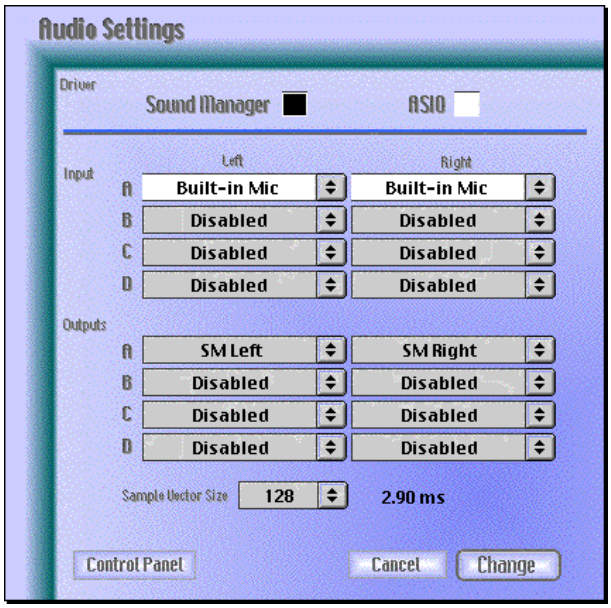
If you have an audio card that uses ASIO drivers, they must be installed in the LiSa folder in order for the program to use the card. All ASIO drivers for your hardware should be installed in a folder called 'ASIO Drivers' (without the quotes) in the same folder as the LiSa application.

Selecting your Audio Drivers



To select hardware for audio input and output, go to the new **Audio Driver...** item in the **Global** menu. If you are using either the hardware built in to your Mac, or have a third-party audio card that uses Sound Manager drivers, select Sound Manager. If you have installed ASIO drivers into your LiSa folder, a list of the available drivers will appear in a submenu under the ASIO settings. If for some reason LiSa is unable to open the ASIO driver, this setting will revert to Sound Manager.

Configuring Audio I/O



Once you have selected your audio drivers, you can configure them in the Audio Setup dialog (also found in the **Global** menu).

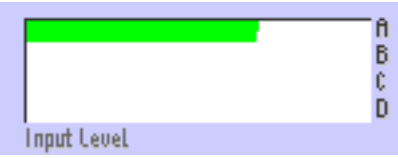
The **Driver** pane indicates which kind of drivers you are using. You cannot change your driver in this window – you must use the **Audio Driver** menu item shown above!

The **Input** and **Output** panes are where you assign specific physical inputs and outputs on your soundcard to channels in LiSa. If you have ASIO installed, each playback or record Zone can be assigned to a lettered left/right pair. For determining input and output assignments in Zones, see p. 69

Sample Vector Size: Expressed in samples, this parameter determines the number of samples processed in a single block by LiSa. This setting has a great deal of influence over the overall behavior of LiSa. For more detail on the relationship between sample vector size and Lisa's response, see Appendix A. If you are using an ASIO device, you cannot change the Sample Vector Size in LiSa. It must be done through the device's Control Panel, which you can open by clicking on the **Control Panel** button in this window.

Input

Whatever your sound source is, it is important to run your input through some kind of a preamp or mixer in order to be able to set your levels properly. You can set an overall level for recording input in the System Settings dialog, see p. 16.



When you have audio input, you should see some activity in the input level meter at the bottom center of the Status window, and on the far right side of the Sample Editor. (The Sample Editor only shows sound routed through input pair A) The recording input bar is split left/right for each lettered input pair. If you are using ASIO, each Record Zone can be set to record from a different lettered left/right pair, see p. 69. Set your mixer levels so that the input level meter is as high as possible without going into the red.

Output

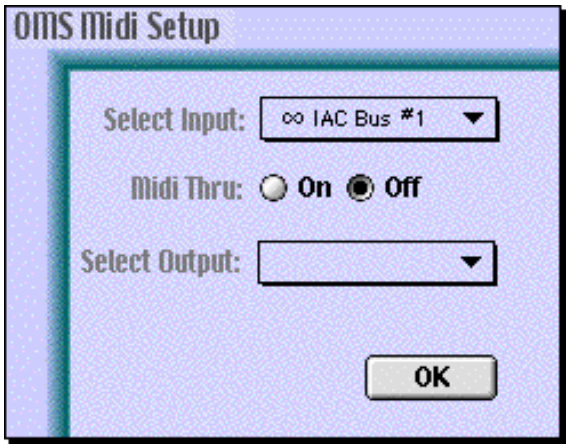
If you are using the Sound Manager and the hardware outputs on your computer, just take both of the outputs from your Mac and send them to a mixer. If you are using ASIO, plug in as many outputs as you are using into your mixer. For assigning playback Zones to specific output pairs, see p. 56

MIDI Setup

Connecting MIDI

LiSa needs MIDI input to take full advantage of its capabilities. (Some MIDI may also be generated from the computer keyboard and the mouse – see p. 101.) You will need a MIDI interface, and OMS, preferably at least version 2.2. Plug your interface into your computer's USB or serial port, and the MIDI out from your controller into the MIDI in plug of the interface.

Configuring MIDI



In order for your MIDI instrument to properly communicate with LiSa, you need to specify which ports are in use for MIDI. This is done in the **MIDI Setup...** dialog in the **Global** menu. There you can select both input and output devices from your OMS setup. Note that when Midi Thru is selected not only the external incoming MIDI is sent thru to the selected output but also the internally generated MIDI, such as Key Map note events and Mouse Control events.

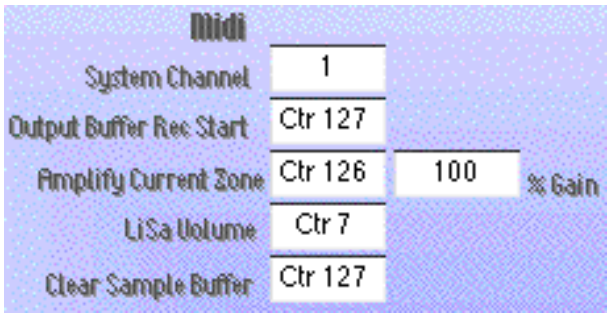
Preferences (the Global menu)

Preference settings for LiSa are found in the **Global** menu. They are stored in each individual Setup. This means that for each LiSa Setup you have, you can have completely different set of preferences. A new Setup will start with the preferences from the last Setup opened.

LiSa Settings

Global settings may be found in the **LiSa Settings...** item in the **Global** menu. It is divided into three sections:

MIDI Settings



In this section, you can set MIDI for commands to LiSa's system.

System Channel. This is the channel on which you make commands to LiSa's system, independent of Zone activation and other performance-related commands.

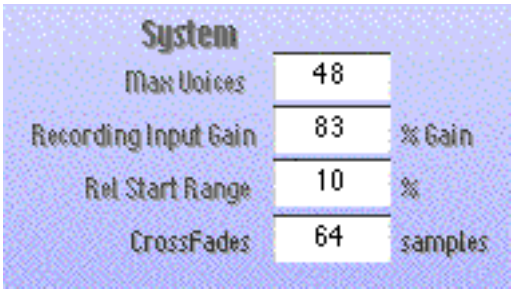
Output Buffer Rec. Start. Any value sent on the selected controller number on the System Channel will initiate Output Buffer recording. To find out what this means, see **Copying Buffers**, p. 81.

Amplify Current Zone. Any value sent on the selected controller number on the System Channel will amplify the Region of the currently active Zone by the value specified in the **%Gain** numerical. This is described further under the heading **Amplify Current Zone**, page 96.

LiSa Volume. This controller number on the system channel will control the overall volume of all of LiSa's output. Any other volume settings will be relative to the LiSa volume.

Clear Sample buffer. Any value sent on this controller number will clear all audio from the sample buffer.

System Settings



➢

Max Voices . LiSa will tend to demand as much of your computer's processor time as it needs to perform its assigned tasks. This can cause two problems:

- If you are attempting to run LiSa in tandem with other applications on your computer LiSa can easily freeze them out. (The Status Window provides you with a running display of how much of your computer's CPU time is being used by LiSa.)
- If you attempt to play more voices than your CPU is capable of generating, you can lose some audio, or even freeze the machine itself.

Earlier versions of LiSa expressed this as a percentage of total CPU load. As this could still lead to occasional freezes in certain situations, it has been replaced with maximum

number of voices

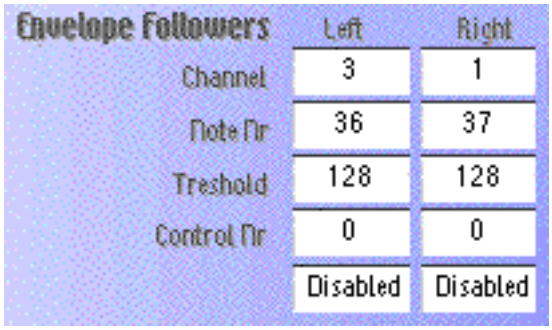
This numerical sets the maximum number of voices LiSa will play. If more Zones are activated than there are assigned voices, LiSa will automatically drop the oldest active voices in order to keep the total below the number set in **Max. Voices.** The best setting will depend on your machine and what kind of playback modes, filtering and playback quality you use in your Setup, as well as what other applications you may be running at the same time. The best way to find the optimal value is simply to experiment.

Recording Input Gain. Overall attenuation of your input signal to the Macintosh's analog/digital converters can also be set here. This numerical has a range of 50% - 150% of the original input level. Normally it should be set to 100%.

Rel. Start Range. This value determines the percentage of a Zone that is affected by the **Rel. Start** parameter. For a full explanation, see **Sample movement parameters** on p.89.

Crossfades. The number in this numerical sets the number of samples used in those crossfades in which you have real time control, such as Absolute start time. The smaller the crossfade, the clickier your transitions will be, but the less CPU time you will use. This value will also control the size of the crossfades used when loading, cutting or pasting, samples into the Sample Editor.

Envelope Followers



LiSa can translate its audio input into MIDI, which can be used as controls for Zone parameters. (See **Envelope Followers** on p. 96for more on this topic). The Envelope Followers track amplitude variations in the audio input. Note that the settings below can be separated for both left and right inputs.

EF Channel. The MIDI channel on which the Envelope Followers will send data.

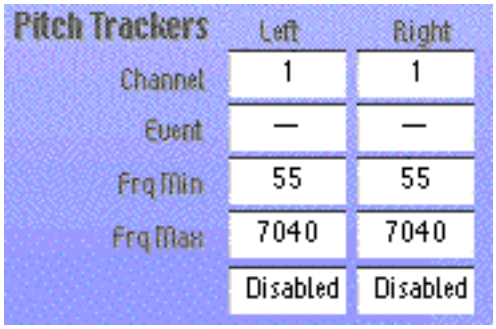
EF Note Number. The MIDI note number that will be activated when the Threshold is exceeded.

EF Threshold. The relative amplitude value at which a MIDI note on will be triggered.

EF Contr. Nr. The Controller number that will follow the amplitude envelope of the incoming signal.

Enable/Disable. This numerical controls the functionality of the Envelope Followers.

Pitch Trackers



LiSa can also detect input pitch, and translate it into MIDI events. For a further explanation of pitch trackers, see p. 97. Note that these are also separated into left and right inputs.

Channel. The MIDI channel on which Pitch Trackers send MIDI data.

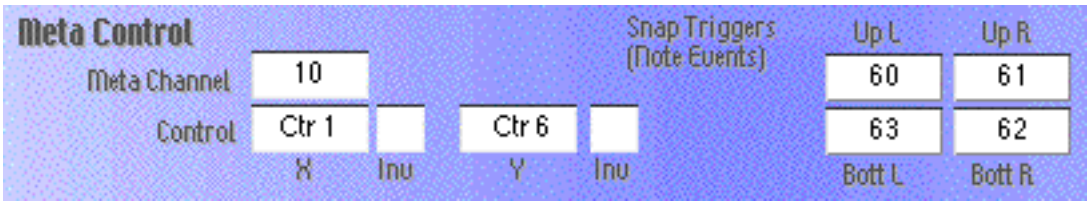
Event. Here you can choose what kind of MIDI event the Pitch Trackers will generate.

Frq. Min. The lowest frequency to which the Pitch Tracker will respond.

Enable/Disable. This numerical controls the functionality of the Pitch Trackers. Controller values are automatically scaled between the min and max values.

Meta Control

These parameters set the control input for LiSa's new Meta Controls, which give you control over many control parameters simultaneously. These setting will be confusing until you read the chapter on MIDI Snapshots on p. 104 for a full description.



➢

Meta Channel. Controllers or notes sent on this MIDI channel will affect the Meta Controllers.

Control X/Y. These two controllers will set the x and y axes of the Meta Controller.

Inv. If this box is checked, the control input will be inverted. An input of 0 will be read as 127, and vice versa.

Snap Triggers. If LiSa receives one of these 4 notes, it will 'snap' all Meta Controller settings to one of the four corner positions.

Size of Buffers

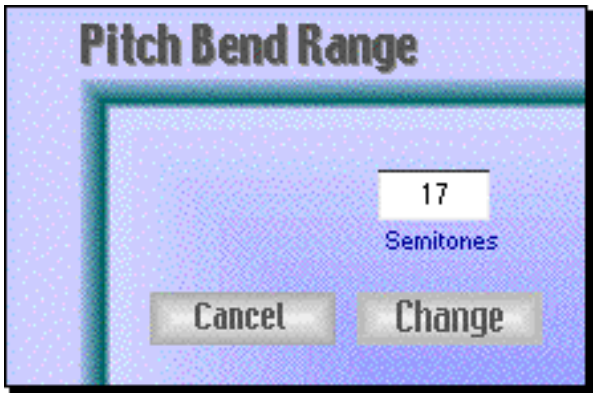
The Sample Buffer is the part of your computer's RAM that is assigned to storing the samples you play in LiSa. It can be as large as your computer's memory allows, but you must assign the memory space in the **Get Info...** dialog in the Finder. (see Memory on p. 13) There are actually 3 buffers in LiSa, and each of them can be set individually through the **Size of Buffers...** dialog in the Global menu. The size of these buffers can be set either in seconds or kilobytes of memory, depending on whether the **View Size in Samples** option is selected in the **Options** menu.

Sample. This is the buffer that actually holds the samples you work with, and is represented in the Status window. This is LiSa's main workspace, and the most important of the three buffers.

Output. The Output Buffer records whatever you have played most recently, including your silences. You can save this buffer to a soundfile in order to listen back to what you have just played, or for further processing later. It does not automatically record; it has to be activated via MIDI, or by hitting the 'S' key on your Mac's keyboard.

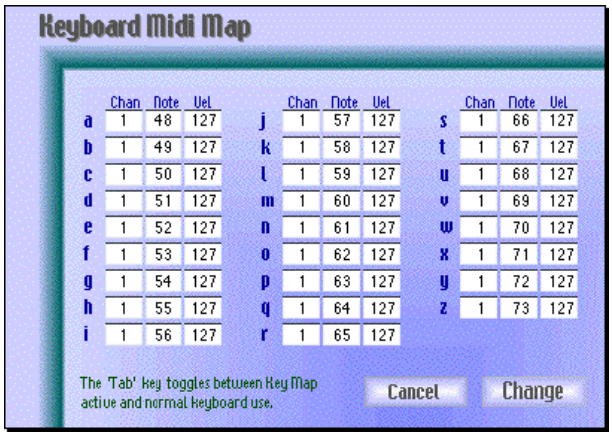
Process. The Process Buffer holds the last piece of sound you produced. If you play for a minute, and then don't play for ten, that minute (or however long, depending on your buffer size) will still be in the buffer. This buffer is specifically designed for resampling something you have already played in a live situation (for more on these two buffers and their functions, see Copying Buffers on p. 81). It's best to think of the Output Buffer for saving or editing sounds at a later time, and the Process Buffer as a tool for live performance.

Pitch Bend Range



In this dialog, you can set the pitch bend range for your Setup.

Keyboard Map



If you want to use your Mac's keyboard to send MIDI note events to Lisa, here is where you can decide which keys activate which notes. See Controlling LiSa from the Computer on p. 101 for more on how to use this feature.

Importing older LiSa files

LiSa 2.5 uses a different file format from earlier versions, and Setups created in earlier versions need to be converted for them to work properly. Due to the nature of many of the changes, not all of your old settings will be converted properly.

To import a Setup from an earlier version, simply open it up in LiSa 2.5. You will see a dialog asking if you want to convert the old Setup to v. 2.5. The setup will be opened, with the parameters adjusted as well as possible to the new version. You will probably get some memory warnings. Since LiSa is now stereo, it uses twice as much memory per second of samples in the buffer. The parameters you will have to pay the most attention to will be your modulator speeds and envelope timings, as the new floating-point timings and variable sample vector size may change these parameters considerably.

The most significant change is the disappearance of Autopan Zones. These will be saved as ordinary Play Forward Zones. To get their behavior to imitate the old functionality, use a modulator controlling the Pan parameter, and have the MIDI note number controlling the speed of the modulator.

Once you have adjusted your converted Setup, selecting **Save...** will bring up a **Save As** dialog box, so

you can save your converted Setup with a new name. This will keep you from overwriting your older version.

Zones

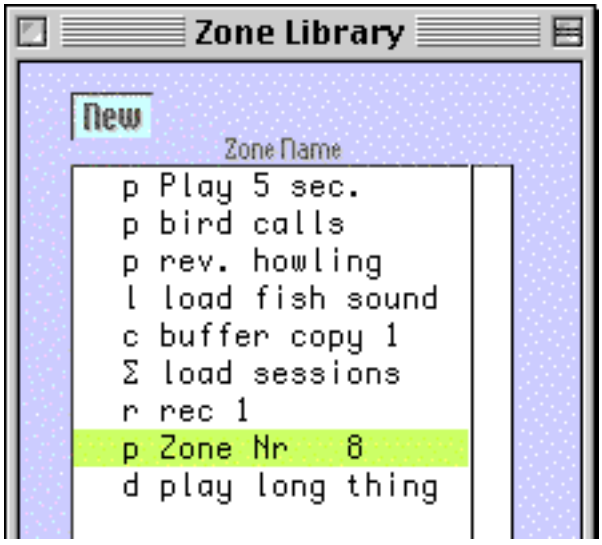
Zones are the primary link between the performer and the sound material. All actions in LiSa are initiated through Zones. They define all the methods and details for user interaction. It is important to familiarize yourself with some basic ideas about Zones and procedures for editing them, or you will quickly get lost further on.

Structure of a Zone

A Zone can be thought of as the link between the keyboard (or other MIDI input) and the Sample Buffer. Playing notes on the keyboard can initiate all the basic activities of recording and playback, loading and saving soundfiles, and most other real-time actions LiSa performs. There are 3 basic elements to a Zone:

- **Keyrange, or range**. This is the key or keys that activate the Zone, i.e., tell it when to start or stop. Zones may respond to any MIDI note in the range 0 - 120 (c-3 to c10), on all 16 MIDI channels. Any one Zone can be activated by any number of keyranges on different MIDI channels.
- **Function**. A function is what the Zone actually does -- record a sample, play it back, or load or save from disk. Each function has further sets of options called *modes*.
- **Sample Region**, or region. This is the segment of the Sample Buffer on which the Zone operates. It can be any size within the limits of the buffer, and can be resized and moved via MIDI.

Zones, like all other data in LiSa, exist independently of any individual Setup, and are saved in Library files. Different Setups can use the same Zones by using the same Zone Library. When you save a new Setup, the Library will automatically be named with the Setup, but it is now a separate file, and can be loaded into any Setup you wish. For more on loading and saving Libraries, see **Libraries**, page 33.



Each Zone listed in the Zone Library has a one-letter prefix indicating its type: ***p****: Play*

All the Zones for a Setup are stored in one Library. Each Library can hold a maximum of 2048 Zones. Double-clicking on a Zone in the Library makes it appear in the Zone Editor window. Zones can be cut, copied, pasted or duplicated in the Zone Library. If you want to make a duplicate of a Zone (for example to create a Zone that is a slight variation of another Zone) you can select a Zone in the Library, and select **Duplicate** from the **Edit** menu, or press Cmd-D. A new Zone will appear with the old Zone's name plus a star (*). If a Zone is assigned to a key somewhere in your Setup, a bullet will appear in front of the Zone's name in the Library window, so you can immediately see which Zones in the Library are in use. The bullet marks will only be updated when you store the current Preset.

***r**: Record*
***l**: Static Load*
***d**: Dynamic Load*
***c**: Copy Buffer*

Creating a Zone

All Zones are created in the same way, regardless of their function. In the upper-right-hand corner of the Zone Library window is a button marked **New**. Click on this button, and a new Zone will appear listed in the Library. It will also appear in the Zone Editor with some sexy name like 'Zone Nr 13.' All Zones begin life as Playback Zones, and it is in the Zone Editor that you can change its function, set its parameters, and rename it.

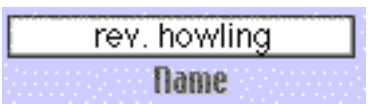
The Zone Editor

The illustration above shows the Zone Editor, as it appears when a Fresh Zone is created. This is the window for a Playback Zone. Both the function icon and the title below it display the Zone's function. If you change the function of a Zone, changes will appear in the window layout. These will be discussed in greater detail in their respective sections.

The Zone information Pane

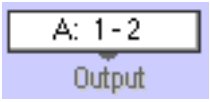
The top pane of the window contains the most basic information about the Zone:

Number. This numerical shows the catalog number of the Zone. Zones are numbered sequentially in the order of their creation. This number is LiSa's internal reference to the Zone, and cannot be changed. In order to edit a Zone, you may use the Zone Number numerical to select the Zone of your choice, or double-click on the Zone's name in the Zone Library. When the Zone editor is topmost, you can cycle through available Zones in the Zone editor by using the left and right arrow keys.



Name. In this box (which is not a numerical) you can rename the Zone. Clicking in it once selects the whole box, and you type the name in. Zone names may be up to 15 characters long. To move the cursor in the **Name** box hold the mouse button down for a second when you click in it, and the cursor

will appear. You can then move it around with the arrow keys. Hitting Enter will make the new name appear in the Zone Library.



Output. This numerical is only visible when you have a soundcard with multiple outputs in your computer, and have installed the appropriate ASIO drivers. Here is where you choose which lettered stereo pair the Zone will send its output to. For configuring output, see p. 14.

Function Button. This button, just left of the name, above the label Play in the picture above, determines the function of the Zone. Clicking on this button brings up a popup menu, from which you can select a function. Once this is selected, the name of the function will appear below the icon, and the window will be reconfigured for that particular type of Zone.

Mode Buttons. The buttons to the right of the Function button vary in number depending on the Zone's function, and control various parameters relating to the Zone -- we'll look at these in more detail in the chapters on the specific Zone functions.

The Region Pane

In this section, the bottom left part of the editor, the sample region, movement range, and tuning for the Zone are set. See **Defining Sample Regions**, page 26 for more details.

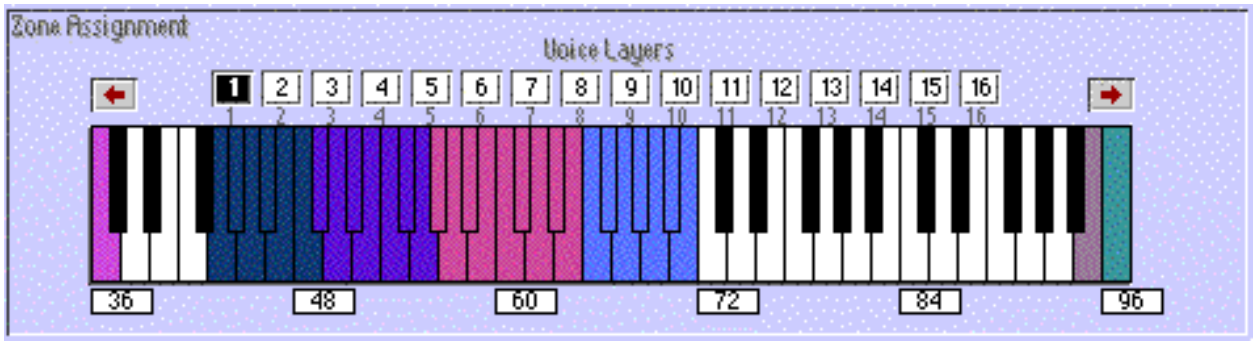
The Function Pane

This pane contains information specific to the function of the Zone being edited, and varies the most from one function and mode to another. As this image is taken from a Playback Zone, it is in here called the Play Treatment pane.

Setting Keyranges

To assign Zones to MIDI note events, you need to open the Assignment window from the **Windows** menu. This window has the current Setup's name as the window title, so initially its title will be 'Untitled Setup'.

The Assignment window is divided into three parts. Here we will be primarily discussing its relationship to creating and applying Zones. For its other functions, see the chapters Presets, Setups, and Libraries on p. 29, and Parameter Control on p. 84.



The Zone Assignment pane of the Assignment window has two parts to it, a row of buttons (actually popup menus) labeled **Voice Layers**, and a representation of a keyboard. The Voice Layer buttons indicate which Voice Layer is currently being shown in the keyboard below. Each Voice Layer responds to a particular MIDI channel. (For a full explanation of Voice Layers and MIDI channels, see the chapter on Parameter Control. In a new Setup each of the 16 Voice Layers is assigned to MIDI channels 1-16.

Keep in mind that the keyrange of your Zone indicates your access to it only, and is in no way connected to how much of the buffer it reads. Keyrange assignments & sample region assignments are wholly unrelated

The keyboard itself represents MIDI note on events, from 0 to 120. The numbers below the keyboard indicate the MIDI note numbers of the keys. As most keyboards cover the range of MIDI notes from 36 to 96 (c1-c6), that is the default for the visible range. You can see lower or higher notes on the keyboard by clicking on the arrow

Keep in mind that the keyrange of your Zone indicates your access to it only, and is in no way

buttons above the keyboard on the right- and left-hand sides, which will move the visible section of the keyboard an octave at a time. It is on the keyboard that you assign Zones to virtual keys. This determines which MIDI note on events will activate which Zones. A Zone can occupy as much or as little of the keyboard as you like, although it is usually unnecessary for Record or Load Zones to occupy more than one key. The one exception to this is Load Session Zones p. 79.

Deleting a keyrange

To remove a keyrange entirely from the virtual keyboard, click-drag an unassigned (uncolored) key over the keyrange. Assigning a new Zone to the lowest key of a keyrange will also delete that entire range from the keyboard. If the keyrange is trapped between two other ranges you don't want to change, you can clear an individual key by Cmd-clicking on any key in the unwanted Zone. From there you can drag the unassigned keys over the rest of the unwanted Zone.

Finding Zones

Once you have created a large number of Zones in a Setup, it's not hard to lose track of them. To find out if a Zone is used in your Setup, check in the Zone Library window. If there is a bullet in front of its name, it is in use in the Setup. (These will only be updated when the Preset is stored).

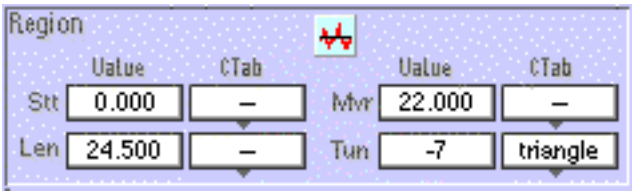
Warning: When Finding a Zone, LiSa will load the entire Preset, including a new sample into the buffer if there is one, so make sure you've saved all changes to the Preset you're working on before you Find a Zone.

To find out where a Zone is in your Setup, select the Zone you are looking for in the Zone Library, and choose **Find Selected Zone** from the **Edit** menu, or press Cmd-F. LiSa will then locate the Zone, load the Preset that it is in, and flash the lowest key of the Zone in the virtual keyboard. If it is loaded into more than one place, **Find Zone Again** (Cmd-G) will locate its next appearance.

Defining Sample Regions

There are two ways to define a sample region: either using the numericals in the Region pane of the Zone Editor, or by directly applying values from the Sample Editor. The sample region you define will be visible in the Sample Buffer pane as a segment the same color as the keyrange in the Assignment window.

Sizing regions from the Zone Editor



The Region pane of the Zone Editor, regardless of the function of the region, will always contain the two numericals below:

Stt. Start of region. This sets how far into the buffer the Zone begins.

Len. Length. This determines the length of the region, how broad an area within the buffer the Zone uses when activated.

To the right of each of these numericals is a box labeled CTab. These are part of the Parameter Control implementation, and will be described in full in Mapping MIDI Controllers – CTabs on p. 93.

Sizing Regions from the Sample Editor

Instead of defining the start and length of your Zone's view by changing the **Stt** and **Len** numericals, you can also do it directly in the buffer, by selecting parts of the buffer and then applying them to the Zone currently being edited. These operations are performed in the Sample Editor window.

To apply a selection in the Sample Editor to the current Zone:

Click-drag through the portion of the buffer you wish to select. The start and length values will appear in the numericals labeled section at the top of the window, and the selected region will be highlighted. Select **Enter Selection in Zone** from the **Edit** menu, or press Cmd-E. The selected region will then become the Zone's sample region.

Select the portion of the Sample Buffer you wish to use, and drag it to the Sample Editor window. The Zone currently visible in the editor will resize appropriately**.**

You can nudge the start point and length of the region by holding down the Option key and pressing the arrow keys on your computer keyboard. It nudges in increments of 1 kB of samples.

The key commands will only change the region size if there is no selected area in the sample editor. If part of the sample editor is highlighted, then they will change the size of the selected area, not the region.

- Option-Arrow left will move the start point earlier in the Sample Buffer (i.e., to the left).
- Option-Arrow right will move the start point later in the buffer (to the right).
- Option-Arrow up will increase the length of the region.
- Option-Arrow down will decrease the length of the region.

Zone Functions

Each Zone has a function, which can be can be changed using the Function button in the Zone Editor window, the first of the row of icons in the top-right of the Zone Editor. Here the general function options of Zones are described. Specific modes for each of these functions are discussed in the following chapters.

Playback. Activating a Playback Zone will play back all or some part of the Sample Buffer. Each Playback Zone can be individually tuned as far as which area of the buffer it will play, and how it will play it.

Record. Activating this Zone will cause some part of the Sample Buffer to be overwritten with new sounds from a live source, and optionally saved to disk**.**

Load Sample. Static and Dynamic Load Sample Zones load soundfiles from disk into the Sample Buffer, which can then be used by Playback Zones.

Copy Buffer. This Zone resamples your own output from LiSa after it has gone through some kind of transformation, and puts it back into the Sample Buffer to be played again.

Load Session. A Load Session Zone is a special bank of Load Sample Zones, designed especially for retrieving live recorded samples created during a performance.

All Zones have certain parameters in common, and others that are unique to their function. These parameters are initially defined when the Zone is created in the Zone Editor. Most of them are also controllable in real time via MIDI or internal modulators. Connections between MIDI control and Zone parameters are made in the Assignment window, described in Parameter Control, p. 84.

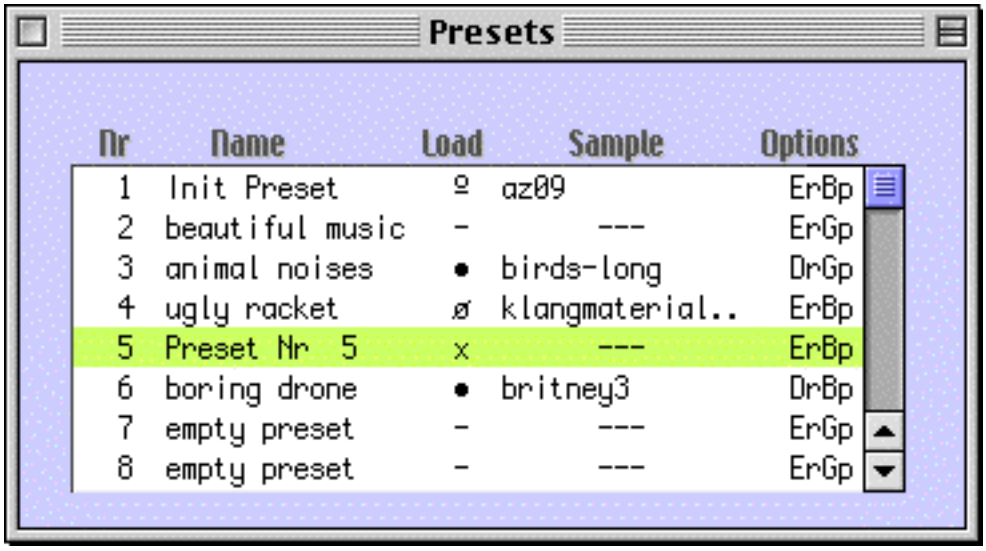
Presets, Setups, and Libraries

Above Zones in LiSa's overall architecture are Presets and Setups. The file you load when you start up the program is called a Setup. Every Setup is comprised of up to 128 Presets, which you can switch between in performance using MIDI Program Change messages. A Preset is what you are actually working with at any one time when programming or performing with LiSa.

Presets

A Preset is the basic performance unit of LiSa. When performing or editing, you work with only one Preset at a time. A Preset is comprised of two parts: Up to 1920 Zones, organized into a maximum of 16 Voice Layers (see p. 85), and an optional sample to be loaded into the Sample Buffer with the Preset. You access Presets through the Preset Window, where you can also set parameters for initial sample loading and playback quality.

The Preset Window



The Preset window is where you can find basic information about the Presets in your Setup. It resembles, but is not identical to, the Library windows we have encountered so far. It is available in the **Windows** menu, or by pressing Cmd-Opt-1.

Note that unlike Libraries, there is no particular need to create Presets in numerical order. Since Presets are accessed via MIDI program change messages in performance, you can 'fill' any empty Preset you wish to match any program change numbers you choose

Unlike Library windows, there are already 128 Presets in the Preset window. A new Setup will have one Preset already made, called **Init Preset**. The other Presets, although visible, are empty, and have not yet been initialized.

Creating and Copying Presets

To create a new Preset:

- **Double-click** on an empty Preset in the Preset window. You will get a dialog asking you if you want to create a new Preset. Clicking 'OK' will automatically create and load it.
- **Select** an empty Preset and then select **Load Preset** in the **Presets** menu. The same dialog box will appear.

To copy a Preset:

- **Select Store Current Preset As....** From the **Preset** menu. You will then be given the option of which position you want to store the copied Preset into.

Once the new Preset is created, you can rename it in the Assignment window. This new name will not be reflected in the Preset window until you store the Preset using either the menu item **Store Current Preset** or **Store Current Preset As...** Using the former will store it in its current position, and the latter will allow you to set its number, and thus the number of the Program Change message that will load it.

Deleting and Clearing Presets

An 'Empty Preset' as seen in the Preset window takes up no space on your hard disk. If you decide you don't need a Preset or want to start from scratch, there are two menu options available, both in the **Preset** menu:

***Presets and Memory**: It is important to note that every time you create a new Preset, your Setup file will increase in size by 34 Kbytes, even if there is nothing in it. A Setup containing the maximum possible number of Presets will thus be almost 4 MB. Thus it is advisable to use the minimum possible number of Presets, and to make sure that any created Presets are actually being used.*

Clear Current Preset. Whatever Preset is currently visible in the Assignment window will be cleared. All Zones will be removed, and all MIDI connections broken. Libraries will be left untouched -- any Zones, Envelopes or Patterns you have created, even if they're not used anywhere else, will not be deleted. Memory allocation will not change, and the 34K of memory the Preset occupies will still be occupied.

Delete Selected Preset. Selecting this item will completely delete the Preset selected in the Preset window. Libraries will still remain, but the memory the selected Preset occupies will be cleared. It is not possible to delete the currently active Preset. To delete a Preset, you must select another one and then delete the unwanted Preset.

Viewing and Editing Presets

To load a Preset into the Assignment window:

Click on the Preset Number numerical at the top of the Assignment window. This works identically to the Zone Number numerical in the Zone editor. You can scroll to or type in the number of the desired Preset.

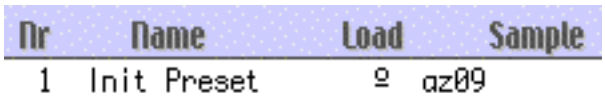
When the Preset number appears in Bold in the Assignment window, that means it has unstored changes.

Press the up or down arrow keys. (This will scroll between created Presets only.). The up arrow key will give you the next higher numbered Preset, and the down arrow key the next lower one. The selected Preset will change only in the Assignment window -- you will not see the selected Preset change in the Preset Window. For this to work, the Preset window must be topmost.

Click on a Preset in the Preset window, and select **Load Selected Preset** from the Preset menu. Double-clicking on the Preset will do the same thing.

Preset Options

Loading samples with a Preset



When you load a new Preset, you have the option to load a sample with it. To choose a sample from disk to load, select the sample from the Sample Library and drag it to the **Sample** column of the selected Preset in the Preset window. The selected sample will always load from the beginning of the Sample Buffer.

There are five loading options for Preset Images; each represented by a different symbol in the **Load** column in the Preset window. Clicking on one of these will bring up a pop-up menu with the options below. In all of them except **Clear Buffer**, the effected area is limited to the region of the buffer into which the new sample is loaded.

-- **No Load**. No sample will be loaded.

• **Replace**. In this mode, the new sample will completely replace whatever was in the region. Parts of the Sample Buffer beyond the original sample will remain untouched.

Ø **Insert**. Any silences currently in the effected region will be filled with sound from the loaded sample. The new sample is layered directly on top of the old buffer. For example, if samples 500-800 of the buffer are empty when a sample in this Mode is loaded, samples 500-800 of the new sample will go into the empty space. If some or all of the new sample is silence, that will be loaded as well.

o **Mask**. This is the inverse of Insert. The entire new sample will be loaded, but any silences that may be in the new sample will not erase what was already in the buffer. New samples will replace old samples, but silences will leave old samples untouched.

X **Clear buffer**. All samples in the entire Sample Buffer will be cleared.

Playback Quality

To the far right of the Preset window is the Preset Options column. This will affect the quality of playback of the Preset. It is possible to select between two different sample rates for playback, Good and Best. Presets assigned to Good will play back their samples at a rate of 22.05 kHz, and Best at 44.1 kHz.

It is also possible to enable or disable sample recording. When sample recording is disabled, more voices will be available, especially on slower machines. If a Preset is record-disabled, the Record indicator in the Status window will have red cross-hatching in it.

If you are using an ASIO audio device with LiSa, the good playback option will not be available, and all samples will be played back

at 44.1 kHz

Clicking on the four-letter code of a Preset will reveal a popup menu with 4 options:

ErGp Enabled Record, Good Playback

ErBp Enabled Record, Best Playback

DrGp Disabled Record, Good Playback

DrBp Disabled Record, Best Playback

Changing Presets via MIDI

Changing your current Preset via MIDI (since it is primarily designed for performance) will not give you the option of storing any changes in your Preset. When editing, it is thus advisable to switch Presets from the user interface.

To change a Preset via MIDI, you must send LiSa a Program Change message on the channel you have selected as LiSa's System Channel in the System Settings Dialog (see p.16). The program change number +1 will be the Preset you call up (pgc 0 = Preset 1, etc.).

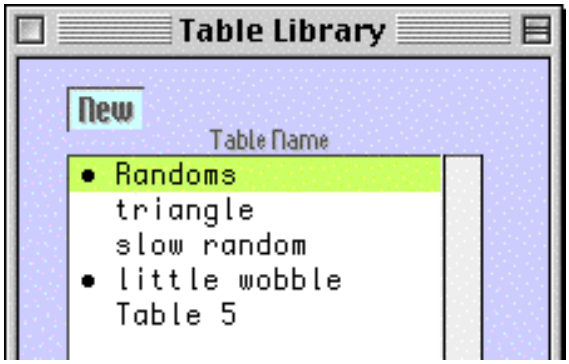
Stop Notes on Preset Change Option: When this is checked (in the **Options** menu), all currently active notes will be silenced, and all Control values that you have changed while using the Preset will be set back to their original values. If it is not selected, all active Zones will remain active until turned off, and returning to that Preset, you will find all of the controllers in their last position before you changed Presets. If you are switching between Good and Best playback quality, all notes will always be stopped.

Setups

A Setup is the actual file you save when you select **Save** in the File menu, and is the file you load or open from the **New Setup...** or **Open Setup...** File menu items. It is comprised of:

- All the Presets you have written for that Setup.
- The preferences you have set in the **Global** menu. Each Setup can have its own System Settings, buffer sizes, and pitch bend range.
- Audio hardware settings and input/output routings
- OMS Settings and routing.
- All selected Options in the **Options** menu, except for **Show Current Sample Pointer**, which always reverts to on.
- Pointers to Libraries. All data structures such as Zones and Tables, which are stored in Libraries, are stored in separate files, and the Setup remembers which Libraries to open up with the Setup.

Libraries



All data structures in LiSa are created and stored in a Library. Nine Libraries contain all of the data structures used in LiSa: Zones, Patterns, Envelopes, Tables, Controllers, Samples, MIDI Processors, MIDI Snapshots, and Parameters. These are separate files from your Setup file -- any number of Setups can share Libraries. When you save your setup for the first time, LiSa will create a folder called 'Libraries' in the same folder as your new Setup file. All new libraries are saved into that file. They are automatically named with the name of your Setup plus the type of Library. (For example, if your Setup is called Foo, upon saving it LiSa will create Library files named 'Foo Envelopes', 'Foo Controllers', etc.)

Once created, Libraries may be saved in any location on your hard drive – they need not be in the same folder as their original Setup. LiSa will remember their access path as long as they remain on the volume on which they were created. All standard Macintosh edit functions work in Libraries – Items in Libraries can be duplicated, cleared, etc. via the **Edit** menu. Some Libraries exhibit slightly differing behaviors, which are mentioned in their specific sections. The explanations below apply to all Libraries, whatever their type. The one exception is the Parameter Library, which is not changeable, and simply provides a list of the control parameters available. For use of the Parameter Library, see Parameters and Controllers on p. 86.

Library Functions

- Creating new data structures. All Zones, Controllers, etc. are created by using the **New** button in the library window of that type. Some of these structures may also be created in other ways as well, but they can all be created from Libraries.
- Managing data so it can be used by multiple Setups. As mentioned above, multiple Setups may share Libraries.
- Reference for what structures have been created, and whether they are used in a Setup. (The exception to this is the Parameter Library, which indicates the used Parameters in each Voice Layer, not Setup.)
- Drag-and-drop of data into a Preset. An item from any Library can be dragged to an appropriate numerical or menu item. For example, any table may be dragged to a CTab numerical in a Zone Editor Window, and samples in the Sample Library may be dragged directly into the Sample Buffer or the Sample Editor.

Loading Libraries

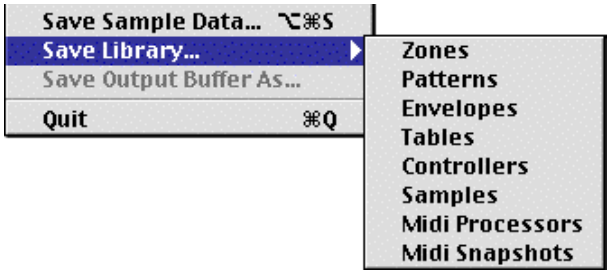
When loading a set of old Libraries into a new Setup, it is best to load the Zone Library last. If the Zones have pointers to patterns or envelopes in a Library that isn't loaded yet, those pointers will be lost.

To load an existing Library into an open Setup, select **Load Library...** from the **File** menu. This will bring up the standard Open File dialog box. Once you have selected a file to load, you will be presented with a dialog box asking if you want to replace the current Library, or append the Library you are loading to it. Selecting **Append** will add the Tables, Envelopes, or whatever, to the end of the current Library of that type.

Selecting **Replace** will delete whatever was in there previously. When you select Append, the current Library will keep its original name. Selecting Replace loads in the new Library, name and all, into your

Preset. All of these operations can be performed while the Library windows are open or closed. If you Load items into a closed Library you will see the results when you open it.

Saving Libraries



You can save a Library independent of the Setup at any time by selecting **Save Library** from the **File** menu. This has a submenu where you can select the library you wish to save.

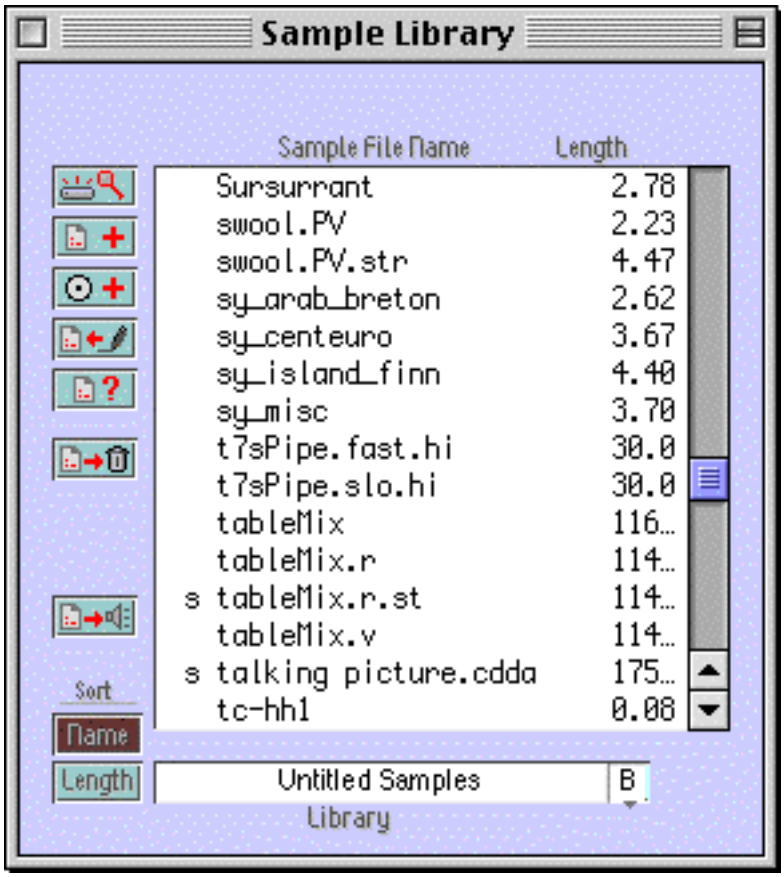
Sound Management

This chapter describes how to handle samples that are already on disk, in LiSa's buffers, or samples that you are recording while editing a Preset rather than performing. For information about how to record samples in performance, see the chapter Recording a Sample on p. 68.

New in v. 2.5: All Stereo!

LiSa is now 100% stereo. This means it can record, manipulate, and play interleaved stereo soundfiles, in either sd2 or aiff format. If you use a mono soundfile in LiSa, it will appear as a stereo sample in the Status Window and the Sample Editor, but the sample itself will remain untouched.

The Sample Library



The Sample Library does not actually contain any samples. Rather, it is a list of pointers to a set of the soundfiles on your hard drive. These samples do not need to be in any particular location on your drive, or even on the same volume. Once in a Library, as long as the sample remains on the same volume, LiSa will be able to find it.

Architecture of the Sample Library

A Sample Library can hold up to 2048 soundfiles, in AIFF or Sound Designer II format. In addition, .wav files can be converted by LiSa, see Building a Sample Library, p. 36 A library is divided into four Batches of 512 samples each, named A through D. A particular sample is not permanently assigned to a particular Batch – it will depend on the number of samples in the Library, and whether the samples are being sorted by name or size. For example, if you have 1000 samples in your Library, and they are sorted by size, the shortest 512 will be in batch A, and the remainder in batch B. If sorted by name, the ones closer to the beginning of the alphabet will be in Batch A, and the later ones in Batch B. You can switch between batches by using the lettered menu to the right of the Sample Name pane.

Building a Sample Library

There are five ways to add samples to a Sample Library:

Click on the Add button. It will bring up a dialog from which you can add soundfiles to the Library. You can select multiple items in the open dialog by shift-clicking.

Click on the Scan button. If you have multiple drives on your system, it will present a popup menu from which you can choose a drive. Once the drive is selected, LiSa will scan the drive for all readable soundfiles and add them to the Library. The number of samples found can be seen in the System Messages pane of the Status window. Aliases on a drive will be resolved.

Click on the Import button to convert CD tracks or .wav files. If you add a .wav file or a CD track, it will be automatically converted to AIFF. You will be prompted to name the converted soundfile and choose a location to save it to. All imported files will be saved as 44.1 kHz, stereo AIFF. If QuickTime is not available, this item will be dimmed.

Drag selections from the Sample Editor over to the Sample Library, which will automatically save them to disk. You will be prompted to name the new soundfile and choose a location to save it to.

Drag AIFF or SDII files from the finder directly to the sample library. If they are valid soundfiles, LiSa will add them. The **Add** button will be highlighted as you drag to indicate that it s valid file.

Working with the Sample Library

The Sample Library has seen extensive renovations in version 2.5. All sample file actions are now handled in the Sample Library window. The Load Sample and Import menu items have been removed, and are now replaced by functions available directly in the sample window. In addition, the Sample Library has many closely integrated features with the Sample Editor, (p. 40), the Zone Editor, (p. 23), and the Preset Window (p. 29).

Display

The Sample Pane shows the filenames of the samples in the Library, and its length in seconds. Once there are samples in the Library, the list can be sorted either alphabetically or by length, depending which option is selected in the lower left corner. A sample used in a Preset, either in the currently active Zone Library, or as a Preset Sample Load, will have a bullet next to its name. The '∞' character to the left of the sample name indicates stereo soundfiles.

Navigating the Sample Pane

You can now navigate around in the Library by typing the initial letter of a sample you are looking for, but please note that this feature only works within the currently visible Batch. In addition, the up/down arrow keys will move your selection in the indicated direction.

Multiple soundfiles can be selected in the Library and removed from it (but not from your hard drive) using the delete key or by selecting the **Clear** item in the edit menu. Please note that if you use the Select All menu item to clear samples, you will only be clearing the currently visible samples in the pane.

Other commands are:

Rename. Clicking on this will bring up a dialog in which you can rename the sample. This is identical to changing the name in the Finder.

Location. Clicking on this button will present a box showing the filepath of the selected sample. The box will remain visible only as long as the mouse button is held down.

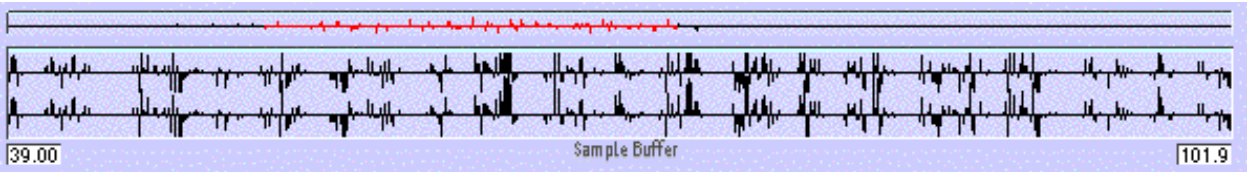
Trash. Puts the selected soundfile in the Trash. It is not an immediate delete – the Trash must be emptied for the soundfile to be permanently thrown out.

Play. Activating this button will play the selected soundfile. Clicking it again will stop playing. Double-clicking on any sample name, or pressing the spacebar when the Sample Library is the topmost window will also play the sample.

Sort. Soundfiles can be sorted by name or size. Clicking on the appropriate button will reorder the files in your Library.

Clear. (From Edit menu). Selected samples will be cleared from the Library, but remain untouched on your hard drive. The Sample Library must be the topmost window for this command to work. Please note that the **Select All** option will only select samples currently visible in the Library window.

The Sample Buffer



To zoom your view of the sample Buffer in the Status window, highlight part of the zoom pane directly above the Sample Buffer window. The part appearing in red is the section of the buffer represented in the Sample Buffer Window.

The Sample Buffer is the section of RAM allotted to LiSa in which playable sounds actually live. (For the basics of this, see **Sound in the Computer**, page 9). When editing a Setup, there are two access points into the Sample Buffer: the Sample Buffer pane of the Status window, and the Sample Editor. Most of the drag-and-drop functionality of the Sample Editor is duplicated in the Sample Buffer pane, but actual editing and processing of samples must be done in the Sample Editor. In general, it is best to do most of your sample organization there.

Loading Samples into the Sample Buffer

There are several ways of loading samples into the Sample Buffer. All of these methods are pastes, not inserts, and will overwrite any previously loaded samples in the chosen location:

Cmd-L. When the Sample Library is the active window, typing this will load the highlighted soundfile in the Sample Pane into the beginning of the Sample Buffer.

Dragging a sample name from the Sample Library to other windows will also load samples into the buffer, in several different ways:

To a Playback Zone in the Zone Editor: As much of the sample as will fit into the Zone's region will be loaded, wherever it is in the buffer.

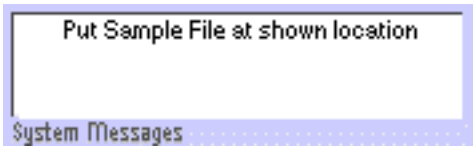
To the virtual keyboard: The sample will be loaded into the buffer immediately to the right of the rightmost loaded sample, or at the beginning of the buffer if empty. In addition, a new Playback Zone, with the same name as the sample, will automatically be created.

When dragged to either the Sample Buffer pane of the Status window, or into the Sample Editor, modifier keys control the exact way you can locate the sample:

With no modifiers, the sample will automatically start from the beginning of the buffer.

Option-drag will automatically place the sample after the last sample in the buffer.

Ctl+Option-drag allows you to place the sample in a specific location in the buffer. Once you drag the sample over the Sample Buffer pane, a number box will appear which will show you the exact location of the sample in the buffer. In the Sample Editor, the exact location of the sample start point is shown in the **Loc** Numericals located at the top of the window.



When dragging samples to the buffer, a message will appear in the System Messages pane of the Status window to remind you of your current dragging mode.

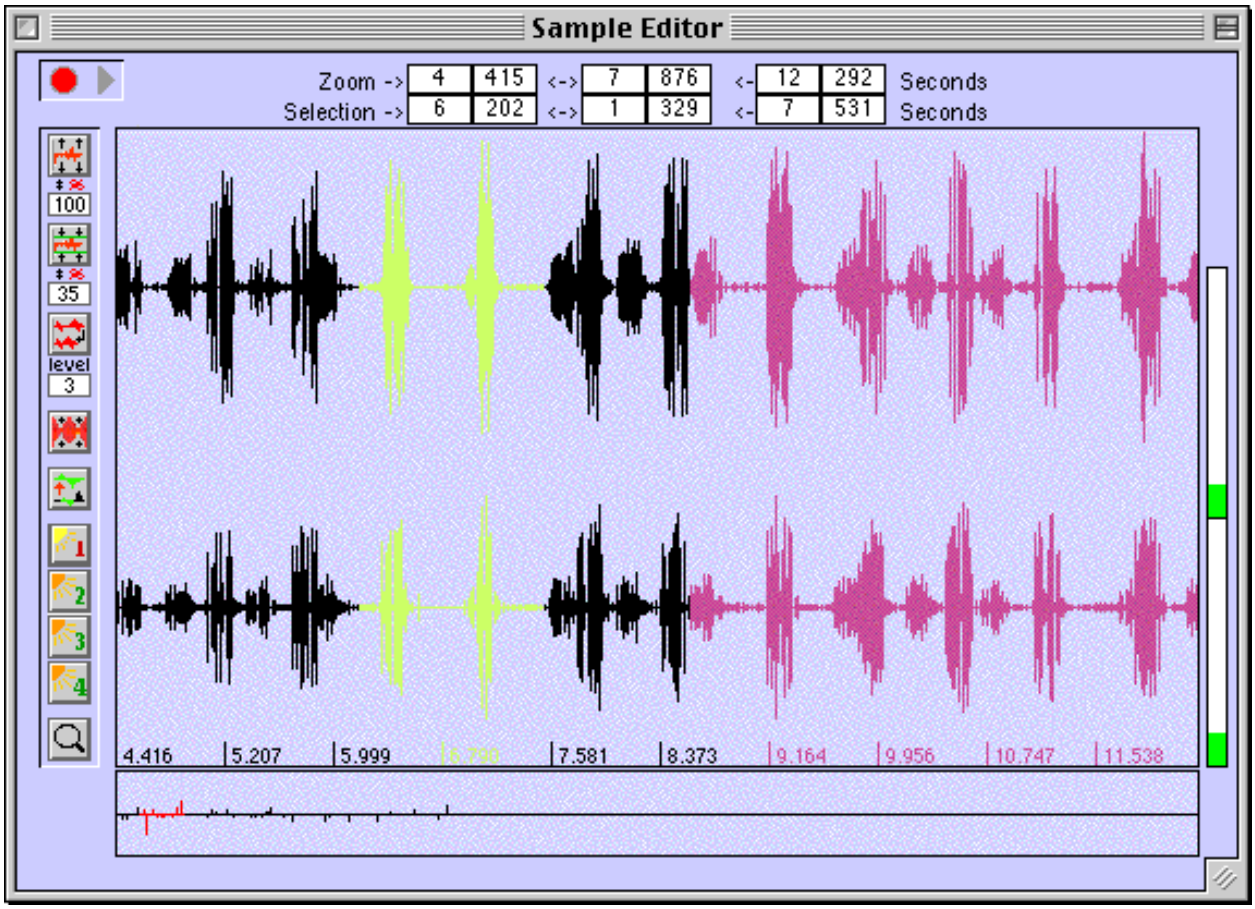
Saving samples from the Sample Buffer

There are two ways of saving all or part of the Sample Buffer to your hard disk as a new sample. Both of these methods will automatically add the new sample to the Sample Library:

Select the **Save Sample Data...** item from the File menu. This will give you the option of saving either the entire Sample Buffer or only the current visible zoom as a SDII file. Current visible Zoom refers to the visible area of the Sample Editor window. The new file is saved and automatically added to the Sample Library.

Highlight the region you want to save in the Sample Editor window. A grabbing hand icon will appear when the cursor is over the highlighted area. You can then drag it to the Sample Library, where you will get a standard Save File dialog box. Dragging it to the Preset window will also save the sample, which will be loaded together with the Preset.

The Sample Editor



New in v. 2.5: Major changes in Sample Editor functions

When working with prerecorded samples, and designing arrangements of sounds for your Presets, you will mostly be working in the Sample Editor window. Many functions in this window have been changed since earlier versions. The Cut, Copy, and Paste buttons are gone, and now should be done via the **Edit** menu. The new buttons have no written descriptions permanently in the window, but if you roll your mouse over them, the name of their function will appear in the Sample Editor window at the top of the button column.

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Overview

The Sample Editor window shows the sounds in the Sample Buffer. Changes made in one window are immediately reflected in the other. As the editor is only reflecting what is in RAM, any edits made in the Sample Editor have no effect on any soundfiles on disk. The entire buffer, or any part of it, may be added to the Sample Library and saved to disk. Unlike LiSa's other windows, it can be resized.

Appearance

Now that LiSa is fully enabled for stereo, the Sample Editor shows two channels for all sounds in the editor, regardless of whether the file is originally mono or stereo. The topmost channel is left. The waveform in the Edit window will also appear in as many as three colors:

- Black, for unselected areas.
- The sample region of the current Zone will appear in that Zone's color. This will also be visible in the Status window. This will only be the case when the Show **Zone Color in Sample Editor** is selected in the **Options** menu.
- The selected area will appear in your computer's 'highlight' color.

The time grid at the bottom of the Edit pane will be displayed in either seconds or thousands of samples, depending on whether **Show Length in Seconds** or **Show Length in kSamples is selected in the Options menu**

Navigation

The Sample Editor provides two views of the buffer: The Edit pane, and a smaller overview below. The Edit pane can be zoomed in and out from the overview, which always shows the entire contents of the Sample Buffer. The part of the buffer visible in the Edit window is always shown in the Overview pane in red. In addition, the top row of numbers, labeled Current Zoom, will show the exact start point, end point, and duration of the area visible in the Edit window. The view in the edit window can be changed in the following ways:

To change the Zoom, click on the magnifying glass icon, and drag the mouse vertically. The cursor will change to a magnifying glass. Moving up increases the magnification, and down decreases it. Holding down the Shift

key and click-dragging the cursor up and down inside the overview pane has the same effect.

To move back and forth in the buffer, drag the red area of the overview pane back and forth. Clicking in the overview will immediately move the area visible in the Edit window to that location.

There are also two types of buttons to aid changing views:

Zoom Selection. Clicking on this button will zoom in the Edit pane on the selected area.

Snapshots. The four numbered buttons on the Sample Editor, called Snapshot buttons, serve as view memories. Shift-Clicking on one of these buttons will remember the location and zoom view of that portion of the Sample Buffer, and a normal click will return the Edit window to that view. When a Snapshot has been loaded, the number in the icon changes from green to red. Snapshot 1 automatically defaults to a view of the entire Sample Buffer. Snapshots are saved with your Setup.

Playback

To start or stop playing in the Sample Buffer, press the spacebar. You will hear the sound beginning at the current cursor location. If you have selected part of the buffer, the highlighted area will automatically be looped. If nothing is selected, the area currently visible in the Edit window will be looped. (The selected area will take priority over visibility, so if a selected area is partially or entirely invisible, you will still hear it.) Hitting Return or Enter will move the cursor to the beginning of the window. It is also possible to start playback using the playback button in the Sample Editor Window.

*For playback and editing functions to work, the Sample Editor must be the **topmost** window.*

Editing

Selecting

To select a portion of the buffer, click-drag with the mouse. Shift-clicking will extend the selection. The highlighted area can also be fine-tuned with the Arrow keys:

Option-left arrow and Option-right arrow will nudge the left-hand edge of the selected area.

Option-up arrow and Option-down arrow will nudge the right-hand edge to the right and left, respectively.

Selecting and the hand grabber: If you have selected part of the Sample Buffer in the Sample Editor, when you pass the cursor over that area, it will turn into the hand grabber tool. To get back to the normal cursor (to click in the selection area), hold down the Option key.

The nudge size is 1 kB of samples (1024 samples, or about .023 of a second). Once a selection is made, its exact start point, end point, and duration will be displayed at the tip of the window, in the row labeled **Selection**. You can only select both channels at once – it is not possible to perform any operations on only one channel of the buffer.

Edit functions

The standard Macintosh edit functions operate when the Sample Editor is the frontmost window:

Cut will remove the selection and put it on the clipboard. Any samples in the buffer to the right of the selection will be shifted to the left (earlier) in the buffer.

Copy copies the selection to the clipboard, leaving the original untouched.

Paste will insert the sound on the clipboard at the insertion point, moving all sounds to the right. If paste is used when a region of the Sample Buffer is selected, it will replace whatever is in that region.

Clear (Available in the **Edit** menu or the Delete key) will do the same as Cut, but not to the Clipboard.

Undo will undo the last action you performed in the Sample Editor.

Special Functions

In addition to the view changes, the Sample Editor has several processing functions to make changes to the sounds in the Sample Buffer. Some are available from the Sample Editor window, and others from the **Edit** menu.

In The Sample Editor window

Normalize Selection/Normalize Level. This normalizes the selected area of the Sample Buffer. This affects only the buffer, and samples on disk are left untouched. This is also available in the **Edit** menu, or by pressing Cmd-M. This is a non-real time option, so it's not recommended for live use. Directly below this button is a numerical you can use to set the normalization level of the selection, from 10 to 100% (the default) of the full amplitude range. Thus it can be used to decrease as well as increase gain.

Limit Selection. This Button will reduce the amplitude of any part of the selected area of the Sample Buffer that is above a certain threshold. Samples or parts of samples with an amplitude below the threshold are untouched. The threshold is expressed as a percentage of maximum volume, and is set in the numerical directly below the button.

Gain Selection. This button will increase or decrease the gain by the percentage specified in the Amplify Current Zone setting in the **LiSa Settings** dialog. (This dialog is found in the **Global** menu. See P. 15 for more on the **LiSa Settings** window.) This works much like the MIDI controlled Amplify Current Zone option (p. 96), but it works for the highlighted area of the buffer rather than the current Zone.

Save Sample to Disk. You can drag any selected area of the Sample Editor to either the Sample Library or the Preset Window. A save file dialog will come up, and you can choose where to save the new soundfile. If dragged to a Preset, that sample will be automatically loaded when that Preset is called up.

In the Edit menu

Clear Sample Buffer. This menu item will clear the entire buffer of all samples.

Enter Selection in Zone. This item, available in the **Edit** menu, will automatically set the Start and Length parameters of the Zone currently in the Zone Editor to that of the current Selection. You can do the same thing by selecting a portion of the Sample Buffer and dragging it to a Zone.

Enter Current Region in Zone. If you change the size of the current Zone via MIDI, selecting this from the **Edit** menu will automatically resize the sample region of the Zone to the current one.

Normalize Selection. This menu item normalizes the selected area, but unlike the button of the same name in the Sample Editor window, it is always 100% normalization.

Reverse Selection. Works just like it sounds. Samples in the selected area are reversed.

Recording

It is now possible to record directly from an external sound source to the Sample Buffer in the Sample Edit window. The window now has level input monitors on the right, so you can see your input levels.

For those of you with ASIO cards supporting multiple inputs, keep in mind that the Sample editor will only monitor or record audio input from channel A.

Selecting your record region

Recording will always begin from the current playback cursor location. It will continue until the end of the visible zoom is reached, or the end of the buffer. Recording in this mode does not loop. When it reaches the end of the visible zoom or the sample buffer, recording will stop automatically.

To only record into a certain portion of the visible zoom, highlight it, and initiate record. Recording will stop once the cursor reaches the end of the selected region of the Sample Buffer.

Initiating recording

Once you have decided what portion of the sample buffer to record into, you can start recording in two ways:

Click on the record button in the top-left of the Sample Editor. A green square will appear in the center of the record button to indicate that recording is taking place. Clicking the record button again, or pressing the spacebar, will stop recording.

Press Cmd-space on your computer keyboard, when the Sample Editor is the frontmost window. Pressing the spacebar or clicking the record button will stop recording.

Once you have recorded your sample, and modified it to your taste, you can save it by selecting the area you wish to save and dragging it to the Sample Library. If you drag it to a key on the keyboard, a new Playback Zone with the same start and end points as your selection will be created, but it will not save your new sample to disk.

Tables and Envelopes

There are two data structures in LiSa which serve multiple functions in different contexts: Tables (often referred to in LiSa as 'CTabs') and Envelopes. This chapter contains basic information on both of these structures, and will briefly mention their applications in different aspects of LiSa. Their use in particular contexts are explained in full in the relevant chapters.

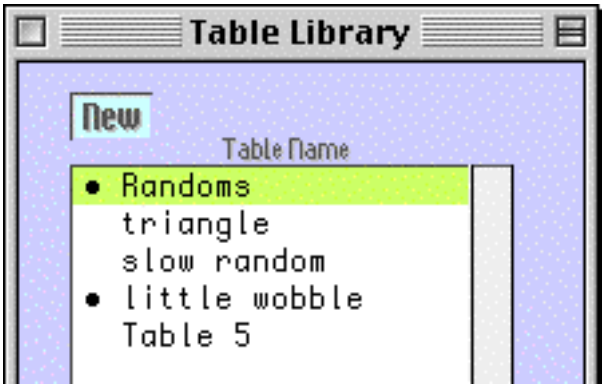
Tables

Tables are one of LiSa's most powerful features, and it is hard to overstate their importance in any advanced LiSa setup. This chapter deals with tables in general; it is best to look in the specific sections below and in the example Setups to see their more advanced uses. Some of the main applications of tables are:

- To modify parameter controls. (p. 93). Any MIDI controller input can be remapped. A linear control input from 0 to 127 can be mapped to 127-0, a set of random numbers, index values for other parameters such as envelope or pattern select, or any other set of values in the MIDI range you may need.
- As drivers for modulators (p. 84). Any modulator can be driven by a custom table as large as 512 steps, making it possible to create any pattern you desire. It is also possible to switch between tables in a modulator, giving you unlimited flexibility.
- Tables can be used to generate sound using wavetable synthesis (p. 58). You can even cut and paste (very) short sections of soundfiles as sound generators.
- Tables can themselves be changed in real time via MIDI (p. 94), bringing an additional level of flexibility.

Creating a new Table

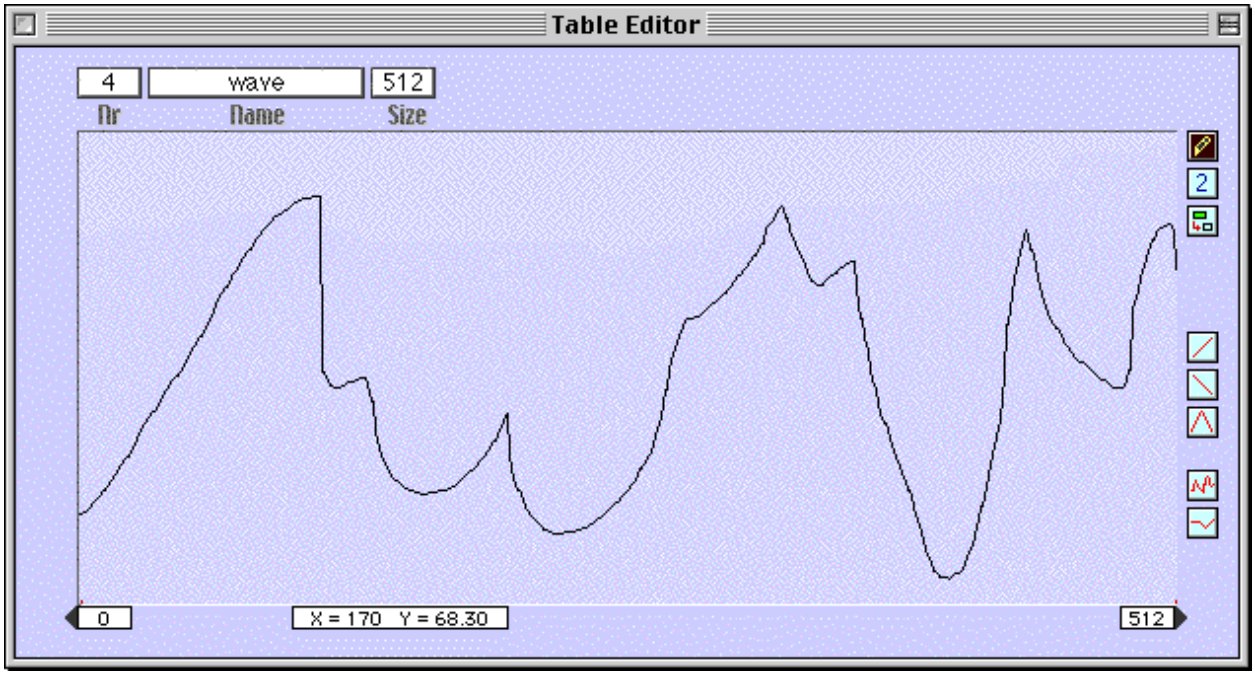
Like all other data, tables are stored in a Library. The Table Library window works identically to all other Libraries. There are two ways to create a new table:



- Click on New in the Table Library window.
- Select the **New Table** menu item from any of the popup menus labeled **CTab** in the Zone Editor, the MIDI Process Editor or the Controller Editor.

This will immediately open the Table Editor window, with a new table full of random values. A single Library can hold up to 256 tables. Each new table's name will appear in both the Table Library and the CTab popup menus in the Zone Editor.

The Table Editor



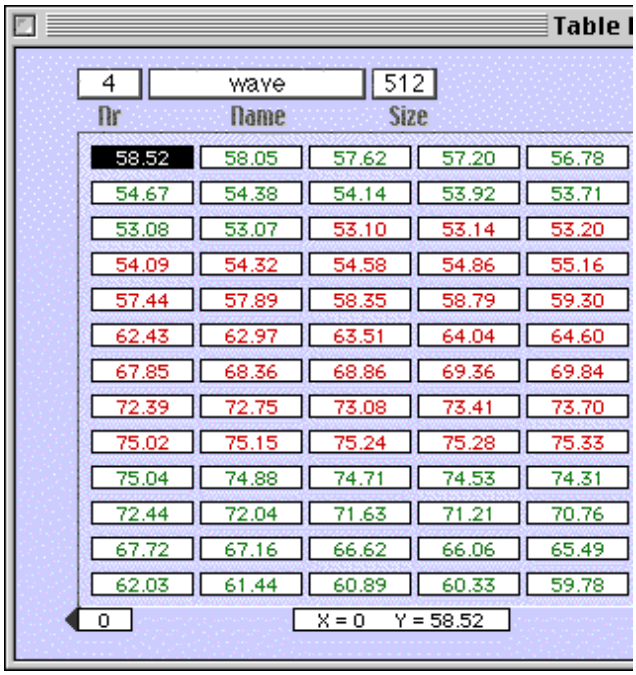
The top row of the Table Editor has the usual LiSa identification number (you can change the table you are editing by scrolling through this numerical or using the right and left arrow keys when this window is topmost) and name field. There is also a third numerical to control the table's size (domain). Default (and maximum) is 512. Note that the Y values are stored in the table as 32-bit floating-point numbers. When tables are used as indexes, they are truncated to integers.

The Table Editor window can be viewed in two ways: graphically (the default) and numerically. You can toggle between these two views by clicking on the radio buttons marked with a pencil or the icon with the numeral 2 on the right-hand side of the window. These two views reflect the same information, but each view has slightly different editing capacities. Tables can be drawn, edited number-by-number, generated using the Function buttons, or copied directly from the Sample Editor.

Graphics view

In this view, shown above, one can simply draw the desired curve into the Editor window. The X and Y values of the cursor are shown in the location box at the bottom center of the editor.

Numerical View



In this view, the table is represented as one or more pages of 128 numericals. Each numerical shows the Y value for an X value that corresponds to its position in the table, ranging from zero to the domain of the table. Putting the cursor over a numerical will show its X and Y values in the location box at the bottom center of the table. You can only see 128 values at a time in this view – to go to higher or lower ranges, click on the boxes with the triangles on the lower left and right of the Editor window. In numerical view, the numbers are color-coded, to help you see the general movement of the curves:

- If a number is higher than the previous number in the table, it appears red.
- If a number is lower than the previous number in the table, it appears green.
- If a number is the same as the previous number in the table, it appears black. The first value in a table is always black.

To edit in numerical view, scroll the numerical corresponding to the X value you want to change to its desired value, or type in the value. In numerical view, you can type in a full 32-bit floating-point number, but only the first two numerals to the right of the decimal point will be displayed. (It is handy to have your highlighting color set to something other than black -- it makes it much easier to see what is happening in the tables.)

Function Buttons

The Table Editor has two types of function buttons. Some put in a standard set of values, and some allow you to set certain parameters and apply a function to them.

Set functions

These buttons will always exhibit the same behavior, adjusting to the size of the table. Minimum and maximum values cannot be scaled, and are always from 0 to 127. When the mouse is over these buttons, the name of their function will appear at the top of the window.

Linear. This button creates a linear table, with Y values beginning at 0, and reaching 127 at the maximum X value of the table.

Reverse Linear. This loads the exact inverse of the above table, with the lowest value of X being equal to 127, and the highest 0.

Triangle. Maps a triangle wave beginning and ending with zero to the full domain of the table.

Variable functions

You can create several line segments or random ranges using the Variable Function buttons. These now work in both Numerical and Graphic views.

New in v.2.5: You can use the Line Segment and Random functions in Graphics mode.

Line Segment. Creates any number of breakpoint line segments. In Numerical view, Shift-click on a numerical in the Table Editor will select it. When you set the selected numericals to values of your choice and click on this button, LiSa will automatically interpolate a line segment between pairs of the selected numericals. If no numericals are selected, and you click on Line Segment, it will automatically interpolate a line from the first to the last value in the visible page of the table. To create a table with more breakpoint line segments, you have to have at least two numericals selected.

Random. This function works very similarly to the Line Segment function. Clicking on this button with no numericals selected will create a flat random distribution in the range 0-127. By selecting pairs of numericals the same way as line segments, and clicking on this button, you can create a random distribution within the limits set by the selected numericals. When creating these 'segments' of limited random distribution, the numericals that start and end the region may change when you click the button, as they are included as part of the random distribution. As with line segments, you can create as many regions of different distributions within one table as you wish.

In Graphics view, the system is similar. Shift-clicking on a point or set of points in Graphics view is identical to shift-clicking on a set of values in the Numerical view. Clicking on the **Line Segment** or **Random** button will behave exactly the same way as well. When you shift-click on a point, a red dot appears at the bottom of the table indicating the position on the x axis you have shift-clicked.

All selected points on a table can be cleared by clicking on the Clear Selection button beneath the Numerical View button. Note that this will clear selected points in both graphics and Numerical view.

Copying from the Sample Editor

You can copy data directly from the Sample Editor and paste it into a table. (Only the first 512 samples of your selection will be used.) Particularly useful when using a table as a Wavetable (see Wavetable Zones on p. 58), this technique will work if the table is in either graphic or numerical view. To do this, select any highlighted area from the Sample Editor, and drag the selection directly into the Table Editor.

Envelopes

Only general handling of envelopes is covered here. Specific applications of envelopes are covered in their respective sections:

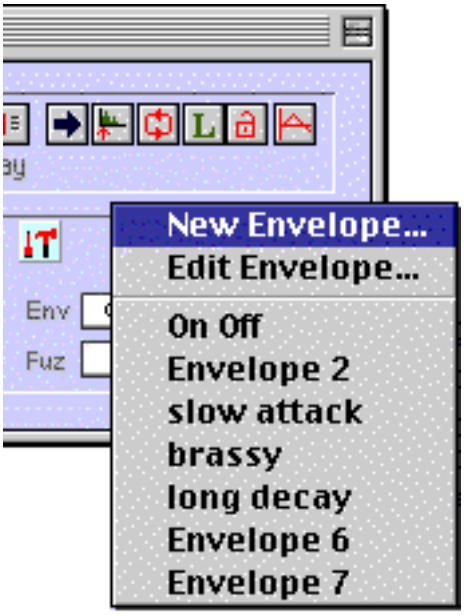
- For Amplitude control, see Amplitude Envelopes on p. 61.
- For Filter control, see Filters on p. 62.
- For Wavetable mixing, see Wavetable Zones on p. 58.

Envelopes in Setups

Envelopes are stored in and accessed from an Envelope Library. You can change the amplitude envelope of a Zone by sending it MIDI, using the Envelope Select parameter (p. 90). Default is to envelope No. 1.

Creating and editing envelopes

To make a new envelope, you can either:



Click on the **New** button in the **Envelope Library** window (available in the **Windows** menu, or by typing Cmd-4.).

Click on the **Val** numerical next to the **Env** parameter in the Zone Editor. A popup menu of all available Envelopes will appear, together with options for creating a new Envelope or editing the current one.

They are edited in the Envelope Editor, which is also available in the Windows menu, or by double-clicking on an envelope in the Envelope Library. You can cycle through available Envelopes in the Envelopes editor by using the left and right arrow keys.

Envelopes in LiSa are basic ADSR envelopes. They contain 4 stages; each scaled from 0 to 99, except Sustain, which is scaled from 0-100. Lower values mean shorter time durations.

Attack. The time it takes the envelope to reach its maximum value.

Decay. The time it takes to go from full value to the sustain level.

Sustain. The value of the envelope after it has passed the decay stage. It will remain at this value as long as the Zone is active. Note that this is not a duration.

Release. The time it takes after the Zone is deactivated (your finger is off the key) for the envelope to return to zero from the **Sustain** value.

Envelope timing

Timing on LiSa's envelopes have been improved in version 2.5, resulting in less latency, and a wider range of control over timings. The minimum possible attack is now approximately 1.5 ms, and the maximum is very long. The maximum speed of envelopes is directly related to the Sample Vector size of your Setup, see Appendix A for details.

Playing Back a Sample

Once you have sound in the buffer, there are a great variety of playback methods for sampled sounds. All of these are done with Playback Zones. The exact way in which the playback works is determined by the *mode* of the Zone. In this section we will look at these possibilities in detail.

Defining a Zone

The process for defining a Playback Zone, like all Zones, is comprised of 5 parts:

- Creating a new Zone in the Zone Library window.
- Assigning a sample region to the Zone, in the Zone Editor or the Sample Editor.
- Assigning the Zone to an activation key or keyrange in the Assignment window.
- Selecting output routing, if you are using a soundcard with more than two outputs.
- Defining the Zone's functions in the Zone Editor.
- Creating Parameter Control variables for the Zone, if desired. This happens in both the Zone Editor and the Assignment window, and will be discussed in full in the chapter **Parameter Control** on p. 84

The order you do these in is of no particular importance (though it helps to create the Zone first), and you can freely readjust any parameter at any time.

Creating the Zone

The first step is to create a Playback Zone and assign it to a keyrange on the virtual keyboard in the Assignment window. Click on **New** in the Zone Library window, and a new Zone will appear. Assign it to a keyrange by clicking on the Zone name and dragging it to the virtual keyboard. When defining the range for your playback Zone, remember that it is in Playback Zones (and in Playback Zones only) that the location of the Zone on the keyboard is related to the pitch of the sound you hear.

Defining the Sample Region

The numericals in the Region pane of the Zone Editor define the sample region of the Zone (the part of the sample buffer it acts on) and set the Zone's playback pitch. Please note that all of these parameters can be controlled via MIDI, and are amongst those most often used in LiSa.

*When setting these two parameters, **Len** takes precedence over **Stt**. That is to say in a 10-second buffer, if **Len** is set to 3 seconds, Stt will automatically not go past 7 seconds*

Stt (absolute region start). Sets the absolute start time of the Zone's region – the segment of the Sample Buffer from which the Zone will access sample data. This numerical will always have a minimum of 0. The maximum depends on the amount of memory you have allotted to the Sample Buffer. This is an absolute offset -- MIDI controls can only make the region go above (to the right in the buffer) this position, not below.

Len (length). Sets the length of the Zone's sample region. Minimum is 1 kB of samples (± 0.023 seconds) and maximum is from the start time to the end of the buffer. Default is 5.00 seconds.

Mvr (movement range). This numerical is used to define the effects of MIDI data sent to the above parameters. When this value is set to 0, MIDI sent to the **Stt** parameter will have no effect. Set to maximum (again, automatically the length of the buffer), the full range of a MIDI controller (0-127) will cover the full range of the buffer. If set to half the length of the buffer, it will cover half the length. Default is the entire length of the buffer.

You will notice that we are ignoring the CTab popup menus. These are related to how their variables interpret MIDI information, and will be discussed at length in Mapping MIDI Controllers – CTabs on p. 93.

Quick Zone Creation

In many cases, you will want a Playback Zone to simply correspond to one sample in the buffer. There is a fast system for creating such Zones, combining keyboard assignment, buffer region, and transposition in one simple gesture.

Drag a sample from the Sample Library directly to the Virtual Keyboard in the Assignment Window, and assign a keyrange. This will automatically:

- Create a new Playback Zone, with the same name as the sample.
- Load the soundfile into the Sample Buffer, immediately after the last sample in the buffer.
- Set the sample region to the exact size and location of the sample.
- Set the **Tun** parameter of the zone so that the leftmost key in the keyrange selected will play back the original pitch of the sample. This holds true regardless of how the tuning of your

keyboard is set.

It is possible, by dragging samples larger than your buffer, to actually create Zones larger than your buffer size. This can cause problems, and after saving and restarting such a Setup, you may receive a warning dialog when loading. You should check out your Zone sizes or resize your buffer before proceeding.

Pitch

Pitch transposition of sampled sounds is one of the most common uses of samplers. LiSa gives you full control over your playback pitch, including the ability to implement non-equal tempered scales. The pitch of a Playback Zone can be altered in two ways:

- By changing the **Tun** value in the Region pane of the Zone Editor.
- By playing it back on different MIDI notes in its keyrange.

Initial Pitch

*When tuning a sample from this numerical, you will only hear the new pitch when you trigger the sample again. (This is not true, by the way, when you alter **Tun** via MIDI.*

To change the note number that will play the sample back at initial pitch, you adjust the **Tun** numerical in the Region pane of the Zone Editor. When you record a sample, LiSa will default to playing it back at its initial pitch at note 60(c3) (We call this the initial pitch of a note, regardless of what its pitch is in the real world, or even if it has no pitch at all). Thus, in a Playback Zone that begins at note 72(c4), the lowest it will be able to play a sample will be one octave above the sample's initial pitch.

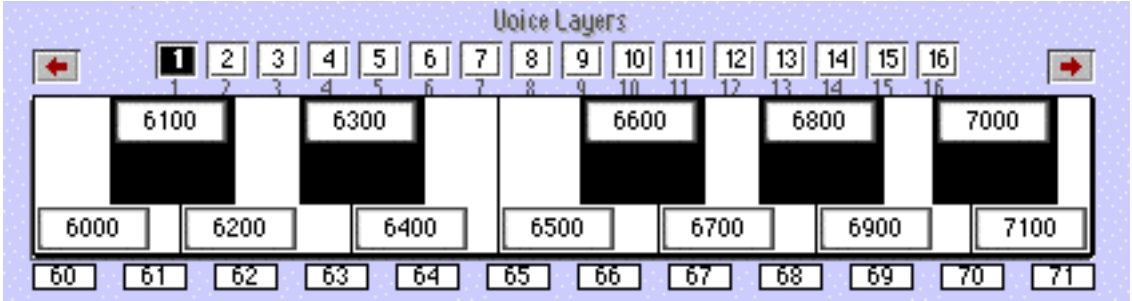
This numerical has a range of -60 to 60, measured in half-steps, which allows you to adjust the initial pitch of the Zone over a 10-octave range, centered on note 60 (c3). This is a dual numerical: by pressing the shift key, you can fine-tune the initial by plus or minus 99 cents (1/100 of a half-step). If the tuning in cents is anything other than zero, the coarse-tuning value will appear in **bold**.

Keyboard transposing

The playback pitch of the Zone will be relative to the initial pitch you have set in Tun. A Zone with a **Tun** value of -12 will play back a sample on key 60(c3) at a pitch one octave lower than its original pitch -- the effective playback pitch will be 48(c2). With a combination of **Tun** and your keyrange, you can play back the sample in any transposition or possible sets of transpositions you desire.

Scale Retuning

Default tuning for the virtual keyboard is 12-tone equal tempered. It is possible that you may want to use a different scale. You may want to implement just or microtonal tunings, or have the keyboard tuned in some completely nonscalar way. This can be easily implemented in LiSa. Look at the Assignment window and press the Tab key. The virtual keyboard will change into this:



The keyboard will not switch back into normal

This is a representation of one octave of the virtual keyboard (notes 60-71, c3-b4). The note numbers

mode (keyrange setting mode) if the cursor is in one of the tuning numericals.

are shown on the lowest row. As with the normal keyboard, you can view above or below this octave by clicking on the arrow buttons to the right and left. Above the note numbers are a set of numericals representing the pitch value of each note, expressed in cents.

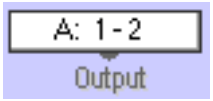
Each of these numericals has a range of 0-12000, thus making it possible for each MIDI note to play at any pitch within LiSa's entire range. The virtual keyboard for each Voice Layer can be tuned separately. These pitch tables are stored at the Preset level, meaning that each Preset can hold 16 pitch tables, one for each Voice Layer.

Preset Tunings

There are a few keyboard shortcuts for the most common tunings. Hitting these keys at any time will tune the virtual keyboard for the currently selected MIDI channel. These are not Cmd-key combinations. A dialog will appear asking for confirmation that you in fact want to retune the keyboard. The available shortcuts are:

- N = normal; 12-tone equal tempered.
- K = quarter-tone equal tempered scale; two MIDI notes to the half-step.
- U = unison; all notes play back at note 60(c3).

Output Routing



If you are using a soundcard with multiple outputs in your computer, and have installed the appropriate ASIO drivers, this popup menu will be visible. Here is where you choose which lettered stereo pair the Zone will send its output to. Keep in mind that it is the Playback Zone that determines output location, not the sound in the buffer. It is possible to make several Zones that play the same sound, but with different output routings. For configuring output, see p. 14.

The Play Treatment Pane

The variables appearing in this pane control the basics of playback. All of these parameters are MIDI-controllable.

Lev (level). This numerical controls the overall level of the Zone's output. This parameter is always linked to the velocity of the played note, so that a velocity of 127 will output the value shown in this numerical. (For more on this, see Velocity Mapping, p. 95.) Maximum is 100 (100% of the original level of the sample), and minimum is 0. Default is 100.

Pan (panning). This controls the location of the sounds in a stereo field. The range is from -100 (hard left) to 100 (hard right). 0 is center. The exact behavior of Pan when used with live MIDI is dependent on the type of controller used. For more information, see Channel and Voice MIDI Control, p. 87.

Env (envelope). A popup menu which selects between available amplitude envelopes. It is possible to change the envelope via MIDI control – see the Output Parameters section of the

Parameter menu, p. 90.

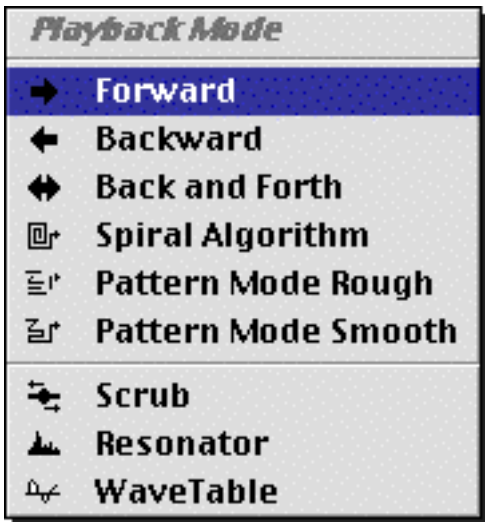
In addition, in the lower-right corner of this pane are the special parameters, unique to each mode, and will be described below with the playback modes.

Defining the Zone's Function

The Zone you have just created should be visible in the Zone Editor window. The Zone's function is defined from Function icon, the leftmost one in the Editor window. (For more, see **Zone Functions**, p. 27.)

The default function for new Zones is Playback, so you are ready to start setting its modes. Different modes will also change the parameters available in the Play Treatment pane, so we'll be jumping back and forth a bit between the two. The function of the bottom right numerical in the Play Treatment pane changes the most depending on the playback mode. This numerical is called the special parameter numerical, and all references to special parameters below refer to this numerical.

Defining the Zone's Modes



The Playback Mode menu, the leftmost of the Function buttons, determines the basic ways the Zone reads the information in its sample region. It covers things like the direction (or directions) the Sample Buffer is read, and also includes some secondary processing (effects) options. Generally, listening to them will make their function more clear to you than the descriptions below, so we encourage you to experiment with the program as you read.

Forward (default). This simply plays the sample region from beginning to end, with no secondary processing.

Backward. As above, but playing from the end of the region towards the beginning.

Back and Forth. In this mode, the Zone's region is read first forwards and then backwards upon reaching the end. A Zone in this mode and in Once or Trigger mode (see below) will play the region once forwards and once backwards before coming to a stop.

The Fuz Parameter. In the Play Treatment pane, these three modes all have the special parameter **Fuz**, which is a distortion algorithm. When set to 0, there is no distortion. As the value of this parameter increases, so does the distortion. The louder the initial sample, the faster distortion will occur. This, like all distortions in the Sample Buffer, is an analog-type distortion, and will not create nasty digital clipping.

In v. 2.5, the autopan mode has been

Spiral Algorithm. The exact operation of this algorithm is a trade secret -- you just have to listen to it and see what it sounds like. Its special parameter is called Spiralness, or **Spl** in the Play Treatment pane. It's a non-linear parameter -- you just

removed.

have to try it out! The range varies, depending on the sample vector size. Default is 64.

Pattern Mode Rough.

Pattern Mode Smooth. The Pattern modes are one of LiSa's most powerful playback options, and are complex enough to merit a chapter of their own. To learn more, see Pattern Modes, p. 64.

Scrub. This is LiSa's attempt at commercial success with the hiphop crowd. It uses the **Scb** parameter. With an initial value of 64, you will hear no sound. This is because the sample is not 'moving.' As you increase the values above 64, you will hear the sample looping in a forward direction, starting very low, and increasing in pitch as the control value goes up. As you go below 64, the same thing will happen, except the sample will go backwards. At a value of 72 (forwards and default) or 56 (backwards) the sample plays at its original pitch. It responds to MIDI values exactly the same way. The total pitch range covered is from as slow as possible to 4 octaves above unbent pitch. This is most useful when connected to the Pitchbend parameter of your keyboard -- it's already centered at a control value of 64.

The Scrub mode will only work well in conjunction with the Looping mode (see the Activate Mode menu below)

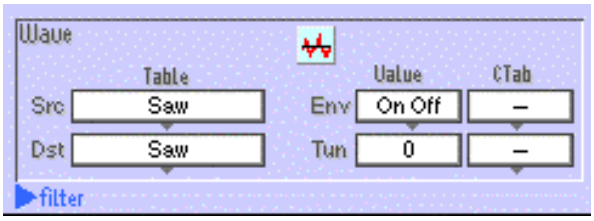
Resonator. The Resonator uses a combination of delay and feedback to emphasize the upper harmonics of a sound. By adding the sample to itself with a slight delay, resonances are created. Playing with it is also the best way to get the hang of what happens when you change the special parameters. This mode has two special parameters, which may be accessed by holding down the shift key.

- **Res** (resonance frequency). This controls the emphasized frequencies. Range is from 0-127, default is 64.
- **Dpt** (resonance depth). This controls the amount of the sample that is fed back. The resonance value can be either positive or negative, but as it is mapped to MIDI, 64 is equal to 0. At 64, no resonance will occur. As you increase the resonance depth in either direction, you will increase the strength of the upper harmonics, but with different timbral results depending on whether your value is above or below 64. Range is 0-127, default is 64.

Wavetable Zones

Although this mode appears with the playback modes, it differs from them in that it does not read samples from the Sample Buffer. Instead, it reads from tables. (For a general discussion of tables, see **Tables** on p. 46). Wavetable Synthesis is a technique that uses a set of numbers stored in a table as if it were one cycle of a repeating waveform, turning the table into a lookup oscillator. By reading the tables at different rates, one changes the pitch of the oscillator. The exact timbre of the sound produced will depend on the shape of the wave inside the table. Wavetable Zones in LiSa use two tables, which can be modulated together. The only special parameter in the Play Treatment pane is **Fuz** (see above), and the Region pane changes entirely, becoming the Wave pane.

The Wave Pane



As you can see, all the numericals, except for **Tun**, now have different names. Since Wavetable Zones don't read from the Sample Buffer, **Stt** and **Len** are no longer needed. In the Wave pane, you choose two waveforms to use, and select an envelope that will determine their relative balance.

Src (source). Clicking on this numerical will present a popup menu of the available tables, or give you an option to make a new one. The table you select here will be the first waveform heard when you activate the Zone, or the Source wave.

Dst (destination). This works identically to the Src parameter. The table chosen here, the Destination wave, will be averaged with the Source wave, in a proportion determined by the selected **Env**.

*Since Release is triggered by the deactivation of the Zone, you will only hear the complete return of the Zone to 100% source if the release on the amplitude envelope is at least as long as the release on the envelope chosen in the **Env** menu. Conversely, if you want it to end with all or part of the destination wave still audible, make sure the amplitude release time is shorter.*

Env (envelope). In this numerical, you select an envelope which will determine the timing and ratio of the two wavetables. In a Wavetable Zone, an envelope functions somewhat differently than it does when used to control amplitude. When the Zone is first activated, you will hear 100% of the Source wave. Over a period of time determined by the attack length of the envelope, the Destination wave will be added to the source, until at the end of the attack, you will hear 100% of the destination wave. The Decay time will determine the period it takes to reach the Sustain level. This is not a volume level, but a ratio setting between the two waves. When Sustain is set to 0, you will hear only the Source wave. At 100, only the Destination. Values in between will give you a mixture of the two waves. Release time will determine the rate at which you return to hearing 100% of the Source wave.

Using CTabs as wavetables

When using a Playback Zone in Wavetable mode, LiSa is treating the chosen tables as lookup oscillators. This means that the tables used are treated like very small sample buffers, and the shape of the table is effectively a waveform. The shape of the table thus changes the timbre and amplitude of the Playback Zone. Some things to remember about using CTabs as wavetables:

- **The full table size is always used, even if you can't see it.** If you try using a table with a domain smaller than 512, the Wavetable Zone will read the entire table anyway.
- **The flatter your table is, the less amplitude you will get.** The difference between the minimum and maximum values of your table will have more of an effect on volume than timbre. If you make 2 sawtooth waveforms, both with a minimum value of zero, and one with a maximum of 127 and the other with a maximum of 64, you will notice a relatively small difference in timbre, but a significant one in volume.

Once you have chosen one of the Playback modes described above, which determines the basic nature of how the sample will be treated as it is played, you use the menus available from the other Function Mode buttons to determine details of Zone behavior and MIDI response.

Advance Mode

Sets the start point for each activation of the sample.

Step Mode. In this mode, the sample will begin playing back at the place it left off the last time it was activated. If its region is moved via MIDI, it will not retrigger.

Restart Mode (default). Every time the Zone is activated in this mode, it begins playing at the absolute start point of the Zone's sample region. If the sample region is changed via MIDI while a Zone in this mode is active, it will automatically retrigger from the beginning of the sample.

Activate Mode

Determines the repeat pattern of the Zone (beginning at the start point determined by the Advance Mode option):

➢

Looping (default). As long as the Zone is active, it will continue playing over and over through its region.

Once. In this mode, the sample will play as long as the Zone is active, up to the end of the region.

Trigger. A Zone in Trigger mode will play the entire region, regardless of how long it is activated. Note that this is pointless to use in conjunction with Step mode, as you will always find your 'step' ending at the end of the sample region.

Due to the nature of Triggered playback, which stops dead at the end of a playback region with no fadeout or looping built in, it is advisable to leave a bit of silence at the end of a soundfile that you plan to use with a Zone in Trigger mode, or you may get clicks at the end.

Voice Allocation

Determines the priority of the voices assigned to the Zone. For more details see **Appendix 2: Voice Allocation** on p. 112.

Free Allocation (default). When LiSa runs out of voices, i.e., when there are more MIDI commands for activating Zones than the computer's processor can handle, Low priority Zones will

drop their longest-playing voice in order to free up a voice for the new note on. LiSa looks for the longest-playing voice in all active low-priority zones to turn off.

Never Replace. High priority Zones never give up their voices for anything, including other high-priority Zones and Record Zones. Beware of overusing this setting, especially in conjunction with any kind of sustain. Once a high Priority Zone has received a note on, it will never give it up, even if that means that no new notes can be produced or recorded.

8/16/32 Voice Max. These three settings limit the number of voices for that Zone. New Note On messages will drop the oldest voice for that Zone. Note that the if the **Max Voices** parameter in the **Lisa Settings** dialog is set to a number lower than the **Voice Max** value of a Zone, the global setting will take priority. For example, if you have Max Voices set to 22 in the LiSa settings dialog, a Zone set with **Voice Max** set to 32 will play no more than 22 voices.

Zone Parameter Control

Enables or disables the connection between the Zone and the MIDI parameter controls as set in the Assignment window. This is useful when editing Zones, to avoid sending unnecessary MIDI to a Zone, and when selecting Zones that you do not want to be affected by MIDI in performance.

Enabled (default). MIDI input can affect Zone parameters.

Disabled. MIDI cannot affect Zone parameters. The Zone can still be activated through the keyboard, and velocity will still affect volume, but no controllers or modulators will affect the Zone.

Modulator Running Mode

Determines the start point for LiSa's internal modulation functions (see Parameter Control p. 84 for more on modulators). In Restart mode, the waveshape or table that determines the shape of the modulation will start from the beginning each time the sample is triggered. In Free Run mode, the start location in the table is unpredictable.

Amplitude Envelopes

When listening to samples from the Sample Editor, LiSa uses envelope Nr. 1 by default for amplitude, so it is wise to not put long attacks or decays on this envelope if you want to audition your samples properly.

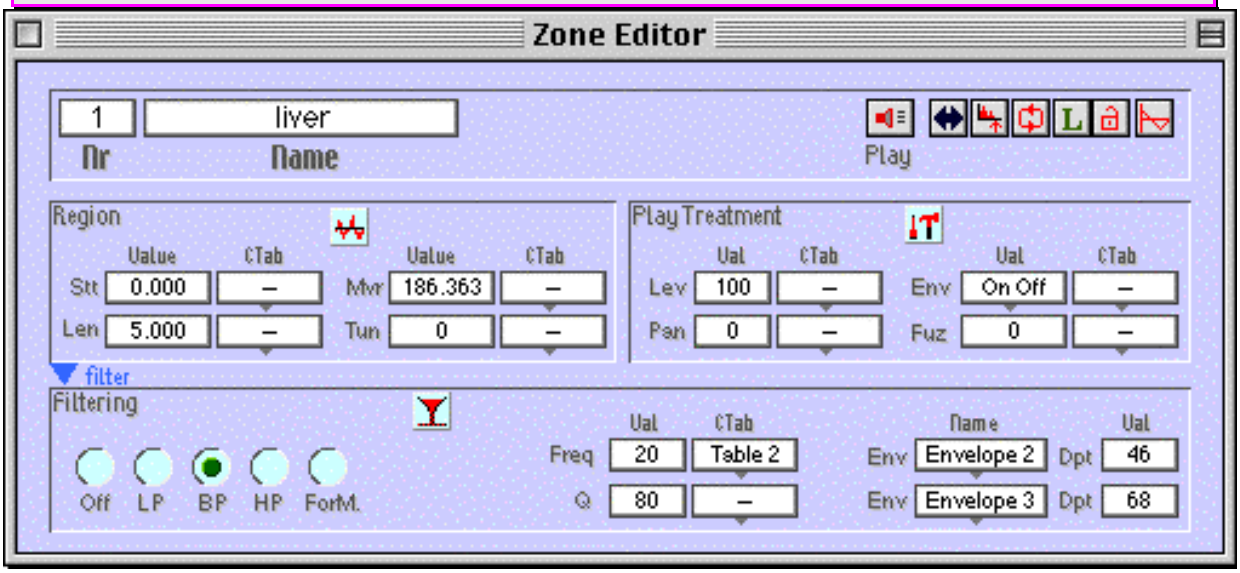
All Playback Zones have an amplitude envelope -- a controller for the amplifier that determines how quickly each sound reaches its maximum volume, and how long it takes to die out after you stop playing the note. When a Playback Zone is created, it comes with one ready-made envelope, called 'On Off,' which immediately turns the sample to full volume when you activate the Zone, and immediately turns it off when you deactivate it. For more on envelopes, see p. 51.

Filters

New In v. 2.5: Expanded Filters

All playback zones have an optional MIDI-controllable filter, which can be viewed by clicking the blue menu triangle labeled **filter** in the lower-left corner of the Zone Editor. Filters have four possible modes: Lowpass, Bandpass, Highpass, and Formant.

When using filters, keep in mind two things:
1: They are computationally expensive, and the more filtered zones you have activated, the fewer overall voices you will be able to sound simultaneously.
2: To get the best results from your filter, always use Best Playback quality in Presets with filtered Zones.



- **Lowpass** filters allow frequencies below the cutoff parameter to pass through, eliminating high frequencies.
- **Bandpass** filters only allow the frequencies at or around the center frequency to pass.
- **Highpass** filters allow frequencies above the cutoff parameter to pass through, eliminating low frequencies.
- The **Formant** filter is a bank of 3 bandpass filters with a set width. This is by far the most computationally expensive filter to use.

When a new playback Zone is created, the filter is off by default. To activate it, click on the **On** radio button. Filters have two parameters:

Freq. In the case of lowpass and highpass filters, this parameter sets the cutoff point. In a bandpass filter, this parameter controls the center frequency. Scaled 0-99. In a formant filter, this parameter controls the distance between the three filters.

Q. For all filters except Formant, this parameter controls the steepness of the filter cutoff. Scaled 0-99, higher values increase steepness, decreasing the bandwidth, and thus the resonant qualities of the filter. 'Q', by the way, stands for 'quality' and is a hangover from the old analog days of filter design. In the case of Formant filters, this parameter controls the distance between the center frequencies of the

three filters. The real Q of these filters is fixed.

These parameters can be controlled both by MIDI (parameters available, like all others, in the Assignment window) and by envelopes, which can be selected from any envelopes in the Envelope Library. The depth of the effect of the envelopes can be adjusted from the numericals labeled **Dep**. Note that unlike the amplitude envelopes for playback Zones, these envelopes may not be switched via MIDI. The effect of the envelopes and the other parameter controls are additive.

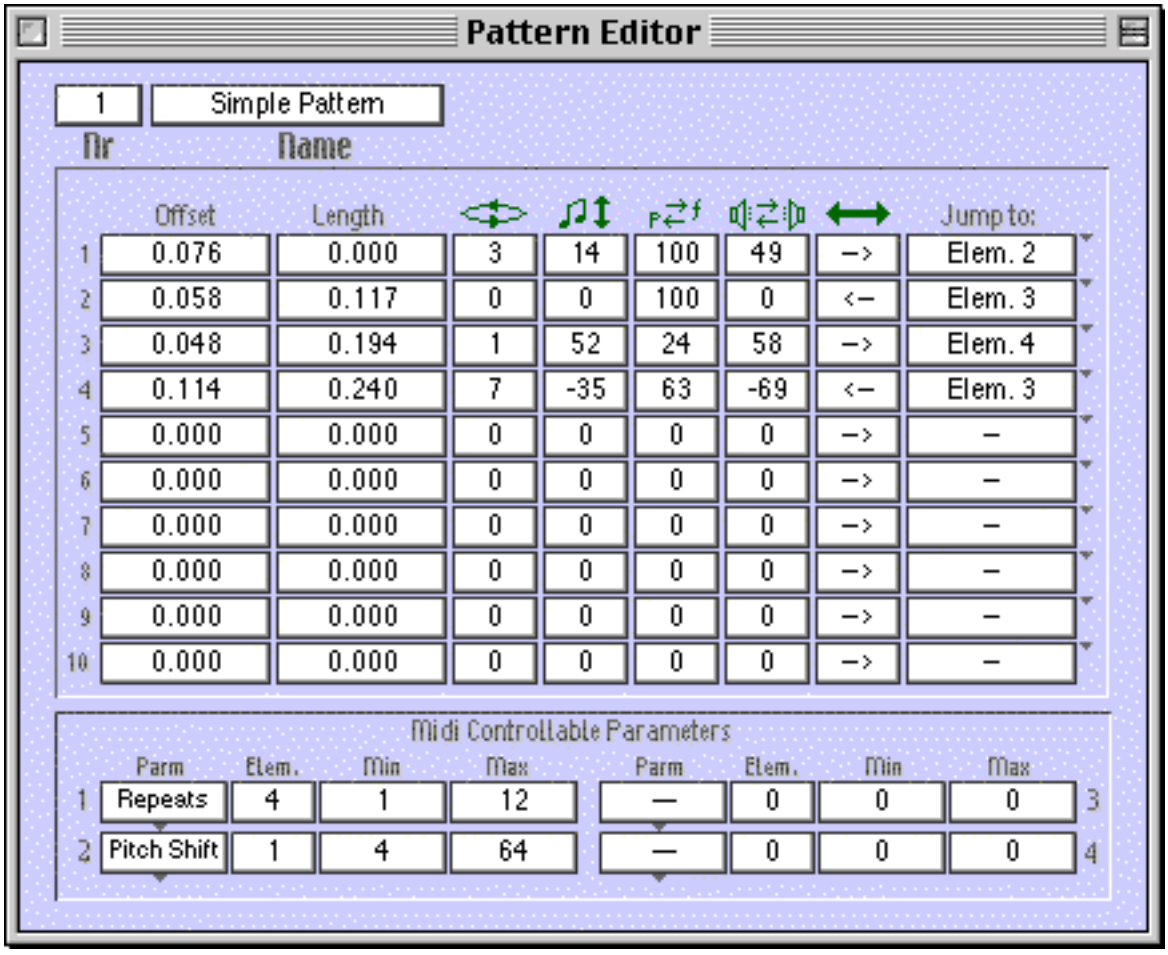
Pattern Modes

The Pattern modes are one of LiSa's most powerful playback options. A Zone in Pattern mode uses custom templates of playback pointer movement through the Sample Buffer, which can be controlled via MIDI.

Except for their sound quality the two types of Pattern modes function identically. Patterns function in Zones in a way analogous to envelopes: you design a set of patterns in the Pattern editor, store them in a Pattern Library, and call them up via the special parameter numerical or MIDI.

A pattern is comprised of one to ten elements; each comprised of a set of instructions to the play pointer, the thing in the computer that indicates the exact location in the Sample Buffer one is hearing at any given moment. When a Pattern Zone is active, it will execute the elements one by one, in an order determined by the **Jump to:** parameter.

The Pattern Editor



To create a new pattern, select **Pattern Library** from the **Windows** menu, (or type Cmd-3) and click on **New**. The Pattern Editor window can be opened by selecting the **Pattern Window** item in the **Windows** menu or by double-clicking on a Pattern in the Pattern Library. Creating a new Pattern will also automatically open the Editor. In this window you can specify the precise movements of the play pointer through the Pattern's Region. Before discussing the Pattern mode parameters in detail, a few general points:

- When in 'show length in samples' mode, the Pattern editor counts in absolute number of

samples. Remember that when you have selected Show Size in Samples, you normally see time represented in the Coarse aspect of a numerical in kilobytes (kB), or groups of 1024 samples in the Zone Editor. The pattern editor, on the other hand, shows you the absolute number of samples -- there is no coarse setting. 400 means 400 samples (circa .009 of a second) not 400 kB of samples (9.287 seconds). Thus when viewing your Zone Editor in Show Size in Samples, it will not directly relate to what you see in the pattern editor.

- Any movement of the play pointer you specify will always be limited to the size of the Zone's sample region. This will become clearer as you read on, but for now understand that any movement you specify that would push the play pointer out of the Zone's region will be wrapped around to the beginning of the sample region. A pattern will never go outside of its Sample Region, however you describe its movements.
- A pattern retriggers when moved based on its Advance mode. Like playback regions, when a Pattern Zone's sample region is moved via MIDI, it will start again from the beginning of the pattern if it is in Restart mode. In Step mode, it will simply continue the pattern from whatever point it left off at the last time it was activated.

Pattern Parameters

It is possible to change parameters in the Pattern Editor while listening to your sample. You cannot, however, reduce the number of elements in a pattern while a voice is activated.

Offset. This parameter determines how many samples the pointer skips over at the beginning of each pass of the element. Every time the element plays, it takes the offset and adds it to the current pointer location before starting to play. Offset's range (in either direction) can be as large as the entire Sample Buffer, although as mentioned above, it will always wrap around within the size of the Sample Region. Default is 0.

The offset starts from the beginning of the Zone if it is in Restart mode. In Step mode, it will naturally continue from where it left off last.

Length. This determines the actual number of samples that the pointer plays when executing the element. Whatever your other processes within the element are, this is what you will actually hear. Default is 0.01 seconds.

*A good rule of thumb to keep in mind when designing patterns is the thousand-sample rule. As long as your **Offset** and **Samples** parameters are under 1000 or so, (about .02 seconds) the transformations you put into your pattern will be perceived basically as pitch and timbral changes. Above this threshold you start to hear more rhythmic chunks of sound. The exact behavior will depend on the sample and the relationship between these two parameters.*

Repeats. This determines the number of times the area defined by Length will be repeated in each pass. Minimum is 0 (default), meaning it plays through only once. Maximum is 9999.

Pitch Shift. This numerical alters the frequency of the samples being played, above and beyond any other pitch alterations that may be taking place. It is a frequency-based parameter, not pitch, and is thus logarithmic rather than linear. When this parameter is set to zero, it is heard at the pitch as established by the keyboard and the **Tun** numerical. When set to its maximum value (100) it is played back at just under twice the frequency of its original pitch, which is to say (just shy of) one octave higher. On the other hand, when you go below zero, the pitch drops much faster. At -50, you are playing it back at half the frequency, or one octave lower, and at -75, an octave

below that. At it □s lowest setting, -99, you □re playing very low, about 6 octaves below your original pitch. Default is 0.

Amplitude. This sets the amplitude of the element, relative to the overall amplitude of the Zone as set in Lev. Maximum is 100 (unity with Lev); minimum is 0 (no sound). Default is 100.

Panning. Controls location of the sound in the stereo field. -100 is hard left, 100 hard right. 0 (center) is the default.

Play Direction. Clicking on this numerical toggles between a forward (-->) and backward (<--) direction of play. Play direction has no effect on the Offset parameter. Default is forward.

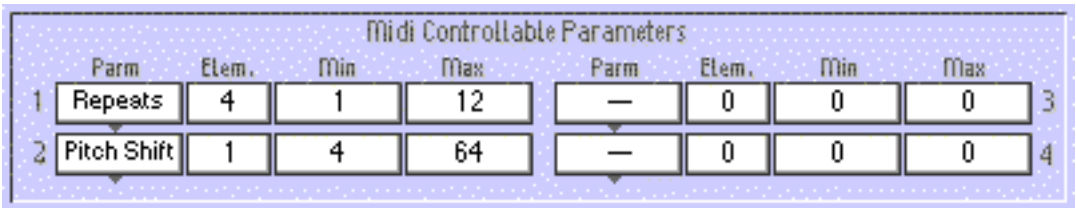
Jump To. This box functions as a gateway from one element to the next. Clicking on it reveals a popup menu with the following options:

- **New Element**. Adds a new element to the bottom of the list.
- **Delete Elemen**t. Deletes current element from the list. You cannot delete element number 1.
- **Element <number>**. Selecting one of these assigns the next element the pattern will jump to. Any active element may be chosen, including itself.

Controlling Patterns with MIDI

Linking controllers to patterns

To assign a pattern element to MIDI, select any of the four Pattern Control options in the Parameter menu in the MIDI pane of the Assignment window, and connect it to a controller. This procedure is explained in full in Parameter Control on p. 84.



Due to the nature of pattern Zones, all parameter control is treated as Channel Controllers. For an explanation of the distinction between voice and channel controls, see ***Channel and Voice MIDI Control****, p. 87*

The exact function of MIDI control patterns is set at the bottom of the Parameter Editor, in the MIDI Controllable Parameters pane. Each of the red numbers at the side indicates one of the Pattern Parameter Controls available in the parameter menu. Thus, if you link Pattern Parameter Control 2 to Aftertouch, you would set exactly what effect aftertouch has in the top-right set of numericals. There are four columns for settings:

Parm. Clicking on this numerical will reveal a popup menu containing the seven pattern parameters. Select the one you want to use.

Elem. This numerical selects which of the pattern elements will be affected. You cannot change one parameter for all elements in a pattern, only one element per controller.

MIn and **Max**. These numbers refer to the parameter values corresponding to the minimum and maximum values of the controller you are using. For most parameters, the MIn and

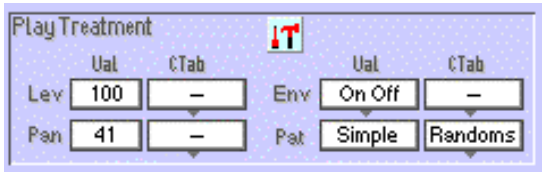
Max have the same meaning they would in the numericals for setting the given parameter. The MIDI control range of 0-127 is interpolated between the Min and Max values. (The exception to this is the Play Direction parameter, which can only be set to 0 or 1. Zero (which is the result of any MIDI control value less than 64) makes the element play backwards, and one (for any MIDI value 64 or over) plays forwards. Min may be a larger value than Max.

Smooth Versus Rough Patterns

There are two different types of Pattern Mode: Smooth and Rough. All of the functions described above work identically in both. The difference is that the Smooth Pattern mode has special algorithms built in to eliminate clicks and pops often heard while jumping around in a sample, and the Rough does not. Depending on the particular Pattern and sample you are using, one may sound better than another, or they could sound more or less the same. Rough mode often gives an extra kick to the upper harmonics that gives the sample a bit more presence. Another difference between the two is that the Rough mode is one of the fastest playback algorithms in LiSa, whereas Smooth, because of the time it spends doing corrections, is one of the slowest, and puts more stress on your voice allocation. So if you have a slower machine, and you're concerned about your number of available voices, use Rough mode when you can.

Using Patterns in a Zone

Once you have made a pattern or two, you are ready to use them in a Zone. Create a new Playback Zone and set the Playback Mode to Pattern. The Play Treatment pane in the Zone editor will look like this:



The only parameter here we have not seen before is the **Pat** parameter. Clicking on the numerical will show a menu of the patterns you have created. Select one, and that is the pattern the Zone will use. Alternately, you may drag a Pattern from the Pattern Library to this numerical.

It is also possible to switch dynamically between Patterns, much as one does with Envelopes. For more on this, see Pattern Controls, p. 91

Recording a Sample

Although there is a great deal one can do with LiSa only playing back sampled sounds from disk, it was primarily designed for live situations in which one can sample another instrument live, process the sample, and play it back. This chapter covers techniques for recording samples into the Sample Buffer in real time, which are done with Record Zones. Many of the modes used in the Record function are identical to those in Playback. There are some small variations, however, and at the risk of being repetitive, they will all be described in full. For recording while editing your Setup see p. 44

A Few Things About Recording in LiSa

Clipping and Overdrive

Digital clipping is particularly ugly, and there are possibilities within LiSa to create certain distortion and overdrive effects, as we shall see. We advise that you record your samples as cleanly as you can, and create any distortion you want within LiSa, using the **Fuz** playback parameter described in the previous chapter.

Inputs

LiSa now operates fully in stereo, and both input channels record independently. That is to say that you can input either a stereo input or two independent mono inputs into LiSa.

If you are using two independent mono sources, and want to save that material for later, please remember that LiSa's sample editor will not edit left and right channels independently. You will need a third-party sample editor which can separate an interleaved stereo file into two mono files, which you can then edit separately.

If you are using an ASIO soundcard with more than two inputs, you can select which input pair the Record Zone is listening to (and which it plays back on) using the new Input and Output menus. See below for details.

Recording from CD

It is possible also to record from your computer's built-in CD-ROM player. By selecting CD as the audio input in the **Audio Input Select** dialog, LiSa will record directly from the CD player. You do not need to use Apple's Sound control panel.

Creating a Record Zone

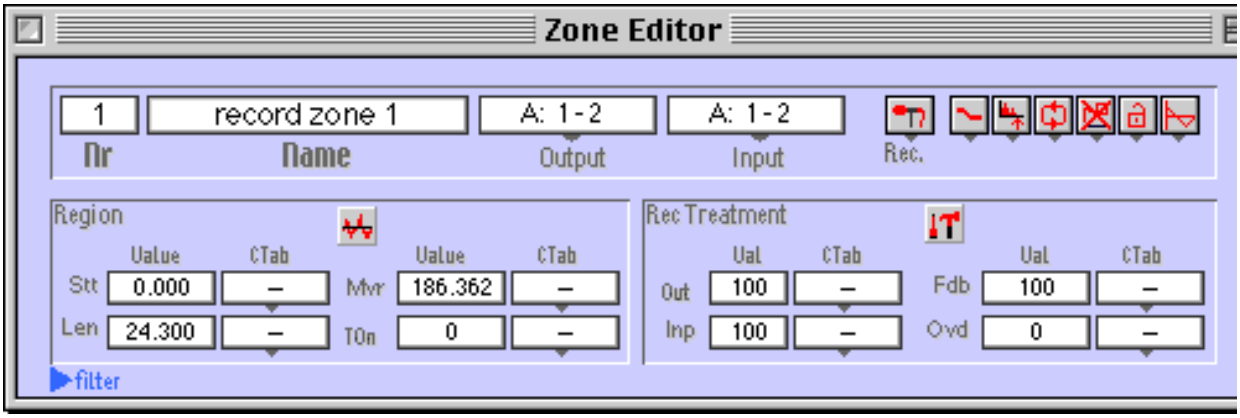
There is no particular reason to assign a Record Zone to more than one key -- The key number you record from will have no effect on playback pitch.

We assume that at this point you are clear on the basic procedures for creating a Zone and assigning its keyboard range. If you aren't, see **Creating a Zone** on p. 23.

Defining the Zone's Function

The Zone you have just created should be visible in the Zone Editor window. The default function for

new Zones is Playback, so the first step is to make it a Record Zone. Go to the Zone Function button (the leftmost icon in the top pane) in the Zone Editor, click on it and select **Record Zone** from the pop-up menu. The Zone Editor looks slightly different from a Playback Zone, but most of the settings are similar.



The Information Pane

Most of the settings here will already be familiar to you. If you are using a soundcard with multiple inputs and outputs, you will note one difference: popup menus labeled Input and **Output**. The **Input** numerical controls which stereo pair the Record Zone is recording, and the **Output**, obviously, sets the stereo pair that the Zone plays back from. Remember that Record Zones only output sound if they are in Looping mode.

The Region Pane

The numericals in this section of the Zone Editor define the sample region of the Zone, and set an activation threshold for recording. The first three function exactly as they do in Playback Zones.

Record Zones will self-limit. That is to say that they will not go past the end of the Sample Buffer -- recording into some random spot in your computer's memory would crash your machine. (This does not apply to all Zone functions).

Stt (absolute start time). Sets the absolute start time of the Zone's region.

Len (length). Sets the length of the Zone's sample region.

Mvr (movement range). Sets the area within the Sample Buffer that the Zone can move in when controlled by MIDI.

TOn/TOf (threshold on/off). This is a dual numerical. **TOn** is normally visible – to view and edit **TOf**, press the Shift key. These parameters (range 0-127) set the relative input level at which the recording process will be initiated and ended. At 0, it will record all input, at 64 it will record only signals that are more than half of the maximum input, and at 127 it will record hardly anything. If it is set to any non-zero value, the Record Zone will only record if it is both activated from MIDI and is receiving a signal above the threshold. When the input drops below the level set in **TOf**, it will pause the recording process.

*There are two things to keep in mind about using a threshold. Firstly, attack and decay times are very short. One sample with amplitude above **TOn** will initiate recording, and about 11 milliseconds or so of sound below the level of **TOf** will deactivate it, depending on your machine. Secondly, the threshold value takes priority over all mode settings. As long as the signal is below **TOn**, the record pointer does not move. This applies to all modes, including Trigger mode. In order to record a whole Zone in Trigger mode, it is necessary to set **TOf** to 0. In a Zone in Loop mode, for example, you might hear the sample playing, but you will not record exactly onto what you hear -- you will record beginning at where it last stopped. You can check the activity of the record pointer in the Status window by selecting the **Show Current Sample Pointer** option in the **Options** menu. The current location of the sample pointer will be displayed in the System Messages pane of the Status Window.*

Defining Record Modes

The Record Mode Icons

Clicking on each of the 5 mode buttons will reveal pop-up menus showing the possible record options:

The Recording Mode pop-up Menu

This covers what happens to the old sound (if any) in the sample region at the moment of recording.

➢

Replace. (Default). When the Zone is in this mode, whatever sound was in the Sample Buffer prior to the recording will be overwritten. If the Zone is in Looping mode, this will behave like an Overdub Zone. To avoid hearing older material, keep the **Fdb** parameter to 0.

Overdub. In this mode, the newly recorded sound is added to whatever sounds were present in that location in the buffer. The original sound will remain. Please note that this is purely additive and there is no limiting, so repeated overdubs will eventually lead to distortion. This is not necessarily a bad thing, but something to be kept in mind. The amount of the original material you will keep depends on the Feedback setting in the Record Treatment pane.

The Advance Mode pop-up Menu

Sets the record start point for each activation of the Zone. These work on the same principle as the Advance Mode items in Playback Zones.

➢

Step Mode. In this mode, the sample will begin recording at the place it left off the last time it was activated. For example, if a Record Zone has a sample region 5 seconds long,

and you record in 3 seconds of sound, the next time you activate the Zone, it will begin at 3 seconds plus 1 sample, leaving your first 3 seconds of samples untouched. Depending on the Activate Mode (see The Record Treatment Pane, p. 72), it will either continue cycling through its portion of the buffer, or step through until the end of the sample region.

Restart Mode (default). Every time the Record Zone is activated in this mode, it begins recording at the absolute start point of the Zone.

The Activate Mode pop-up Menu

Determines how the record pointer will move through the Sample Buffer when it is activated (beginning at the start point determined by the Advance mode option).

➢

Looping (default). As long as the Zone is active, it will continue recording over and over through its allotted area in the Sample Buffer. Regardless of the Recording Mode, a Zone in loop mode will overdub material from that particular activation, in an amount determined by the **Fdb** parameter (see above).

Once. In this mode, the sample will record as long as the Zone is active, up to the maximum length of the Zone.

Trigger. A Zone in Trigger mode will record the entire sample region, regardless of how long it is activated. Thus, a short keystroke can initiate the recording of a very long sample.

The Auto Save Session pop-up Menu

Handles direct saving of samples to disk. This is discussed in more detail in Load Session Zones, p. 79

Disabled (default). The Zone will not auto-save.

Recording while editing: If you activate a Record Sample Zone by option-clicking on the virtual keyboard, instead of via MIDI, it will not save the recording as a session. Once the recording is finished, LiSa will prompt you to name and save the soundfile as one would any other file.

Enabled. For samples to be auto-saved, this must be enabled and the **Auto Save Recording Sessions** item in the **Options** menu must be enabled (checked). If only one or the other is on, no auto-saving will occur. (This is in order to make it easy to disable all auto-recording zones when editing your Setup.) When both of these are enabled, it means that every time a new recording is made into the Zone, it will be saved immediately to disk. Make sure you know when you are using this, or you can fill up your disk awfully fast! Recorded samples are immediately available for reloading into LiSa using Load Session Zones. When you quit LiSa, it will create a folder in the same folder that contains your Setup file. This folder will be named with the format '<date> Sessions <time>'. Saved soundfiles are in SDII stereo format, 44.1 kHz. For more on this, see Managing Sessions on p. 81.

The Zone Parameter Control pop-up Menu

Enables or disables the connection between the Zone and the parameter controls as set in the Assignment window.

➢

Enabled (default). MIDI input can affect Zone parameters.

Disabled. MIDI cannot affect Zone parameters.

The Record Treatment Pane

The variables in this pane control input, output and feedback levels for the sample as it is being recorded. All of these are also controllable via MIDI from the Assignment window.

Out/Pan (output level/panning). This is a dual numerical. Out controls the overall level of the Zone. Range is 0-100, with 0 meaning no output, and 100 meaning full sample volume level. This value does not affect the sample itself; only its output level. Default is 100%. Pressing the Shift key will change it to the Pan parameter. Range is -100 to 100, from 100% left to 100% right.

*When you record a sample in Looping and Overdub mode, you will hear the old material every time through before it is recorded over. If you do not want to hear it, set **Out** to 0.*

Inp (input level/channel). This dual numerical sets both the attenuation of the signal input as it is recorded, and the channel which the Zone will record from. Note that this value does not affect the level of the incoming signal -- it cannot be used to control clipping, you need to do that at your sound source. This parameter, being MIDI-controllable, is best used when attenuating input in live situations. Default is 100%. Holding down the Shift key will turn this numerical into a channel select, with the options of Left, Right, or Both. When Both is selected, and sound is recorded at only one of the two stereo channels, the Sample Buffer will only display the channel that is receiving sound input. If either Left or Right is selected, the mono channel

will be duplicated into both sides of LiSa's stereo buffer, thus giving a two-channel mono sample.

Fdb (feedback). If the Zone is in Loop mode, this parameter will effect how much of the previous sample you hear. If this value is anything higher than 0, some amount of the previous signal will be mixed in with the new signal as the buffer is re-recorded, with the amount depending on this setting. Range is 0-100% of the original signal. Default is 100%.

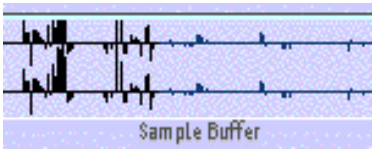
Ovd (overdrive). Overdrive is an extension of the feedback control -- rather than attenuating the previous signal, it amplifies it. After repeated looping, you can get some rather interesting distortion effects with Overdrive. You can think of it as Feedback values of more than 100%. In order for **Ovd** to take effect, **Fdb** must be set to 100. Default is 0.

Recording

Once you have defined your Zone, you're ready to record sound into it. Information about the recording process may be found in the Status window.

The **Input Level** monitor shows the input level to LiSa through your computer's or soundcard's analog-digital converters. This should never go into the red -- that means annoying digital clipping is occurring, and you will have to readjust your levels either from your mixer or in the System Settings dialog box (p. 16). The Input level display has a separate monitor bar for up to eight possible inputs.

The **Rec** monitor turns magenta if a Record Zone is currently active. Remember that this does not necessarily indicate if recording is actually taking place. When **TOn** is above 0, it will only record when the level of your input exceeds the threshold values. Selecting the Show Current Sample Pointer option will allow you to see if recording is actually taking place.



The Sample Buffer pane will show a graphic representation of the samples currently in RAM. When you record, you will see your sample appear in the buffer after recording is completed, or if you are in Looping mode, after each loop.

The **Voices** monitor indicates how many voices are currently active. The number below the red button indicates the number of voices recording, below the green button, the number of voices playing back.

When recording is active, a message will appear in the System messages pane. If **Show Current Sample Pointer** is selected in the **Options** menu, it will show the current point of the sample pointer as well.

Activating your Record Zone

You will never hear your recorded sound directly as you record it. In

To initiate recording, simply press the key on your keyboard that is assigned to your recording Zone's

Overdub mode you will hear the original sample, and if you are looping and overdubbing, you will hear the last recorded version. In Once or Trigger mode, you will hear nothing as you record.

keyrange. Assuming you are not using a threshold, recording will commence immediately, in whatever fashion you have set in the Zone Editor. Once you have recorded, you can play the sounds using Playback Zones.

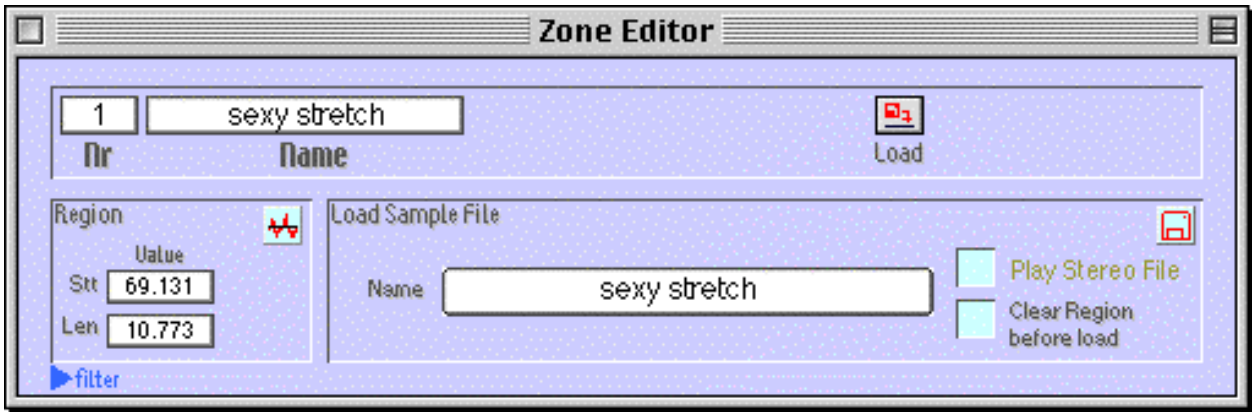
File Management Zones

There are three special kinds of Zones devoted to dealing with soundfiles: Static and Dynamic Load Sample Zones, and Load Session Zones. A Load Sample Zone is designed for loading samples that have been previously recorded. Load Session Zones are for loading samples which have been recorded live.

Load Sample Zones

There are two varieties of Load Sample zones, Static and Dynamic. They both serve the same basic function of loading soundfiles from disk into the Sample Buffer, but with different modes of operation. Like all Zones, Load Sample Zones are spawned by creating a new Zone in the Zone Library and selecting Static Sample Load from the Function Icon menu in the Zone Editor. Once you've done this, you'll notice that it looks rather different from the Zone Editor windows we've seen so far.

Static Zones



Firstly, you will notice that no Mode Icons remain, and there are no CTabs next to the **Stt** and **Len** numericals. This is because that except for keyboard activation (meaning you can activate the Zone with a midi note-on event), Static Load Sample Zones are not MIDI-controllable. The Load Sample File pane on the bottom right is where you select the sample to be loaded.

Selecting a Sample to Load

Like Record Zones, Load Sample Zones need only be assigned to one key on the virtual keyboard -- their keyrange does not affect playback pitch.

To select a sample to load, drag the name of the desired soundfile from the Sample Library window into the **Name** box in the Load Sample File pane. The name of the selected file will appear in the **Name** box in the Zone Editor Window. In addition, the Zone length will automatically be adjusted to the size of the soundfile, and the Zone will automatically be renamed with the name of the sample it is loading.

Quick load sample creation

*Don't forget: in these drag-and drop file creations, you can tweak the **Stt** and **Len** parameters as you need to after creating the zones*

If you drag a soundfile entry from the Sample Library to the Zone Library, it will automatically create a new Static Load Zone. The Zone will have the same name and length as the soundfile, with its start point at the beginning of the Sample Buffer.

Loading a Sample

When you activate a Load Sample Zone, it will load the soundfile from disk into the sample region specified by the **Stt** and **Len** numericals in the Region pane. Some things to keep in mind about loading samples from a Static Zone:

- **Sample Loads are Destructive**. That is, whatever material is in the Sample Buffer already in the region of the load Zone will be overwritten. It is not possible to mix a statically loaded sample with sound previously existing in the buffer.
- **Region Size**. The amount of time you assign to your sample region in the buffer need not be the same size as the sample. If the region is larger than the sample to be loaded, it will load the entire sample, and leave any other material inside that region untouched, unless you have selected the 'Clear Region before load' button. If the region is smaller, it will load as much as will fit in the region, starting from the beginning of the soundfile.

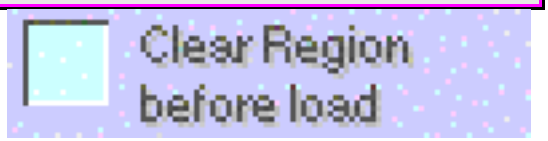
When you attempt to load a sample you will get a notification (in the Sample File Messages pane in your Status window) indicating if the sample was successfully loaded.

Sample Load Options

There are two options available for loading samples:

Play Stereo File. NB: This option will only be available if you have loaded a stereo file into this zone! When this option is selected, the sample will *not* be loaded into the sample buffer, but will simply be played direct from your hard disk, without changing the material in the buffer. This makes it possible to play samples that are much longer than the Sample Buffer. As the file is playing, you can see its progress in the Stereo File Progress Bar in the Status window. The velocity of the note that activates this Zone will determine its initial level. The playback volume is also adjustable via the Output Level parameter. You can stop the playback of such a file at any time by sending LiSa an All Notes Off message, which is a value of 0 on controller number 123 of the MIDI channel to which the Load Zone is assigned.

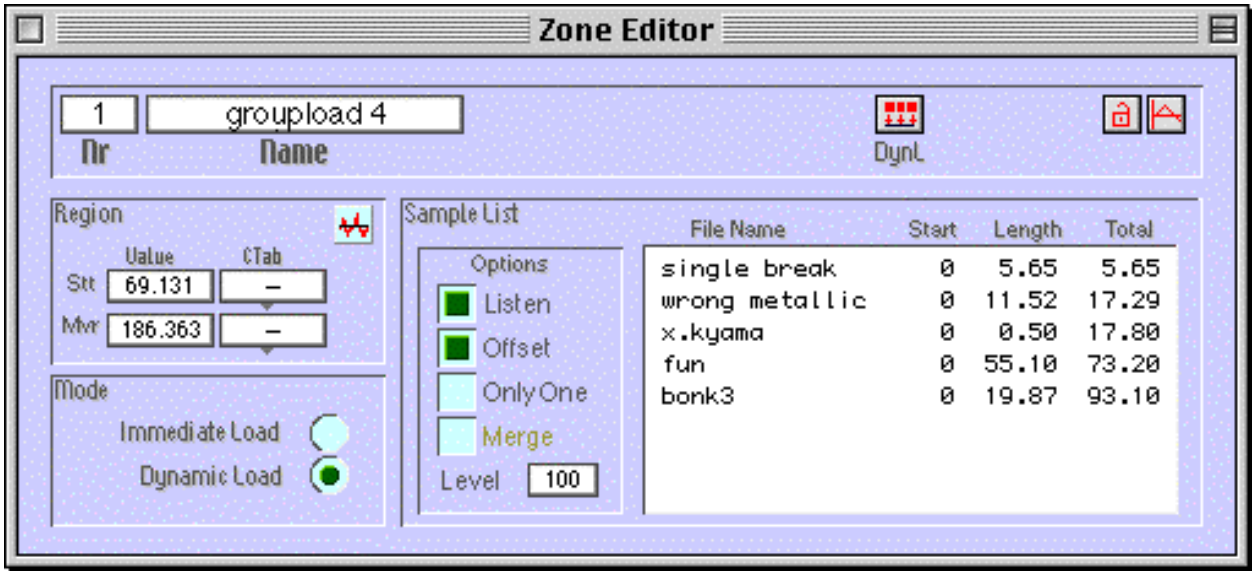
*Notes on the **Play Stereo File** option: 1.The numericals in the Region pane are irrelevant. 2. Only one file can be played this way at any one time. 3. If you are interacting with the graphical interface of LiSa while the file is playing, especially pulling down menus, the file may momentarily hang, but it will continue to play back as soon as the screen interaction ends. 4. Stopping a file as it is playing will turn off all MIDI notes active on this channel, so if you might be using that feature, put your load zones which will play files directly on a separate MIDI channel.*



Clear Region Before Load. This option is mostly useful for erasing space in the Sample Buffer. As mentioned above, under normal circumstances, if the load region is larger than the soundfile, the rest of the region is normally left untouched. If the **Clear Region Before Load** option is selected, the part of the region *not* containing the soundfile is cleared. For example, if you have a Static Load Zone that is 10 seconds long, and a 5-second sample in it, the 5 seconds after it in the Sample Buffer will be cleared.

Dynamic Zones

Dynamic Load Sample Zones work on a similar principle, but have more options available.



Movement

Dynamic Load Zones can be moved via MIDI, like a Playback or Record Zone, with a corresponding CTab. The **Mvr** parameter will set the movement range. Length may not be altered, or even set – the size of the Zone automatically adjusts to that of the sample being loaded.

Multiple samples

Like a Static Load Sample Zone, samples are added by dragging them from the Sample Library. Up to eight samples may be dragged into the Zone. Moving them up and down in the window will change their load order. To see why you might want to do this, see below. Dynamic Sample Load Zones have two Modes, Immediate and Dynamic. Each Mode has one or more available options, which may be selected in the Options pane.

Loading modes

Immediate Load.

This is the default setting of dynamic Zones. When the immediate load radio button is selected, all samples in the Sample List pane are loaded in top-to-bottom order. An activation of any length will load the entire sample collection. (Like the Static Zones, you can think of this as being in Trigger mode.) When in this mode, there is one option:

Merge. When this is selected, the samples to be loaded will be mixed with the samples already present at that location in the buffer, like a record Zone in Overdub mode. The **Level** numerical controls the amount of the new sample to be added to the old. Continued adding of samples on top of each other will create the same kind of distortion made by the **Fuz** playback parameter,

not digital clipping.

Dynamic Load

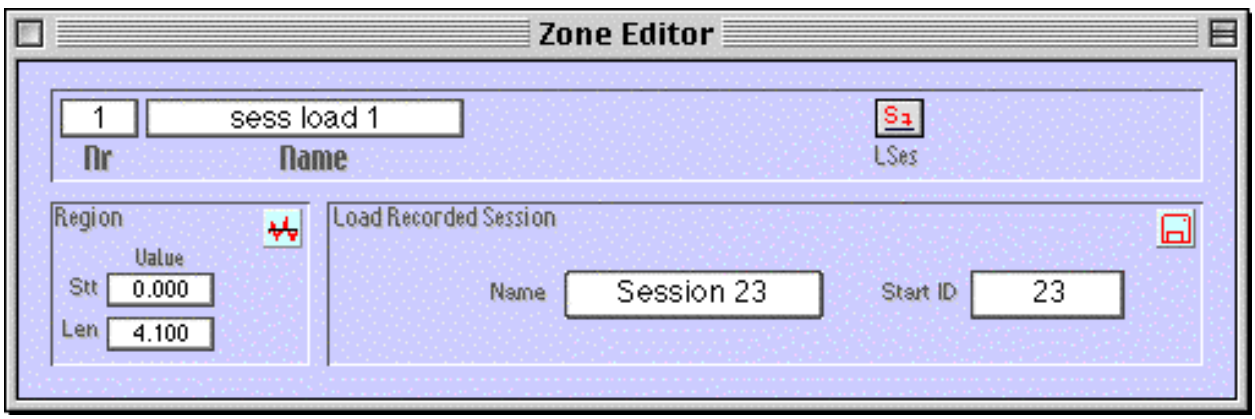
In Dynamic Load mode, the sample is loaded only as long as the Zone is active. If you have two 10-second samples, and hold the key controlling the Zone down for 5 seconds, only the first 5 seconds of the first sample in the collection will be loaded. The options for this Mode are rather complicated, and build on one another:

Listen. In Dynamic mode, you will probably always want to have this button checked. This plays the sample as it being loaded into the buffer.

Offset. When **Offset** is selected, the velocity of the note on event that activated the Zone is used as an index to select which sample is to be loaded first. The full range of the velocity is divided among the number of samples in the collection. In the example above, a gentle press on the keyboard will load the collection starting with the sample 'single break', a light medium one 'wrong metallic, a more determined one "x.kyama', and so on. The samples will always be loaded from the beginning of the soundfile, and will stop loading when the Zone receives a note off. Once one sample is finished, it will start loading the next one in the list.

Only One. Only available when **Offset** is selected. When **Only One** is selected, the Zone will only load one of the samples in the collection. In the above case, with Only One selected, a low-velocity note on would load 'single break' alone, no matter how long the key was held down.

Load Session Zones



There is another way to record and play back live samples, using Sessions. When using a Record Zone and then playing it back you are only dumping sound into the buffer. Using Load Session Zones, you can save any number of samples when recording live, and then load them at a later time during your performance. To use Sessions in a live performance:

- Enable Auto Save Recording for one or more recording zones. This will automatically save whatever your Record Zone records to disk.
- Once you have recorded some live sounds, you reload the saved recordings into the Sample Buffer with a Load Session Zone.

Once the sessions are loaded, you can play the sessions back with a Playback Zone.

Recording Sessions

Every time you activate a Record Zone that has Auto Save Recording enabled, you create a new Session. Regardless of which Record Zone you activate on which MIDI channel, it is simply saved as the next consecutively numbered Session.

Record Zones have the option of being set to save recorded samples to disk or not, via the **Auto Save Recording** function. (For a full explanation on how to auto save Recordings, see The Auto Save Session pop-up Menu on p. 71.) You can record as many sessions as your hard disk can hold. They will be saved into the same folder as your Setup, and automatically named 'Session 1,' 'Session 2,' etc. Sessions start numbering themselves anew every time you start up LiSa.

Loading Sessions

A load Session Zone, unlike a Load Sample Zone, is best used over a large keyrange. When you activate a key in this Zone's range, it will load a Session file based on the relative number of that key in the Zone's keyrange. The first key in the range will load session 1, the second will load session 2, and so on, depending on the number of sessions you have. If you attempt to load a session that does not yet exist, you will get an error message in the System Message pane.

There is a numerical in the Load Recorded Session pane called **Start ID**. (The box next to the label **Name** in this pane is display-only -- it is connected to the **Start ID** numerical.) This allows you to choose the session numbers that your keyrange will load into the Sample Buffer.

For example, you might want to have multiple Load Session zones on different MIDI channels. If your Zone on channel 1 has 10 keys assigned to it, they will default to playing back Sessions 1-10. You can create a second Load Session Zone on channel 2 as well, and have it play Sessions starting with number 11 by changing the Start ID numerical to 11. The number shown in **Start ID** will always be the Session number played by the 'lowest' key in the keyrange.

The note values of the keyrange you assign to your Load Session Zone will not affect their playback pitch! This Zone only loads, it does not play.

The effective number of sessions that can be loaded is 1144. The highest possible Start ID number is 1024, and if you have a Load Session Zone covering all 120 MIDI notes, 1144 is your maximum. Also note that the Sample Regions of these Zones cannot be moved or resized via MIDI.

Session loads work just like Static Load Sample loads in other respects. Loading a Session will only fill the Sample Buffer up to the size of its Sample Region, regardless of the size of the Session file it is loading, always starting from the beginning. You will not hear a Session when it loads -- you need a Playback Zone in order to be able to hear the Session.

Managing Sessions

Saved Session folders

If you are planning to save sessions, it is very important to save your Setup BEFORE recording any sessions. Sessions recorded by an unsaved Setup will appear in the folder containing the LiSa application, not in a sessions folder. One will be created if you save your Setup before quitting, but it will be empty. Should you find your Sessions folder empty, check in the LiSa application folder.

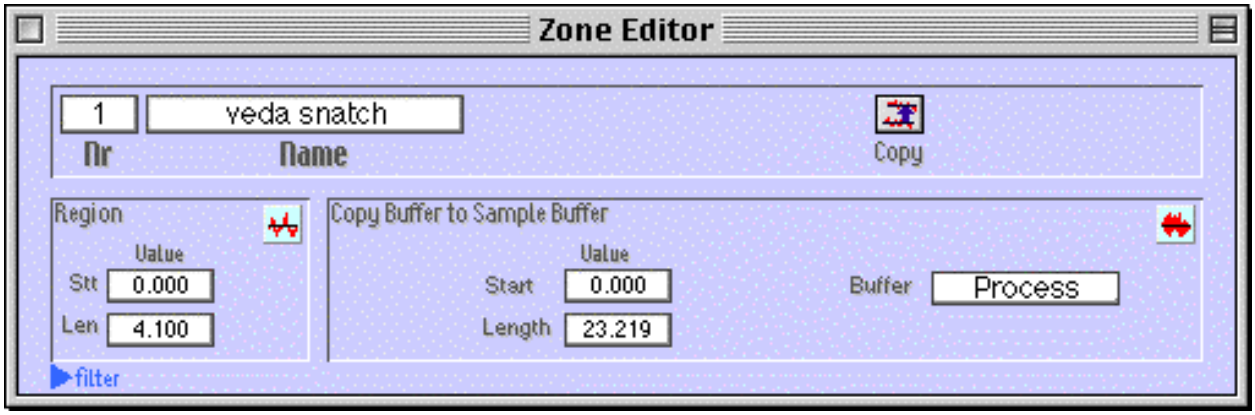
If you have recorded Sessions, they will be automatically reorganized every time you shut down LiSa. When you quit, it will create a folder in the folder that contains your Setup file. This folder will be named with the format '<date> Sessions <time>'. They are saved with the names 'Session 1', 'Session 2', etc. These can then be renamed as samples for later use, or reloaded as Sessions in another performance.

When loading Sessions, LiSa looks in the folder containing your Setup, and loads whatever it finds there with the name 'Session' followed by a number. This means that any samples can be loaded as Sessions by naming them 'Session <number>' and putting them in this folder. They could be previously recorded sessions or any old samples that you've named in this format. (This has no particular advantage over simply making a bunch of Load Sample Zones with old session samples, but you can do it.) If you choose to use those Sessions again, as Sessions, you have to take them out of the folder they were saved into. LiSa will not look in folders *inside* the folder containing your Setup. During a performance, Sessions must be directly in the folder containing your setup. After quitting, LiSa automatically moves them as described above.

Warning: If you have moved old sessions back into your Setup's folder and record any new sessions, LiSa will write over the old ones. If you have old Sessions numbered 1-20 in that folder, and record a new Session, LiSa will not record it as session 21, but will rather write a new file entitled 'Session 1', deleting your old 'Session 1' in the process.

Copying Buffers

Another one of LiSa's live performance abilities is the capacity to resample something that has already been played and return it to the Sample Buffer. This is done with Copy Buffer Zones. (For basic information about LiSa's buffers and how to resize them, see p. 19.



These Zones only copy from one buffer to another. In order to save any of this information to disk, you have to save it from the Sample Buffer with a Save Sample Zone.
If you are using ASIO, only the content of output channel A can

Copy Buffer Zones can be set to copy either the Output Buffer or the Process Buffer. You toggle between these two choices by clicking on the **Buffer** numerical on the right-hand side of the Zone Editor. The **Region** pane contains numericals for determining the size and location of the Zone's region. As in Static Load Zones, the sample region cannot be changed via MIDI. The numericals in the **Copy Buffer to Sample Buffer** Pane set the region of the Process or

be copied back to the Sample Buffer.	Output Buffer that is copied to the Sample Buffer.

The Output Buffer

The Output Buffer is normally empty. To copy it to the Sample Buffer, it must first be filled. Recording is initiated by a MIDI control message, or by hitting the 'S' key on your Mac's keyboard. It accepts any value from a controller to trigger recording -- the controller number you set yourself, in the **LiSa Settings...** dialog from the **Global** menu (p.16). If you are using an ASIO device, please be aware that only sound routed through output A is copied to the Output Buffer.

The **Output Buffer Rec Start** numerical is where you set the controller number. Any number, including zero, which you send from this controller to Lisa on the MIDI channel you have designated as the System channel (see p. 16) will enable recording. Recording will not commence until some sound is produced. Once that happens, the indicator above the rightmost of the two **Voices** monitors in the Status window will turn from green to red.

This indicates that the Output Buffer is being filled. It will turn back to green once the buffer is full. There is no way to stop the recording process once it begins -- it is always in Trigger mode. Once the buffer is recorded, you have two choices.

- It can be saved to disk. Select **Save Output Buffer As... from the File Menu.**
- It can be loaded into the Sample Buffer any time by activating a Copy Output Buffer Zone.

This process can be repeated at any time -- the old output buffer will be overwritten by the new sounds.

The Output Buffer records everything that happens while it is being recorded -- including nothing, so if there are silences in your performance, there will also be silences in your Output Buffer, and thus also in your Sample Buffer when you copy the Output Buffer to it.

The Process Buffer

New in v. 2.5: The output buffer is now stereo.

Unlike the Output Buffer, the Process Buffer continually records LiSa's output. It is a circular buffer, meaning that as new information is added, the oldest information is dropped to make room for the new. When LiSa is not producing any sound, the Process Buffer is inactive -- it does not fill up with silence.

When you copy the Process Buffer, you are copying some portion of the last few seconds of sound (depending on the size of the Process Buffer and sample region) into your Sample Buffer. This makes it possible to record something live (in a record Zone), load it (Load session Zone), play it back through some process (Playback Zone) load it again after it was processed by the last Playback Zone (Copy Process Buffer Zone), and process it again through the same or another Playback Zone.

Activating this Zone simply takes a part of the Process Buffer and copies it into the Zone's sample region, exactly like a load from disk. You can also set the Start and Length of the portion of the Process Buffer you copy, but since this is a circular buffer, you cannot predict with much accuracy exactly what sounds you will get.

Parameter Control

Setup

For the basics of connecting and configuring MIDI in LiSa, and for setting MIDI preferences, please see MIDI Setup, page 15

Parameter Control Types

MIDI

MIDI is LiSa's primary interface to the outside world, and in a performance situation most of your manipulations of LiSa will be done via some sort of MIDI instrument. LiSa gives you maximum flexibility in assigning controllers to different parameters of the program. There are six primary functions of MIDI:

- Activating Zones. This is done using note on and note off MIDI commands, much like MIDI on a standard sampler.
- Moving and resizing the sample region of a Zone in the Sample Buffer.
- Changing Zone parameters such as panning or distortion.
- Controlling input and output levels of samples.
- Amplifying the current Zone.
- Initiating an Output Buffer recording.

Modulators

Zone Parameters can also be controlled using internal table-driven modulators. Their operation is explained in full below. In all respects regarding Setup and connections to Parameters, they are treated no differently from MIDI controllers.

Architecture

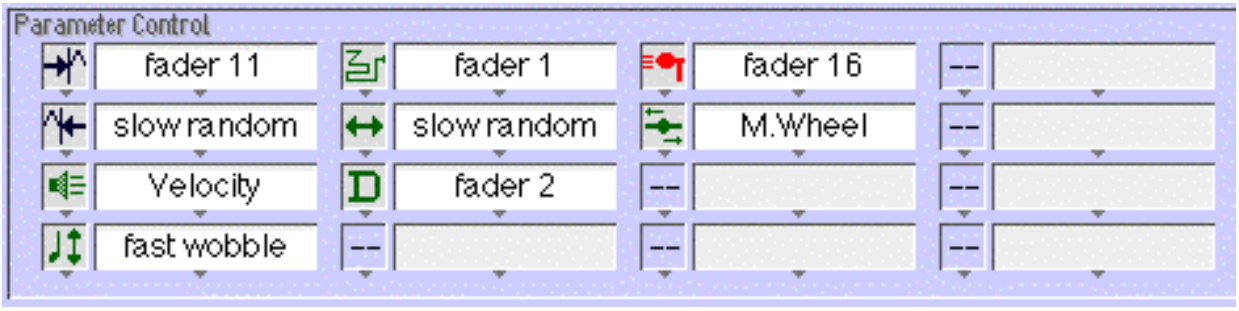
Parameter Controls are connected to Zones in the Parameter Control pane of the Assignment window. This will always mean first selecting a Parameter to control, and then assigning it to a Controller. Controllers of both types are created in the Controller editor. There is a Parameter Library, but you cannot create new Parameters. The number of Parameters in LiSa is fixed, and the Library is there primarily for reference and drag-and-drop convenience.

Controllers, whether they are MIDI or Internal Modulators, are stored like all other data in a Library, created in an Editor, and named with a name of your choice.

MIDI in LiSa is assigned to Voice Layers, and MIDI sent to a Voice Layer can affect all of the Zones whose keyranges are in that layer. It is possible to vary the way MIDI affects the various Zones on a channel, or not have a Zone be effected by MIDI at all. A MIDI input, typically a 7-bit value (0-127), is assigned to a variable. This could be sample region length, a degree of effects processing, or almost any of the Zone Editor parameters. Before this number is applied to the variable it can be passed through a special table called a Control Table, or CTab. These tables can be custom-designed to map the normally linear values of a MIDI controller to some other set of values. (See Tables, p. 46.) You can see the MIDI input from your instrument in the MIDI Monitor pane of the Status window, or in the Assignment window by selecting **Display Last MIDI Event** in the **Options** menu.

The only exception to this structure is MIDI control of modulator parameters, such as speed and table shape. Modulators exist independently of any given Voice Layer, and MIDI control for these is set in the Controller editor (see Editing Controllers, p. 87)

The Parameter Control Pane



The Control Pane in the Assignment window contains 16 pairs of popup menus, in which MIDI inputs or LiSa's internal modulators can be assigned to various Parameters. Assigning MIDI inputs to either effects Parameters or sample region Parameters involves the same process, all of which is done in the Assignment window:

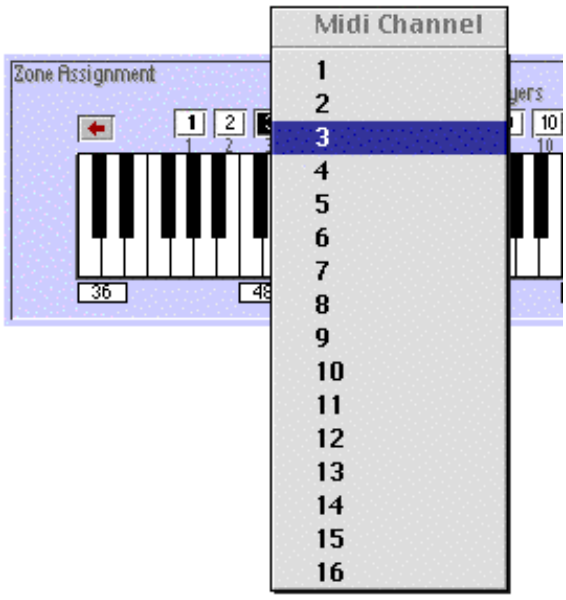
Selecting the Voice Layer in the Zone Assignment pane (see Assigning Controllers to Parameters below).

Selecting a Parameter to be controlled in the Parameter Control pane.

Assigning Controllers from the Controller Library to sample region or effects Parameters in the Parameter Control pane.

Creating and assigning CTabs, if desired, to the various Parameters. CTabs affect individual Zones, and not the overall input of a controller, so different Zones in the same Voice Layer can respond differently to the same controller. CTabs are set in the Zone Editor of each individual Zone.

Voice Layers and MIDI Channels



Each of the radio buttons on the top of the Assignment window is actually a popup menu, which can be set to any number from 1 to 16. This number sets the MIDI channel number the Voice Layer listens to. It is possible to have any number of Voice Layers assigned to a single MIDI Channel. This has two main consequences:

- You can activate more than one Zone from a single key. This is done by assigning the Zones to the same key in different Voice Layers responding to the same MIDI channel.
- Controllers can affect more than one Voice Layer. By assigning a Controller to a MIDI Channel that affects more than one Voice Layer, one Controller can affect parameters in multiple Voice Layers.

If nothing is selected in the Assignment Window, selecting Copy from the Edit menu will copy the entire Voice Layer to the clipboard, from where you can paste it into another Voice layer in the same, or another, Preset.

Assigning Controllers to Parameters

The Parameter Control pane of the Assignment Window can be thought of as the patchbay where you can connect Parameters to Controllers (either external MIDI or the internal modulators -- see below). The pane is comprised of 16 pairs of popup menus. There are two ways to assign a Parameter to a Controller:

- **Click** on the left-hand menu. This is the Parameter Select menu. A popup menu of all Parameters will appear. Select the Parameter you want to control. From the right-hand menu, the Controller Select menu, select a Controller, or create a new one.
- **Drag** Parameters and Controllers from their respective Libraries to the appropriate menu spots in the Parameter Control pane.

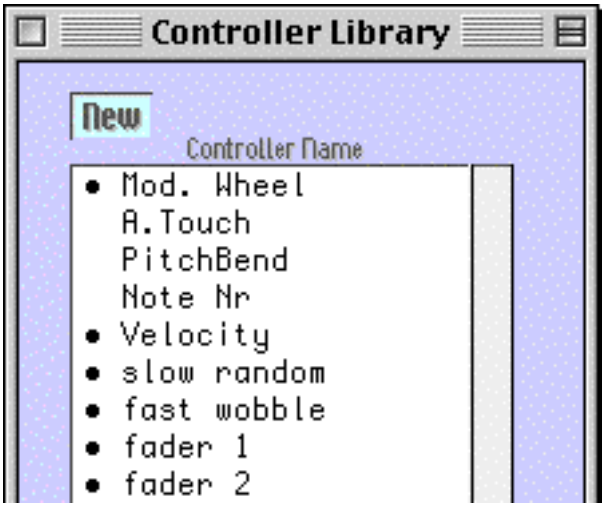
A Parameter must always be selected before a Controller. A Controller Select menu will not respond unless it has a Parameter assigned to it. A Parameter may only be connected to one Controller per Voice Layer. Used Parameters will be grayed out in the Parameter Select menu, and bulleted in the Parameter Library.

Parameters and Controllers

Parameter Library

The Parameter Library is fixed – you can use it to drag Parameters to the Assignment window, and as a reference to see which Parameters have been assigned to the current Voice Layer. Assigned Parameters are marked with a bullet in the Parameter Library window. A Parameter may only be assigned once in a given Voice Layer. Unlike other Libraries, the bulleted Parameters indicate which are used in each Voice Layer, not each Setup.

Controller Library



The Control Library will always appear at first with a limited set of the standard MIDI controls. Any Controllers you create in the Controller Editor will appear here.

You can add your own custom controls, which may be either MIDI inputs or modulators, to the Controller Library. You can drag Controllers into the Assignment Window, or access them from the popup menus in the Control pane.

Creating Controllers

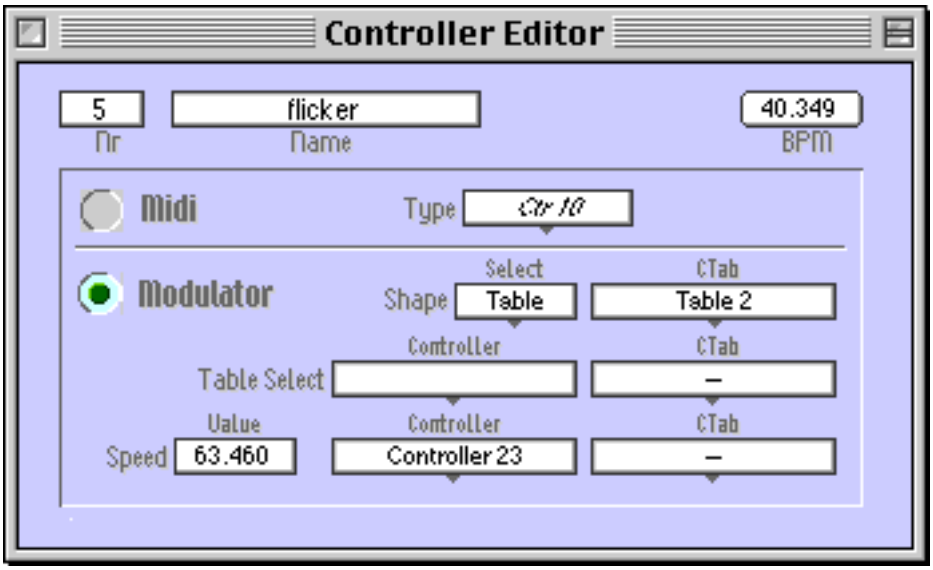
Controllers may be created from either the Controller Library or the Parameter Control pane of the Assignment window. The Control Editor window will automatically open when you create a new Controller.

- To create a new Controller from the Library: click on **New**.
- To create a new Controller from the Assignment Window, select **New Controller...** from one of the Controller Select menus in the Parameter Control pane.

Once you have created a new Controller, the Controller Editor will automatically appear, and it will be

available for editing.

Editing Controllers



At the top of the Controller Editor are numericals for the number and name of the Controller. Like Zone numbers, these are for internal reference only and may not be changed. Scrolling through the controller number numerical will bring up the appropriate Controllers in the Controller Library for editing. You can also scroll through available Controllers in the Controller Editor using the left and right arrow keys. The second numerical is a name field, which can be edited the same way as Zone names. The two radio buttons select between external MIDI control and internal modulators.

MIDI Controllers

Clicking on the **Type** numerical will bring up the MIDI Controller Menu. This shows the MIDI input options available. The **Controller** item has a submenu showing all 128 MIDI controller numbers. Select the menu item, rename the Controller, and you're done. If your MIDI is plugged in, it is also possible to select your MIDI input by selecting the Type numerical and activating the controller you want to use. LiSa will automatically detect which controller you are using and show it in the numerical. This works for all MIDI except note number and velocity. (Hitting a key will enter Aftertouch or Poly Key Pressure, depending on which your keyboard is using)

Channel and Voice MIDI Control

There are two different types of MIDI input in LiSa: Those that affect the entire Voice Layer, and those that only act on the current sounding voice. Poly Key Pressure, Note Number, and Note Velocity will affect every voice separately – if Note Velocity, for example, is connected to **Tun**, the pitch of each voice will depend on the velocity of the key that activated it. The other Controllers, including Last Note Number, and Last Velocity, will affect all active Zones in the Voice Layer. If Last Velocity is connected to **Tun**, all active Zones will change their pitch when a new note is struck. Likewise with panning – A Channel Controller will move all voices on that Voice layer to the new panning position. (This can be varied from Zone to Zone with CTabs, of course) All of LiSa's internal modulators are

Voice Controllers.

Modulators

In addition to external MIDI, you can create any number of internal modulators to control Parameters. These work by automatically reading tables at a preset speed. As we will see below, this speed can itself be varied with another controller. LiSa has some tables built in, but it is also possible for the modulators to read from custom tables. To create a modulator:

- Select the **Modulator** radio button.
- Select a table from the Shape menu

Shape. This popup menu determines the wave shape of the modulator. There are four permanent tables built into LiSa, with sine, sawtooth, and square waves, and one random table. The default is a table, with Table Nr. 1 as the selected table. To use a custom table, select Table from this menu, and select the table you wish to use from the **CTab** menu to the right.

CTab. If you have selected **Table** from the Shape menu, this menu will become available. You can select a table from ones you have already created, or make a new one by selecting **New Table...** from the menu, which will open up the Table Editor.

Table Select. These two menus allow you to control the table that the modulator is reading. You can select the controller which will select tables in the Controller menu. In the CTab menu, you can pick a CTab to filter the controller. (For more on table selection, see Table Editing Parameters, p. 93). This is a particularly powerful feature that allows you to change the table the modulator reads in real time.

Speed. Sets the speed at which the modulator will be read. The maximum and minimum speeds will vary depending on the size of the table. Range is from 0.01 to 127.0. Note that these are floating point values. Maximum modulator speed is dependent on the Signal Vector size of your setup. (For more on this see Appendix 1.) You can also set a controller to vary the speed in the Controller menu. The range of the controller can be set with the selected CTab in the menu to the right. To remove the modulator's speed control, select Remove from the popup menu.

Controller Behaviors

As mentioned above, controllers are assigned to parameters in the Parameter Control Pane of the Assignment window. Clicking on one of the left-hand small boxes presents a pop-up menu with all of the parameters listed below.

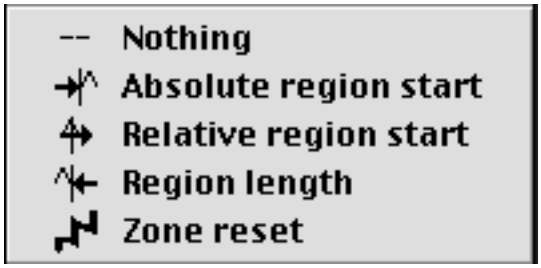
Some Zone Parameters behave slightly differently under MIDI control than when they are changed by hand in the Zone Edit window. All Controller behaviors are described in detail below. Note that 'Controller' here means any kind of input that can be assigned in the Parameter Control pane of the Assignment window; i.e., velocity, pitchbend, etc. plus internal modulators.

For Parameters that only refer to specific Zone functions or modes, Controllers will only affect Zones of the appropriate type; e.g. changing the Spiralness Parameter will only affect Playback Zones in Spiral mode.

Also keep in mind that although MIDI control is assigned to an entire Voice Layer, individual Zone responses will depend on what (if any) CTab is assigned to the individual Zone's MIDI input and the settings in the Region pane of the Zone Editor window.

Sample movement parameters

Nothing. No Parameter is available, and no Controllers may be assigned in the corresponding Controller Select menu.



Absolute Region Start. This Parameter controls the start position of the sample region of the Zone. This Parameter is always additive, e.g., the higher the value, the further ahead of the original sample region start point (as set in **Stt** in the Zone Editor) the start of the sample region will move. The maximum range covered by this Parameter will depend on the size of the **Mvr** (movement range) numerical. The CTab connected to the **Abs. Start** value is the one to the right of the **Mvr** numerical in the Region pane of the Zone editor. If you set your Mvr high enough to move your sample region out of the buffer, LiSa will loop the region around back to the beginning of the buffer

Relative Region Start. If the **Mvr** of a sample is very large, it is possible that the jumps between Controller values will skip more samples than you would like. Rel. Start acts as a fine tuner for your sample region start point. The overall range of **Rel Start** is set in the Global LiSa Settings window, expressed as a percentage of the **Mvr** parameter of the Zone in question. For example, if the Rel. Start range is set to 10% (default), and the **Mvr** of the zone is 12 seconds, the control range 0-127 will move the start pointer from 0.0 seconds to 1.2 seconds. It is not necessary to have **Abs. Start** enabled for **Rel. Start** to work. The CTab connected to the **Rel. Start** value is the one to the right of the **Stt** numerical in the Region pane of the Zone editor.

*When controlling Sample movement from a controller, and jumping the sample pointer around, you can reduce the amount of clicking by increasing the **Crossfade** parameter in the LiSa Settings Dialog. Keep in mind, though, that the longer the crossfade, the more stress on your CPU.*

Region SP Offset. To those of you familiar with earlier versions of LiSa, this control parameter replaces the region/pointer option switch. When a controller is sent to this Parameter, it moves the *sample pointer itself* within the sample region. The Zone's region does not change, and the **Mvr** Parameter has no effect. Every time your Controller moves the pointer, the sample will start to play again from that point, and will continue to the end. Once it reaches the end of the sample, it will either loop or stop, depending on the Advance mode of the Zone.

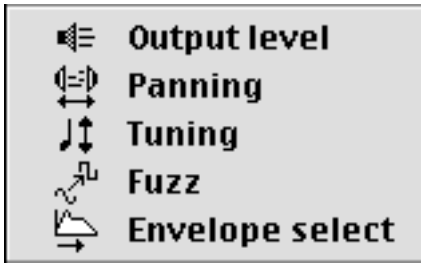
Region Length. This Parameter changes your total sample region length in relation to the original length set in **Len** in the Zone Editor.

A control value of 0 will shrink the sample region to 1.5% of its original length, and a control value of 127 will double it.

Zone Reset. When this is sent a 0, and only a 0, all Zones on the channel, active or not, will automatically revert to their original settings as described in the Zone editor. This includes start and length of the sample region and effects settings.

Output Parameters

Output Level. Sets output level for playback Zones in all modes. Equivalent to the Lev numerical in the Zone Editor.



Panning. Controls the pan position of a Zone. 0 = 100% right, 127 = 100% left. The exact behavior of this input depends upon whether the MIDI control is a voice or channel control. (See Channel and Voice MIDI Control, p. 87.) If it is voice-specific, pan for each instance of a Zone will vary depending on its MIDI control. If channel-specific, all voices in the Voice Layer will move together.

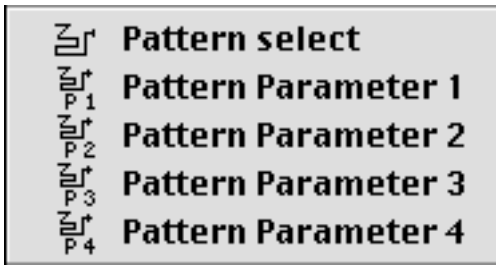
Tuning. Works the same way as the **Tun** numerical found in all Playback Zones. You can set the range of pitch change in the **Pitch Bend Range...** dialog in the **Global** menu.

Fuzz. Amplifies previously recorded sample. Works exactly the same way as the **Fuz** numerical in the Playback Treatment pane of the Zone Editor.

Envelope Select. Sending a Controller value to this Parameter will change the envelopes in all Zones in the Voice Layer to the envelope of the corresponding number in the Envelope Library. This index works like program change messages, i.e. the Controller value will always be one less than the index number of the envelope. Control value 0 brings up envelope 1, etc. To avoid changing all envelopes in a layer identically, use CTabs or voice-specific Controllers with this Parameter.

You can get different Envelopes (or patterns) in different Zones by giving each Zone a different CTab for this variable.

Pattern Controls



Pattern Select. Sending a Controller value to this Parameter will change the pattern in all pattern Zones in the Voice Layer to the pattern of the same number in the Pattern Library. If you have 10 patterns, control value 0 or 1 will load pattern number 1, 2 will load pattern 2, etc. Note that this is different from how Tables and Envelopes are selected. To avoid changing all patterns in a layer identically, use CTabs or voice-specific Controllers with this Parameter.

Pattern Parameters 1–4. These are assigned to different aspects of a Pattern Zone. The operation of these Controllers is discussed in full in **Pattern Modes**, p. 64.

In Pattern Select and Envelope Select, sending control values that do not have a pattern or envelope connected to them will automatically select the highest-numbered pattern or envelope. Thus if you have less than 128 patterns or envelopes, a CTab is more or less required to map your various patterns across your control range

Playback Zone Parameters

These items control depth or degree of output effect on Playback Zones in various modes. Full control range covers the full range of the Parameter, (scaled to seven bits of resolution) however its range is expressed numerically in the Zone Editor.

Spiralness. Changes the mystery Parameter (**Spl**) for Zones in Spiral mode.

Playback Direction. This control only works for Playback Zones in Back and Forth mode. Any control value below 64 will force the playback pointer to a forward direction, no matter what direction the Zone was originally playing in. At 64 or above it will force the playback pointer to move backwards until it reaches the start of the region.

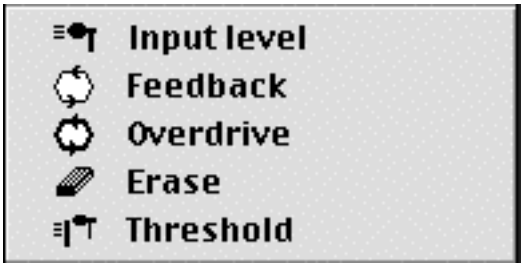
Resonance Frequency and **Resonance Depth**. Controls these two values for Zones in Resonator mode (**Res** and **Dpt**).

Scrub. Changing this control value 'scrubs' the sample backwards and forwards. Due to the design of this mode, pitchbend is the most suitable controller. As you increase the values above 64, you will hear the sample looping in a forward direction, increasing in pitch as the control value goes up. As you go below 64, the same thing will happen, except the sample will go backwards. At a value of 72 (forwards) or 56 (backwards) the sample plays at its

original pitch.

Record Parameters

The next five MIDI inputs control record Parameters, and function exactly as they do in the Zone Editor for Record Zones. For details see Recording a Sample, on p. 68.



Input Level. Controls the input level of sounds as they are recorded. Identical to the **Inp** numerical in the Record Treatment pane.

Feedback. Controls the amount of old sound that is retained when loop recording. Identical to the **Fdb** numerical in the Record Treatment pane of the Zone Editor.

New in v. 2.5: Overdrive in playback

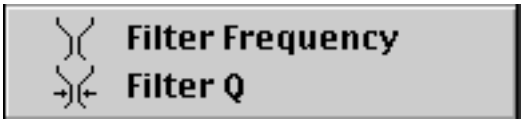
Overdrive . Overdrive is an extension of the feedback control -- rather than attenuating the previous signal, it amplifies it. You can think of it as Feedback values of more than 100%. In order for **Ovd** to take effect, set **Fdb** to 100. Identical to the **Ovd** numerical in the Record Treatment pane of the Zone Editor. In addition, the Ovd parameter now has an effect on voices while playing back. Increasing this parameter while there are voices playing back will create a DC offset in the sound, creating a rather interesting distortion effect, which is guaranteed to drive soundmen mad at all your gigs.

Remember, when using this parameter for recording, that it will affect Playback Zones in the same voice layer, so it might be wise to keep your Playback and Record Zones on separate Voice Layers.

Erase. This Parameter is most useful when using LiSa as a delay system. Increasing this value when loop-recording sound will decrease the amplitude of whatever you record into the Sample Buffer at that time, and a value of 127 will erase it entirely. This can be very useful for 'punching holes' in repeatedly delayed material. The Erase function cannot be connected to a CTab.

Threshold. Identical to the **TOn** numerical in the Region pane of the Zone Editor. Sets volume threshold for recording.

Filter Parameters



Filter Frequency. This controls the frequency (high cutoff, low cutoff, or bandwidth center, depending on the filter)of the filters used in Playback Zones. 0 is lowest, 127

highest.

Filter Q. Sets the q (steepness of the filter slope) of the filter. 0 is flattest, 127 steepest.

Table Editing Parameters

For changing table values in real time. See Real-time Control of Tables on p. 94 for details. Note that it is not possible to connect a CTab to any of these Parameters.

Edit Table Select. This is an indexing Parameter, like Envelope select. The Controller value will select the number of the table edited by the other three MIDI controls. Since CTabs cannot be used, you can only access the first 128 tables for real-time editing.

Selected Table Index. Midi values sent here will set the index number (X value) of the table to be altered by Selected Table Value.

Selected Table Value. Sets the Y value of the index selected above.

Selected Table Length. Changing this parameter will vary the amount of the table that is actually looked at. The control range (0-127) is automatically scaled to the size of the table.

Wave Table Parameter

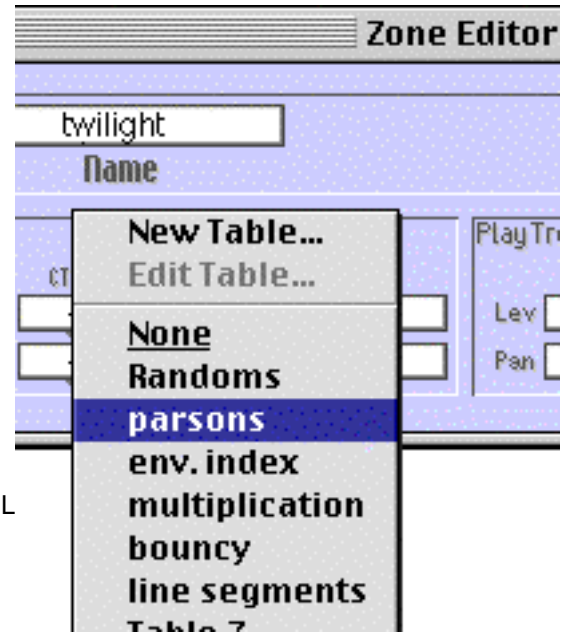
Used in Wavetable Playback Zones.

Wave Table Mix. Controls the relative volume of the Source and Destination waveshapes. 0 is 100% Source, 127 is 100% destination.

Mapping MIDI Controllers – CTabs

Tables (CTabs) can be used to map linear Controller signals to other sets of values. For a general description of creating and editing tables, see **Tables and Envelopes**, p. 46.

Controllers



Although MIDI input effects all enabled Zones assigned to that Control Layer, the response of each Zone to that MIDI input does not have to be identical. You can map the input to any output you desire with CTabs. To the right of all the MIDI-controllable Parameters in the Zone Editor is a numerical labeled **CTab**. Clicking on this will reveal a popup menu with all available CTabs. From here you can choose the Control Table to which incoming MIDI is mapped.

L

MIDI input is mapped to the X value, and MIDI output to the Y value of the CTab. Tables of any size can be used – LiSa will interpolate the values to the 0-127 of MIDI controllers.

Indexes

If you want a Zone to respond to some MIDI inputs but not to others, linking a parameter to a CTab that contains one fixed value (for example, 64 for the tuning parameter) will effectively disable it.

Some Zone Editor Parameters (notably envelope select and the pattern modes) use MIDI controllers to select between options rather than control variables. CTabs also come in handy for this – you can map out the full range of a Controller to select all or a selection of items out of the Envelope or Pattern Libraries. It is often handy to use MIDI notes rather than a continuous controller to choose between index numbers. This can be done using MIDI Processors, which can convert note information to controller information. See p. 98 for more on this.

Real-time Control of Tables

You can use MIDI to change table values in real time. Tables being used for any purpose can be changed, although it is most powerful when used to change tables being read as waveforms. To do this requires at least two control sources. Settings for real-time control of tables are made in the Control pane of the Assignment window. To edit a table via MIDI:

Edit Table Select. If the Parameter is connected to a Controller, that Controller's value +1 will select the table number to be edited. (It works like Program Change messages – an index value of 0 will edit table 1, etc.) If no Controller or modulator is connected to this Parameter, all MIDI sent to the other Table Edit Parameters will automatically be applied to table number 1. Note that there is no way to control this Parameter with a CTab, so you may have to think carefully about what order and where those tables are in your Table Library. In addition, this means that only the first 127 tables in your Table Library can be edited in this manner.

Selected Table Index. The value this Parameter receives will set the index number (X value) of the table to be edited. If it receives a value of 16, whatever value comes into the **Selected Table Value** Parameter will change index number 16. This Parameter by itself changes nothing in the table. It is often useful to connect a modulator attached to a sawtooth wave the same size as the table to be edited to

this Parameter, to be able to change values sequentially.

Selected Table Value. Sending a value to this Parameter will immediately change the value (Y value) of the table at the index specified in **Selected Table Index.**

Miscellaneous MIDI Controls

Sustain and Sostenuto

LiSa also supports MIDI Sustain and Sostenuto commands, both directly from the Status window and via MIDI. Enabling Sustain on a MIDI channel will keep all Record or Playback Zones in the effected Voice Layers active until Sustain is turned off for that channel, at which point all sustained notes receive note off messages. Enabling Sostenuto acts like sustain as long as it is on. When Sostenuto is turned off, all held notes will continue to hold until the key that activated them is pressed again.

Each of the 16 buttons next to the words **Sustain** and **Sostenuto** will enable sustain or sostenuto on Voice Layers 1-16. Clicking with the cursor in these buttons will toggle them on and off. If more than one Voice Layer is assigned to a particular MIDI Channel, enabling Sustain for that Layer will enable it for all other Layers sharing that MIDI Channel as well.

You can also activate Sustain and Sostenuto from MIDI messages:

- A value of 127 from Controller No. 64 will turn on sustain for all Voice Layers connected to that MIDI Channel, and a value of 0 will turn it off.
- A value of 127 from Controller No. 66 will turn on sostenuto for all Voice Layers connected to that MIDI Channel, and a value of 0 will turn it off.

Sustain and sostenuto can be enabled from the keyboard for the active Voice Layer. '+' will toggle sustain on and off, and '-' will do likewise for sostenuto.

Velocity Mapping

It is important to note that velocity is always connected to the amplitude of a Zone in the traditional MIDI manner – the harder you hit, the louder the sound is, reaching the volume set in the **Lev** numerical when a key is struck with a velocity of 127.

It is possible to change the relationship between velocity and volume response by using a CTab, however. If you look at the Play Treatment pane in the Zone Editor, pressing Shift will turn the value of the **Lev** numerical into the word **Vel**. The CTab to the right of the numerical is connected to velocity. By adding a new table here, you can change the relationship between velocity and volume. In the example, a table titled Inverse, which goes from 127 to 0 has been inserted, so a soft touch will be loud, and a loud one soft.

Amplify Current Zone

It is possible that you will record a sound at a level that is unsuitably low in volume when played back. It is possible to amplify the sample region of your current Zone (that is, the last Zone played, or the one visible when you have **Show Current Zone** selected) by sending it a MIDI control value. This is set from the **LiSa Settings...** menu item in the **Global** menu. (See p. 16.)

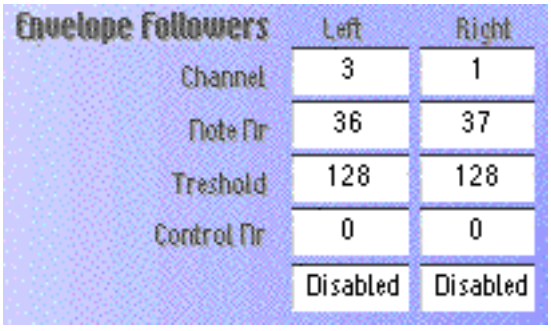
In **Amplify Current Zone**, there are two variables. The first is the controller number. Sending any value on this Controller on any channel will cause the sample region of the selected Zone to be amplified by the percentage specified in the numerical labeled **%Gain**. (This works best with a controller you can send from a button rather than a slider -- every time you change the slider value, you will 'bump up' the amplitude of the signal.) This numerical has a range of 0 - 200% amplitude of the original signal.

Using this will permanently change the sound in the Sample Buffer, although not in your original soundfile, if the sample comes from one. Repeated amplifying will cause distortion akin to analog distortion, not digital clipping. It also is slightly slower than real-time. If your region is fairly short, it is fast enough to use in performance, but not instantaneous. The speed of your computer will also affect this -- it's best to experiment a bit before trying it out on stage.

Clear Sample Buffer

You can now clear the entire sample buffer of sounds via external MIDI control. In the **LiSa Settings** dialog box, you can set a controller (which operates on the System Channel), which will clear the Sample Buffer when you send it a value of 0.

Envelope Followers



The audio input into LiSa can be converted to MIDI. Audio can generate note on and off messages, and be attached to MIDI controllers. LiSa uses the amplitude of the incoming signal to generate these MIDI values. Settings for the Envelope Followers are made in the **LiSa Settings** item in the **Global** menu. This MIDI is treated exactly as MIDI coming from an external device. Settings can be different for Left and Right inputs.

Note that these settings have nothing to do with recording audio as it comes in. These settings are only for MIDI.

EF Channel. All MIDI from the Envelope Followers is sent on the channel set here.

EF Note Nr. When the Envelope Follower detects input above the threshold level, it will send a note on message to LiSa for this value on the MIDI channel specified above. When the signal goes below the threshold, it will send a note off.

EF Threshold. Here you can set the threshold level for note on and off messages. Amplitude above the threshold will generate a note on, and when it falls

below the threshold, a note off. Setting this numerical to zero will cause a note on when any audio is received, and at 127 the envelopes will never be triggered.

EF contr. Nr. Here you set the Controller number for the Envelope Follower.

Enable/Disable. This numerical controls the functionality of the Envelope Followers.

To use MIDI from the envelope followers, treat it like any other MIDI input:

For **Note on** messages, just drag a Zone to the key specified, and it will be activated once the EF passes the threshold.

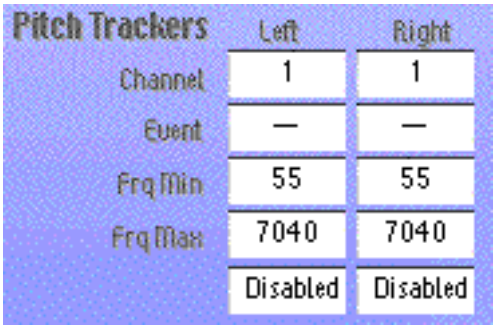
For **Controllers**, create a new Controller in the Controller Library with the number of the MIDI controller you have assigned in the dialog box, and treat it as any other external Controller.

Pitch Trackers

New In v. 2.5: Pitch Trackers

LiSa now has the ability to take pitch information from audio inputs and convert it to MIDI. It works in a way similar to the Envelope Followers. LiSa listens to incoming audio, attempts to isolate a dominant pitch, and converts this information to MIDI. When using this feature, there are two things to keep in mind:

- The accuracy of the pitch tracking will be *very* dependent on the kind of input it is receiving. The noisier a signal, the less accurate the pitch tracking will be.
- Using the pitch trackers is very processor-intensive, and when using them you will have fewer voices available.



The pitch tracker takes the pitch input, and scales it to a range of 0-127. The MIDI output range is scaled to the values between the **Frq Min** and **Frq Max**. For example, if the **Frq Min** parameter is set to 110 Hz, and the **Frq Max** is set to 1760 Hz (four octaves), the pitch tracker will output a 0 when it hears a pitch of 110, 32 at 220 Hz, 64 at 440 Hz, etc.

The pitch tracker can be set to output controllers 0-127, pitch bend, channel aftertouch, program change, or MIDI notes. When you choose MIDI notes as the output, a note is turned on as soon as the input enters the active pitch range. When the input pitch changes, the old note will be turned off, and a new note will be immediately initiated. Thus there will always be some note on as long as the input sound is within the active pitch range.

Settings for the pitch trackers are found in the **LiSa Settings** dialog in the **Global** menu.

Channel. The MIDI channel on which Pitch Trackers send MIDI data.

Event. Here you can choose what kind of MIDI event the Pitch Trackers will generate.

Frq. Min. The lowest frequency to which the Pitch Tracker will respond.

Frq. Max. The highest frequency to which the Pitch Tracker will respond.

Enable/Disable. This numerical controls the functionality of the Pitch Trackers.

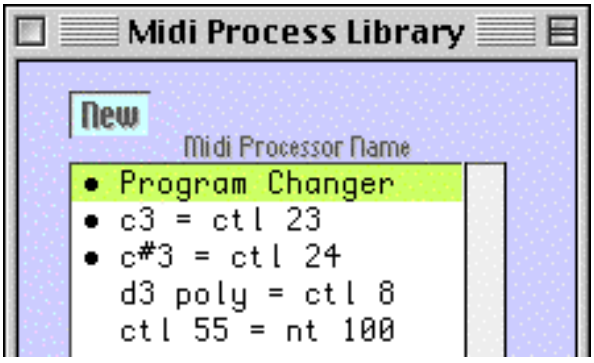
MIDI Processing

The MIDI Process Editor is a very powerful tool which adds an extra level of specialized control to your MIDI input. The Process Editor can be thought of as a way of mapping one type of MIDI input to another: Aftertouch can be used as note ons, MIDI notes can be used to increment and decrement controllers, and so on. This can be particularly useful if you have a limited number of hardware controllers – you can assign as many keys on your keyboard as you would like to function as MIDI controllers.

Architecture

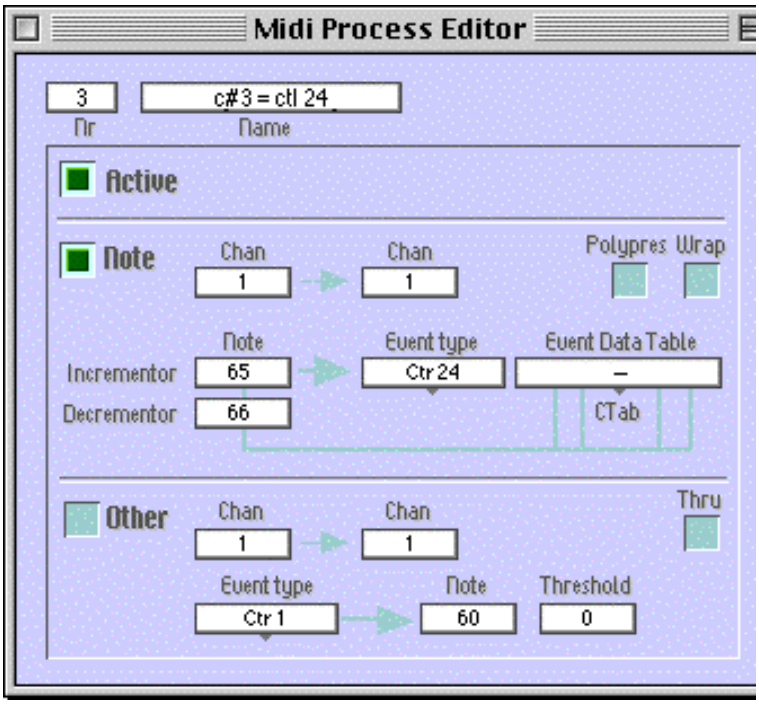
MIDI Processors function in LiSa much as any other element does: You create processors in an editor, and can store as many as you wish in a Library. Each Processor is designed to handle one particular input as it comes into LiSa. A Processor is associated with a Setup, so all Voice Layers and Presets within a Setup are affected.

The MIDI Process Library



This functions as any other library does in LiSa: You create new Processors here, by clicking on the **New** button, and can save, import, or export the Library just like any other. Unlike many of LiSa's other functions, you can only create new Processors in the Library. Active Processors are marked with a bullet.

The MIDI Process Editor



The two topmost numericals, like in all editors, contain the number of the Processor being edited, and the name of the Processor. You can scroll through the **Nr**. numerical to switch between Processors, and change the name in the **Name** numerical.

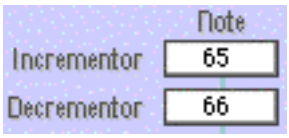
The **Active** radio button in the topmost pane simply turns the Processor on and off. If a Processor is deactivated, the MIDI that would otherwise be treated simply passes into LiSa unchanged. The only place where Processors can be activated or deactivated is here in the Editor.

The two lower panes are where you actually change the settings for your MIDI input. Each of these panes is for a different type of input: The upper is for MIDI note inputs, and the lower is for all others. A single Processor can only process one kind of MIDI input at a time.

The Note Pane

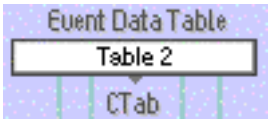
When the **Note** radio button is selected, you set your processing in this pane. Note on messages are transformed into continuous inputs (controller, aftertouch, pitch bend, or program change). It works by selecting two input notes, assigning one to increment and one to decrement the selected value. The numericals to the left of the arrows indicate the input, and to the right, the MIDI input as LiSa will see it.

Chan. The leftmost of these two numericals sets the channel for the incoming notes to be processed, and the rightmost sets the channel as it comes in to LiSa.



Note Incrementor/Decrementor. These two notes, when played on your MIDI keyboard, will either raise or lower the value selected in the Event Type numerical by one each time the note is played. Note Off messages are ignored.

Event Type. You select the output (controller, aftertouch, pitch bend, program change, or poly key pressure), in this menu. If you choose PolyPres (polyphonic key pressure) a numerical will appear beneath this menu where you can choose the note that the pressure message will be sent to.



Event Data Table. This is a CTab for the output of the Processor. If you wish to map your input values to a different set of values, you can do it by making a custom table to map your input, and selecting it in this numerical. Incrementing or decrementing will then

step through the values in the table.

In addition to these basic setup controls, there are two additional options for note inputs:

Polypres. If your keyboard has poly key pressure, holding down your incrementor or decrementor keys will cause the event to continually increment or decrement as long as you keep generating pressure. The incrementor key will increase the value as you apply pressure, and the decrementor the opposite. One of the advantages of this system is that unlike poly key pressure used directly, releasing the key will not return your value to zero.

Wrap. When this is selected, incrementing the controller value over 127 will automatically wrap the output value to zero, and vice versa. If this is not checked, once a control output reaches its minimum or maximum value, it will remain where it is, regardless of whether the increment/decrement note is played. If **Polypres** is selected, this option is disabled.

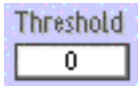
Other

Selecting this radio button configures the Process Editor to receive controller, aftertouch, pitch bend, or program change data, which can be used to trigger note events. When the incoming data goes above a certain threshold, a note on will be triggered on a selected note. The note will be turned off when the input goes below the threshold.

Chan. The leftmost of these two numericals sets the channel for the incoming data to be processed, and the rightmost sets the channel as it comes in to LiSa.

Event Type. This selects the input that the Processor will look at on the selected MIDI channel.

Note. This is the note that LiSa will receive, on the output MIDI channel selected above in **Chan**.



Threshold. When the incoming MIDI exceeds the value specified in this numerical, the note selected is triggered. The velocity is equal to the input value. For example, if your **Event Type** is program change, the **Note** numerical is set at 60, and the threshold is 50, program change 100 will produce a note with a velocity of 100. If you are using an input that generates continuous data, however your velocity will almost always be threshold plus one, since as soon as the threshold is passed, the note is generated.

Thru. When this box is checked, any MIDI input values are transmitted to LiSa, as well as triggering the note event. If it is not checked, the controller information is ignored.

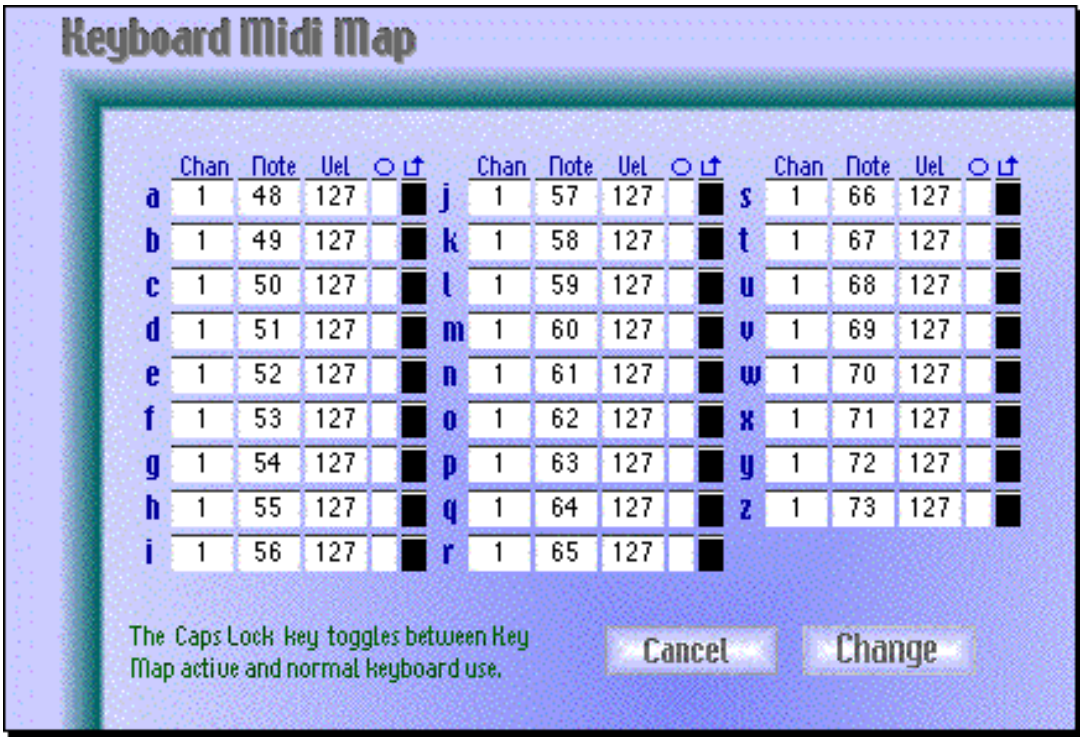
Controlling LiSa from the Computer

When editing a Setup, it is sometimes convenient to be able to test it without having to use an external MIDI device. This can be done in two ways: Notes can be activated directly from the computer keyboard, or you can use the Mouse Control window. LiSa treats all MIDI coming from the keyboard or Mouse Control window just as any other MIDI coming from an outside source – CTabs and MIDI Processors remain in effect.

Playing Notes from the keyboard

Setup

In the **Global** menu is the item **Keyboard MIDI Map...** Selecting this will present a window with a set of numericals, three for each of the alphabetical keys of the keyboard.



Using these numericals, you can set a channel value, note number, and velocity for the alphabetical keys. The note assignments are saved with your Setup.

New in v. 2.5: Toggle and repeat keyboard options

There are two new checkboxes next to each key, which give you additional flexibility when using the keyboard for note input:

Keyboard Toggle. When this checkbox is selected, the note played will remain on until the note is pressed again. Default is on.

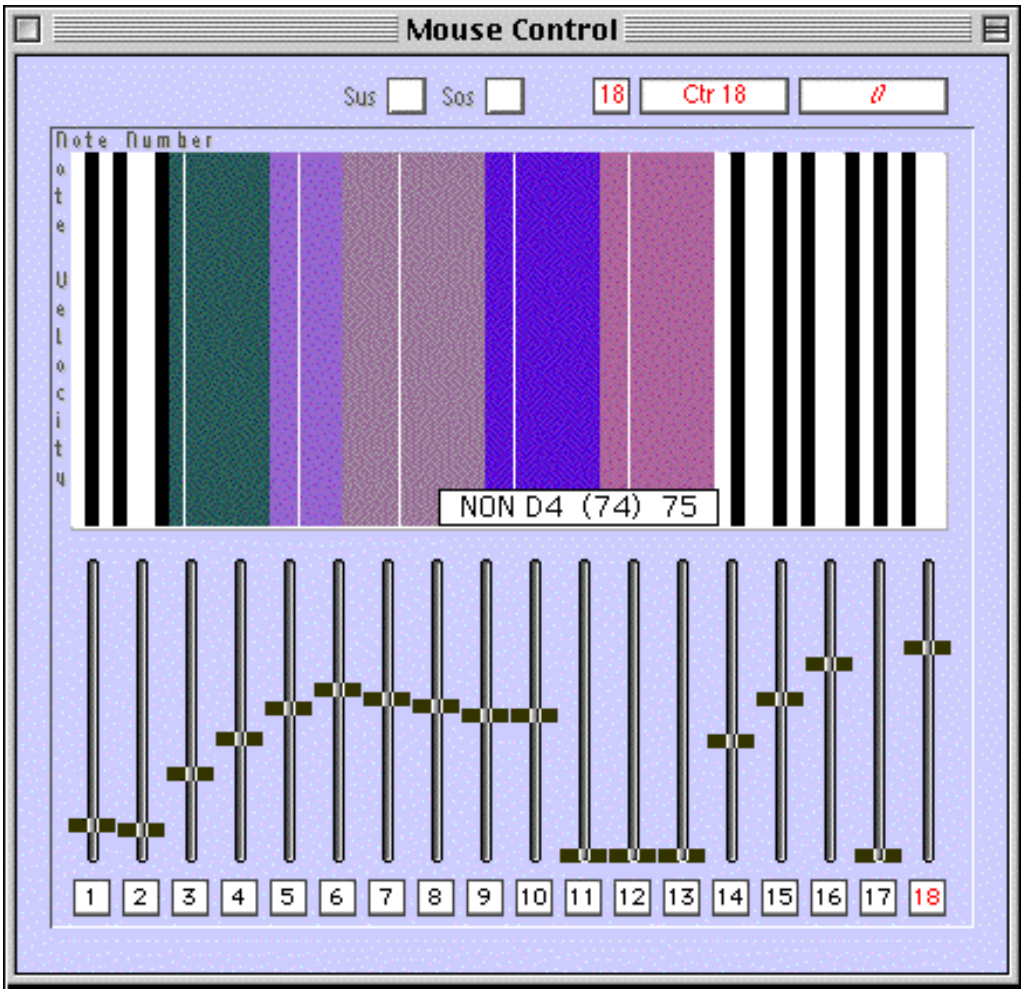
Keyboard Repeat. When selected, a key held down will repeat at the normal keyboard repeat rate. When typing normally, a key will simply start repeating if it is held down for a certain period of time. When this option is selected for a key, pressing it will refire the note at the repeat rate. The most useful application for this option is to use your computer keyboard as a continuous controller. Using the MIDI

Processor discussed above, you can convert the repeated note events into increments or decrements of a controller, so you can change a control value from the keyboard simply by holding a key down rather than tapping it repeatedly. (The rate of keyboard repeating depends on your system, and can be changed in the Keyboard control panel)

Behavior

To activate computer keyboard MIDI, press the Caps Lock key. This will toggle keyboard MIDI on. Pressing Caps Lock again will deactivate it. The number of notes you can play from the keyboard at a time varies from computer to computer. You can, of course, enable Sustain for the MIDI Channel you are using. Both Sustain and Sostenuto work normally.

The Mouse Control Window



The Mouse Control Window, available from the **Windows** menu, allows you to use the mouse in place of external MIDI input, for testing or performance purposes. It has been significantly improved in LiSa 2.5, with up to 18 possible controllers, including poly key pressure. X-Y type mouse movements are no longer possible through this window, but an improved version of this functionality has been moved to the MIDI Snapshot function, described in MIDI S on p. 104. All Mouse control assignments are saved per Preset, so it is possible to have a different set of mouse controls for each.

Playing Notes

The main pane of the Mouse Control Window is an elongated representation of the current Voice Layer keyboard. Clicking in this area of the window will activate the note. The higher up in the window you click, the greater the velocity. The note will remain on as long as the mouse button is held down. Click-dragging will play notes as you move the mouse around. The most recent note played is displayed at the bottom of the main pane. Sustain and Sostenuto for the current Voice Layer can be activated using the buttons at the top of the window.

Using Controllers

Each of the 18 sliders under the main pane can be assigned to a controller, aftertouch, pitch bend, or poly key pressure. These are assigned using the three numericals at the top of the window.

- To choose the slider you wish to assign to a controller, select the slider number in the leftmost of the three numericals at the top of the window, move the slider you wish to use with the mouse, or click on the number below the slider. The number of the selected slider will be highlighted in red.
- In the center numerical, you can choose the controller you want the selected slider to output. This will behave exactly like MIDI control coming from an outside source.
- If you have chosen poly key pressure, the rightmost numerical will become available. Here is where you can choose the note that the poly key pressure will be controlling.

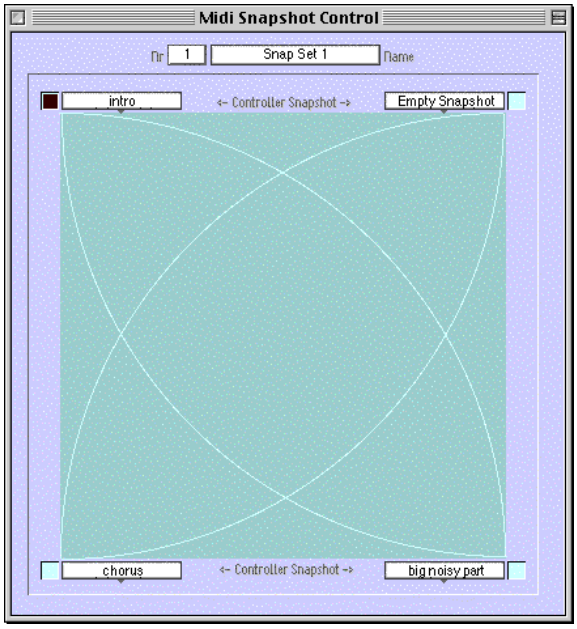
Once you have configured this window, you can move the sliders with the mouse to send control information to LiSa's MIDI input. Click-dragging a slider will move it. To adjust several sliders at once, shift-drag in the slider area.

MIDI Snapshots

MIDI snapshots are one of Lisa's most powerful new features. With Snapshots, you can record the entire MIDI state of your setup, and either switch between these states or interpolate between them using your mouse or MIDI. This makes it possible to control a large number of variables with only a single control. You can design a whole piece around a series of snapshots, switching and interpolating from one to the next. Snapshots can be very simple to use, but it is also possible to do extremely complicated things, such as creating a score of a piece, using Snapshots.

Quick Snapshot Creation

The operation of snapshots can be most clearly explained if you have actually created a couple. For a start, we will create two snapshots which use only controllers, to give us some material to work with:



- Open the Snapshot Control Window and the Mouse Control Window. The sliders (which default to controllers 1-18) will be used to provide a handy example.
- Move a couple of the sliders around with the mouse. You have now changed the MIDI state of LiSa.
- In the Snapshot Control Window, there are four popup menus, all of which now have the name of the default snapshot, 'Empty Snapshot'. Pull down one of these menus and select **New Snapshot**. A new Snapshot will be created with the name 'Control Snapshot 2'. This contains the current values of the controllers you have changed in the Mouse Control Window.
- Move the sliders in the Mouse Control Window to new positions, and do the same in one of the other popup menus. **Control Snapshot 3** will be created.
- In the Snapshot Control Window, click-drag the mouse between the two corners with the new snapshots in them, and you can see the sliders in the Mouse Control Window interpolating between the states set in the Snapshots you have created. If you move the cursor towards one of the corners labeled 'Empty Snapshot', all the sliders will go towards zero.

You now have two different Snapshots, each being a record of the entire MIDI state of LiSa at the moment you created them. Although we have only used controllers in this example, any MIDI message can be included. Note ons and program changes are handled slightly differently from continuous controls – that will be discussed below. Now that we have some data to work with, let's take a closer look.

Architecture

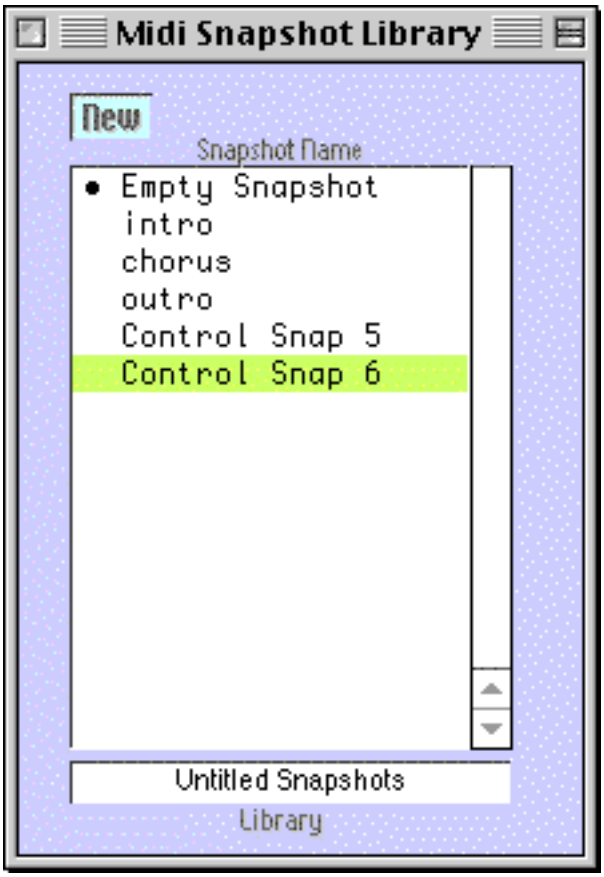
Snapshots are used in sets of 4, called Snap Sets. Each Setup can hold 128 Snap Sets. They are stored on the Setup level, so whatever Preset you are in, you will have the same set of Snapshots available. A Snap Set represents 4 different MIDI states that you can interpolate between at any one time. You can change between Snap Sets by sending Program Change messages on the Meta Control Channel (see LiSa Settings, p. 16) Snapshots are handled via three windows:

- The **Snapshot Library**, which works as all the libraries in LiSa.
- The **Snapshot Editor**, where you can set and fine-tune the contents of individual Snapshots.
- The **Snapshot Control Window**. This is where you create and select your snapshot sets and interpolate between them with the mouse.

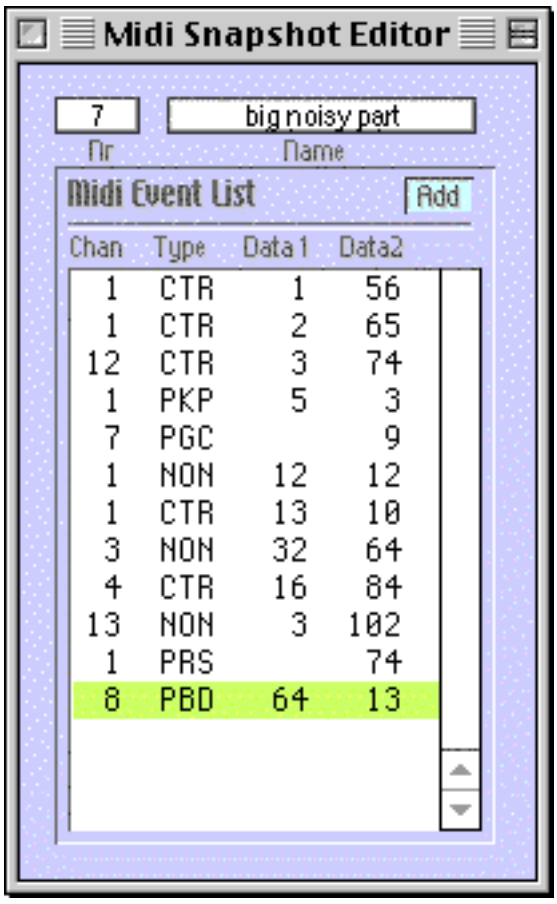
The Snapshot library

If you take a look at the Snapshot Library, you will see three items: the two snapshots you have just created, plus the default, called **Empty Snapshot.** We suggest that you always leave this one as it is, for reasons that will become clear below. As with all Libraries, clicking on the **New** button will create a new Snapshot. Snapshots that are assigned to a Snap Set are bulleted.

When creating a new Snapshot in the Snapshot Library, it will not be empty. It will reflect the current MIDI state of LiSa at the moment you have created the snapshot.



The Snapshot Editor



The Snapshot Editor contains a list of the entire MIDI status of LiSa at the time the snapshot was made. At the top of the window are the by-now familiar **Num** and **Name** numericals, and below, the **MIDI Event List**, describing the MIDI state of the Snapshot. It is possible to edit MIDI settings by hand, adding, removing, or changing any MIDI setting of the snapshot. It is divided into 4 columns. Each entry is a numerical – to select an entry, click once. To edit it, double-click.

The first column, **Chan**., sets the MIDI channel for the event. The next column, **Type**, is where you see the kind of MIDI event it is. The next two columns, **Data 1** and **Data 2**, will mean different things depending on the type of MIDI event it is.

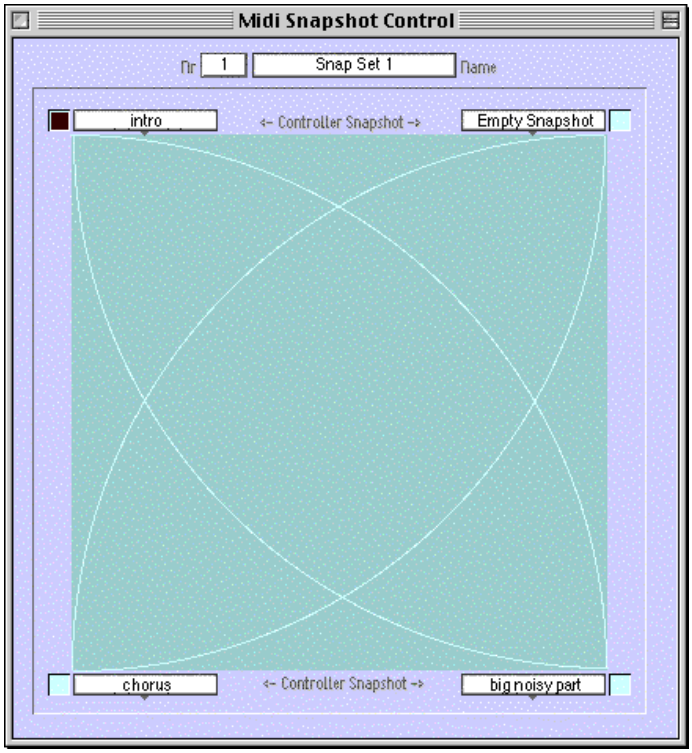
Below is a list of the MIDI event type, its abbreviation in the **Type** column, and what the Data columns signify:

MIDI Event	Abbreviation	Data 1 Function	Data 2 Function
Note On	NON	Note number	Velocity
Poly Key Pressure	PKP	Note number	Pressure amount
Controller	CTR	Controller number	Controller value
Program Change	PCH	--	Program number
Channel Pressure (Aftertouch)	PRS	--	Aftertouch
Pitchbend	PBD	64 (fixed)	Pitch bend value

Any of the events that are already listed in a snapshot may be edited or deleted, and new ones can be added. You can also build a snapshot from scratch, by clicking on the **New** button, and changing the parameters by hand. The MIDI Event column is a popup menu, and the other parameters are numericals.

The Snapshot Control Window

The Snapshot Control Window serves two main purposes: the creation and organization of Snapshots and Sets, and as a field (called the Meta Control Pane) for mouse control to interpolate between the Snapshots in a Snap Set.



Snapshots and Snap Sets

Creating New Snapshots

To create a new Snapshot in the Control Window, click on one of the four Snapshot Name menus in the corners of the window. You will see a list of all the snapshots you have created, plus the option to create a new one. Selecting **New** will create a new Snapshot in the Snapshot Library, reflecting the current MIDI state.

Modifying Existing Snapshots

If you want to completely rewrite a snapshot you have already created, rather than the slow process of working in the Snapshot Editor, you can simply overwrite it in the Control Window. To do so, select the Snapshot you want to overwrite in one of the Snapshot Name menus, and Shift-Click on the adjacent Current Snapshot button.

Creating Snap Sets

A Snap Set is a set of four Snapshots. Only one Snap Set can be active at any one time. There are 128 slots for Snap Sets in a Setup. By default, they all contain Snapshot number 1, Empty Snapshot (this is why you don't want to change that snapshot). Creating a snap set is as simple as selecting a snapshot for each of the four corners of the Meta Control Pane. You can scroll between Snap Sets using the Number numerical at the top of the window. The default names of the Snap Sets are Snap Set 1-128, but these can be changed in the **Name** numerical.

The Meta Control Pane

The main pane of the Snapshot Control window is the Meta Control Pane. Clicking or click-dragging the mouse in this area will interpolate between the *continuous* MIDI values in the 4 Snapshots of the Snap Set. The four curved lines indicate the area in which a particular Snapshot will have an effect on the interpolation. For example, if you have the cursor in the upper-right corner of the Meta Control Pane, you will have 100% of that snapshot, and 0% of the other three Snapshots, affecting LiSa. As you move the cursor diagonally and to the left, the influence of that Snapshot will fade, until you reach the white curve closest to the opposite corner, at which point 0% of that Snapshot will be part of the interpolation. Meta Control can also be done via MIDI, see below.

When interpolating between Snapshots, either by mouse or by MIDI, only continuous values, such as controllers, pitchbend, and aftertouch, will be sent to LiSa. If the Snapshots contain Note On or Program Change events, they will be ignored.

Notes and Program Changes

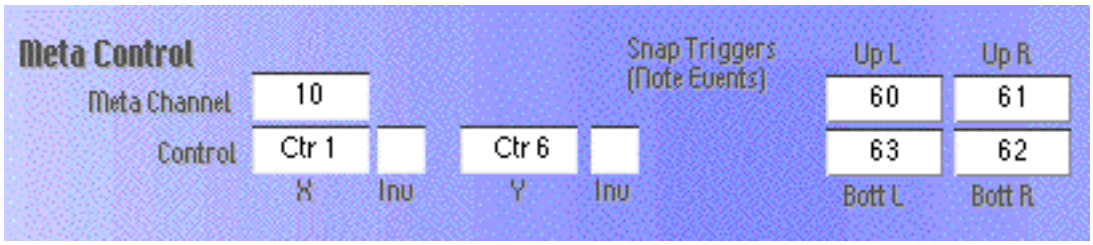
When you save a Snapshot, if any MIDI notes are currently on, the note on events will become part of the snapshot. These events, however, cannot be invoked using Meta Control. To activate them you must use either a MIDI or onscreen Snap Trigger, which immediately loads the Snapshot into LiSa. Note that if you have both note events and continuous controller events in a snapshot and invoke it with a Snap Trigger, all the controller values jump directly to their new positions. Any controller values that are not in the Snapshot, however, will remain untouched. The easiest way to use a Snap Trigger is by clicking on one of the Snap Trigger buttons in the Snapshot Control window. This will immediately activate any notes that were on when you made the snapshot.

When changing from one Snapshot to another, all active notes will be turned off unless:

- Sustain is turned on for the MIDI channel that contains the active notes, or
- The same note, with an identical velocity, is present in the new Snapshot.

Using MIDI with Meta Control

All of the Meta Control possibilities you can perform with the mouse in the Snapshot Control window can also be done using external MIDI. You can assign two external controllers to imitate the movement of the mouse in the Meta Control pane. Two controllers are assigned to the x and y axes of the pane. (A joystick, if you have one, is an excellent controller for this purpose). The four Snap Triggers can be invoked using 4 MIDI notes of your own choosing. To assign MIDI to Snapshot controls, open the Lisa Settings window in the Global menu.



Meta Channel. Controllers or notes sent on this MIDI channel will affect the Meta Controllers.

Control X/Y. These two controllers will set the x and y axes of the Meta Controller.

Inv. If this box is checked, the control input will be inverted. An input of 0 will be read as 127, and vice versa.

Snap Triggers. If LiSa receives one of these 4 notes, it will 'snap' all Meta Controller settings to one of the four corner positions.

Appendix 1: Sample Vectors and timing

Definition

When LiSa processes audio samples, they are not processed one at a time, but rather in a chunk, which are all put through the system at once. This chunk is called a sample vector. The size of the sample vector will effect all aspects of timing in LiSa, including latency (the time between you take an action and it actually comes out of the computer), modulator and envelope timings, and the overall amount of the CPU's time that LiSa uses. Vectors are always set in powers of 2, and in LiSa can range from 64 to 512 samples.

Every time a sample vector is processed, LiSa generates what is called an audio interrupt. That means that everything else the computer is doing stops for a moment while the audio is processed. It also takes the processor some work to enter and exit interrupts. The frequency of this interrupt is equal to the sample vector size divided by the sample rate. For example, if the sample rate is 44.1 kHz, and the sample vector size is 64, an interrupt will occur every 1.45 milliseconds. LiSa's scheduling is tied to this variable rate.

Effects

What does all this mean? There is a general tradeoff between sample vector size, responsiveness of your computer, and processor load. It will affect different aspects of your Setup in different ways. All of these factors have to be taken into consideration when choosing your vector size:

- **Processor Load**: The smaller the sample vector size, the more strain processing samples puts on your CPU. The more interrupts per second, the more your computer works to output one second of audio.
- **Latency:** Since a smaller sample vector produces more, but shorter interrupts, LiSa will be more responsive to input when the vector is smaller. (This issue becomes more important if you are using a soundcard.)
- **Modulators and Envelopes:** These functions are both used to process soundfiles in one way or another, and are thus part of the recipe of ingredients in the audio output. This means that they, like any other sound material, are processed in sample vector-sized chunks. Modulators and envelopes cannot do anything in a shorter space of time than 1 sample vector. For example, if an envelope is set to its fastest attack speed (which would take place in one sample vector), that speed would be 1.45 ms at a sample vector rate of 64, and 11.61 ms at a sample vector rate of 512 (512/44,100=11.61).

This means that if you change your sample vector rate while you are in the process of developing a Setup, you will have somewhat different behavior in your Setup, particularly regarding the maximum speed of modulators and envelopes. LiSa is designed to keep these speeds as consistent as possible if you change vector sizes, but the fastest speed of any modulator or envelope will always be dependent on the vector size. It will always be a matter of balancing between all of the above factors to find the optimum settings for a particular Setup. The sample vector size is saved with your Setup, so each Setup you use can have a different size, if you wish.

Changing Settings

You change the sample vector size for your Setup in the **Audio Settings....** Dialog in the Global menu. It is the last item in the window:

If you are using an ASIO soundcard, you cannot change the Sample Vector size within LiSa, you have to do it from the Control Panel for your device. This can be accessed either in your Control Panels folder (usually in the Apple menu) or by clicking on the Control Panel Button in the Audio Settings window. We have found that when using an ASIO device, 256 samples usually produces the best results.

Ctabs as Modulators

When LiSa processes sound, it does so in groups of samples. This is known as the *signal vector size (SVS)*. When you set the Modulation Rate to its maximum speed (127.00) what that means is that the Parameter you are modulating is changed once every SVS samples, or once per audio vector. Thus, tables are non-interpolating between their SVS values (except for volume and panning). This has several effects to keep in mind when designing tables for modulators:

The smaller the table, the faster the modulation rate. If you want to maximize the modulation rate, use the smallest table possible. For example, if you want to modulate pitch with a square wave, use a table with a domain of two, with the first value set to 0.000, and the second to 127.000. The smallest SVS that can be set is 64. This means that a modulator using the above Table and running at full speed (127.00) will change between the two values every 64 / 44100 ~ 1.45 ms, resulting in a freq. of 689 Hz.

Modulation rate changes geometrically. Every increment in the Speed numerical of the Controller Edit window adds one to the number of audio vectors that are calculated before moving on to the next value. At a rate of 127.000, it is one vector. At 126.000, it is two, making it twice as slow, at 125.000 it is three, and so on. All pre-built modulator tables contain 16 values.

To make the low modulator speed independant of the vector size, the highest speed is based upon an SVS of 64. This means that when you set the SVS to 128, modulator speed settings higher than 64.00 won't give you higher speeds, since the maximum speed you get now is twice as slow as with an SVS of 64. So ith an SVS of 512 your max. effective speed is 16.00.

Just one more fact: the longest modulator cycle you can get is by using a Table of 512 units long and a speed of 0.01. In this case it takes 2 minutes and 27 seconds to do one complete cycle!

Appendix 2: Voice Allocation

Polyphony and Voice Allocation

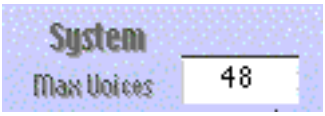
Number of Voices

LiSa is designed to be able to play a maximum of 128 voices (sounded notes or sample records) simultaneously. The actual number of voices you will be able to get depends on several factors:

- The speed of your machine.
- The kinds of Zones you are using, as some are more computationally expensive than others.
- Number of filters you are using. Filters slow LiSa down considerably.
- Playback Quality of your samples. If you are using Good playback quality, you will get more voices than if you use Best. (Good quality will not be available if you are using an ASIO soundcard.)

Sounding voices is naturally the most time-consuming task on the part of your computer's processor, so the faster the computer is, the more voices it can sound. LiSa can make very big demands on your computer's CPU, and will even 'steal' processor time from other programs in order to produces all the voices that are being demanded of it. In a case when you are using LiSa on a computer simultaneously running other programs (for MIDI control, for example) problems could obviously develop.

LiSa formerly allowed you to set limits on the amount of CPU time it could use directly. This system has been changed somewhat in v. 2.5.



Now you set the maximum number of voices that LiSa can sound at any one time, in the Lisa Settings dialog box. You may need to experiment a bit to determine the best number of voices for your performance configuration.

Voice Priority

If the maximum number of voices is exceeded, LiSa follows a strict order in deciding which voices will be sacrificed first. They are given priority in the order below, with the ones sacrificed first at the bottom of the list. The number of voices being played does not affect loading and saving soundfiles. The Zones that are sacrificed last are listed first:

- **Playback Zones** (High Priority). Playback Zones can have their voice allocation prioritized into

high or low priority. A high priority Zone will always take precedence over any other Zone, and if any record tasks are called for, a low priority Zone will be dropped first. Note that this means that if all voices that are playing are set to high priority, you will not be able to record.

- **Record Zones**. If you are using all available voices for playing and try to record a new sample, low-priority playback voices will always be sacrificed to perform the record. Also, to record a sample requires two voices, so if your maximum number of voices is 12 and you're using them all, when you activate a Record Zone, you will have 10 still playing.

- **Playback Zones** (other than High Priority). All other playback zones will always be dropped first, starting from the one that has been playing the longest.

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Appendix 3: Keyboard Shortcuts

The shorcuts listed here are in addition to those visible in LiSa's menus. Keyboard shortcuts will exhibit different behaviours depending on which window is topmost – keep this in mind if something unexpected happens.

Key(s) Pressed	When Topmost Window is:	Result
Cmd - 1	any	loads the selected Sample File from the Sample Lib into the Sample Buffer
spacebar	Zone Editor	Activates/deactivates current Zone
	Sample Editor	Plays buffer or selection in Sample Editor
	Sample Library	Plays selcted sample
Cmd-spacebar	Sample Editor	Records into buffer or selection in Sample Editor
backspace	Sample Editor	Clears selection in Sample Editor
	Assignment Window	Clears visible Voice Layer
	Pattern Library	Clears selected Pattern
	Sample Library	Removes selected sample(s) from Sample Library (but not from your disk)
	Snapshot Editor	Removes selected MIDI event from shapshot
Cmd-backspace	Sample Editor	Clear Sample buffer
Any letter key	Sample Library	Jumps to corresponding letter in Library
Tab		Toggles between normal and tuning keyboard layout in Assignment window
Caps Lock		Toggles between normal keyboard and Key Map active
s		Toggles start/stop grabbing output buffer
-		Toggles sostenuto on visible Voice Layer

+		Toggles sustain on visible Voice Layer
k		Assignment window defaults to quarter-tone scale
n		Assignment window defaults to chromatic scale
u		Assignment window defaults to unison (all notes have the same pitch value)
Esc		Resets audio engine. Stops all active voices.
Numbers (01-16)		Makes the corresponding Voice Layer visible in the Assignment Window. Note that for layers 1-9, a leading zero is required.
Up arrow	Presets	Select and load previous Preset
	Sample Library	Select previous sample file
Down arrow	Presets	Select and load next Preset
	Sample Library	Select next sample file
Left arrow	All Editors	Select previous Item
Right arrow	All Editors	Select next Item
Option-left arrow	Sample Editor	Nudge selection 22ms to the left (start and endpoints)
Option-right arrow		Nudge selection 22ms to the right (start and endpoints)
Option-up arrow		

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