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KYMA.5 WALKTHROUGH CONTENTS

DOCUMENTING THE DOCUMENTATION

The Kyma.5 documentation is presented in several forms, each appropriate for a different mode of working. This section gives you an overview of which document is best suited to which situation.

Kyma.5 Walkthrough

For tyros and veteran users alike, this is a guide to finding your way around the Kyma.5 environment. This document gives you an overview of the environment, a strategy for approaching this deep system one layer at a time (so you can experience Kyma as an inexhaustible source of delight rather than a steep learning curve), and then walks you step-by-step through the new features like your own personal tour guide. If you are new to Kyma, we recommend doing the Kyma.5 Walkthrough first and then proceeding to the Introduction and Tutorials sections of the Kyma 4.5 Manual. Veteran Kyma users are also advised to begin here, with the walkthrough.

Graphical Quick Reference

For instant gratification, look at this first. But then keep it around so you can refer to it anytime you are using Kyma (that's why we printed it on card stock, so it would stand up to a lot of use). If you are wondering what you can do in a specific window or a subpart of a window, just find the window in the Graphical Quick Reference and read the description associated with it. If English is not your first language and you are looking for the minimum documentation that you could translate, this is it! This document has the highest ratio of graphics to words, so it would provide the most information for the least translation time. This document replaces the Quick Reference section of the Kyma 4.5 manual.

Expressions Quick Reference

There are several new real-time operators and functions that you can use in parameter fields. This document replaces pages 213-214 of the Kyma 4.5 manual.

What's New in Kyma.5 (Release Notes)

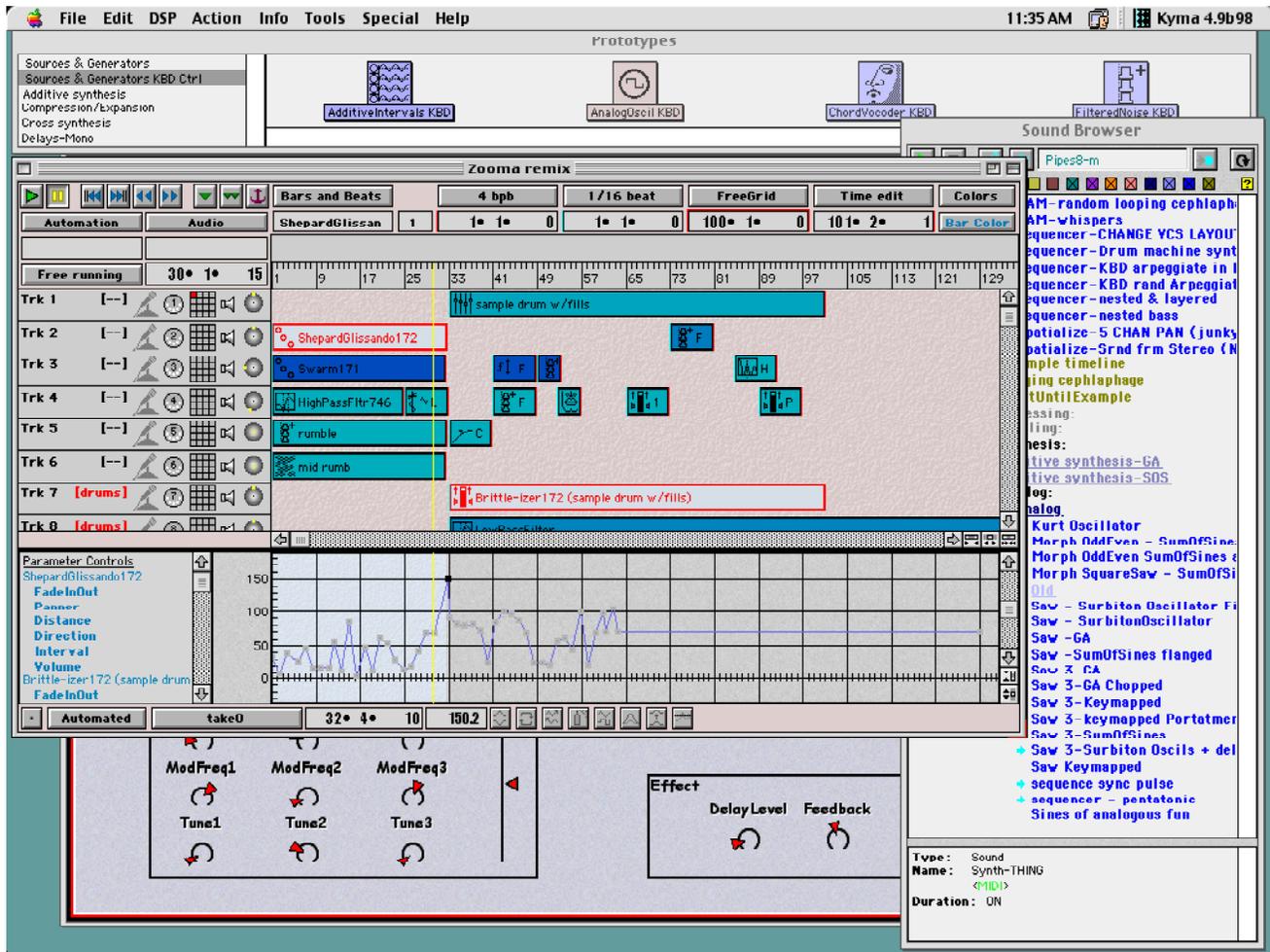
If you are already familiar with Kyma 4.5, this is a quick way to peruse the list of *changes and additions* that have been made since the previous software release. If you are a Kyma veteran eager to see what's new, and you don't have the patience to go through the walkthrough just yet, we recommend perusing this list of changes and the Graphical Quick Reference first and *then* using the Kyma.5 Walkthrough to guide you through the details of some of the powerful new user interface options.

Kyma 4.5 Sound Design Environment (aka "the big book")

This is a reference manual, graphical quick reference, and tutorials for Kyma version 4.5. Nearly everything in this manual still applies to Kyma.5, so you should still keep this manual around for reference and we recommend that you read it-especially the Introduction and the Tutorials.

Everything related to Kyma.5 is intended as an Addendum to the large manual, rather than as a replacement for it.

INTRODUCTION



Whether you are new to Kyma or an experienced Kyma user looking for a quick introduction to the new features in Kyma.5, these mini-tutorials will give you a rapid, hands-on immersion in all of the new features, so you can immediately begin using them in your work.

If this is your first introduction to Kyma, we recommend that you also work through the tutorials in the main manual in order to complete your training as a Kyma Master Power User!

OVERVIEW

Kyma is a deep program, but it is organized in layers. You can create rich and unique sounds straight out of the box, and, over time, begin to take control over more and more of the details until Kyma becomes your own customized sound design environment.

This walkthrough has been organized as a step-by-step path into Kyma.5, peeling off the layers one at a time. At each step of the way, you will be able to use Kyma in your work, and, at each new level of understanding, you will be customizing your Sound library until Kyma evolves into your own personalized sound design environment.

The Layers of Kyma

Here, then is the 7 step program for achieving the status of Kyma Master:

- Step 1: Use the **Sound Browser** to familiarize yourself with the *over one thousand* new sounds and effects in the Kyma Sound library. You can think of this core Sound library as the software equivalent of “factory patches”. Once you know where these “factory Sounds” are, how to adjust their parameters in the **Virtual Control Surface**, and how they can be combined together, you can immediately begin using them in your work and applying them to your own samples and live audio inputs.
- Step 2: Immediately begin customizing the Sound library by creating and saving your own presets for the Sounds that came with your system. Begin to expand upon the core library by saving copies of the library Sounds with your own inputs or use the library Sounds as inputs to your own chains of signal processing modules.
- Step 3: Create more complex Sounds that evolve over time by arranging and layering Sounds in the **Timeline**. Use the Controller editor at the bottom of the timeline to draw or record time-varying parameters for your Sounds.
- Step 4: Use the Sound editor to see the signal flow *inside* the library Sounds and Prototype Sounds. Listen at each step along the signal path to learn how the example Sounds were created. Use the signal flow editor to modify copies of Sounds from the **Prototypes** palette or the **Sound Browser**. Save these as new Sounds on disk to further expand and customize your growing Sound library.
- Step 5: Further extend your Sound library by creating your *own* samples and analysis files using the Tools menu, and edit them in the **Samples editor** or **Spectrum editor**.
- Step 6: Learn to use arithmetic expressions to control the way parameters evolve over time and to create dynamic relationships between parameters
- Step 7: Abstract and encapsulate your Sound, hiding complexity by designing a **Virtual Control Surface** as a front panel or by creating a new class of Sound with its own icon and parameters.

You can make effective use of Kyma at the very first levels, and may never find the need to go any deeper into the program. Still, it’s reassuring to know that in Kyma the deeper levels exist in case you ever do find a need for them, even if just occasionally.

Reusable Sounds

Kyma is so modular and flexible that it is like an open invitation. It entices you to be a creator rather than just a collector or consumer. As you well know, creating something that is truly *new* requires some extra time and thought. In Kyma, this extra effort is not expended on a one-off project and then lost. Once you have invested your time and brain power in creating a new kind of synthesis or processing algorithm in Kyma, you can save your entire process and re-use it later in a different context or applied to different source material. You have done more than just create one sound; you have extended your working library. The more time you invest in your Kyma system, the more powerful it becomes and the more it comes to embody your expertise and ideas. So let's get started!

Acknowledgements

Thanks to Jean Lewis and Matthew Goss for beta testing the Kyma.5 Walkthrough!

A Request for Feedback

If, in the course of working through the walk-through or any of the other documentation, you come across anything that is unclear or incorrect, please let us know. We plan to continuously revise and update the manual and post the updates at our web site, so your feedback would be very helpful. Thanks!

THE SOUND BROWSER

When you first start up Kyma, you see a window labeled **Sound Browser** on the right side of the screen. In the **Sound Browser** you can locate files, audition files, test combinations of files, and glean useful information about any of the sound-related files stored on your computer disk(s).¹

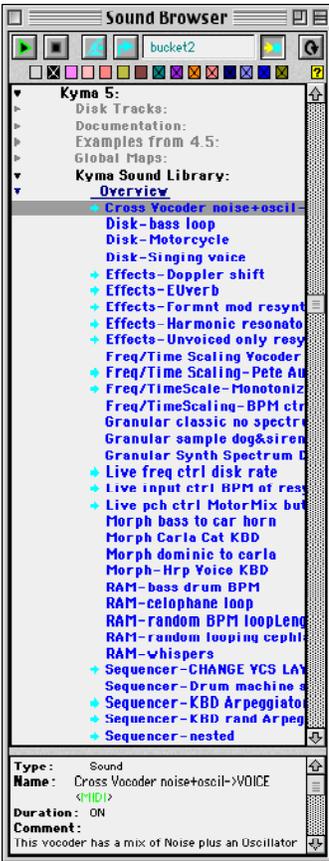
Whether you are new to Kyma or a grizzled Kyma veteran, the **Sound Browser** is a great place to begin on a new sound design project. By listening to the Sounds that you and Symbolic Sound have already created and supplied with presets, you can usually find something close to what you need and then either tweak the parameters or combine it with other Sounds to customize it for your own use.

As you start designing your own Sounds and presets, you can save them on disk and extend this core library. In just a short time, you will have your own library of custom sounds and effects that you can access quickly and reuse as part of future projects.

Navigating through the disk file hierarchy

Take a look at the contents of the Sound Browser window:

1. Any files that you can access from the Finder (on a Mac) or Windows Explorer (on a PC) are also accessible from the Sound Browser; thus, if have your computers networked or if you have a network file server, you can also use the Sound Browser to see and audition remote files.



The level of indentation indicates the level to which one file or folder is nested within another. In this case, we can see by the indentation that **Kyma Sound Library** is a folder inside another folder named **Kyma 5**. Inside the **Kyma Sound Library** are several folders and files, one of which is called [An Overview](#), and inside the overview file, there are several **Kyma Sounds**.

To see the contents of a file or folder, click on the little triangular arrow next to the folder name. For example, scroll up a little in the **Kyma5** folder until you can see a folder named **Examples from 4.5**, and click on the gray triangle next to the name of the folder. The triangle turns a darker shade and points downward. It also reveals its contents in an indented list just below the folder name. To close it, click the arrow again. It returns to its original faded color and the arrow next to it now points sideways once again.

In general, faded out colors and sideways arrows indicate closed files or folders, while saturated colors and downward pointing arrows indicate open files or folders.

Colored-coded check boxes at the top of the Browser

By now you have probably noticed that the color of the text has a meaning as well. The color of a file name indicates its file type. For example, black text indicates a directory name, dark blue underlined text indicates a Sound file, and bright blue indicates the name of an individual Sound.

To see what type of file corresponds to each color, place your mouse over each one of the colored boxes that are arrayed horizontally across the top of the list. The fly-by help message tells you which kind of file is associated with which color.



By checking or unchecking the color associated with file type, you can choose to include or remove that file type from the list, thus simplifying your visual searches. For example, position your mouse over the bright blue color is associated with Sounds. Try unchecking it and checking it and to see that it alternately hides or shows the Sounds that are in [An Overview](#).

Information on the selected Sound or file

To get information on a file, select the file name; its information will be displayed at the bottom of the list. For example, find and select the dark blue Sound named **Cross Vocoder noise+oscil->VOICE** (the Sounds are arranged alphabetically). The box at the bottom of the list shows the file type (Sound), its duration, and a short comment.

Scroll down past the files in **Kyma Sound Library** until you see the folder named **Samples** (not to be confused with the folder within the **Kyma Sound Library** called **Sampling**). Open the **Samples**

folder by clicking on the triangle to the left of the folder name, open the sub-folder named **animals**, and select the sample named **small dog growl 1**. The information displayed at the bottom of the screen is:

Type: Samples File
Directory: YourDiskName:Folder:Kyma 5:Samples:Animals:
Modified: 2 Jan 1997 3:27:24 pm
Duration: 1.82102 s
Pitch: 4 c (261.626 hz, 60.0 mn)
Samples: 80307 (44.1k, 16 bits, mono)

The “Pitch” is the pitch specified in the file header. This can be useful for individual instrument tones, but for samples that have no particular pitch, the standard practice is to use middle C or 60 mn (mn stands for note number). The last entry tells you how many samples are in the file and tells you how it was recorded: the sampling rate, the bit depth and whether it was a stereo or mono recording.

Spawning a Sub-Browser

To spawn another browser containing just the files from a single folder, double click on the folder name in the main **Sound Browser**. This opens a browser with the folder name as its label. The only limitation on this is that you cannot have two browsers open on the same Sound file at the same time, since that would create an ambiguous situation with respect to editing and saving your changes.

Auditioning a File in the Sound Browser

To hear the selected file, press the green-edged **Play** button at the top of the Sound Browser, or use Ctrl+Space.²



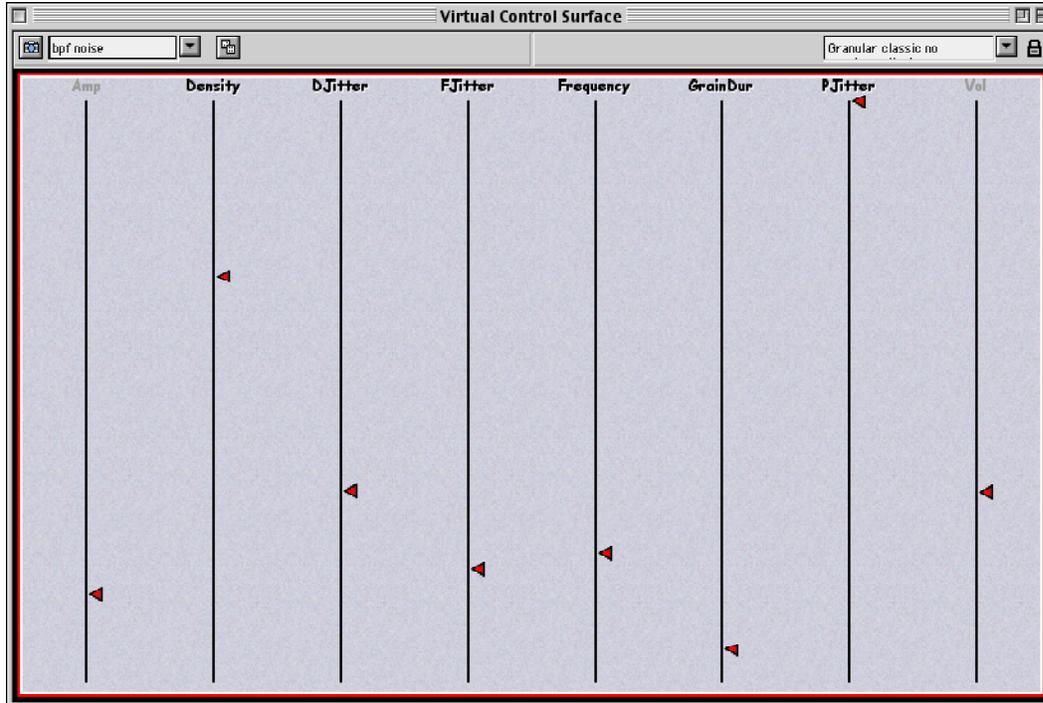
For example, try selecting and playing **small dog growl1**. To stop the playback, click the **Stop** button at the top of the list (just to the right of the **Play** button), or use Ctrl+K. To replay the last Sound played, use Ctrl+R. By default, the samples you play in the Sound Browser will automatically loop. To play them without looping, hold down the Cmd or Ctrl key when you play (or use Cmd+Space).

You can use the **Play** button to play Sounds and analysis files as well as samples. For example, scroll upwards to locate **Granular classic no spectrum display**, one of the Sounds in [An Overview](#). Select it and play it by pressing the **Play** button just as you did with the **small dog growl1** sample.

2. On the Macintosh, the shortcuts can be accessed by pressing either the Command key or the Control key along with the shortcut key.

Using the Virtual Control Surface

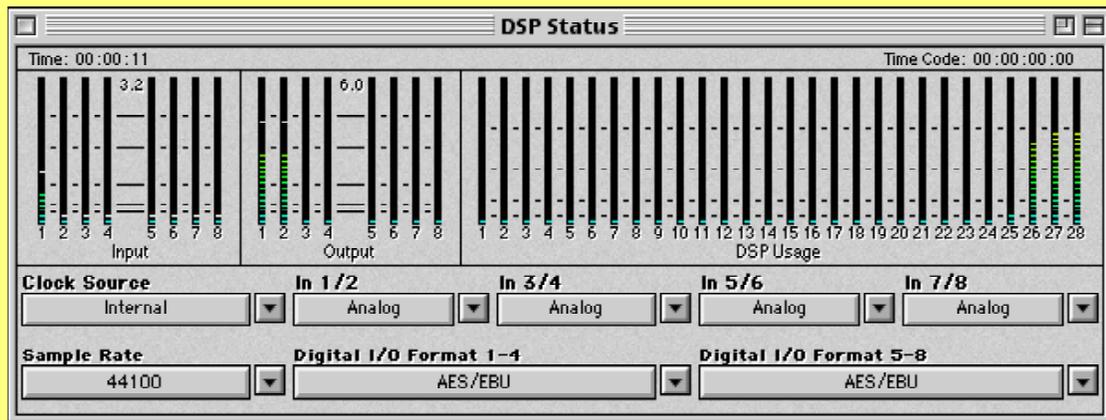
When you play a Sound that has adjustable parameters, Kyma will open a Virtual Control Surface, so you can change the parameter values. There's a detailed discussion of the Virtual Control Surface in the next section ("The Virtual Control Surface" on page 14). For now, suffice it to say that you can change the parameter values by moving the faders (sliders) with the mouse. For example, try adjusting the volume by moving the slider just below the parameter named Vol on the right side of the control surface.



DSP STATUS WINDOW

When you play a Sound in Kyma, it compiles and loads a program to generate the sound on the Capybara. Depending on the algorithm, this program could require a small fraction of a single processor, or it could require all four of the processors on a basic Capybara•320 in order to run in real time.

To see how much processing power is required by the Sounds you are playing, open the **DSP Status** window (found under the **DSP** menu).



The first four (or eight) meters show the input levels, and the next four (or eight) show the output levels.

The next group of four (or if you have expansion cards, 6 to 28) meters show how much processing power is being used on each DSP in your Capybara. Processor usage is shown in a kind of log scale, with marks at 20%, 40%, 60%, and 80% usage. The DSP associated with the right-most meter handles audio I/O, reading and writing disk tracks, and live MIDI messages. Synthesis and processing algorithms are scheduled on the next DSP (going from right to left). If there is not enough power on a single processor, Kyma will split the algorithm up so that part of it is computed on the next processor, and so on. Each of the processors must be running a small program at all times and this "overhead" program is indicated by a single green line at the bottom of the meter. If you ever manage to come up with a Sound that uses up all the processing power on all your processors, the **DSP Status** window will flash the words "Out of Real Time" in red in the space just above the processor usage meters.

In the example shown here, the right two meters show about 80% usage on the first two processors, about 70% usage on the third, and about 20% of the fourth processor. The other processors are not being used.

Trying out combinations of Sounds in the browser.

One Input, Many Effects

Suppose you have an input that you'd like to try processing in various different ways. The input could be a disk track, the live input from a microphone or CD player; it could even be the output of another Sound.

Notice that some of the Sounds in the Sound Browser have blue-green (also known as cyan) colored input arrows next to them. A cyan-colored arrow next to a Sound name in the browser list indicates a sound-*processing* algorithm, and it means that you can substitute your own input for the default input that comes with that Sound³ (or algorithm) as an example.

To substitute your own input for the default input used in the Sounds marked with cyan arrows, you first have to designate a global "replacement input".

For example, let's say that you wanted to try processing the Sound called *RAM-whispers* in several different ways. First, select *RAM-whispers* in the Kyma Sound Library [An Overview](#) file, and play it so you know what it sounds like unprocessed. Use the Virtual Control Surface faders to try out various different values for the parameters. Start controls where the loop begins within the sample. Length controls how long the loop is. A negative value for Length causes the loop to go backwards through the sample.

To designate it as the global replacement input, click on the cyan colored right-angle arrow just to the left of the input field (the text field at the top of the Browser).



Once you click on the arrow, the name of the selected Sound will be displayed in the input field. Notice that the connection button (the yellow arrow pointing into the cyan dot just to the right of the name of the input) has also been depressed. You can disconnect *RAM-whispers* at any time by clicking the connection switch.

Now we are ready to try different kinds of processing on the input. Any Sound that has a light cyan arrow next to it can be used to process the global replacement input.

Try selecting and playing *Effects-Harmonic resonator (KBD)*. Notice that, in the info field at the bottom of the Sound Browser, you see the word **MIDI** displayed in green. This indicates that the Sound expects input from the MIDI keyboard, so try playing some chords on your MIDI keyboard (or send the Copybara MIDI from your MIDI sequencer). Then try adjusting the values of Decay and InputScale.

Now try using the whispers as the modulator on a vocoder by playing *Cross Vocoder noise+oscil->VOICE*. As before, try experimenting with the on-screen faders.

3. In Kyma, the word "Sound" with an uppercase 'S' is an abstract data structure representing anything from an elemental source of audio signal (like an oscillator or the microphone input), to a compound chain of signal processing modules and mixers (which can itself in turn be used as a source of audio signal). So a filter with a sample as its input is called a Sound just as a disk track is also called a Sound. (If you don't like this terminology, you can substitute the word "module" or "algorithm" for the word "Sound").

To hear the selected Sound with its original default input, disconnect the replacement input (by clicking the “connection” button to the right of the input field). Try this out now with *Cross Vocoder noise+oscil->VOICE*: disconnect the *RAM-Whispers* input, play *Cross Vocoder noise+oscil->VOICE*. Connect *RAM-Whispers* by clicking on the “connection” button again. After changing the state of the connection button, you have to hit the play button again before you will hear the result.

Now try *Effects-Formnt mod resynth* as the processing algorithm on the whisper sample.

Change the Input field to *Disk-bass loop*⁴ (by selecting *Disk-bass loop* and clicking the right-angle cyan arrow button next to the input field). Play *Effects-Harmonic resonator (KBD)* with an A flat minor 7th chord on the MIDI keyboard, *Cross Vocoder noise+oscil->VOICE* and *Effects-Formnt mod resynth* again, this time using *Disk-bass loop* as the replacement input.

To use the live input from a microphone (or any other line-level input connected to channel 1 of the Capybara) as the replacement input, click the cyan colored Microphone button just to the left of the right-angle arrow button.



Kyma will now function as an effects processor, processing whatever you say or sing into the microphone. Try the same set of processing algorithms *Effects-Harmonic resonator (KBD)*, *Cross Vocoder noise+oscil->VOICE*, and *Effects-Formnt mod resynth* again but this time using your voice as the live input.

One effect on many inputs

What about the reverse situation: you have an interesting signal processing effect, and you’d like to try it out on several different inputs?

One convenient way to do this is to spawn a sub-browser and use it for locating input Sounds, while using the original browser to select the processing or modifier Sounds. The designated replacement input is global, so it will be used by both the original browser and the sub-browser that you spawned.

For example, scroll down in the Sound browser until you see the folder named **Samples 3rd Party**. Double-click on the **Samples 3rd Party** folder to spawn a new browser. In the **Samples 3rd Party** browser, open the sub-folder **Sounds Good** and the sub-folder named **Sample Material** and select the sample **bucket2**.

Designate **bucket2** as the replacement input in the sub-browser, and play *Effects-Harmonic resonator (KBD)* in the original Sound browser.

Continue browsing through the **Samples 3rd Party** folder and try out some other samples as inputs. If you have some of your own samples, use the Sound Browser to spawn a sub-browser on the folder where they are stored. Try placing one of your samples into the input field and then process it using the cyan-arrowed Sounds in the original Sound Browser.

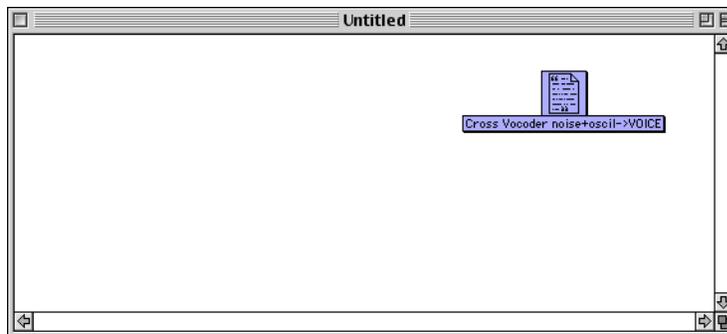
4. This sample is courtesy of Thomas Tibert, producer of the Sounds Good sample library. This particular loop came from his CD called *On the Jazz Tip*. Check out all of his titles at <http://www.ivo.se/sounds.good/>.

Saving a new combination

While trying out different combinations of inputs and effects, you may come across one or two that you consider good enough to save for future use. That is the whole idea behind Kyma, after all: creating your *own* ways of processing and synthesizing sound. In order to start saving Sounds, you will need to know how to create new Sound files and save them to the disk.

Kyma Sounds are stored on disk in collections called Sound files (rather than each Sound being stored in its own file). To create a new Sound file, choose **New...** from the **File** menu (or use Ctrl+N). Choose **Sound file** from the file type list in the dialog box and click the **New** button. This creates an empty Sound file window. To save a Sound with the combination of input and effect that you have created, drag the effect from the Sound Browser into the new Sound file window. When you drag the name from the Sound Browser into the Sound file window, it turns into an icon representing the new Sound. You can select and play these icons just as you can select and play the Sounds by name in the browser.

For example, select **bucket2** in the **Samples 3rd Party** sub-browser again designate it as the replacement input. Then play **Cross Vocoder noise+oscil->VOICE** with **bucket2** as its input. Let's say that you like the way this sounds and want to save it. Create a new Sound file window, and drag **Cross Vocoder noise+oscil->VOICE** from the Sound Browser into the new window. Then select the icon, and use Ctrl+Space to play it.



What if you want to drag a Sound from the browser into a Sound file window with its *original* input (rather than the replacement input)? To do so, disconnect the replacement input first (by clicking on the button with the yellow arrow just to the right of the replacement input field); *then* drag the Sound into the Sound file window.

To change the name of this Sound, first make sure it is still selected; then press Enter. A dialog pops up so you can enter a new name — **Bucket Vocoder** (or whatever mnemonic that will help you find it in the future).

At this point the new Sound exists in RAM but has not been saved on the disk. To save the Sound file on disk, choose **Save...** from the **File** menu (or use Ctrl+S). Give this collection of Sounds a memorable name (something like **Tutorial Sounds** or **DrumLoop Processing Sounds**) and use the file dialog to find the most suitable place to save it on disk.

 Refresh the Sound Browser's list by clicking on the refresh button (the right-most button with the circular arrow on it at the top of the Sound Browser).

Any time you make a change to the files on your hard disk, either in Kyma or behind Kyma's back in the Finder or Windows Explorer, you have to refresh the Sound Browser so it will reflect the changes in the directory structure.

Now you should be able to find your new Sound file in the Sound Browser as part of your newly expanded and customized Kyma Sound Library.

Finding a Sound in the Library

The Kyma Sound Library already contains over 1000 (oops, make that 1001 now) examples, and you have already begun adding to that number. To locate Sounds (or other files) in the library, you can search for them by name in the Sound Browser.

Suppose, for example, that you are in need of some alien voices for a project. To search the Kyma Sound Library for Sounds and files containing the word 'alien', first spawn a sub-browser by double-clicking on **Kyma Sound Library**. That way, you can restrict your search to the sound library rather than search your entire disk. Next, click on **Kyma Sound Library**, and choose **Find...** from the **Edit** menu (or use Ctrl+F). Enter a name or part of a name into the dialog box and press Enter (or click **OK**). In this case, enter "alien". When Kyma finds the first match, listen to it. To continue searching, choose **Find again** from the **Edit** menu (or use Ctrl+G). To stop a search at any point, click the mouse or press any key.

If you continue searching, you will find samples, analysis files and time lines as well as Sounds. You can select and play any of these file types in the Sound Browser.

HOW TO OPTIMIZE YOUR SEARCHES IN THE SOUND BROWSER

The Find command searches the open folders, starting from the selected file or Sound and wrapping around to the top of the list once it reaches the end. If it does not find a match, it goes back and searches *all* folders between the selection and the end, wrapping around to the top of the list once it reaches the end.

The Sound Browser will not find a file whose file type is not selected in the colored check boxes at the top of the browser. (For example, if the blue box is not checked, the Find command will not bother searching for Sounds).

To speed up your searches, check only the boxes of the file types you are looking for.

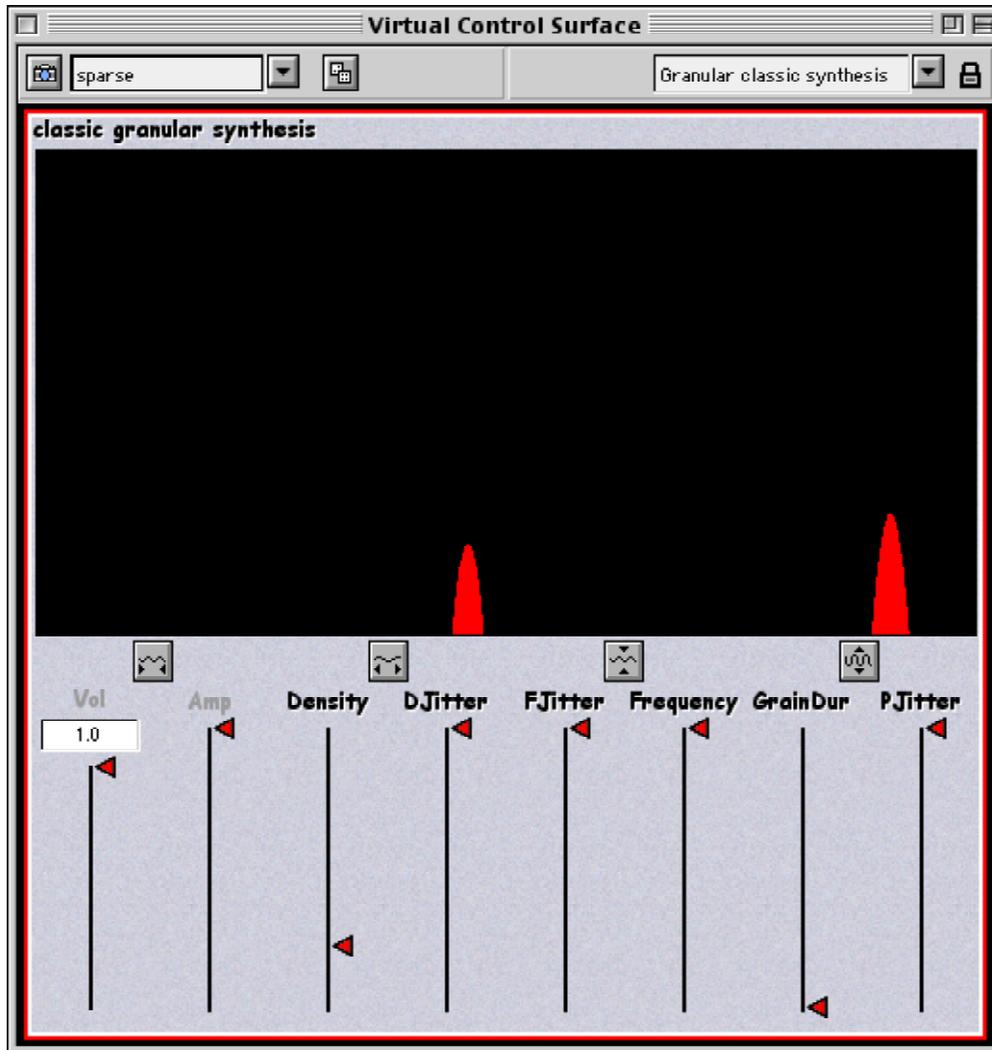
Combinatorial explosion

By now you are starting to get the idea why we call Kyma "recombinant sound"; in Kyma you can combine any sound with any other, quickly trying out combinations of parameter settings, creating a combinatorial explosion of new sound possibilities. And we haven't even scratched the surface yet...

Next let's look more closely at how you can use the Virtual Control Surface to create and save innumerable sound presets and customized control interfaces.

THE VIRTUAL CONTROL SURFACE

In the Sound Browser, play the *Granular Synth Spectrum Display* Sound. A **Virtual Control Surface** will open, giving you on screen faders with labels.



You have no doubt noticed by now that any time you play a Sound that happens to have adjustable parameters, a **Virtual Control Surface** like this one will automatically open on screen, allowing you to adjust the parameters of that Sound using the mouse (or MIDI controllers). For example, Vol, Amp, Density, etc. are the names of sound parameters. To adjust a parameter, click on its virtual controller labeled with that parameter name, and drag it to a new position. If there is a numeric display above the fader, you can also set a new value for the parameter by clicking in the numeric field, typing in a new number and pressing Enter. Use the Tab key to quickly move between the numeric fields of a Virtual Control Surface.

Presets and Dice

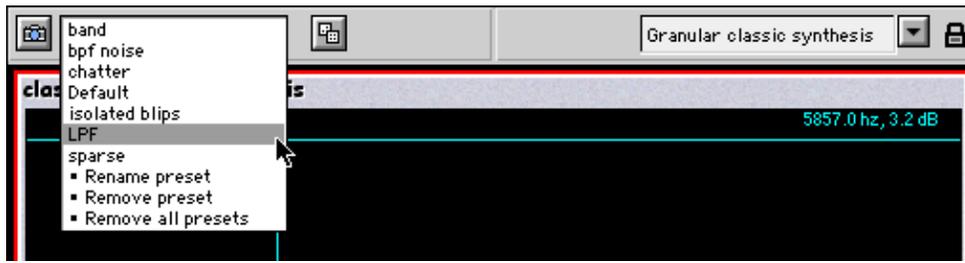
At the upper left of the **Virtual Control Surface (VCS)**, you see:



- A camera icon (for taking a snapshot of the current fader settings),
- A pull-down list of presets with the currently selected preset name displayed in the window, and
- A button with a pair of dice on it (for setting the faders to random positions).

A *preset* is a set of values for *all* the controllable parameters of a given Sound, saved under a single name. To see the Sound's list of presets, click on the arrow to the right of the current preset name.

To select a different preset, drag down until the desired preset name is highlighted; then let up on the mouse.



Experiment with selecting presets for *Granular Synth Spectrum Display* and tweaking individual parameters using the mouse.

CUSTOMIZING THE KYMA SOUND LIBRARY

In the upcoming section, you will start customizing your version of the Kyma Sound Library (see how quickly you got to this point?) So now is a good time to go into the Finder or Windows Explorer and make a duplicate of the Kyma Sound Library before you start making changes to it.

If you are working in your own studio, then you don't have to worry **too** much about altering the original library, since you can always retrieve it off the CD-ROM if necessary. However, if you are sharing your Kyma system with other people, each of you will probably want to maintain your own customized sound library as well as a shared library of everyone's contributions.

Saving a snapshot of a preset

Suppose that, as a result of your tweaking, you come across a set of parameter values that amaze and delight you and you decide that you'd really like to save those settings for future use.

To save a snapshot of the current parameter settings as a preset, click the camera icon or press Enter on your computer keyboard. Kyma will prompt you to type in a name for the preset.

CHANGING SOUNDS USING THE SOUND BROWSER

When you open a Sound file by clicking on the arrow next to its name in the Sound Browser, you are reading that Sound file off the disk and into the memory of your Macintosh or PC. When you make changes to those Sounds (by adding a preset, for instance), the changes have been made to the *copy* of the Sound that resides on in the memory of your computer; they have *not* been made to the original Sound that is saved on your hard disk.

If you make a change to a Sound in the browser, Kyma will mark the changed Sound with a yellow “caution” triangle next to its name. The file and the folders containing that changed Sound will also be marked with the yellow caution sign to remind you that you have made a change. When you close the Sound file or any of the folders containing that file, Kyma will ask you if you are sure that you want to save those changes, overwriting the copy of the Sound already stored on the hard disk. At this point you still have a chance to bail out or to drag the changed Sound into a new Sound file so you can save it under a new name.

A Random Walk through Timbre Space

Sometimes the quickest way to explore the “timbre space” defined by a particular Sound is to take a random walk through it, bump into the walls, touch the ceiling, and get a feel for its capabilities and limits. If you have ever gotten stuck looking for just the right sound, you know that a roll of the dice can sometimes help you break out of your frustration and stir up your imagination. Try pressing the **Dice** button, located just to the right of the Preset list at the top of the Virtual Control Surface. The **Dice** button sets all of the parameters to random values (sometimes with amazing results!)

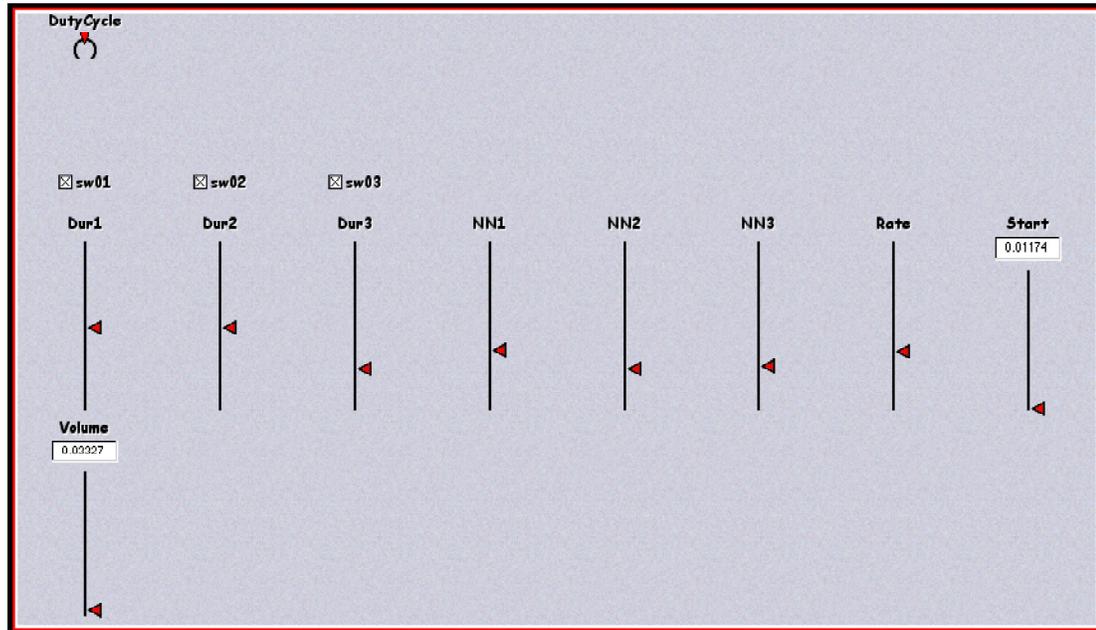


Try rolling the dice a few times on the *Granular Synth Spectrum Display* to hear what kinds of sounds you can get out of this algorithm. If you hit an interesting setting, try adjusting individual parameters within that setting. If you find a really great setting, take a snapshot of it and save it as a new preset.

Notice that the parameter names **Vol** and **Amp** are grayed out. The grayed out parameters ignore rolls of the dice (which can, in this case, protect you against deafening yourself with randomly large level settings). To toggle between “frozen” and “active” states, click on the parameter name. When a parameter is frozen, you can still change its value by hand or with a MIDI fader, but it will not respond to the dice.

Rearranging the Widgets

You can change the position, type, range and MIDI mapping of the widgets in the Virtual Control Surface of a Sound and save the new arrangement along with the Sound on the disk. For example, find the Sound called *Sequencer-CHANGE VCS LAYOUT* in the Sound Browser, and play it. Carefully experiment with different values for the parameters. To make small changes in a parameter, you can hold down the shift key as you move the fader. You can also type a value into the numeric field at the top of the fader and press Enter for it to take effect.



Let's rearrange this VCS as follows:

- Move DutyCycle and Volume to the right side
- Remove the numeric field from the top of the Volume fader.
- Change the Dur faders into potentiometers and arrange them across the top.
- Arrange the toggle switches just below the Dur potentiometers
- Line up the three NN faders just below the three toggle boxes, and add numeric displays to them.
- Change the step size or grid on the NN faders to be one half step.
- Make Start into a horizontal, rather than vertical fader and remove its numeric display.

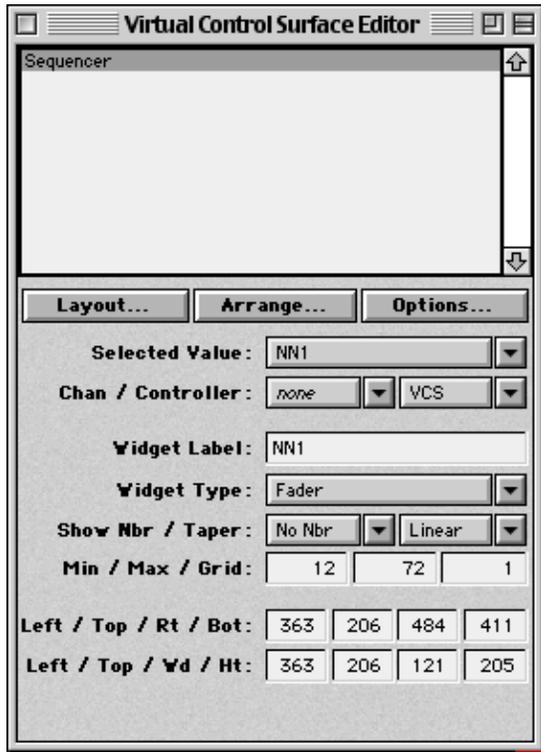
Unlocking the Virtual Control Surface

To modify a VCS, you must first unlock it by clicking on the padlock icon in the upper right. This puts the VCS into Edit mode rather than Play mode. When you unlock the VCS, you see faint white squares around the widgets. Click in the center of a widget to select it and drag to move it. Click on one of the black squares in the corners to resize the widget. To select a group of widgets, use shift-click to extend the selection or (starting from an empty area) draw a box around the widgets you would like to select.

Move DutyCycle and Volume over to the right side:

Try selecting and dragging DutyCycle all the way over to the right edge of the VCS. Do the same for Volume.

Unlocking the VCS also opens the **VCS Editor**, a floating window, reminiscent of a calculator in appearance, that you can reposition wherever you like on the screen to keep it from obstructing your view of the VCS.



The name of the selected widget is shown in the **Selected Value:** menu (where it currently has **NN1**). Click on the arrow just to the right of where it says **NN1** to see a list of all the widgets in the VCS. You can select a widget either by clicking on it in the VCS or by selecting it from this list.

Chan: / Controller: lets you choose a MIDI channel and controller number to control this parameter.

Widget Label: is the name on the controller. By default its initial value is the same as the name of the parameter, but you can change this by typing in a new name and pressing Enter.

Show Nbr / Taper: lets you toggle between widgets with numeric displays and those without. Taper refers to the units and the scale of the controller. By default the controls are linear, but you can change them to be logarithmic (for example, if you would prefer to control dB than controlling linear amplitude).

Min / Max / Grid: lets you set the minimum value and maximum value for the controller. Grid is the quantization or step size of the controller. The default range for controllers is 0 to 1 with a grid of 0 meaning continuous. In this example NN1 is controlling the pitch in units of note number, so its range is 12 to 72 and its grid size is set to 1 so it increments in half steps.

Left / Top / Rt / Bot: is the position of the widget in terms of pixels and can be used for fine adjustments or comparisons between widgets when you are trying to line them up.

Left / Top / Wd / Ht: is similar except that it gives you the width and the height of the widget (rather than the absolute position of its top and bottom edges). This is especially useful for making sure that a group of widgets all share the same dimensions.

Remove the numeric field from the top of the Volume fader:

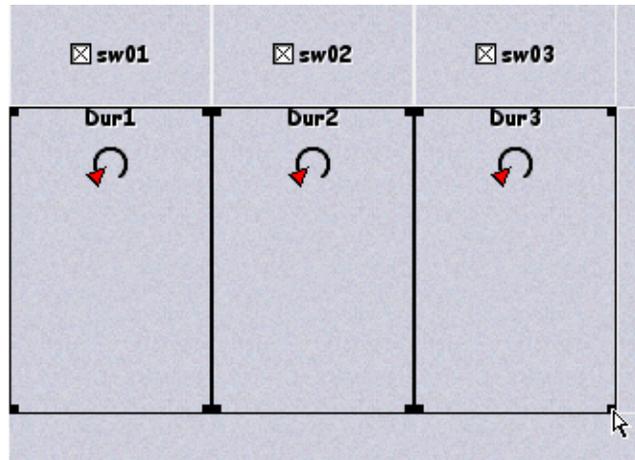
Select Volume either by clicking on it in the VCS or selecting it from the **Selected Value** menu in the VCS Editor. To remove the numeric field from the top of the Volume fader, select **No Nbr** from the **Show Nbr:** menu.

Change the Dur faders into potentiometers and arrange them across the top:

Select all three Dur faders by drawing a selection box in the VCS. Start drawing in the empty area below the Dur faders and extend the box part way into all three faders (it's not necessary to extend the box completely around the faders).

In the VCS Editor, the **Selected Value** is shown as *--More than one--* and any changes you make will be applied to all three. To change all three from faders to pots, click on the **Widget type:** menu, and select **Potentiometer**.

Potentiometers are shorter than faders are, so you can shrink all three of the pots in the vertical direction. In the VCS editor, click on the black square in the lower right hand corner of the right-most widget.



Carefully drag the black square upwards to shrink the height of the widget boxes to more closely match the actual size of the pots.

Then, click in the center of Dur2 and drag all three pots up to the top of the VCS.

Arrange the toggle switches just below the Dur potentiometers:

Similarly, select all three toggle switches, and drag them upwards until they are positioned just below the Dur pots.

Line up the three NN faders just below the three toggle boxes, and add numeric displays:

Select all three NN faders using the box selection method. Then drag all three leftward and upwards until they are positioned just under the toggle switches.

Add numeric displays to them by selecting **Number** in the **Show Nbr:** menu of the VCS Editor.

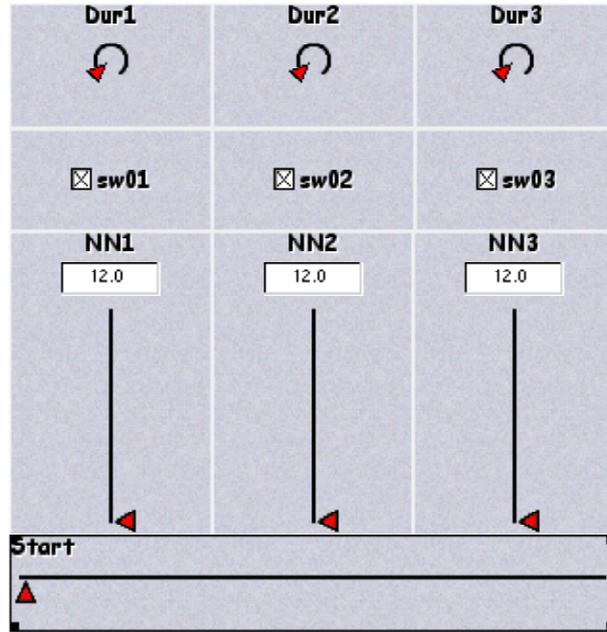
Change the step size or grid on the NN faders to be one half step:

To see the current step size or grid, look at the **Min / Max / Grid:** displays in the VCS Editor. The current step size is set to 0, meaning that the faders can choose any continuous pitch, including the pitches in between the half steps of a piano keyboard. In many cases this is desirable, but let's suppose that you want to restrict the pitches to the equal tempered half steps of the piano keys. Set the grid size to 1 by typing a 1 in the Grid field and then pressing Enter. (Later, it might be fun to come back here and change the grid to a larger or smaller interval just to hear what that might sound like).

Make Start into a horizontal, rather than vertical fader, and remove its numeric display:

In the VCS itself, select Start and drag it to the left side of the VCS just under NN1. To change its widget type, go to the VCS editor and select **Horizontal fader** from the **Widget type:** menu. Then go back to the VCS to graphically resize the widget box, making it the same width as the three NN faders just above it.

In the VCS editor, select **No Nbr** from the **Show Nbr:** menu.



Shrink and squeeze:

Select all of the Dur, sw, NN, and Start widgets by drawing a selection box around them. Carefully resize all of them to be a little narrower and slightly shorter.

This will leave spaces separating them. To squeeze out the extra space, go to the VCS Editor and select **Squeeze Vertical** from the **Arrange...** menu.

Deselect Start by shift-clicking on it. Then choose select **Squeeze Horizontal** from the **Arrange...** menu to squish the remaining widgets together.

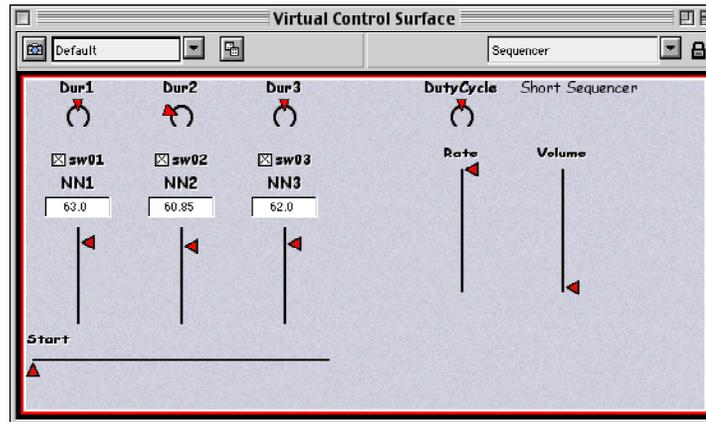
Reduce the size of the window:

Move Rate, Volume, and DutyCycle closer to the other widgets (but still separated to show that they are not related to the steps of the sequencer). Resize them so that they line up nicely. Then resize the whole VCS window by clicking and resizing in the reddish area at the lower right corner of the VCS window.

As a final touch, let's put a name on our new masterpiece. From the **Options...** menu, select **Add widget** and **Text**. This places a text box in the VCS. To enter the text, type into the Widget label field of the VCS Editor. Try typing, "Short Sequencer," and then press Enter.

Resize the Text box so you can read the text, and drag it up into the upper right corner of the VCS. Lock the VCS by clicking on the padlock icon. Kyma will ask whether you want to save all the changes you just made to the VCS. (Yes! You *do* want to save your changes!) Take a moment

now to enjoy your handiwork by playing with your new control panel and saving some presets for it.



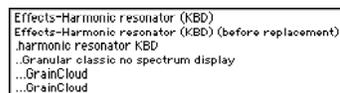
Multi-level Virtual Control Surfaces

A “layout” is defined as the list of presets along with the widget types, placement and ranges. When you combine two or more Sounds, each having its own layout, the result is a multi-level Virtual Control Surface—a VCS with multiple layouts. You can think of these as multiple “pages” or “levels” of a single VCS.

These multiple layouts are helpful in that they organize the controllers in logical groups. For instance, say that you had a granular synthesis algorithm feeding into a reverberation algorithm. You could keep all the controls related to the grain cloud in one layout and all the controls related to the reverberation algorithm on a separate layout to make things clear.

To see this in action, select *Granular classic no spectrum display* in the Sound Browser and make it the replacement input. Then select and play *Effects-HarmonicResonator KBD*. Reduce the Decay and InputScale and play an interesting chord on the MIDI keyboard.

Look in the upper right hand corner of the Virtual Control Surface for the list of layouts. Click on the arrow just to the right of the currently selected layout name so that you can see the entire list of layouts.



The currently selected layout is called **Effects-Harmonic resonator (KBD) (before replacement)**. This gives you the harmonic resonator controls only. You can use this layout when you want to adjust the parameters of the effect without touching the parameters of the synthesis algorithm feeding into the effect.

Try selecting the layout at the top of the list **Effects-Harmonic resonator (KBD)**. This gives you the merged layouts of the granular synthesis and the harmonic resonator. You can use this layout when you want access to all of the parameters in all of the combined Sounds. If necessary,

you could also rearrange it more logically using a combination of the VCS Editor and graphically resizing and repositioning.

Try selecting the layout named..**Granular classic no spectrum display**. These are the parameters of the granular synthesis alone, without any of the harmonic resonator's parameters.

The layouts are arranged hierarchically, with dots and indentation indicating how far away the layout controls are from the last effect in the chain. The last effect added, the **Effects-Harmonic resonator (KBD)** has no indentation, because it is at the end of the chain. **Granular classic no spectrum display** is further "upstream" in the signal flow, so it has more dots before its name. If this last bit was not immediately clear, don't worry about it yet, because it will become completely clear by the time you get to the section on "The Sound Editor" on page 67.

VCS Editor Menus

In our earlier discussion of the VCS Editor, we went through each of the display/data entry fields. Now let's take a closer look at the menus.

Layout menu

The **Layout menu** is for renaming, removing, or combining layouts.

Return to our earlier example. of the *Granular classic no spectrum display* as the input to the *Effects-HarmonicResonator KBD*.

We want to make this into a new compound Sound and save the changes to it, so create a new Sound file window (Use Ctrl+N and choose Sound file as the type.) Drag *Effects-HarmonicResonator KBD* from the Sound browser into the new Sound file window, select it and play it, readjusting Decay and InputScale and playing an interesting chord on the MIDI keyboard.

Unlock the VCS to get the VCS Editor. Select the top layout in the list: **Effects-Harmonic resonator (KBD)**. Use the Layout menu to duplicate it. Use the same menu to rename it "Level controls".

Using shift-click, select all of the controls *except* for Amp, Density, InputScale, and Vol. Delete these controls from this layout by choosing **Remove selected widgets** from the **Options** menu of the VCS Editor. Rearrange the faders so they are next to each other.

Now you have an additional layout, one which includes just the level controls from each of the two Sounds. Re-lock the VCS, and try switching to your new layout and experimenting with the controls.

Unlock the VCS again, and select *both* Level controls and Granular class no spectrum display from the list of layouts. (Use shift-click to extend the selection). From the **Layout** menu, select **Merge into new layout**. This creates new layout with the controls from both of the original layouts.

They are piled on top of each other at the moment, so click the **Arrange...** button, and select **Clean up this layout**, arranging the faders into 9 columns. Use the **Layout** menu to rename the layout 'Merged layout'.

Arrange

The next menu in the VCS Editor is called **Arrange...** and it has a list of options for graphically rearranging groups of widgets.

Be very careful of the last option in this menu: **Clean up this layout**. It will throw away all of your changes to the positions and sizes of all the widgets in the layout. Use this option only at the beginning of your work (to specify the number of columns you would like) or when you are ready to give up and start over again.

The **Align** options are good for taking an almost straight column or row of widgets and forcing them to be in perfect horizontal or vertical alignment along one of their edges. **Distribute** means to measure the space between the first and last widget (your choice of which edge to use in the measurement) and to evenly distribute the selected widgets within that space. **Squeeze** means exactly what you think it means: squeeze out any extra space between the selected widgets. Here are some examples:

Align horizontal (tops)



Distribute horizontal (centers)



Squeeze horizontal



Options

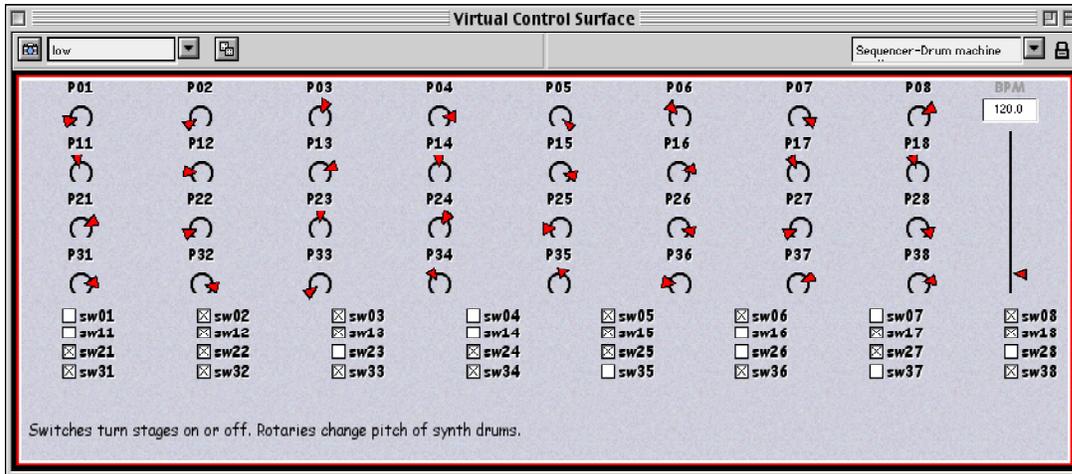
The right-most menu in the VCS Editor, **Options...**, contains all the options related to adding, hiding, and removing widgets. You can add a box (useful for indicating logical groups of controls) or some text (useful for labeling those logical groups of controls). Hiding or removing controls can be handy when you are trying to create new sub-layouts that show only a subset of all the available controls.

Interaction of the Virtual Control Surface and the Motor Mix

If you have a CM Automation Motor Mix™, make certain that you have it selected as your controller in the Preferences and that you have connected its MIDI in and out to your Capybara•320. Once you have set it up this way, the Motor Mix and the Virtual Control Surface will mirror each other. (If your Motor Mix powers up in Pro Tools mode by default, hold down **PLAY**

and **ESCAPE** while turning on the power to use it with Kyma, and the same combination a second time to switch it back to Pro Tools mode.)

In the Sound Browser, try playing the Sound called *Sequencer-Drum machine synthetic* to see how this works.



The name of each parameter will appear on the LCD scribble strip above each vertical strip of (from top to bottom) button / rotary / 4 buttons / fader. The name of the fader is printed on top, and the name of the rotary is shown below.

If the on-screen control is a fader, the motorized Motor Mix fader will jump to the initial position of the fader on screen. If the controller is a switch or a gate, it will be mapped to one the buttons labeled with letters on the Motor Mix. When the virtual button is down or when the toggle is checked, it corresponding button on the Motor Mix will light up. If the virtual control is a rotary or potentiometer, it will be mapped to one of the continuous rotary controls on the Motor Mix. The rotary knobs on the Motor Mix are continuous and control the *change* to a parameter, not its absolute position (so they are not motorized). To remap your virtual faders to the Motor Mix rotary controls (and rotaries to faders at the same time), press the **Mode** button (found at the top of the left column of buttons just to the left of the Motor Mix's left-most fader).

Virtual faders and rotaries are assigned to Motor Mix faders and rotaries from left to right. If there are more than eight virtual controls, the next set of eight are on the "next page" of the Motor Mix. To scroll over by a single column of faders, press the right arrow button on the upper left of the Motor Mix. To page over by groups of eight faders, press the **Bank** button and then press the right arrow. The left arrow button can be used to scroll back the other way.

Names in the virtual control surface are often longer than what can fit in the LCD scribble strip display, so they are almost always abbreviated on the Motor Mix. To see the full name of a parameter and its current value as a number, press the numbered button just below that parameter name (the horizontal row of buttons between the LCD scribble strip and the continuous rotary).

To "zoom in" on a fader or to put it into "fine tuning mode", press the **Shift** button (lower right corner of the Motor Mix) followed by the button marked **alternate**. This gives you 10 times the accuracy (by mapping the full fader throw to one tenth of the full range of values).

To scroll through the presets, use the rotary at the top right of the Motor Mix. An abbreviated version of the preset name is displayed in the segment display just above the rotary and the full name appears in the scribble strip. To select a preset, press down on the rotary (which doubles as a button).

MERGING SEVERAL MIDI STREAMS WITH THE MOTOR MIX OUTPUT

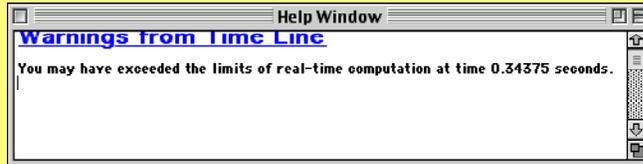
If you are using a MIDI merge to combine the output of the Motor Mix with the output of a MIDI sequencer or other MIDI controllers, bear in mind that the Motor Mix puts out controller data on channel 1. So all other sources of continuous controller data should be sent to higher channels in order to avoid conflict.

License to Explore

Now that you know how to open directories, search the Sound Library, play Sounds, use one Sound as the input to another, and use the dice to explore timbre space, it's time to take a break from the written walkthrough so you can explore the Kyma Sound Library and have some fun. When you come back to the Walkthrough, we will look at how you can start arranging and layering your Sounds in time!

WARNINGS IN THE HELP WINDOW

Sooner or later, given the boundless combinatoriality of Kyma, you are bound to run into something along the lines of the following message in a Help window:



Our recommendation? The first and usually best strategy is to ignore it. Play the Sound or timeline anyway and see how it sounds. Kyma is set to be a little on the conservative side as far as when it warns you that you may be exceeding the limits of real time computation. So usually, even after getting this warning you can play with impunity. If, however, you hear the sound breaking up or otherwise sounding distorted or clicky, and all the meters in the DSP Status Window are going into the red, it could be that you really are running out of processing power.

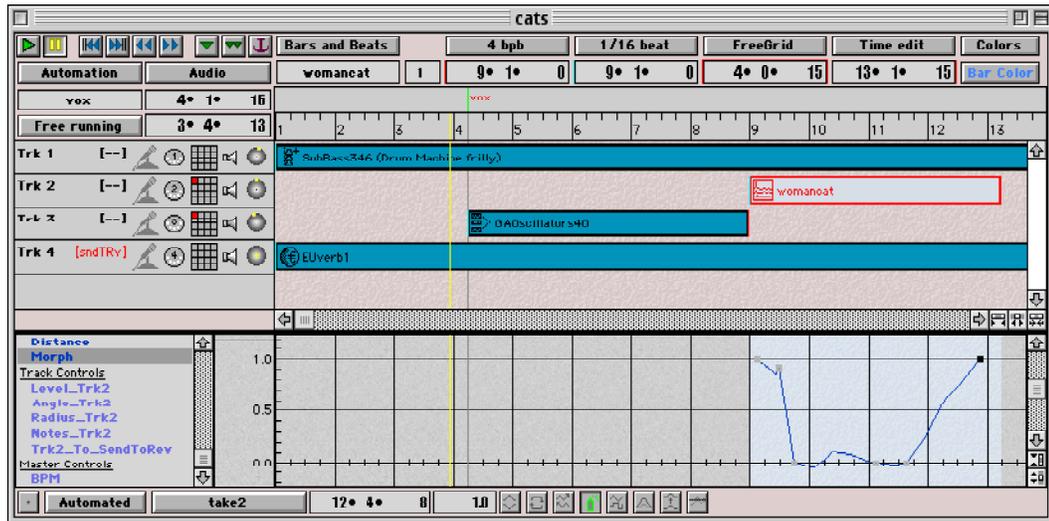
Some ideas for decreasing the amount of processing power required: reduce the polyphony, reduce the number of partials or banks in an OscillatorBank or Vocoder, decrease the bank size, decrease the sample rate, record part of the Sound to disk so it is not computed in real time. (These suggestions will make more and more sense, the more you learn about Kyma).

THE TIMELINE

So far in this walkthrough, we have been creating individual Sounds with lists of fixed presets. The next step is to layer these Sounds, create sequences of Sounds, and to record or draw the way the presets should evolve over time. To these things, you need the Timeline. To create a new Timeline, choose New... from the File menu (or use Ctrl+N), choose **Timeline** as the file type, and click **OK**.

Overview

In the timeline, time is displayed from left-to-right, and tracks or layers are displayed from top to bottom.



The upper and lower edges of this window are used for controls, menus, and informational displays. Just below the information displays on the top is the time ruler that displays time in beats or in SMPTE time code. Track information is shown on the left side of the window. Automated parameter controls are shown in the lower half of the window. You can drag your Sounds into the center part of the window, and their relative spatial positioning in that window will be turned into relative start times and durations when you play the Timeline. To change the relative sizes of the top and bottom halves of the Timeline, position your cursor over the middle line until it changes to an up and down arrow; then drag the line up or down as desired.

Throughout the Timeline, and in many other places in Kyma, you can see a help message on how to use a particular control by positioning your mouse over it. Take a moment right now to

position your mouse over the different displays, buttons, and menus, in order to familiarize yourself with the capabilities of the Timeline.

HOW DOES THE KYMA TIMELINE DIFFER FROM A HARD DISK EDITOR OR A SEQUENCER?

At first glance, the Kyma timeline could be mistaken for a hard disk editor or a sequencer. That's not *too* surprising, since a sequencer, an editor, and the timeline are all tools for arranging sounds in time. There are, however, some important differences that can both explain the behavior of the timeline and suggest things you could accomplish with the timeline that you could not do in a sequencer or hard disk editor.

The most important difference is in what the time bars represent. In a disk editor or audio sequencer a time bar represents a digital audio file. In a MIDI sequencer, a time bar represents a MIDI note event. However, in Kyma, each time bar represents a synthesis or processing algorithm—a program running on the Copybara, starting at a particular time, perhaps running in parallel with other programs, and stopping at a specified time. For example, in a Kyma timeline, each bar could represent a different effects-processing algorithm applied to the microphone with each effect starting at a different time, some of them running in parallel and routed to different outputs, and some of them fading out before others. So the timeline could be viewed as a “process scheduler” or as a time-varying synthesis architecture.

Once a sound is recorded to disk, it becomes fixed and unchangeable. In Kyma, the idea is to *put off* the necessity of recording sound to disk until the last possible moment (or forever if you are using Kyma in live performance). That keeps your sounds live, performable, adjustable and easily changeable right up until the moment when you record to disk and freeze them in their current state.

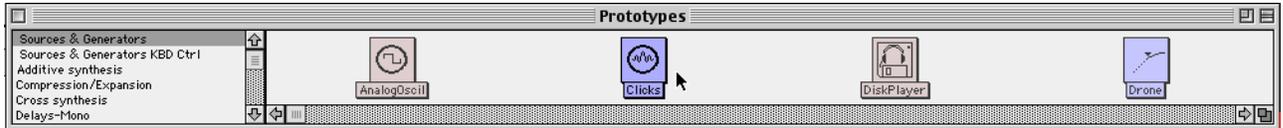
Dragging from the Sound Browser into the Timeline

You can drag (or copy/paste) Sounds into the Timeline from anywhere Sounds are stored: the Sound Browser, the Prototypes, a Sound file window, or a Sound editor.

For example, let's drag a Sound from the Sound Browser and place it in the Timeline. In the Sound Browser, inside the **Overview** Sound file, find the Sound called ***Freq/Time Scaling Vocoder*** and play it once to hear what it sounds like. Take special note of the names of the controls and the names of the presets in the Virtual Control Surface for this Sound, so you can see where these controller names and presets are used in the Timeline.

Now, drag ***Freq/Time Scaling Vocoder*** from the Sound Browser into the Timeline and drop it into the first track, close to the beginning (in other words, close to the upper left edge of the Timeline). Don't worry about getting it exactly in position; just place it close to the beginning, because we can fine-tune it later.

Next, let's try dragging a Sound from the Prototypes strip (the palette at the top of the screen) into the Timeline. Find the Sound named **Clicks** and drag it into Track 2 just below **Freq/Time Scaling Vocoder**. To find a Sound in the Prototypes, you can either use Ctrl+B and type part of the name or you can scroll down the list of categories on the left and scroll through the icons on the right until you see the Sound's icon.



Creating a new track

There is no limit to the number of tracks in a timeline. To create a new track beyond the four you are given initially, just drag a Sound into the position where you need the new track, and it will create one for you automatically.

Copying and pasting Sounds within and between windows

You've just finished dragging a Sound from the browser into a timeline and dragging a Sound from the Prototypes into a Timeline. You could also have accomplished the same result Copy from the Edit menu (or use Ctrl+C) and Paste from the Edit menu (or Ctrl+V).

MOVING A SOUND FROM A TIMELINE TO ANOTHER WINDOW

To move a Sound from a timeline into another timeline or Sound file window, Copy the Sound in the timeline and then Paste it into the destination window. You cannot drag a Sound out of a timeline, because Kyma will think you are trying to drag it into another track of the same timeline.

THE DIFFERENCE BETWEEN THE PROTOTYPES AND THE SOUND BROWSER

Both the Prototypes and the Sound Browser contain Sounds that you can use as in creating your own Sounds. In theory, the Sounds in the Prototypes are intended to act as low-level modules that you use as building blocks in creating more complex Sounds. The Sounds in the Sound Browser, on the other hand, are intended to be more like "factory patches": complex finished examples that you can immediately apply to your own source inputs. In practice, however, some of the Sounds in the Prototypes are fairly complex and some of the Sounds in the browser are fairly basic. This blurring of the distinction between building blocks and finished examples is probably inevitable, given that any Sound in Kyma, no matter how simple or complex, can be combined with other Sounds to create an entirely new Sound which can, in turn, be combined with yet other Sounds, and so on in an endless process.

There are other differences between the Browser and the Prototypes. The Prototype strip is intended as a source of building blocks, so it contains at least one example of every type of Sound module available in Kyma. These Sounds are created at the moment you open the Prototype strip (which happens automatically when you start Kyma). They are not stored on disk, so they do not maintain any kind of state (such as a list of presets), and you cannot edit them in place and save the changes. All you can do is drag a *copy* of a prototype Sound from the Prototype strip into a timeline or Sound file window and then edit the copy. By convention, any keyboard-controlled Sounds in the Prototypes have polyphony 1 and respond to the default MIDI channel.

The Sound Browser is more like a window on all sound-related files on your disk. It includes, not just Sounds, but also sample files, spectral and other kinds of analysis files, MIDI files, text files, etc. If you drag a samples file, an analysis file, or a MIDI file from the browser into a timeline or Sound file window, Kyma will create a Sound that can read and interpret that file. Sounds in the Sound Browser *can* be edited in place (so be careful!) and their changes (including things like additions to the presets list) can be saved on the disk. They tend to be more complex than the Sounds in the Prototypes. For example, there are keyboard-controlled Sounds with polyphony and effects, and there are "performance environments" that take live input and process it interactively.

Sound Info Display and Editing

When you first drag a Sound into a timeline, the Sound is automatically selected. To deselect, click in an empty area of the timeline. To select a Sound, click on it. To select a group of Sounds, draw a box around them or use shift-select to add one at a time to the current selection.

Information on the selected Sound or group of Sounds is displayed at the top of the window: the Sound's name, its MIDI polyphony (relevant only if it expects MIDI note events), its start time, anchor time, duration, and end time. If you have a group of Sounds selected, these fields shows the name and polyphony of the earliest Sound in the group, the earliest of their start times, the latest of their end times, and the total duration of the whole group of selected Sounds.



To remind yourself of the meaning of each field, position the mouse just above the field for some pop up help. Extra color has been added to the borders of these fields to serve as a quick reminder of what their contents represent. The start time field has extra color on its left edge, the anchor time has a bluish glow, the duration has extra color around its top and both sides, and the end time has extra color on its right edge.

These are not just information *displays*; they are also data *entry* fields. For example, to force ***Freq/Time Scaling Vocoder*** to start at time zero, select it, click in the start time display, change it to read 00:00:00:00, and then press Enter to save the change. (To navigate through the time displays and the sub-fields of the time displays, use the Tab key to move forward and Shift+Tab to move backwards).

Change the duration of ***Freq/Time Scaling Vocoder*** to 60 seconds by tabbing over until the End time display is selected and changing it to read: 00:00:60:00. Once this change takes effect, the end of the ***Freq/Time Scaling Vocoder*** will extend off the right edge of the Timeline. Use the zoom-to-fit button described in the next section to force the entire timeline to fit within the visible window.

Zooming

The zoom buttons that affect the display of time and duration (horizontal zooming)  are located in the lower right corner of the upper half of the timeline below the vertical scroll bar.

The first button shrinks the length of the bars in the timeline (that is, it will zoom out to show more time in the visible window on the timeline). The second button will make the bars longer (that is, it will show *less* time in the visible window on the timeline), and the last button- the zoom-to-fit button- forces the entire timeline to fit within the visible area without need for scrolling.

Changing the duration of a Sound in the Timeline

In addition to specifying a new start time for the selected Sound by typing it into the info field, you can also reposition time bars by dragging them to new positions.

To change the duration or end time of a Sound, click on its right edge and drag the edge rightward or leftward to its new length.



If you reach the right edge of the timeline window, continue dragging rightward and the timeline will scroll to the right. There is a limit to how far you can drag the right edge by hand. At some point it is better to either: zoom out (making the graphical size of the bar smaller) or to use the data entry displays at the top of the timeline to type in a new end time or new duration for the selected bar.

Try this now with **Clicks**. Drag the bar itself as far left as it can go so it starts at time 0. Then drag its right edge out until it has the same duration as **Freq/Time Scaling Vocoder**.

Time units and quantization

The left menu at the top of the timeline lets you switch between time code (absolute time in the form of **hours:minutes:seconds:frames**)



and bars and beats (relative time in the form of **Bar•Beat•Subdivision**, controlled by the BPM metronome).



If you ever find yourself needing to view time in terms of minutes, seconds, and fractions of a second, see the box titled “Minutes, seconds, and fractions of seconds” on page 57 for a little trick you can use.

Use the next menu to set the size of a grouping in terms of either frames-per-second or beats-per-bar. For example, the screens above show a grouping of 30 frames per second and 4 beats per bar.

The next menu is for setting quantization: the smallest duration for purposes of graphical placement and time displays (but not affecting the quantization on the DSP, which is always sample-accurate). You can specify the quantization in terms of fractions of a frame or fractions of a beat. Several commonly used fractions are supplied in the menu, or you can type in your own arbitrarily small fraction.

Nudging and track-changing with the arrow keys

Once you have positioned an object close to where you want it in the timeline, you can use the Arrow keys to nudge it just a smidgen more to the left or right. Use Shift-Arrow for larger smidgens.

Arrow moves an object one quantum left or right: one fraction of a frame or one fraction of a beat as specified in the quantization menu in terms

Shift+Arrow moves an object by the smallest unit of time: either by one frame or by one beat.

Use the up and down arrows to move the selected Sounds up or down by a track. If the target track is already occupied, the selected Sound will jump over that track and land in the next one down that has available space at that time.

Grid menu

The third menu from the right in the strip at the top of the timeline is the Grid menu. This puts an invisible grid on the timeline to help you place and move objects more accurately in time. The options are:

- **Free grid** which allows you to place objects at any time,
- **Quantized grid** which allows you to place objects on the specified quantization times only (where the quantization has been specified in the menu just to the left of the Grid menu),
- **Magnet grid** makes each Sound that you drag into a track stick to the previous Sound like a magnet. This can be useful when you are first dragging Sounds into the timeline, because it causes the first Sound you drop into a track jump to time zero,
- **Enter beat or time** is the mode to use when you want to precisely specify each time or duration by typing it in by hand.

The name of the current grid mode is always displayed on the Grid menu activation button.

Transport controls

To play the Timeline, click the green **Play** button in the transport controls in the upper left corner of the timeline.



As a short cut, you can toggle between play and pause by pressing once on the space bar on your computer keyboard. If you prefer to use a different key-equivalent for starting than for stopping, use Ctrl+RightArrow to play and Space to pause. To rewind and stop, use Ctrl+LeftArrow. To rewind and play, use Ctrl+Space.

Try playing the Timeline you are working on by clicking on green play button, and then pause it by tapping once on the space bar. Try out the various key equivalents for starting, stopping, and rewinding.

Mute and Solo

To solo a track, click on the track's speaker icon (located on the left side of the timeline).



To extend the solo to other tracks, use shift-click. This will silence all but the soloed tracks. Click on it a second time to toggle it out of solo mode. A blue speaker with little blue rays of sound coming out of the speaker icon indicates that the track is in solo mode.

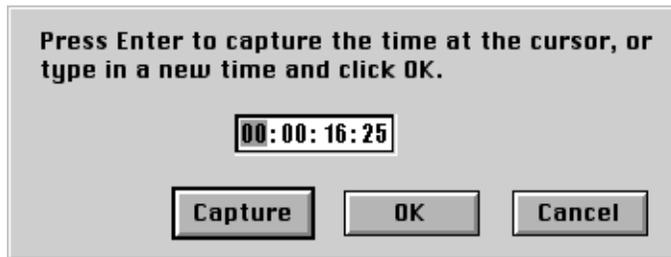
To mute a track (silence it while continuing to play all the others), use Option+click (or Ctrl+Click on the PC). To extend the muting, use Shift+Option+click (on the PC it is Shift+Ctrl+Click). A red line drawn through the speaker icon indicates that the track is in mute mode.

Markers

The horizontal strip just above the time ruler is reserved for markers. To insert a marker, click on the marker insert button at the top of the Timeline, just to the right of the transport controls.



This opens a dialog for placing the marker in one of two ways:



- Numerically: Type in the precise time for the marker click OK. or
- By ear: Listen to the timeline and press Enter when you hear the point at which you'd like to insert a marker. (In order to do this, you must start playing the timeline first and then click the Marker Insert button).

Try inserting a couple of markers into your example timeline right now. First, play the timeline. Then click the Marker Insert button. Listen to the timeline and click Capture (or press the Enter key) at exactly the point at which you'd like to place the marker. Click the Marker Insert button again but this time, use the tab key to tab through the fields and type in a time for the marker and then click OK.

Next, put the timeline into pause mode, and insert a marker using the Capture button or Enter key. The Capture button inserts a marker at the same position as the time cursor (whether you are in pause or play mode).

Notice that the markers appear in the empty strip just above the time ruler. There you can select them in the usual manner (by clicking or drawing a box around them). Selected markers can be repositioned by dragging or deleted by pressing the Backspace or Delete key.



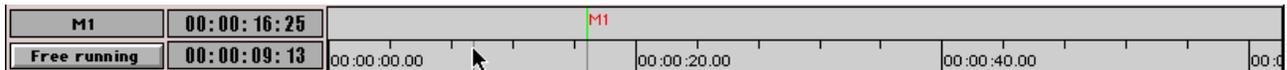
The name of the selected marker is displayed at the far left. You can change the name of a marker by typing a new one into the Marker name field and pressing the Enter key. Note: you

cannot type spaces within a marker name in this window (because Space is interpreted by the timeline as a play/pause toggle). To include internal spaces in a marker name, enlarge the marker name window (using Ctrl+L), and then enter the name or phrase in the larger dialog box.

The time of the earliest selected marker is displayed in the next field. To reposition the selected marker to a precise time, enter the time in this field and then press Enter.

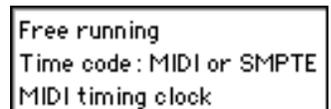
Positioning the Time Cursor

The horizontal strip just above the Sounds and the track labels (and just below the Marker area) is dedicated to time cursor control.



Using external time code to control the time cursor

At the very left, where it now says **Free running**, there is a menu for selecting the source of external control over the time cursor. Press down on the button to bring up the menu.



In Free running mode, Kyma and the Copybara generate their own clock for controlling the progress of the time cursor across the screen.

In Time code mode, the Copybara reads the time code from one of the inputs on the back: VITC in, LTC in or MIDI in so a video or a MIDI sequencer can control the time cursor.

Typing in a new position for the time cursor

The current time of the cursor is shown in the display just to the right of that menu. Like the Sound info displays, it serves both as a display and as a data entry window. Try typing a new time into the window followed by Enter. The time cursor will jump to that position (whether in play or in pause mode).

Clicking in the time ruler to move the time cursor

The long strip to the right of the time display is called the “time ruler”, because of its resemblance to a measuring-stick. If you want the time cursor to jump back or ahead in time, click on that time in the time ruler. The time cursor will jump to that time (in either pause or play mode). Try this out with your example timeline right now.

Using the transport buttons to move the time cursor

While the timeline is playing, you can jump forward or backward to key points using the blue transport buttons just to the right of the yellow pause button.



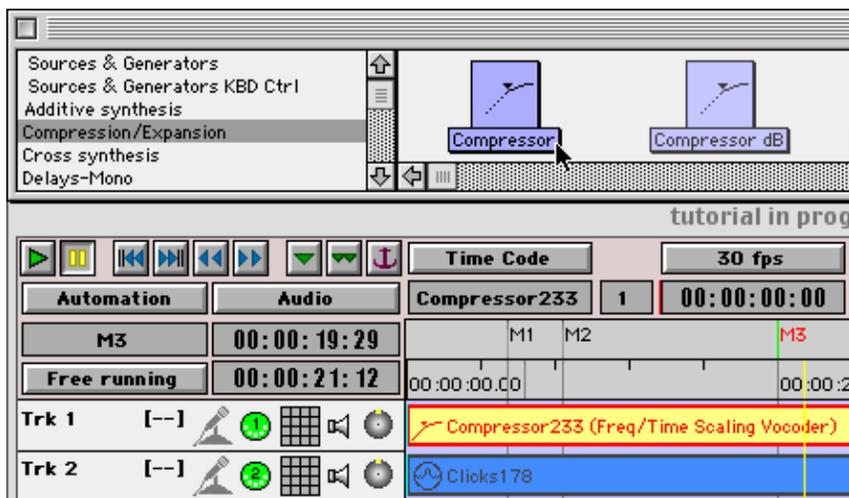
The first two buttons are for telling the time cursor to jump to the previous marker or the next marker relative to the current position of the cursor. To jump backwards by two markers, click twice on the Previous marker button. Play the timeline and experiment with these buttons.

The next two buttons are for jumping to the previous or the next “important time”. In this context, an “important time” is defined as the start of a time bar, the end of a time bar, or the position of an anchor. Go ahead and try out this pair of buttons now (though, with your current example timeline, the only important time is will find is the beginning, since both time bars are exactly the same length and start at exactly the same time).

Applying an effect to a Sound in the timeline

To apply a modifier or an effect to a Sound in the Timeline, drag and drop the modifier onto the Sound. The modifier can come from the Sound Browser, a Sound file window, the Prototypes, or a Sound editor.

For example, since the dynamics of the vocoder are a little uneven in our example timeline, let’s try putting a compressor on the vocoder. In the Compression/Expansion category in the Prototypes window, find the **Compressor**. Drag it over the **Freq/Time scaling Vocoder** bar in the timeline, and drop it onto the bar.



The name of the bar changes to **Compressor1 (Freq/Time Scaling (Vocoder))**. Play the Timeline to hear the results.

Undo and removing the last-applied effect

Undo from the Edit menu reverses the last operation you performed. For example, if you have just dragged a modifier onto a Sound, you can remove it again by choosing Undo (or use Ctrl+Z).

But what if you modified the Sound in a previous session and have already saved the timeline on disk and done several other kinds of operations in the meantime? In that situation, Undo would no longer serve to remove the modifier Sound. However, you can *always* remove the last modifier on a Sound by selecting the Sound in the Timeline and pressing the minus key.

For example, to remove the **Compressor** you just placed on the vocoder, press the minus key (-). To put it back again, choose Undo from the Edit menu.

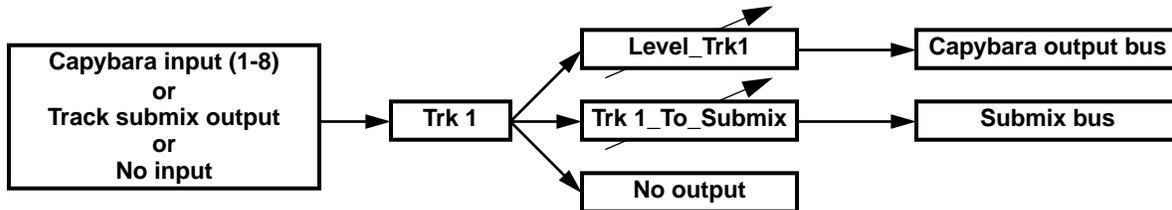
Replacing the input of a Sound in the timeline

To replace the input of a Sound in the timeline, Option-Drag the new input into the timeline and drop it on the bar of the Sound whose input you would like to replace.

In our example timeline, we currently have a vocoder with a compressor on it. Let's substitute a Disk-bass loop (found in the Sound Browser) as the input to the compressor. Hold down the Option key (the Ctrl key on a PC), drag Disk-bass loop from the Sound Browser over the **Compressor(Freq/Time Scaling Vocoder)** bar, and drop it onto the bar. Try playing the timeline to hear the results. Then Undo by typing Ctrl-Z. Play the timeline again to make certain that the vocoder is back in place.

The implied mixing architecture of the timeline

Each track of the timeline has zero or one input and has zero, one or more outputs. If you do not specify otherwise, the outputs of all the tracks are added together in a mixer.



Track status icons

The arrangement of the track status icons roughly parallels the signal flow diagram shown in the previous section:



The **Track input source** icon is displayed within the square brackets on the left. The double-dash indicates that there is no input to this track (in this particular example, none is needed because the Sound is using the cephalaphage sample as its source). Press down in this area to get a menu of input choices for the track (including each of the analog or digital audio inputs on the back of your Capybara). 

Associated with the input are two status icons: a microphone for **Audio input status**, and a 5-pin DIN to represent **MIDI input status**. Press down on the MIDI icon for a menu that lets you choose a different MIDI channel on which Sounds in this track expect to receive MIDI. The appropriate icon turns green when the Sound under the time cursor in that track expects to receive audio or MIDI input. The icon turns red, when the input is being recorded. (Only MIDI can be recorded in the current version of the software so you can only surmise what the next update might have in store for you).

Starting with the grid icon just to the right of the MIDI icon, are three icons associated with the track's output. The **Submix status** icon (the square grid) represents any submixes to which you have routed the output of this track. In this example, the track is not routed to any submixes, so the grid is empty. You can route a track to several different submixes, and each one is repre-

sented by a block of color in the grid and by its name in a list that you see when you press on the grid icon.

The **Mute/Solo status** icon is a little speaker. Clicking on the speaker solos the track, and option-clicking on the speaker mutes the track.

The rightmost icon is a circle with a black dot in the center (representing you) and a yellow dot on top representing the apparent source of sound. This is the **Panning status** icon and later, when we add spatialization to our example, the yellow dot will move around while the timeline is playing, indicating the moving sound source.

Press on the panning status icon to get an Audio output menu. This gives you the option to choose any combination of hardware outputs (corresponding to the analog or digital outputs on the back of your Capybara) for the track. You can also opt for no output (although this would only make sense in cases where the track output is routed to submixes instead).

 If you choose to hard-wire the track output to one or more physical outputs of the Capybara, the panning status icon is replaced with an **Output channel status** icon: a grid with a green light in each output channel. Note that this is for sending the track output to specific, fixed hardware output channels. If you want to allow for panning, use the menu to switch back to the Use Pan Controls option. The pan controls are discussed in detail in a later section.

Effects processing applied to submixes of tracks

We've already seen how to modify a single Sound by simply dragging the modifier Sound and dropping onto the time bar of the Sound to be modified. But what if you'd like to apply processing to a *group* of Sounds in the timeline? For example, what if you would like to add reverb to *all* the Sounds in a timeline? By sending each Sound in the group to the same submix, and then using that submix as the input to a new track, you can apply processing to the whole group of tracks.

Routing the output of a track to a submix

 To route the output of a track to a submix, click on the Submix status icon (the square grid icon in the track status area) until you see the submix menu. The top level of the menu gives you a choice of connecting or disconnecting this track from any of the existing submixes. There is also an option to create a *new* submix and connect to that.



Try this now in our example timeline. Route the output of Track 1 to a new submix and name it **Vox**. When you create the new submix, Kyma will supply a random letter as its default name, or you can choose to type in a more mnemonic name instead.

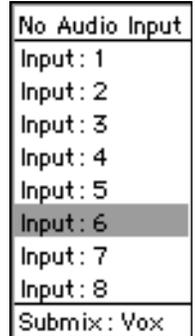
For each submix this track is routed to, the Submix status icon shows a block of color. (Don't worry, you *can* route to more than 16 submixes, it's just that only 16 of them will be represented by a block of color in the status icon). The name of the submix also appears in the Submix menu of each of the other tracks in your timeline. For example, look at the Submix menu for Track 2:



You *could* also route the output of Track 2 (or any of the other tracks) to the same submix Vox. (For the time being, however, let's connect Track 1 only).

Using a submix as the input to a track

To select a submix as the input to a track, click in the Track input source area to see the menu of potential inputs for this track.



The first choice is No Audio Input (for the case where Sounds in the track are synthetic or use samples stored in RAM or on disk as their source of Sound).

The physical inputs on the back of your Capybara make up the next group of potential audio inputs to the track. Depending on your hardware configuration, you will see 4, 8, or for older machines 2 potential audio input channels.

The last grouping is a list of the names of all current submixes. Only the allowable input sources are shown, so if a track's output goes to a particular submix, that submix name is absent from the list of potential inputs. You can, however, still set up such a feedback loop by physically routing a Capybara output to Capybara input.

Try this now with our example timeline. Select Vox as the input for Track 3.

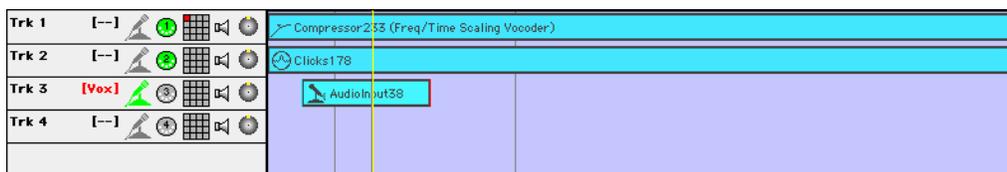


The name of the input is displayed within square brackets in place of the double-dashes that were there before. Wherever it is used as an input, the color of the submix name is the same as the color of its square in the icon where it the recipient of the input of a track. To give you a visual indication of the submix routing, the color of the submix name in its *destination* track is the same as the color of its square in the Submix status icon in the *source* track.

How is the audio input used in a track?

The specified audio input to a track is used only in places where there is an **InputChannel** Sound in the track. (You can find **InputChannel** Sounds in the Prototypes under the **Inputs** category). This is true whether the input is a submix of other tracks or whether it is one of the Capybara's input channels.

Try this out in our example timeline. Drag an InputChannel from the Prototypes into Track 3 of the example timeline. Position it such that it does not start at time 0, and increase its duration without making it as long as the other Sounds in the timeline.

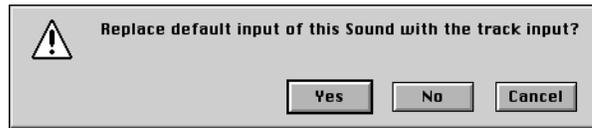


Press play to play the timeline. When the time cursor reaches the start of **InputChannel**, notice that the Audio input status icon (the microphone) turns green to indicate that audio input is expected. In this case the source of audio for the track is a submix, so don't be misled by the icon into thinking that it is literally expecting the microphone input at that moment. You may

also notice that the voice gets subtly louder for the duration of *InputChannel*, because the output from Track1 is doubled for that period of time.

Simply doubling the output of Track 1 is clearly not what we had in mind when creating the submix, so let's add some processing by dropping *EuverbMONO* (from the Reverb-Mono category of the Prototypes) onto *InputChannel*. Press Space to play the timeline. This time, you will hear Track 1 through some reverberation for the duration of *EuverbMONO(InputChannel)*.

Processing a submix is such a common operation that there is a shortcut for doing it. Delete *EuverbMONO(InputChannel)* (select it and press Backspace or Delete). Now drag *EuverbMONO* into the (now empty) Track 3. Kyma will ask you if you'd like to replace the input of EU with the Track input.



If you answer Yes, then Kyma will place a copy of *EuverbMONO* of an *InputChannel* into Track 3, starting at time 0 and lasting for the current duration of the submix. This saves you a step if your intention is to put some processing on the submix for the duration of the submix.

If you have a pre-amplified microphone or another line-level source plugged into the first audio input of your Capybara, try another experiment with the timeline. Switch the audio input source of Track 3 from its current setting of **Vox** to **Input: 1** and play the timeline again. Now if you speak into the microphone you can accompany the alien voice and hear your own voice through some reverberation. This is one of the ways you can use the timeline in a live performance situation.

Switch the input to Track 3 back to Vox before proceeding.

QUICK TRICK FOR CREATING A NEW TRACK

You have to select an submix or audio input for a track before you can drag an effect onto it and have it automatically use the audio as its input. But what if no track exists yet? A quick trick for creating a new track is to select a Sound in the track just above where you want to create a new one, and use the down arrow key to move that Sound down into the empty area, thus creating a new track there. Then you can use the up arrow to move the Sound back to its original track before proceeding.

Routing tracks to specific output channels

To route a track to a specific output channel, first open the output menu by clicking on the circle icon (the rightmost icon in the Tracks label). Then select an output channel (or elect to use the Position and Panner controls instead).

Try routing Trk1 to channel 1. (Solo the track so you can more easily hear the results). Then add channel 2 to the list of output channels. If you have a surround setup, try removing channels 1

and 2 from the output list and adding channels 3 and 4 to the list of outputs; that should route the output of Trk1 to the surround speakers.

Notice that, when a track is routed to a set of specific output channels, the output status icon changes to a rectangular grid with a green square for each of the output channels.

Before proceeding, switch the output of Trk1 back to **Use pan controls** (the choice at the very bottom of the pop-up menu). This will allow you to pan the output of the track around the room to any virtual location. (More on this in the section called **Spatializing**).

WHAT ACTUALLY HAPPENS WHEN YOU PRESS PLAY IN THE TIMELINE?

Each bar in the timeline represents a program to be run on the Capybara. When you press play, Kyma comes up with a way of scheduling all of those programs to run (serially or in parallel, depending on the way you have arranged them in the timeline) on the multiple processors inside your Capybara.

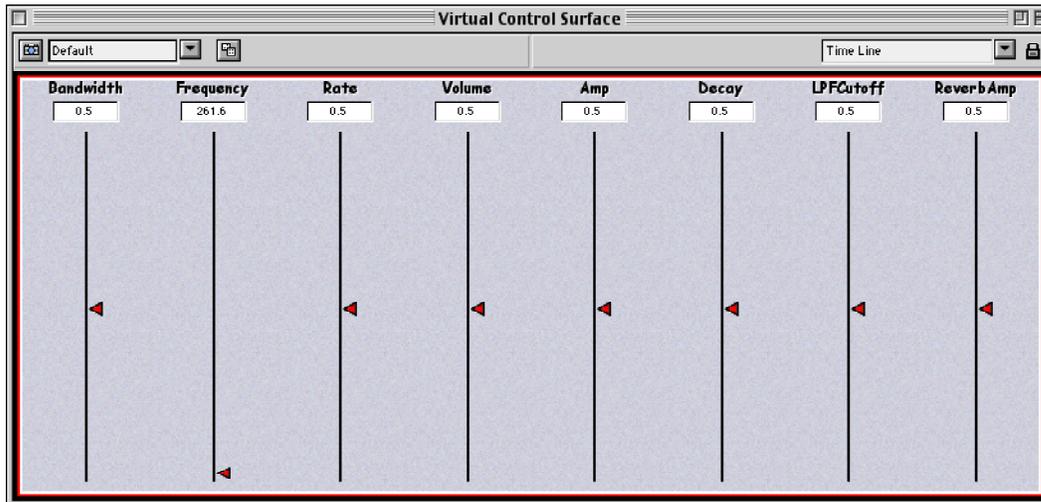
You can think of each time bar as representing a virtual module in a hardware architecture that changes over time. For example, if you had 20 Sounds in a timeline, but they did not overlap in time, Kyma would not schedule all 20 of them on to run on the Capybara at the *same* time. Each program runs *only* when it is needed. When it is finished, its computational and memory resources can be used by another program that starts up later. As a result of this efficient scheduling, the power of your Capybara hardware is leveraged. Unlike a static piece of hardware which has fixed resources at all times, the Capybara can be reused for different purposes at different times, and this changeover is sample-accurate (in fact it occurs in between output samples).

If there is enough computation power on one processor to run several of the programs, Kyma schedules several of them on a single processor. If a program is too complex to fit on a single processor, Kyma splits it up across several processors and makes certain that the signals get from one processor to the other. If a program reads a sample out of memory, Kyma makes certain that the sample is loaded on the same processor as the program that reads it. So a lot of things have to happen each time you press Play.

Some timeline operations that may *seem* trivial (such as moving a time bar to the left or right) actually require Kyma to completely redo the scheduling of the programs among the multiple processors, because moving a time bar could result in different resources being required at different times.

The Timeline Virtual Control Surface and Layouts

When you play a Timeline, you see a Virtual Control Surface that includes the live controls from each Sound in the Timeline. Some of the original Sounds may already have their own arrangements of controls and lists of presets, so the Timeline VCS has several pages or layers to it. Each page is called a “layout” and includes a list of presets along with the placement, types, and ranges of the widgets.



The first page (or top layer) of controls is the layout for the Timeline itself; this allows you to save a list of presets for the entire Timeline.

Restart the timeline using Ctrl+Space. Then use the Dice Button to generate random settings for the variable parameters. If you stumble across something that pleases you, snapshot it as a preset. Save the example timeline to disk using **Save** from the **File** menu (Ctrl+S), giving it the name “Tutorial Timeline”. Your presets for the timeline will be saved along with the timeline and the objects in the timeline.

You can also access the individual Sounds’ layouts from the list found at the upper right of the VCS next to the lock icon. Click and hold down the arrow icon next to the name of the currently selected layout so you can see the list of all the layouts in the VCS. The names of the layouts are indented to show what layer they are on. The Timeline layout is on the top layer. On the next layer, you can see the individual Sounds, and below the Sounds there may layouts for subparts of the individual Sounds.

There are three Sounds in our timeline so far: **Compressor(Freq/Time Scaling Vocoder)** (which we dragged from the Sound Browser) **Clicks** (which we dragged from the Prototypes), and the **EuverbMono**, (also dragged from the Prototypes). Sounds in the Prototypes are created just when you open the Prototype strip, so they do not have any layouts saved with them. Sounds in the Sound Browser, on the other hand, are saved on disk and may have one or more layouts saved with them.

For example, the **Freq/Time Scaling Vocoder** has several layouts for its different subparts: one layout called Sample, one called Oscillator, and one called Vocoder. In a later section on the signal flow editor, we will go more into depth about how to view and edit the subparts of a Sound (and in fact most of the nearly 600 page Kyma 4.5 manual is devoted to designing and editing).

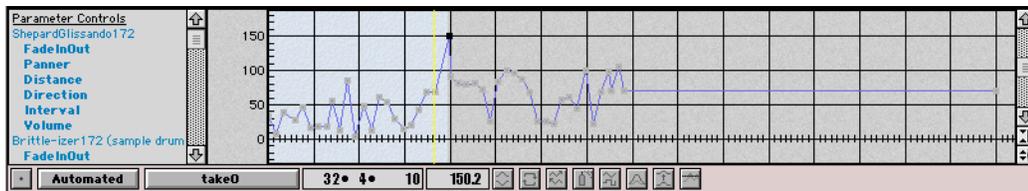
For now though, select the layout named Vocoder, and notice that there are a couple of presets stored with the layout: **Default** and **high data rate**.

You may often find yourself designing Sounds in the Sound Browser or a Sound file window and saving lots of presets for the Sounds. When you later use these Sounds in a timeline, you can still get at those presets by going to the Layout list and selecting the layout for your original Sound.

In the heat of production, you will be adding and removing live parameters so fast that you could easily end up with a VCS full of gaps or a giant VCS with all the controls stuck in the lower left corner. To quickly reduce the size of a bloated VCS: click the unlock icon, and resize the VCS by dragging on the reddish area in the lower right corner of the window. Then, in the VCS editor, choose **Clean up this layout** from the **Arrange** menu. Caution: Use this option only if you want to shrink the VCS to a smaller size and do not care about the particular placement or ordering of the widgets. **Clean up this layout** does an automatic placement, ordering, and resizing of the all the widgets in the VCS.

Controlling Parameters in the Timeline

The bottom half of the timeline is dedicated to creating and editing time-varying controls for the parameters of the timeline and the Sounds it contains.



On the left is a list where you can select one of the controllable parameter names. On the right, is a graph of how the parameter selected in the list varies over time. The bottom frame of the controls editor has menus for changing the state of the controls (for example whether they are live or automated), the source of control (for example the MIDI channel and controller number). It also has displays showing the time and value of the selected point in the graph, and a set of buttons for transforming the graphs.

INCREASING THE SIZE OF THE CONTROLLER EDITOR

To increase the size of the lower section of the Timeline, position your cursor over the center horizontal line between the controller editor and the timeline until the cursor changes into an up-down arrow cursor. Once the cursor changes to the up/down arrow, you can pull the center line up or down to change the relative sizes of the upper and lower halves of the time line.

Local, Track and Master Controls for Parameters

In the example timeline we’ve been working on, select **Compressor (Freq/Time Scaling Vocoder)**, and take a look at the list of controllable parameters.



There are three types of controls in the timeline: Parameter controls, track controls, and master controls.

Parameter controls correspond to the controllable parameters of the selected Sound(s) in the timeline. Notice that **Bandwidth**, **Frequency**, **Rate**, and **Volume** are the same parameter names as the ones that show up in the VCS when you play the example timeline. Three additional parameters are added to any Sound that you drag into the timeline: **FadeInOut** (so you can give an amplitude envelope to the Sound), and **Panner** plus **Distance** which you can use to give the Sound a virtual location in space. Parameter controls are “local” to the Sound, that is, they can control the parameters of that Sound only. These controls are limited to the duration of their Sound,

and they remain with the Sound if you move the Sound to a new time or a different track.

Track controls exist for the duration of the entire timeline and they affect any of the Sounds in a track. Track controls remain with the track, rather than with a particular Sound, so any Sound you drag into that track will be affected by the track controls. The list shows the track controls for the tracks containing the selected Sounds. Each track has a controller for **Level**, which you can use for mixing tracks, and **Angle** plus **Radius**, which you can use for assigning the track to a spatial location. If the track is routed to any submixes, there is also a **Trk_To_Submix** level control for each of the submixes. (For example, if you wanted to send some of this track to a reverb, you could use the submix level to send just a little of the signal to the reverb rather than the full strength signal). Another track control, Notes, is slightly different in that it represents discrete note events, rather than a continuous controller. For now, Notes is always live, meaning that you can control Sounds on that track using a MIDI keyboard or sequencer, but in this version of the software, you cannot yet record and edit MIDI note events. (Sounds like it could be a useful feature for future releases, though).

Master controls can affect all Sounds on all tracks (but only if the Sound’s local parameter has been slaved to the global, master controller), and they exist for the full duration of the timeline. A default master control that is automatically supplied in any new timeline is **BPM**: the beats per minute or metronome controller.

Sources of parameter control

A parameter can be controlled in one of three ways: **live** from the VCS or an external source of MIDI continuous controllers, **automated** by a time-varying function that you’ve either drawn or recorded into the controller editor, or **slaved** to another controller. The two menus at the bottom of the timeline show you the **state** of the selected parameter and the **source** of its control. You can use the **State menu** to change the state of the selected parameter between live, recording, automated, and slaved. Use the **Source menu** to choose between different MIDI channels and controller numbers (for live and recording), the different takes of recorded automation functions, or different master controls (for slaved).

Live controls

When you first drag a Sound into the timeline, its controllable parameters are still **live**, meaning that they can be controlled from the Virtual Control Surface (VCS) or by incoming MIDI controller messages from a fader box or a sequencer. A “live” parameter is indicated by a green dot next to its name in the list of parameters. Only the *live* controls of the timeline show up in the VCS (since the automated parameters can no longer be controlled by the on-screen faders).

In our example timeline, notice that all of the selected Sound’s controllable parameters have green dots next to them in the Parameter controls list. The green dot indicates that the parameter is **live**. Select **Bandwidth** in the list, and look at the two menus on the bottom of the editor.



They show that the state of the selected parameter is live and that its source of control is either the VCS or MIDI continuous controller 12 on channel 1. To change the MIDI channel or controller number, click on the Control Source menu, and enter the new information in the dialog box.

Capturing the current settings of the VCS in the timeline

While the timeline is playing, you can adjust the live parameters using the Virtual Control. Once you’ve arrived at some parameter settings that you like, you can capture the values of parameters in the *selected* Sound by choosing **Set selected live controls to current values** from the menu called **Automation** in the upper left of the Timeline just below the transport buttons.

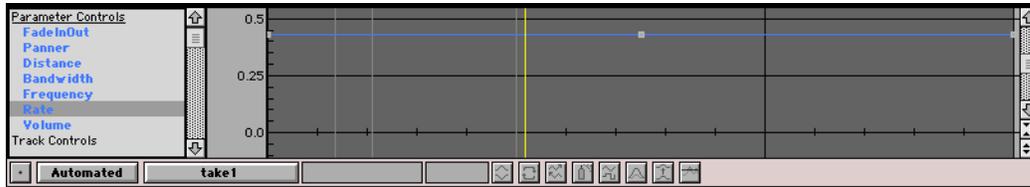


By selecting this option, you are saying that the live parameters of all currently selected Sounds should be automated and that they should have to the same (constant) values in the timeline as they have in the current settings of the Virtual Control Surface.

Try this out in our example timeline. Make sure **Compressor (Freq/Time Scaling Vocoder)** is still selected. Then play the timeline. In the VCS, adjust the faders, and/or roll the dice. Once you arrive at an interesting set of parameter values, go over to the Automation menu and select **Set selected live controls to current values**. (The **Set selected live controls to current values** option applies *only* to *selected* Sounds).

Displaying automated parameters

To see the results, let’s revisit the list of the selected Sound’s parameter names in the lower left of the Timeline. Note the absence of green dots. That’s because all the parameters are no longer “live” but automated.



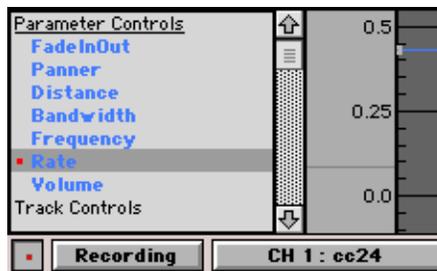
To see how a parameter’s value varies over time, click on the parameter name in this list, and its control graph will be displayed in the area just to the right of the list. For example, if you select **Rate**, you will see a graph of how the value of **Rate** changes over time. Right now, the value of **Rate** *doesn’t* change over time; it is a constant value of 0.8 (or whatever value you happened to set it to when you captured the positions of the faders in the VCS). The State menu shows that Rate is no longer live but Automated and that its source of control is **take1**, the name of its control graph.

Recording VCS or MIDI fader moves

To record the controllers as you perform them in the VCS or on MIDI faders, first put the parameter you’d like to record into record state. The next time you play the timeline, Kyma will record all of the fader moves associated with that parameter.

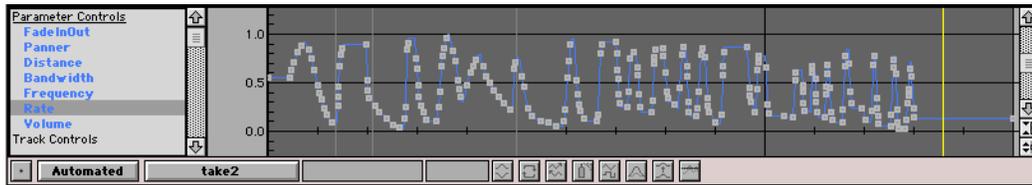
To put an individual parameter into record state, select it in the parameter list and click on the Record button just below the list. The button will turn red, and a red dot will appear next the parameter name in the list to show that it is “armed” for recording and will begin recording the next time you press the play button for the timeline.

Try this now with the **Rate** parameter. Select it, and press the record button.



Notice that the State menu indicates that you are in Recording mode and the Source menu shows that it will be recording MIDI continuous controller 24 on channel 1 (in addition to the on-screen fader called **Rate** in the VCS).

Play the timeline, and move the Rate fader in aesthetically pleasing ways. While the time cursor is over the Sound whose parameter(s) you are recording, the MIDI status icon for the track will turn red.

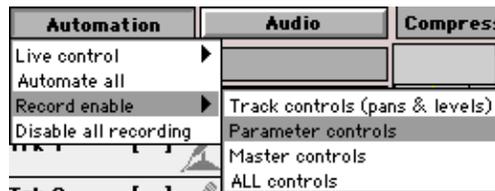


Record for a full minute or hit Space to pause whenever you've had enough. Then bring the timeline into the front so you can see the results. (You may have to reselect **Rate** if it has become deselected).

The State menu shows that **Rate** has been automatically knocked out of **Recording** mode and is now in the **Automated** state. Notice that the Source menu shows the source of control as being **take2**. Click on the Source menu if you'd like to return to **take1** instead.

Often you need to record several parameters at once, so the Automation menu provides some shortcuts for putting groups of parameters into Record mode.

For example, select all of the Sounds in our example timeline; then go to the **Automation** menu and **Record enable** all of the selected Sound's parameter controls.



Now play the timeline. While the timeline is playing, use the VCS to select presets, press the Dice button, and/or adjust the faders. The timeline will record all of these parameter changes.

After you have finished recording, press Play on the timeline so you can hear your recorded performance.

MIDI CONTROLLERS VERSUS MIDI NOTE EVENTS

Note that, although you can control Sounds in the timeline using live MIDI keyboard events, it is not yet possible to *record* MIDI note events. You can record and subsequently edit MIDI controller moves, but you cannot record and edit MIDI keyboard events...not *yet* anyway.

Editing automated parameters

Now that you have created something, your first thought is probably, "How can I modify it?" To edit an automation graph, first select the parameter you want to edit in the parameter list on the left; this will display its automation graph in the area just to the right of the list. The time span of the Sound whose parameter you are editing is shown with a different background color in the Controls Editor. In other words, a parameter can't have any effect on a Sound before that Sound begins or after it ends. The background color of the Controls Editor highlights the span

of time during which that parameter can have some effect, and it prevents you from adding points outside of this time span.

To create a new version of the control function without losing the current control function, click on the **Source of Control** button (where it now says **take1** as the source of control). Select **New Take** from the menu to create a new take. This will create a new take called **take2** and preserve **take1**. You can give the take a more meaningful name by selecting **Rename take** from the **Source of Control** menu.

 To see a larger range of values or to see more detail, use the scroll bar and the **Zoom in** and **Zoom out** buttons in the lower right corner of the editor.

To *add a new point* to an automation graph, option-click at the time and value where you would like to place the new point. To *delete a point*, select it and press Backspace or Delete.

To *change the position of a point* already in the control function, select it and drag it to a new time and value position. To drag several points at once, draw a box around the points or extend the selection using shift-click; then click and drag one of the points to the new location.

To *nudge a point by a small amount*, use the arrow keys. The left and right arrow keys nudge the selected point(s) by the quantization specified in the Quantization menu at the top of the timeline. By holding down the shift key and pressing an arrow key, you can move by the basic unit of time (either a beat or a frame).

To *drag a point (or points) to a new time without changing its value* (or vice versa), click on one of the points and then hold down the shift key before you start to drag. That will restrict the motion to the initial direction of the drag: either horizontal or vertical.

You can *change the time or the value of a point numerically* using the data display/entry fields just below the graph area. The time and value of the earliest of the selected points is displayed in the fields at the bottom of the timeline. Type in a new time or new value followed by Enter.

Add some new points to the **Rate** control by option-clicking at various locations. Press Space to hear the Sound with this changing parameter value. Add some new points to the **Rate** control function and move some points around until you have something you think will make an interesting **Rate** automation control. Then play the Timeline by tapping the space bar. Have a listen, make some changes to the **Rate** control, and then listen again.

To COMPILE OR NOT TO COMPILE

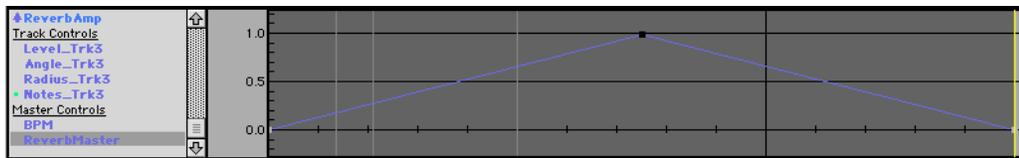
You may have noticed that some of the changes you make require the timeline to recompile before you play it again, while others do not require it to recompile and in fact can even occur while the timeline is still playing. Any changes to the duration or position of Sounds require the timeline to recompile the next time you play it. Changes to automated controllers, on the other hand, can be made while the timeline is still playing. There is one exception. The first time you change an automated controller from a constant value to one that varies over time, the timeline will recompile prior to playing with the new automation function. (This is due to an optimization that can be made on constant parameters.)

Slaving one control to another

Suppose you wanted one control to exactly mirror the changes in another control. You can accomplish this by slaving one control to another. The master controller can be another controller in the same Sound, a Track control for the track containing the Sound, or a Master control.

To slave one controller to another, first select the name of the parameter in the parameter list. Then, in the state menu, select **Slave to...** and choose a master controller from the list of potential master controllers.

For example, let's create a single master controller for controlling two different parameters of the reverb. First deselect all Sounds. Then go to the state menu, where it says **Control**, and select **New Master**. Give it the name **ReverbMaster**. Scroll down in the parameter list to verify that **ReverbMaster** is now listed as one of the Master controls. Select **ReverbMaster** and edit its graph to start at 0, increase to 1 at the midpoint, and decrease until it reaches 0 again at the end.



Next, select the **EuverbMono** Sound. Then select **ReverbAmp** in the parameter list. In the State menu, choose **Slave to** and look through your choices for master controller. Notice that the choices are limited to the other parameters of **EuverbMono**, the track controls for the **EuverbMono**'s track, and master controls: **BPM** and **ReverbMaster**. Select **ReverbMaster** as the master control for **ReverbAmp**. Notice that **ReverbAmp** is marked with an up arrow in the parameter list to show that it is controlled from elsewhere. Its graph is a pale version of **ReverbMaster**'s graph.

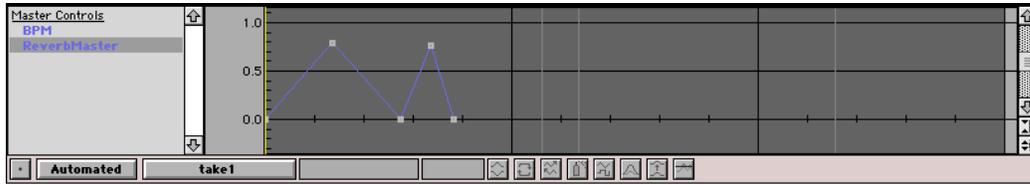


Next, select **Decay**, and slave *it* to the same master control, **ReverbMaster**.

Slaved controllers are in the same state as the master control. In this example, **ReverbMaster** is automated, so the two parameters slaved to it are also automated. Try making **ReverbMaster** live. First, select it in the parameter list. Then, press down where it says **Automated** to get the state menu, and select **Live**. Now play the timeline, and use **ReverbMaster** to control both the decay time and the level of the reverberated signal.

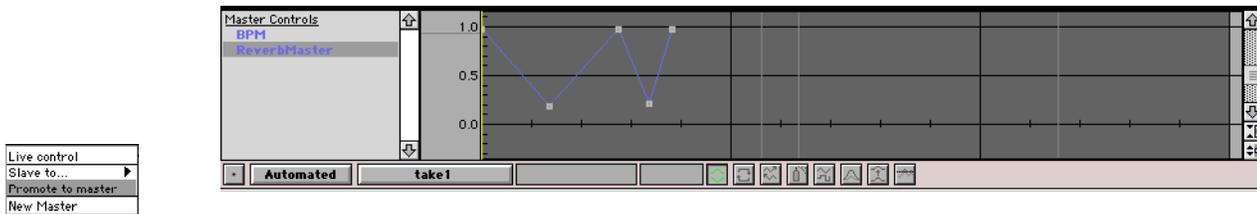
Controller transformations

The icon-labeled buttons across the bottom of the timeline are transformations that you can apply to the selected controller automation graph. For example, switch **ReverbMaster** from live back to **Automated**, create a new take, and draw a lopsided M shape like this one:

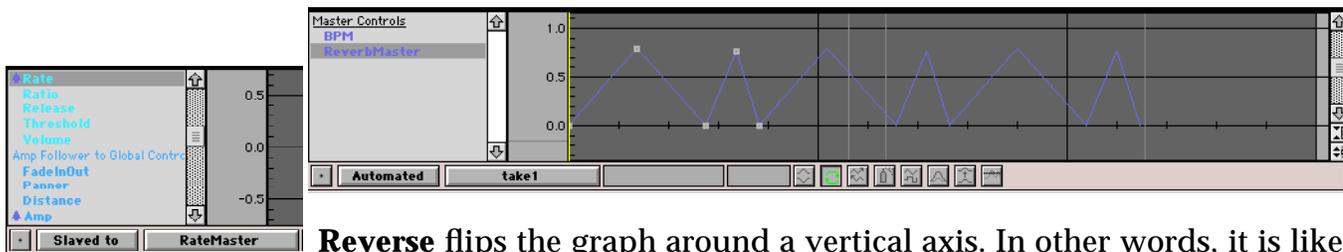


Then try applying transformations to this graph one at a time by clicking on the transformation button just below the Controls Editor.

Invert rotates the shape about a horizontal axis. Press the Invert button. When you get a cross hair cursor, click on the axis of rotation. This is an example of inversion around 0.5:



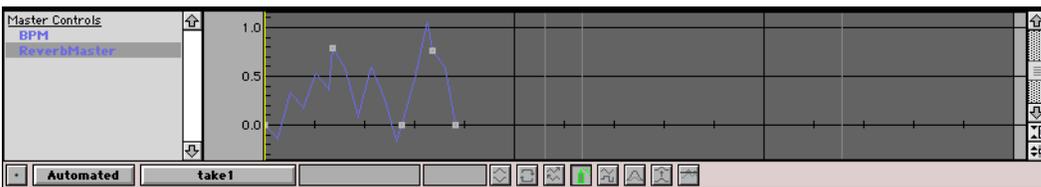
Loop repeats the shape for as many full repetitions as will fit in the time span:



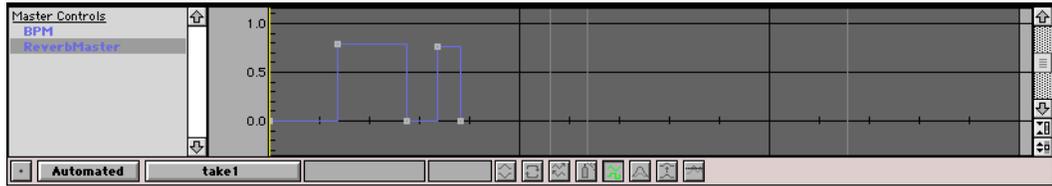
Reverse flips the graph around a vertical axis. In other words, it is like going through the graph backwards:



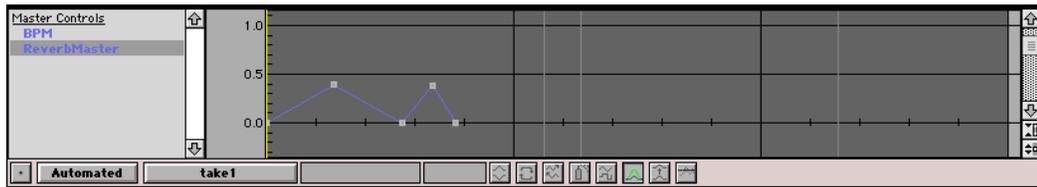
Spray can adds random jitter to the graph between the break points. Press the spray can icon. Draw a box with the cross hair cursor. The height of the box determines the size of the random numbers. The width of the box determines how often a new random number is generated.



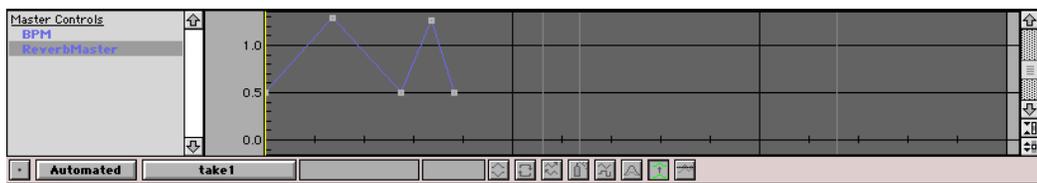
Square off turns the graph from continuous to discrete. It jumps immediately to each new value rather than sloping continuously from one value to the next.



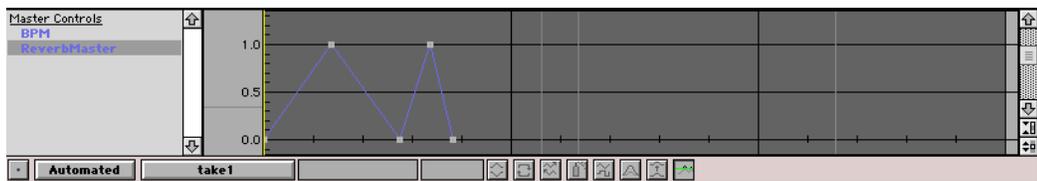
Scale multiplies every value of the graph by the same number. Click on the scale icon. Then enter the scale factor. For positive scales graph keeps its same shape but will be shorter or taller after the scaling. Negative scale values will invert the graph.



Offset adds the same number to each point in the graph. Click the Offset icon. Then enter the offset. The graph looks exactly the same except that the whole thing is shifted up or down.

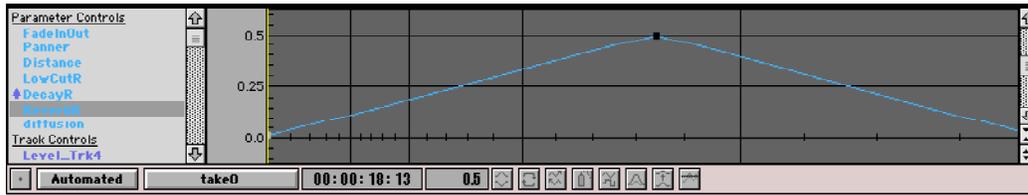


Threshold forces every point above a threshold to the value 1 and every point below a threshold to the value 0. Click the threshold icon. Then draw a box. The vertical location of the box is the threshold value. The height of the box is the hysteresis. In other words, it is the amount above (or below) the threshold that the graph has to go before it is really considered to be above (or below) the threshold. Think of a graph that has lots of small variations above and below the threshold. If you don't want the result to jump between 0 and 1 for each of those small variations, make the hysteresis a little larger than the small variations that you would like to ignore by drawing the box a little taller than the small variations.



Info displays for the automation controls

Just below the graph of the selected controller, there are two data entry/display fields. The first displays the time of the selected point and the second displays its value. If more than one point is selected, the time and value of the earliest point will be displayed.



To change the time or value of the selected point, click in the appropriate field, type a new number, and press Enter. If more than one point is selected, you will set the position of the first point, and the positions of all other selected points will shift relative to the new position of the first point.

To quickly set all selected points to the same value, press Enter, type the value into the dialog box, and press Enter again to set all selected points to the new value.

Audio Signals as Controls

There are two ways to use audio signals as parameter controls in a timeline. One is to extract the frequency or amplitude envelope from a signal and use it as an automated controller. The other is to convert a live audio input into a global control so you can control the parameter(s) in real time. For example, you can create a timeline for a live performance, where the audio signal from a musical instrument controls some of the parameters of the synthesized sounds or the signal processing algorithms.

Extracting an amplitude or frequency envelope from an audio signal

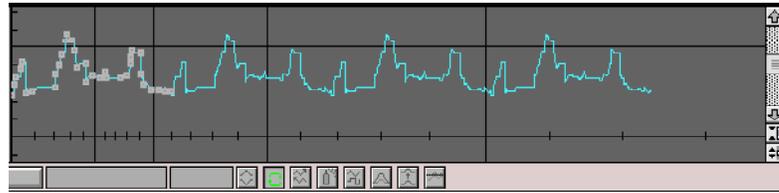
To extract a controller from an audio signal, drag and drop the Sound into the controller editor. For example, let's control the Frequency parameter of *Freq/Time Scaling Vocoder* using the frequency envelope of a different Sound.

First, select *Freq/Time Scaling Vocoder*, and then select **Frequency** in the parameter list. In the Sound Browser, find the sample named *karsten honey pie* (in the **Samples 3rd Party/Forced Media** directory). Play it first, so you are familiar with the melody.

Drag *karsten honey pie* from the Sound Browser and drop it into the editor for the **Frequency** controller. A dialog opens, giving you a choice between selecting an **Amplitude** envelope, a **Frequency** envelope or setting the value of **BPM** based on the duration of the dragged Sound. For the purposes of this example, select **Frequency** and click **OK**. Wait for the duration of the sample while the watch spins around and Kyma extracts the frequency envelope. (In this particular instance, you've dragged a sample into the timeline, so its duration is finite. However, if you had dragged a Sound into the timeline, Kyma would ask how much of the Sound's envelope to extract. The default duration of a Sound is two years; it's unlikely you'd want to wait quite that long for the envelope extraction, no matter how entertaining that animated watch cursor might be).



When Kyma has finished extracting the frequency envelope, it will display the melodic contour in the controller editor. Click the loop button to repeat that shape for the duration of *Freq/Time Scaling Vocoder*.



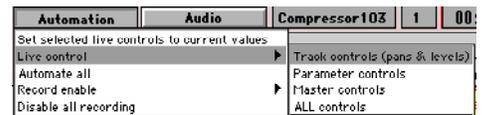
You can see that the shape of the controller follows the melody of the sample. Now play the timeline and listen for the pitch contour of Karsten’s voice imposed on the words of the cephalopage.

Follow a similar procedure when you want to extract the amplitude envelope of a Sound. First select the timeline parameter you would like to control. Then drag a Sound from the Sound Browser or Prototypes and drop it into the controller editor. Select Amplitude as the envelope you would like to extract. Sit back and look at the spinning wrist watch while Kyma plays the Sound and extracts its amplitude envelope.

You can use the amplitude envelope to control *any* parameter of the Sound in the timeline; just because it’s an amplitude envelope, it does not have to be used to control another amplitude parameter. For example, you could use the amplitude envelope of a drum loop to control the cutoff frequency of a filter in the timeline. In that particular instance, you might also want to use the Scaling button to transform the extracted amplitude envelope into the right range for a frequency parameter, but the shape of the envelope would be maintained. These kinds of cross-modulations can be useful both in a musical context and in a sound design context.

Using the live audio signal as a live controller

You can also track a parameter of a live audio signal and convert it into a live controller in the timeline. This can be particularly useful when you plan to perform live with a timeline, using different aspects of your live audio signal to control various aspects of the processing and synthesis.



The key to converting some aspect of the audio signal into a live controller that shows up in the Virtual Control Surface is to use one of the Sounds in the **Global controllers** category of the Prototypes. Each of these prototypes converts some aspect of an audio signal into a live controller that shows up on the Virtual Control Surface. For example, find the prototype named ***Amp Follower to Global Controller***, select it, and use Ctrl+Space to play it. This prototype tracks the amplitude envelope of an (unheard) drum loop sample and converts it into a controller called Amp (which you should now see jumping wildly up and down in the Virtual Control Surface in response to the drumloop’s amplitude changes).

In order to link this audio-derived-controller to a parameter in the timeline, you would drag the ***Amp Follower to Global Controller*** into the timeline, and slave both Amp and the parameter you want to control to a common master controller.

As an example, let’s try controlling the Rate parameter of the vocoder with the amplitude envelope of a live signal from the microphone. Without closing the example timeline you’ve been working on, create a *new* timeline (using Ctrl+N). Copy ***Freq/Time Scaling Vocoder*** from your

old timeline, and paste it into Trk 1 of the new timeline. (Although it may be tempting, you cannot drag a Sound from one timeline into another, because that would just move the Sound to a new time and track within the *same* timeline). Next, drag *Amp Follower to Global Controller* from the Prototypes into Trk2 of the new timeline, and stretch it out to the same length as *Freq/Time Scaling Vocoder*.

Next we want to slave Rate and Amp to the same master controller. Select *Freq/Time Scaling Vocoder* so its parameters show up in the list of controls. Select Rate and select **Promote to master** from the state menu (press the **Automated** button just below the list of parameters). This will create a new master control with the default name of RateMaster, and it will slave Rate to RateMaster.

Now select *Amp Follower to Global Controller*, select the parameter named Amp, and use the state menu to slave Amp to RateMaster.

Finally, select RateMaster and use the state menu to set it to Live control. Then play the timeline. You should hear the vocoder slowing down and speeding up in response to amplitude changes in the (unheard) drum loop.

Now let's switch to the live input from the microphone so you can control the rate of the vocoder with your voice amplitude. Option-drag (Ctrl-drag on the PC) an Input *Channel 1* from the Prototypes, and drop it onto *Amp Follower to Global Controller* in order to replace its input with the audio input to channel 1 of the Capybara.

Now (assuming that you have a pre-amplified microphone feeding into channel 1 of your Capybara) you can play the timeline again, and control the rate of the vocoder with the amplitude of your voice. Try setting the value of Release up to its maximum, so you can hear the effect die away after you stop making noise into the microphone.

Do a **Save as...** to save this timeline as an example, for future reference, on how to use an audio signal as a controller (call it something like **audio input controls rate**). Then close it and return to our regularly scheduled timeline.

Kyama timeline control as MIDI continuous controller output

The parameter controllers in the timeline are not MIDI continuous controllers; they are internal to Kyma. However, there *is* a way to send them out of the Capybara as MIDI continuous controllers. Suppose, for example, that you'd like to use one automated controller graph to control both a Kyma Sound and a patch on an external synth—or that you prefer to use the timeline editor to create control graphs for your MIDI devices. The key in both instances is to use a prototype called *MIDIOutputController*. For example, create a new timeline, and drag *MIDIOutputController* from the MIDI Out category of the Prototypes into Trk1 of the new timeline. Set its duration to about 8 seconds.

Using the timeline to create MIDI continuous controllers

Select *MIDIOutputController* and look at its list of **Parameter Controls**. One of them, Amp, represents the value that the *MIDIOutputController* will send out on MIDI channel 1 as continuous controller 7. (That is the default output channel and the default controller number; you can change these by editing the Sound).

Select Amp, and change its state from **Live** to **Automated**. Use the controller editor to create a shape that you will be able to recognize (try something along the lines of a triangular-shaped slow increase followed by a slow decrease).

When you play the timeline, Kyma will send the time-varying value of Amp out as MIDI controller 7.

Using the same controller for both Kyma and an external MIDI device

Make sure **MIDIOutputController** is still selected and select its Amp parameter again. Use the state menu to promote Amp to a master control called AmpMaster.

Drag another Kyma Sound (for example, **VariableRateDisk** from the **Sources & Generators** category of the Prototypes) into the timeline. Set the duration of the **VariableRateDisk** to be the same as that of the **MIDIOutputController**—about 8 seconds. Select which of the Kyma Sound parameters you'd like to control, for example, Rate. Using the state menu, slave Rate to AmpMaster.

Now play the timeline. The rate change in the disk player will be mirrored by a change in the MIDI output controller 7. Save this timeline as **output midi controller**, in case you ever need to refer to it later as an example of how to do this.

BPM

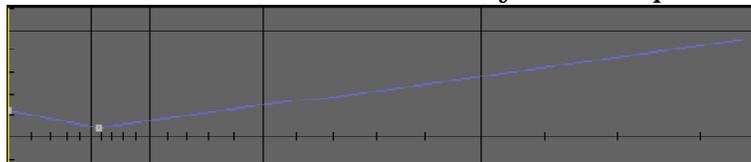
The Beats per minute (BPM) controller is a master control that is automatically created whenever you create a new timeline. Initially, it is set to a moderate value of 120 beats per minute. If you drag a Sound into a timeline and it has !BPM as one of its parameters, the local BPM parameter is automatically slaved to the master BPM controller. Thus, in the default case, any tempo-dependent Sounds that you drag into a timeline will be synchronized to a common tempo. This being Kyma, it almost goes without saying that you can of course, unslave the local BPM from the master controller or use the transformation buttons to make the local BPM a function of the master controller.

Setting or changing the tempo

To instantaneously change the tempo on a specific bar or beat, use Option+Click (Ctrl+Click on the PC) to add a point on that beat at the old value. Then add another point just after that at the new tempo value.

To create an accelerando or ritardando, add a point at the original tempo on the beat where the tempo change should begin and another point at the new tempo on the beat where the tempo change should end.

Try adding a ritardando and accelerando to the BPM of your example timeline. Then play the



timeline, soloing the Trk2 (because **Clicks** is the only Sound that depends on the BPM). You'll notice that the time cursor slows down and speeds up in sync with the tempo changes.

If you switch the time units from Bars and Beats to Timecode, you may also notice that time has become warped! Don't be alarmed, though; this is just a way to bring "real time" into conformity with musical time. Since the time cursor moves more slowly when the tempo slows down, the marks for real seconds are closer together at those points. Or you *could* look at it as a representation of what musicians have always known: time does not always proceed at the same rate.

Setting the value of BPM based on the duration of a sample

Create a new Timeline using File new (Ctrl-N), and switch the units from **Timecode** to **Bars and Beats** using the menu at the top of the timeline.

Select BPM in the list (on the lower left); the default BPM value for new timelines is 120.

Now locate **rustDrum80p8** in the Sound Browser. (It's in **Samples 3rd Party/ Spectralnoise**). Drag **rustDrum80p8** from the Sound Browser into the controller editor. When it asks you which parameter you would like to extract, click **BPM**.

The dialog gives you a choice of two methods for inferring the value of BPM from the sample: you can either assume that the sample is exactly one bar long, or, if it is not one bar long, you can tell it the number of beats that you hear in the sample. For this example, select *Set bar length equal to the duration of this Sound*. This will change the tempo such that the duration of the drum loop Sound is the same as the duration of one measure. Select one of the points in the BPM graph and read its value in the data display/entry field below. It should read 80.82.

Change the grid mode from **Free Grid** to **Magnet Grid**, and drag **rustDrum80p8** into Trk1 of the Timeline. Notice that it fills exactly one bar at this tempo. Extend the duration of the sample to 8 bars by tabbing over to the duration field (or simply clicking in that field) and typing the value 8•0•0 (for a duration of 8 measures, zero beats and zero fractions of beats).

When you want to set a timeline's BPM to the duration of a sample loop in the future, remember to drag the sample into the BPM controller editor *first*. *Then* drag the sample into the timeline. If you do it in this order, the sample will last exactly one bar at the current BPM rate. In the timeline, you can then lengthen the duration of the sample and it will loop to fill out the additional time.

MINUTES, SECONDS, AND FRACTIONS OF SECONDS

BPM stands for beats per minute, so if you set the value of the BPM controller to 60, you will get 60 beats per minute, or one beat per second. You can use this fact to display time in units of minutes, seconds, and fractions of a second. First create a new take for BPM and set its value to 60. Then, set the time units to Bars and Beats. Change the grouping to 60 beats per bar. Change the subdivisions to 1000 (for milliseconds) or 44100 (for samples if your sampling rate is set to 44,100 kHz). Whatever you choose as the subdivision will determine the fractions of seconds.

Now you can interpret (Bar number - 1) as the current minute. (Beat - 1) will be the current second, and the subdivision number will equal the number of milliseconds (or samples). Well, admittedly it is a bit twisted, but it can come in handy sometimes!

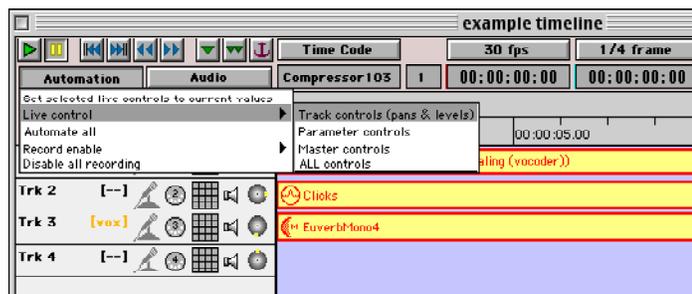
Mixing

Returning to the mixer metaphor, you can think of each track as something like a strip in a mixing console. It has an input, it has one or more outputs, and each track has a level control and pan control(s) listed under Track Controls in the parameter list.

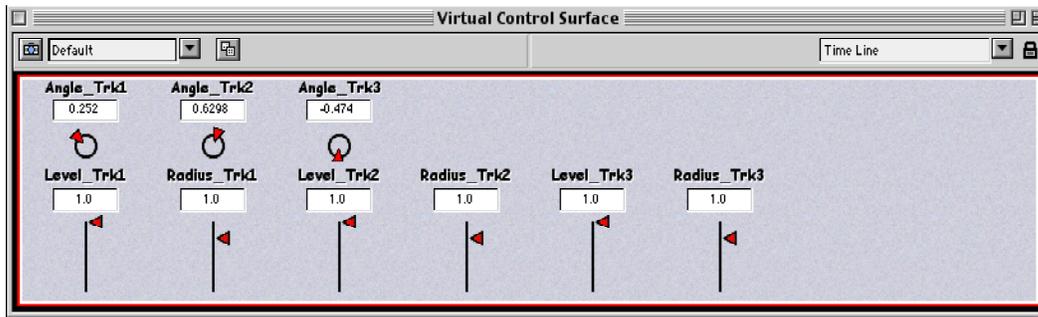
Creating a virtual mixing desk for a timeline

Select all of the Sounds in your example timeline. In the parameter list, scroll down until you can see **Track Controls**. Each track has a level parameter named **Level_Trk** followed by the number of the track.

To set all of the track parameters at once to live control, click the **Automation** menu (at the top, just below the transport controls), scroll down to **Live control** and over to the submenu where you can select **Track controls (pans & levels)**. That sets all of the selected Sounds' track level and pan controls to live. (Alternatively, you could have selected the parameters one at a time and used the state menu below the parameter list to switch each one to live control. The Automation menu provides a way to change the state of *groups* of parameters all at once).



Play the timeline. The Virtual Control Surface is now a “mixing desk” for the timeline. It has controls for the level of each track, and pan position (in the form of the Angle and Radius controls).



(You might have to unlock the VCS and use **Arrange... Clean up this layout** to get your virtual mixing desk to look like the one above.)

Set each of the Radius controls to a value of 1 (by clicking in the numeric field, typing in a 1, and pressing Enter). Now you can “mix” the timeline by moving the Level controls.

(Each individual Sound also has a FadeInOut parameter for controlling its individual “envelope”. The amplitude of an individual Sound at each point in time is determined by multiplying its FadeInOut envelope value at that time by the overall track level at that time).

Play through the timeline a few times, adjusting the level controls until you like the balance of the track levels. Then use the **Automation** menu to **Set selected live controls to current values**.

Submix levels

You can control how much a track contributes to a submix using the submix level track control. This is a control on the level of track *before* it has been attenuated by the Track’s level control.

When you send a track’s output to a submix, a new Track control is automatically created as a level control for that submix. The name of the controller is constructed out of the name of the track, the word “To” and the name you’ve given to the submix.

For instance, since you routed Trk1 to a submix called “vox” earlier, a track control called Trk1_To_Vox was automatically created and added to Trk1’s list of Track Controls. If you then brought “vox” in as an input to Trk3, the signal flow would be:

$(Trk1 * Level_Trk1) \rightarrow$ Capybara output(s)

$(Trk1 * Trk1_To_Vox) \rightarrow (Trk3 * Level_Trk3) \rightarrow$ Capybara output(s)

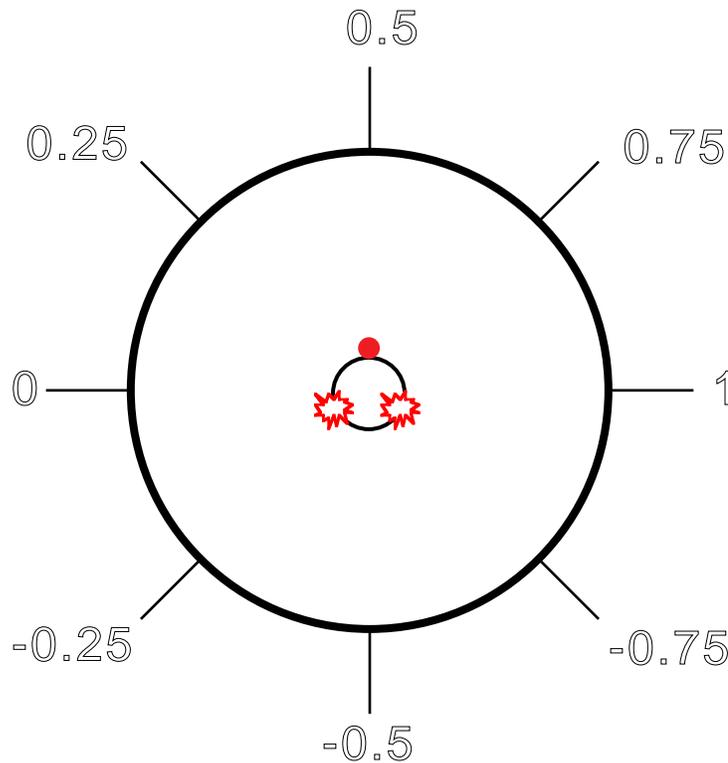
Note that Trk1_To_Vox and Level_Trk3 both end up affecting the level of the submix called vox. However, Level_Trk1 has no affect on the level of vox.

Spatializing

As you’ve already noticed, two of the track controls, **Angle** and **Radius**, can be used to place that track at a certain point in space.

Specifying a position in polar coordinates

Imagine that you are sitting at the center of a circle, and that a sound source can be positioned anywhere along that circle, inside the circle, or outside the circle. Let's label a possible point source of sound as its distance (or radius) and angle relative to Bozo the Clown's⁵ position at the center of the circle.



A sound source directly to Bozo's left is at angle 0, a sound source directly in front of Bozo is at angle 0.5, and a sound source to your right is at angle 1. (If you multiply these numbers by 180 degrees (or by pi), they will correspond to familiar angles). Positions *behind* you are the negative versions of the ones in front of you.

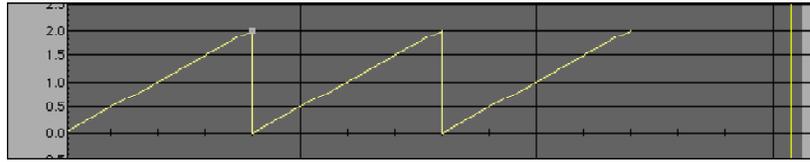
A sound source that is on the circle is at Radius 1, a sound source closer to you (on the inside of the circle) has a Radius less than 1, and a sound source further from you (outside the circle) has a Radius larger than 1 (but no larger than 2).

Panning the position of a track

For example, let's pan the track containing the Sound *Clicks* in the example timeline. First select *Clicks*. Then select its angle function, Angle_Trk2, in the parameter list. Create a new angle function going from 0 to 2 in about 4 seconds. You may need to use the vertical zoom out button at the bottom of the right scroll bar in order to draw the function all the way up to 2. Or you could just type the number 2 into the value field and press Enter. Delete any points that come after that. Then use the Loop button (one of the transformation buttons found below the

5. Chosen because his orientation is clearly indicated by unique nasal morphology and laterally symmetric follicle placement in the cranial region.

controller editor), in order to repeat the function In the end the function should look something like this:



Now play the Timeline. Notice that the little sound source indicator on each track shows a yellow box at the position of the virtual sound source as it travels around the room. Try soloing Trk2 in order to hear the panning in isolation.

Panning the position of a Sound relative to its track

Imagine now that Bozo is sitting on a spinning piano stool, rotating such that his nose is always pointing in the direction of the virtual track position. From Bozo’s point of reference, then, the sound would always be coming from a source directly in front of him. Each individual Sound has a position *relative to the position of its track*. This position is specified in polar coordinates as Panner (corresponding to Angle) and Distance (corresponding to Radius). So in the spinning Bozo case, you could use Panner to cause Bozo to hear an individual Sound panning from left to right even though he is unaware of the spatial movement of the entire track.

Another way to think of this to say that the Track position is as an initial or base position for the sound source and the Sound position controls specify a *change* or deviation from that position. (Of course, the base position can also be changing, in which case the Sound position controls specify a change to a changing position!)

You could also think of the track position as the “carrier” and the Sound’s position as a modulator or deviation from that carrier—a kind of “position modulation” analogous to frequency modulation. And, just as in frequency modulation, the carrier does not have to be static; it can be changing, typically at a slower rate than the modulator frequency, though even that is not a requirement.

For example, you can imagine assigning each Track a fixed position in the stereo or surround field by using Angle and Radius, and then specifying the movements of individual Sounds relative that track position using Panner and Distance.

Position panning versus routing to specific output channels

The advantage of using the panning controls instead of routing tracks to specific Capybara output channels is that your timeline will work no matter how many output channels or what the speaker configuration. For example, you could use a stereo setup in your home studio to prepare a timeline for performance in a larger studio or performance space with 8 monitors. Conversely, you might create a performance piece using the 6 channel setup you have in your own studio, and then perform it in lots of different venues with varying numbers of speakers. If you use the panner controls rather than hard-routing the tracks to output channels, then your timeline will automatically remix itself to whatever configuration you have to use at the time. If, for example, you have some sounds spinning around the room in a quad setup, you can still play the same timeline on a stereo setup. The sounds will still pan back and forth according to the

same functions you were using before; it's just that anything that was in the rear speakers will now be mixed into the front two speakers.

How to set up your speaker configuration

To inform Kyma of your speaker configuration, go to the **Edit** menu and choose **Preferences...**

Then click the button called **Speaker Placement...**

In most cases, you can choose an already-defined setup from the first menu: **Placement preset**. For example, if you have your speakers set up in four corners but also have a center channel in front and a channel running to a special subwoofer speaker, you could choose **Quad + Ctr + Sub** from the menu. When you choose one of the predefined setups, it will automatically fill in all the specifics in the fields below.

Alternatively, if your setup is not one of the common ones listed in the menu, you can specify the location of each speaker as a radius and angle relative to a listener at the center of a circle.

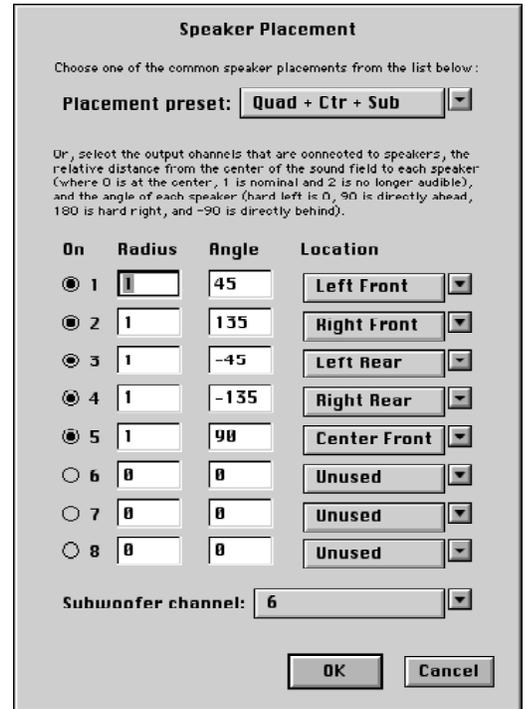
In the Speaker Placement set up, hard left is 0 degrees, straight ahead is 90 degrees, hard right is 180 degrees, and negative angles are the same as positive angles except that the speakers are behind you rather than in front of you.

In your timeline, use the **Audio** menu to set the number of outputs that you *intend* for this particular timeline (that will help adjust the levels if you ever have to mix down to fewer channels).

If you use the panner controls to spatialize your timeline, then you can play your timeline on different speaker setups simply by editing the Speaker Placement information in the Preferences.

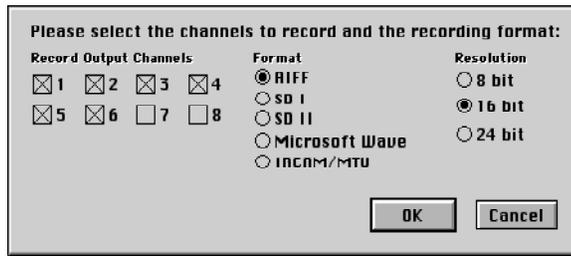
Recording a timeline to the hard disk

There are two different ways you might want to record a timeline to your hard disk. One is that you might want to record the audio that would have gone to each output channel into a separate audio file. In other words, if you have a surround timeline with lots of panning functions in it, you might want to record the audio for output channel 1 into one mono file, the audio for channel 2 in another mono file, etc. The end result is that you would have six separate mono audio tracks that you could then import into your favorite DAW or send to a client. The second mode of recording to disk is to “cache” individual Sounds in the timeline by recording them on disk. This can be useful if you are building a complex mix and run out of real-time DSP power. By caching some of the Sounds to disk, you free up your DSPs for more real-time synthesis and processing without losing the process by which you created the original Sounds.



Recording each audio output channel into its own mono disk file

To record what would have gone to each audio output channel of your Capybara, click on the **Action** menu and select **Record to disk...**



Select the desired file format and bit-depth. (The sample rate of the recording will be whatever sample rate you have currently selected in the DSP Status window). Use the check boxes to select which of the output channels you would like to record. You do not have to record all of them at once; you can make several passes over the timeline, recording a different set of output channels each time through.

You *could* even record more channels than you actually have! For example, suppose you have a basic Capybara with four audio outputs, and you're working on a job where they'd like you to supply the result as 6 channels of surround. First, you could closely approximate the placement and panning using a timeline and your quad setup. Once you were happy with the result, you could use the **Edit Preferences Speaker Placement** dialog to con Kyma into thinking that you actually have a 5.1 Surround setup by selecting that from the list of predefined configurations. And finally, you would select **Record to disk...** from the **Action** menu in order to record 6 audio tracks to the hard disk.

Caching individual Sounds to disk to save DSP resources

Whenever possible, it is best to leave your Sounds fluid and as adjustable. In other words, the longer you can postpone recording them to disk, the longer they remain changeable and performable. At some point, though, if you have a Sound pretty much the way you want it, and the complexity of your timeline is beginning to tax your available DSP resources, caching a Sound to the disk is probably the best way of freeing up DSP resources without losing any of the history of how your Sound was created.

To cache an individual Sound on disk, find the **DiskCache** prototype (use Ctrl+B or look in the Prototypes under the **Disk** category), drag it from the Prototypes into the timeline, and drop it onto the Sound that you'd like to record. The next time you play the timeline, that Sound will be recorded to disk as it is playing. Immediately after recording, edit the **DiskCache** so you can change the check box from Record to Play. From then on, a recording of the Sound will be played from the disk rather than generated live. However, it is reassuring to know that, if you do want to make further changes to the Sound, all you need do is to click on the Sound and press the minus (-) key to remove the DiskCache and return to generating the Sound in real-time.

Try this out on your example timeline. Drag a **DiskCache** from the Prototypes and drop it onto the **Freq/Time Scaling Vocoder**. Play the timeline. A dialog pops up asking you for the file format, number of channels, and the bit resolution of the recording. Select an AIFF Mono 16-bit file

and click **OK**. Next, Kyma will ask where you'd like to save the file and what you'd like to name the file. Name it **vocoder cache**, and save it where you can easily find it and throw it away after you finish with this example. Click **Save** or press Enter. The timeline will proceed to play, and the vocoder will be recorded to the disk as you listen to it.

Once the timeline has finished, you should immediately edit the *DiskCache* to play the recording from disk. To edit, double-click on the *DiskCache(Freq/Time Scaling Vocoder)* Sound, opening the Sound editor window. Uncheck the **Record** box so the *DiskCache* will read from the file specified in the **FileName** field. Then click on the disk icon to the right of the **FileName** field, and use the file dialog to locate the file named **vocoder cache**.

Close the Sound editor by clicking the close box on the window. Kyma will ask you whether you want to keep the changes you just made, so click **Yes** or press Enter.

Play the timeline again. This time, the vocoder is being read from a disk file rather than generated in real time, so you should probably notice a difference in the amount of DSP usage shown in the DSP Status window. Make a mental note of how much DSP processing is being used.

Then, select the *DiskCache* Sound in the timeline and press the minus (-) key to remove the cache. Play the timeline again, and take note of how much more DSP power is being used.

If you every find yourself running out of processing time, try selecting some of the Sounds that are not being performed in real time and cache them on disk. This will free up more DSP power for use on the Sounds you are performing live or the Sounds whose parameter automation you are still adjusting.

Controlling the flow of time in a live performance

In a live performance (whether that performance is on stage or in your own studio as you sync to picture), you need to be able to control the flow of time rather than being slaved to a click track.

To change or stop the flow of time in a timeline, you can use the prototypes called *TimeStopper*, *WaitUntil*, or *TimeController*. These Sounds affect one kind of time—cursor time—without affecting another kind of time—the sample rate clock. What this means is that you can slow down or stop the time cursor without slowing down or stopping the sound itself. By placing one of these Sounds into a timeline, you can slow or stop time at the moment that the time cursor reaches that Sound.

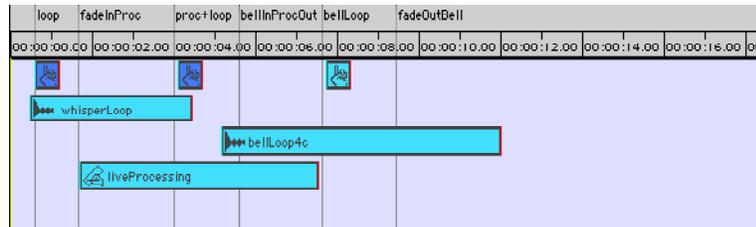
What stops and what keeps on going?

The time cursor, automated controllers, MIDI file readers, and MIDI Scripts are all affected. Synthesis, sample playback, live processing, and expressions in parameter fields that depend on time (e.g. ramp:) all continue to do their things even when cursor time has come to a halt.

Think of the timeline, not as a DAW or sequencer, but as a program-scheduler for your Capybara computer. Whatever programs are running when the time cursor runs across a *WaitUntil* will continue to run forever (or until you break through the *WaitUntil* by satisfying its Resume condition).

Example of how to use WaitUntil to pause the time cursor

The best way to see how to do this in your own timelines is to take a look at a relatively simple example first. Use the Sound Browser to locate the timeline named **WaitUntilExample** in the **Timelines** directory. (Make a note of where this is, because you may want to come back here later to play the other timelines in this directory). Double-click on **WaitUntilExample** to open the timeline.



The *WaitUntil* Sounds are the ones in Trk1 with the little upheld index finger icon.

Double-click on the first *WaitUntil* and examine its parameters. The **Resume** field contains the signal that will restart time. In the case of this first *WaitUntil*, time will resume when it gets a MIDI **!KeyDown** message. The same holds true for the second *WaitUntil*. Finally, take a look at the **Resume condition** for the third and last *WaitUntil*. This one will resume when a middle C is detected in the audio input signal.

Play this timeline by pressing the space bar. When the time cursor reaches the first *WaitUntil*, it stops. The “nothing ever disappears” sample will loop forever or until you send it a **!KeyDown** (hope you have a MIDI keyboard handy or you could be listening to “nothing ever disappears” for a very long time...)

Once you hit a key and break through the first *WaitUntil*, you will be able to do some live processing of the audio input layered with the loop. If you have a microphone hooked up (or some other line level signal feeding into your Copybara), you can hear yourself processed through that effect. Both the live processing and the looping sample will go on forever unless you press a key on the MIDI keyboard again.

Now the live processing fades out and a bell loop starts up in the transition before the next and final *WaitUntil*. Now you are going to have to sing a middle C to finally get to the end of the timeline. The bell just happens to be tolling a C, so that should help. Sing a nice clear “ooo” on the same pitch as the bell, and time should start up once again so you can get to the end of this tutorial.

To jump over a *WaitUntil*, click in the time ruler. That causes the time cursor to jump to the time you just clicked, so you can always jump around a *WaitUntil* if you don’t feel in good voice today.

A typical session with the timeline

MIDI AND SPATIALIZING IN THE TIMELINE

Because the timeline takes over much of the functionality of the MIDI - Voice module and the multiple-output modules in the Prototypes Spatializing category, it is not necessary to use these modules in the timeline. In fact, if you do drag one of these modules into a timeline it creates an ambiguity—should it use the spatializing features of the timeline or of the module? Should it use the polyphony specified in the timeline or in the MIDI Voice? For that reason, you should take the input or inputs of these modules and place them into individual tracks of the timeline, rather than dragging the top level MIDI Voice or multiple output Sound into the timeline.

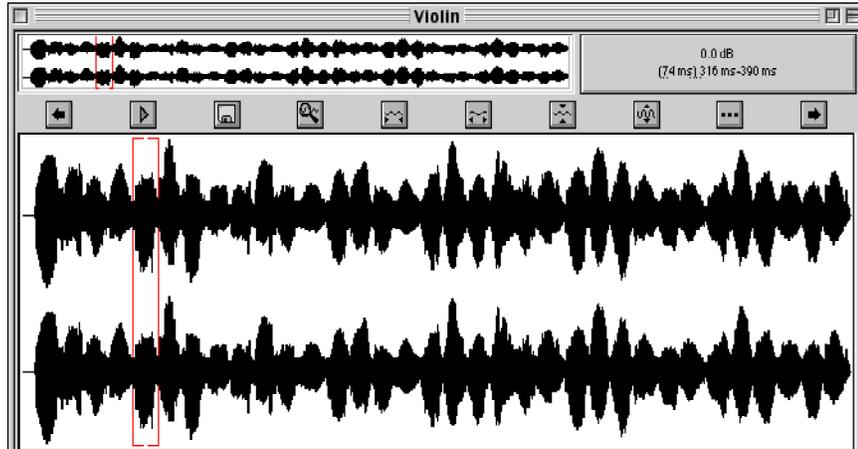
To end the section on the timeline, let's imagine what a typical timeline work session might be like. Try creating your own timeline as you read along (referring to earlier sections if you've forgotten any of the procedures). Have fun!

Open a new timeline using File new (Ctrl+N). First, search the Kyma Sound Library for some kind of background or pad texture. One good place to look is in **Synthesis-Background & Pads**. Test out a few until you find one you like. Then drag it into your new timeline, and change its duration to 60 seconds or so. Play the timeline. Use the Virtual Control Surface to adjust the parameters the way you like them. To access the presets of this Sound, click in the layout menu in the upper right of the Virtual Control Surface and go down a level from the Timeline layout to the original layout for this Sound. When you are happy with the settings, make sure the Sounds is still selected and use the **Automation** menu to **Set selected live controls to current values**.

Next, add some rhythmic material. Some promising places to mine for rhythmic material would be the **Looping** category of the Prototypes, the **Drum machines** category of the Prototypes, or the **Sequencers** category of the Prototypes. In the Kyma Sound Library, look in **Sampling:Rhythmic loops**, or in the **Sequencers** folder. When you find something you like, drag it into your timeline and use the Virtual Control Surface to adjust the parameters (and the **Automation** menu to **Set selected live controls to current values**). At this point, you might also want to edit the master control called BPM.

Now, to add some sampled material (or a voice over), use the Sound Browser to locate a folder of your own samples (or select something out of Kyma.5 **Samples** or **Samples 3rd Party**). Double-

click on it to open the Samples Editor. Select a small clip in the sample. Listen to it by pressing the play button just above the large sample window.



Copy it using **Ctrl+C**. Click in the timeline on Trk3 and paste the clip at that point. Repeat this procedure until you have all of your voice over or sample material.

Now for some fun! Try dropping different effects from the Prototypes or the Sound Browser onto the Sounds already in your timeline. If you don't like the result, use **Edit Undo**, or press the minus (-) key to remove the effect.

If you find yourself running out of DSP power, drag a *DiskCache* onto one of your Sounds and record it onto your hard disk.

Route some of the tracks to a submix, and bring the submix in on another track. Then drag one of the reverbs onto that track.

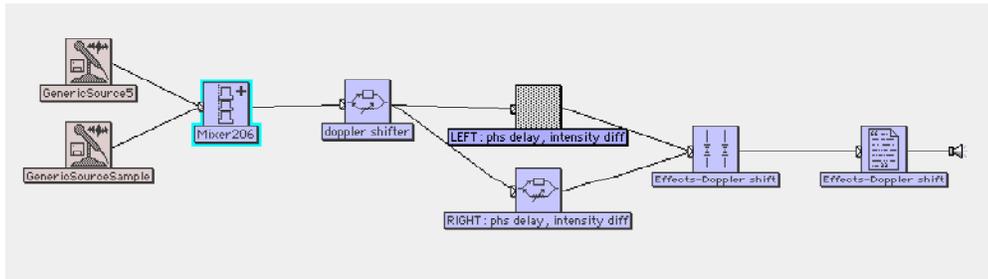
Edit the Track parameters called Angle and Radius so you can place each track in space. Try using the Spray Can transformation to pan one of the tracks randomly around the room.

THE SOUND EDITOR

To open an editor on any Sound, whether it is in a timeline, in the Sound Browser, in the Prototypes, or in a Sound file window, *double-click on the Sound*. For example, use the Sound Browser to locate [Effects-Doppler shift](#) in the **Overview** folder of the Kyma Sound Library. Double-click on it to open an editor.

Signal Flow (the upper half of the Sound editor)

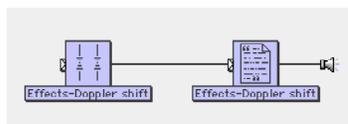
At this point, you are either entering a whole new world (if you are new to Kyma) or returning to a familiar sight (if you have been using Kyma 4.5).



The upper half of the Sound editor shows you the signal flow of the modules that make up the Sound. This is also where you can modify the Sound by adding or deleting modules from the signal flow diagram.

Hiding and displaying branches of the signal flow

If the left-most module has a small tab on its left edge, that is an indication that there is more to the signal flow diagram, and that it is currently hidden. To open the next level, click on the small tab.



To completely open the entire signal flow diagram, hold down the Ctrl or Cmd key and click the little tab.

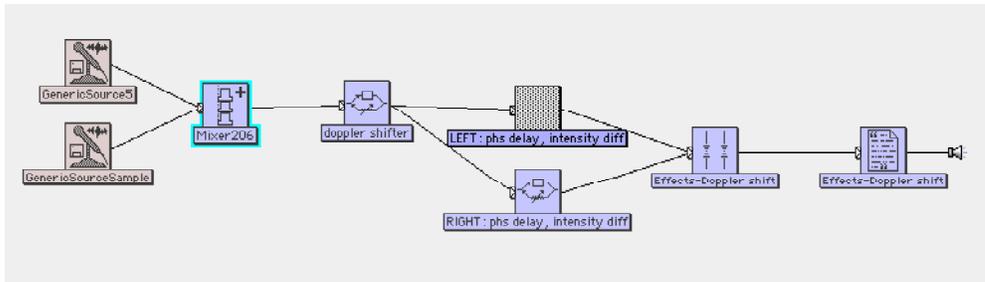
If the entire signal flow is open the next level, click on the small in-arrow icon attached to the left edge of the icon. Continue opening levels until you see icons that do not have the little arrow icons attached to their left sides. (To completely open the entire diagram, hold down the Ctrl key at the same time you click on the arrow icon).

Color-coding of modules

Signal sources are color coded as red-tinted icons. Signal modifiers are blue. Sounds that are used as control signals, rather than audio signals, show up as yellow icons.

The Replaceable input

Notice that one of the Sounds, the *Mixer* just to the left of *doppler shifter*, has a cyan halo around it. That's because this is the *replaceable input* for the entire Sound.



If you were to drag *Effects-Doppler shift* and drop it onto a Sound in the timeline, the replaceable input is the module within it that will be replaced by the Sound in the timeline.

In the Sound Browser, you can tell that *Effects-Doppler shift* has a replaceable input, because it has a cyan arrow next to its name. As you already know, the cyan arrow indicates that you can replace its replaceable input with the global input that you have specified into the field at the top of the Sound Browser.

To choose one of the modules in a signal flow as the replaceable input, select it, go up to the **Action** menu and choose **Set replaceable input**. The selected Sound will acquire a cyan halo and all the behavior of a replaceable input.

What if you had selected one of the GenericSources as the replaceable input? Then, if you were to drop the *Effects-Doppler shift* onto a Sound in the timeline, you would hear a mix of the timeline Sound plus one of the car samples. Similarly with the Sound Browser, the global input would replace just one of the car samples, so you would hear a mix of the global input plus the other car sample going through the doppler effect.

But Wait; There's More!

Actually, there is *lot* more to working with the signal flow editor, but that is the end of our walk-through tour of the new features in Kyma.5. Don't worry, though, because the nearly 600 page manual called *The Kyma Language for Sound Design* awaits to satisfy your every curiosity about the signal flow editor and other exciting topics such as:

Tools

The Wave Editor

The Spectrum Editor

Real time Arithmetic and Time Functions in Parameter Fields

Encapsulating a Complex Sound

However, this would be a good point to take a break from reading manuals, so you can explore the Sound browser, timeline and Virtual Control Surfaces for a while. Then you will be ready to dig into the main manual, starting with the Introduction and the Tutorials!

K Y M A . 5 W A L K T H R O U G H

THREE MODES OF USING KYMA

As a creative individual, you have three modes (at least): an exploratory phase where you are listening and reading and taking in information, a solitary phase where you cut yourself off from the outside world and immerse yourself in creation, and a “linking” phase where you pause to make a progress report that you can interactively present to your audience in the outside world.

Kyma can assist you in different ways during each of these phases. In “pre-production” mode, Kyma can be your sound design playground where you can explore the existing Sound library and experiment with new combinations, building up a larger and larger treasure trove of new Sounds of your own design. During “production:” mode, in the heat of creation, you will be drawing upon your private store of Sounds, combining them and applying them to the project at hand. And finally, in your “public” mode you can exploit Kyma’s real-time capabilities for performing your work on stage, for giving live interactive demonstrations and talks, or creating sound installations.

The more time you invest in Kyma, the more it will repay your efforts by leveraging your creative intelligence.

APPENDIX

Default Parameter Ranges

angle	[-0.5 thru: 1.5].
boostcut	[-12 thru: 12].
'boostcut*'	[-12 thru: 12].
bpm	[0 thru: 2000].
'coef*'	[-1 thru: 1].
dcoffset	[-1 thru: 1].
direction	[-1 thru: 1].
fmntshift	[0.75 thru: 1.25].
freqjitter	[0 thru: 1].
freqlow	[0 thru: 1000].
freqmid	[1000 thru: 8000].
freqhigh	[8000 thru: SignalProcessor sampleRate * 0.5].
'freq*'	[lc = 'cutoff'] ifTrue: [0 thru: 10000].
gain	[0 thru: 10].
gaindb	[-128 thru: 128].
'tune*'	[-1 thru: 1].
'interval*'	[-24 thru: 24].
looplevelength	[-1 thru: 1].
logfreq	[0 thru: 127].
keynumber	[0 thru: 127].
keypitch	[0 thru: 127].
offset	[-1 thru: 1].
panner	[-0.5 thru: 1.5].
radius,distance	[-2 thru: 2].
rate	[0 thru: 2].
ratio	[0 thru: 100].
q	[0 thru: 10].
scale	[-2 thru: 2].
'smallInterval*'	[0 thru: 12].
swing	[0 thru: 0.5].
timeconstant	[0.0001 thru: 5].
threshdb	[-60 thru: 0].
upinterval	[0 thru: 24].