CellSynth

by *Living Memory*

USER GUIDE

Introduction

CellSynth is a music synthesiser, sample player and audio processing tool.

If you already have a sound knowledge of synthesis, it will not take long to familiarise yourself with the tools you have at your disposal.

If you have no prior knowledge of sound synthesis, don't worry. All you need is the courage to experiment. In fact, using CellSynth will actually help you understand how sounds are synthesised on both old analog machines and modern digital samplers, synths and effect units.

Although CellSynth's interface will be unfamiliar at first, it will soon become clear as the cells are represented by simple icons that indicate their function and the connections and flow of the signal are all represented graphically.

To help at first, you can turn on CellSynth's tool tips (Options menu: Tips - on by default), which will pop up if you leave your mouse over cells or parameters in the cell edit dialog. Once you have familiarised yourself with the icons and parameters, you can switch tool tips to only display sample names, or off completely.

The best way to learn how to use CellSynth's powerful functions is to work through some examples. The first example in the "CellSynth by Example" Chapter can be followed as a tutorial and each stage can be checked against the finished steps (the Matrix files of each step are provided on the CellSynth CD).

Power to Create...

Underneath the deceptively simple looking interface lurks incredible power and flexibility. The Cells are the building blocks that can create sounds that are limited only by your imagination and creativity.

Create familiar sounds such as that of traditional analog synths by using the sine, square, saw-tooth and triangle cells as sound generators and modulators, following the methods used since the beginning of electronic sound synthesis.

But why stop there … add samples, either used traditionally, as you would in a sampler, or apply any of CellSynth's features to them. Anything is possible.

Powerful MIDI support allows real-time control over CellSynth from any MIDI controller, or the built-in Event Sequencer can be used to program note or controller events, allowing automated mixes and effects. CellSynth can also be synced to clock to allow it to be used as part of a larger MIDI setup.

This all adds up to a program that really does have the power to create whatever your imagination can dream up.

System Requirements

Mac Version

- A 100 MHz Powermac with at least System 7.5,or even better, OS 8. (The faster the Mac the more CellSynth can do!)

- At least version 3.0 of Sound Manager.

- Mac must be able to play stereo 16 bit audio at 22050 or 44100.

- A monitor capable of displaying 1000s colours.

- A sense of fun!

Bear in mind that to get the full benefit of CellSynth you need at least a 150MHz machine. Having said this, the 22050Hz version CellSynth works fine on machines down to 100MHz. Although on slower machines it may not be possible to process incoming MIDI and audio and record to hard disk at the same time.

If you notice the performance of your mouse degrading then you are reaching the limits of what you can do with CellSynth.

PC Version

The PC version was still in development at the time of writing. All differences, including system requirements, will be documented in an Addendum.

Learning How to Use CellSynth

This Manual

Well done! You've taken the trouble to look at this manual. That's a good start in learning how to use CellSynth.

This manual is designed to be self-sufficient, i.e. if you are reading a printed copy, can read it away from your computer. Hopefully there are enough screen shots so it makes sense no matter where you are reading it!

If you are viewing the manual on-screen, you can make use of its interactivity. If you want to find out more about something, try pointing the mouse at it on the screen. If it turns to a pointing finger you can click to jump to more information about that feature. For example, all the brief descriptions of the cells have links to more detailed reference (describing all the parameters). Clicking on the Cell button shown alongside each description will jump to the relevant section at the back of the manual.
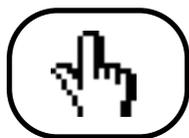
Click to get more information.

Command-hyphen to return to where you just came from. Each time you press these keys together you will jump back a step.

CellSynth's Online Help

CellSynth has an extensive online Appleguide. To access this either choose CellSynth Help from the Help menu or press Command-H.

You can search the online help for subjects and keywords. Some subjects have interactive examples.

Example Matrix Files with Annotation

CellSynth is provided with a series of example Matrix Files. These are easily accessible using the pop-up menu at the top of CellSynth's main round window.
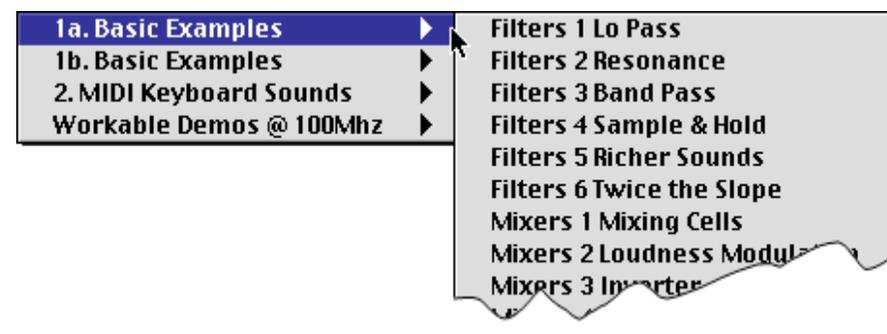
Each of these have a description of how they have been made in the annotation window. The Basic Examples are the building blocks of more complex sounds while the MIDI Keyboard Sounds demonstrate playable sounds and Workable Demos are almost complete tracks in themselves (they have been simplified to run on lower spec computers – check out the audio files on the CD for full quality examples.

Installation

Which Version of CellSynth?

There are 2 installations on the CD, one for faster machines and one for slower machines.

CellSynth has been tested on PowerMacs from fast G3s down to 100MHz powerbooks.

Obviously the faster your machine the more you will be able to do with CellSynth.

To install, you simply drag one of the installation folders to your hard disk.

Fast Machine (604/G3 running at 150 MHz or faster

If you have a machine that is faster than 150 MHz then drag the folder called CellSynth 604/G3 (150 MHz+) to wherever you want it on your hard disk. This installation contains a CellSynth application that runs at CD quality (sample rate of 44100Hz). If you want, you may also copy the CellSynth application "CellSynth 22050" from the other installation folder. If you find that CellSynth behaves slowly or the audio cracks up, try using the 22050 version instead of the 44100.

Slower Machine (601 running at 150 MHz or less

If you have a machine that is slower than 150 MHz then drag the folder called CellSynth 601 (up to 150 MHz) to wherever you want it on your hard disk. This installation contains a CellSynth application that runs with a sample rate of 22050Hz. And some of the demo files are cut down to try and avoid processor overload. (If you really want to there is no reason why you shouldn't check out the 44100 version, but you may find it less useful).

You can also listen to the demo audio tracks on the installation CD.

To avoid unnecessary problems PLEASE TAKE THE TROUBLE TO READ THE "READ ME" FILES which will have up-to-date information that may not have made it into this manual.

Note on Processing Power

It is possible to run CellSynth even on slower 100MHz machines but it will be VERY limited and the interface (graphics/mouse and drawing) can slow down considerably while CellSynth is playing. On machines from 200MHz upwards, these problems do not exist and it is possible to get maximum reward from CellSynth.

Reverb cells use a lot of processing power, and so does recording to hard disk while playing. So if you have a slow machine and you find a CellSynth file that does not work, try deleting any reverb cells first.

Folders Installed with CellSynth

Matrix Files

Example Matrix files.

You can save your favourite Matrix files into the Matrix files folder.

This folder should be in the same folder as the CellSynth application.
If it is then its contents will be available in a popup menu at the top of the
round window. The popup menu can be used as a shortcut to aid loading your
favourite Matrix files. Make folders (one level deep only) to group your sounds
into submenus.

Event Sequences

Some pre-made Event Sequences which can be used to control CellSynth
(with MIDI notes and controllers).

Harmonic Tables

Example files for the harmonic editor.

MIDI Programs

This will be empty on installation. Aliases of Matrix files can be put in
this folder and will be loaded when CellSynth receives a MIDI Program
Change. This is explained fully later in this manual.

Tutorial 1

Files used in the examples in this manual.

*Thank you for purchasing CellSynth and a big thanks if you were one of the Beta
Testers! Living Memory wish you many enjoyable hours of CellSynthesis!*

CellSynth Main Window

Cell Store

Generator Cells

Generator Cells are Oscillators (Sine, Square, Sawtooth, Triangle and Harmonic) plus a random/noise generator and a sample player.

Matrix

The 'Matrix' is the name given to the 36 squares in the round window. Each square is called a 'Cell'. You create an active cell by dragging one from the cell stores

Cell Store

DSP Cells

DSP Cells are cells that can be used to alter the result of the signal fed into them. Like Effects processors.

Matrix Pop-up

Matrix Pop-up only appears if "Matrix Files" folder is in the same folder as CellSynth.

Alien Planet

Peak Level

On / Off

Click on the speaker to turn on CellSynth's audio output. The speaker will move when producing output

Active LED

Glows when CellSynth is producing output.
Also glows when CellSynth is waiting for MIDI sync

Using CellSynth – The Basics

The Matrix

The 'Matrix' is the name given to the 36 squares in the round window. Each square in the Matrix is called a Cell.

Cells can be audio generators (oscillator or sample) or processors (filter, mixer/amplifier, reverb, delay, envelope etc.).

Every Cell has up to 4 audio inputs and 4 modulation inputs from its neighbouring cells; up, down, left and right.
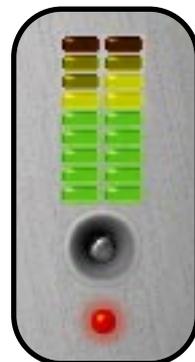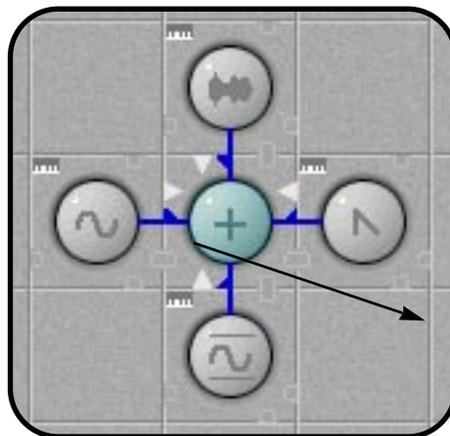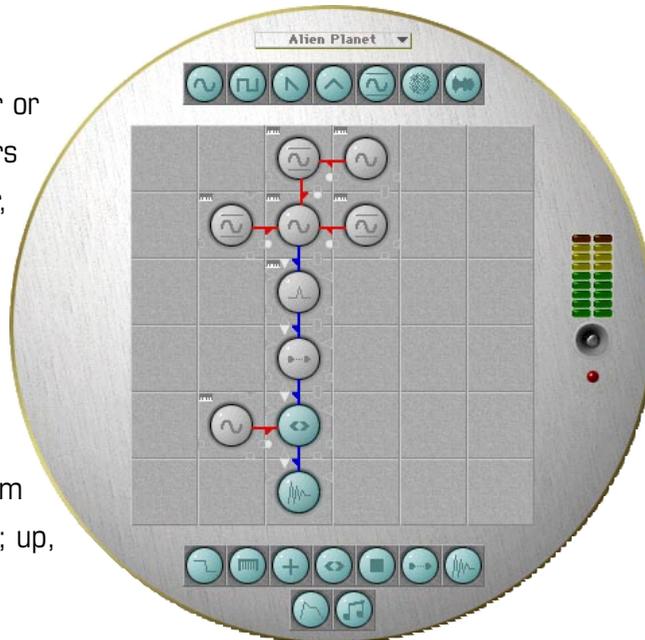
The audio output of each Cell goes not only to its neighbours but also (optionally) to the stereo output of CellSynth.

You create an active cell by dragging one from the cell stores at the top and bottom of the round window.

Here we have 4 cells:
- a triangle oscillator
- 2 sine oscillators
- and a Mixer/Amplifier

- The blue lines and white triangles show the path of the audio signal.
- Red lines and white semicircles show the path of modulation.
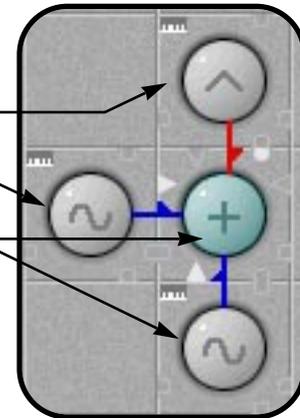
Therefore this matrix shows that the audio signals from the sine oscillators are going into the mixer, and the mixer is being modulated by the triangle oscillator.

The oscillators are greyed, that means that the audio signal for the cell is muted (not heard at the stereo output). The output of the mixer cell is the only audio that can be heard in this matrix.

A Blue cell is heard at the Stereo Output
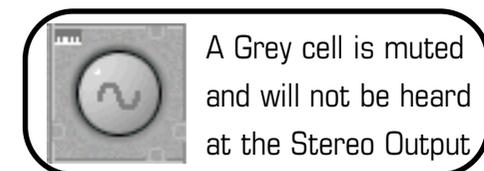
A Grey cell is muted and will not be heard at the Stereo Output

Moving Cells

When you move the cursor over the tile surrounding an active Cell, the cursor will change to a hand. This indicates that if you click the mouse button and hold it, you can drag the Cell to another location.

Editing Cells

To edit a Cell, click once in the Cell Button to show the Cell Edit window.

A Cell Edit window contains all the parameters for the Cell you are editing.
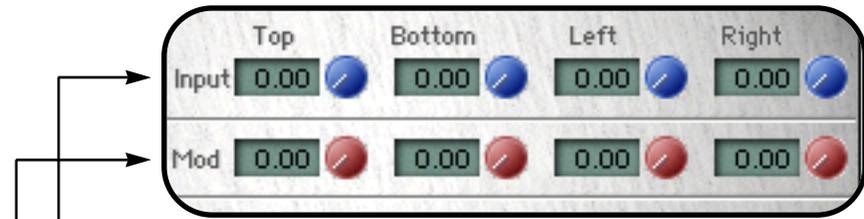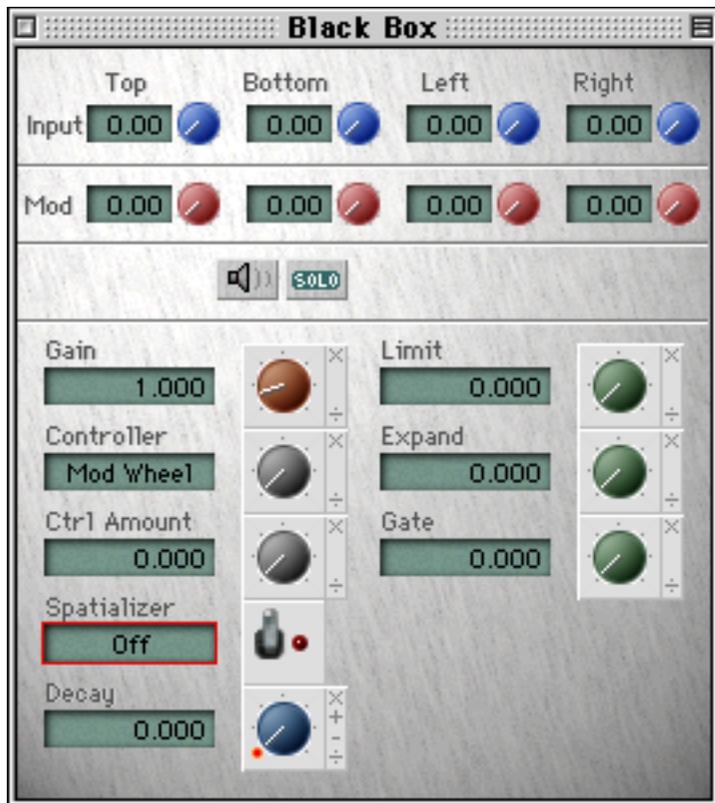
The first row of controls affect the amount of audio input from the Cells neighbours (Top, Bottom, Left and Right).

The second row affects the modulation from the neighbouring cells.
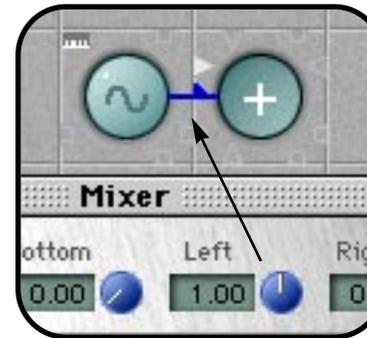
When you turn up, for example, the audio input to a cell from its neighbour to the left, the Matrix displays a blue arrow to indicate that the cell is receiving audio input.

The same is true of the modulation inputs, except the line is red.
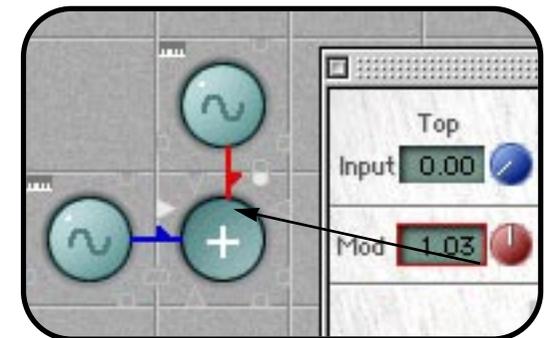
You can also set the audio input to 1.0 by clicking on the white triangle on the Cell's tile on the Matrix and modulation to 1.0 by clicking on the white semi-circle.
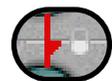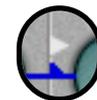
The Mute, MIDI Control, Solo buttons, some or all of which will be present depending on the Cell being edited, are simple on/off buttons.

There may also be a fourth editor button. This opens a further editor window for the cell being edited. These are discussed in detail later, but here is a brief tour of these additional editor windows:

The Sample Cell has a window that allows the start and end point of a sample to be set.
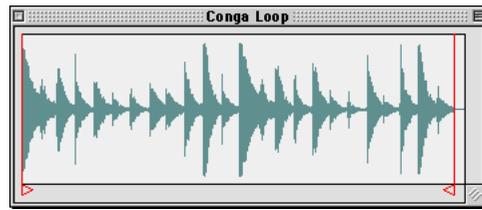
The Harmonic Oscillator Cell has a window that allows the harmonics to be adjusted.
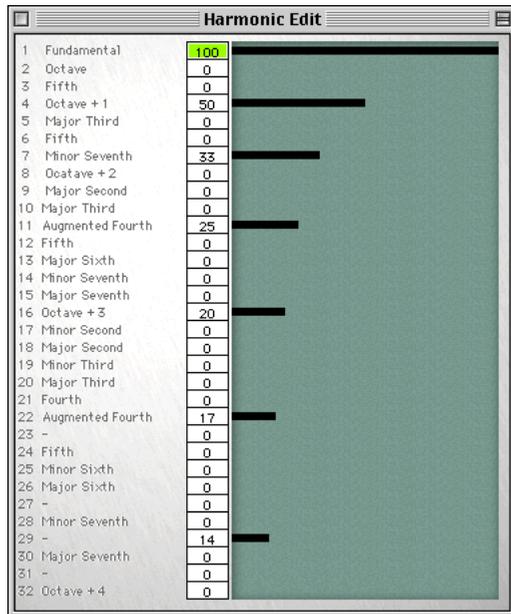
The Envelope Cell has a window for graphically editing the shape of the envelope.
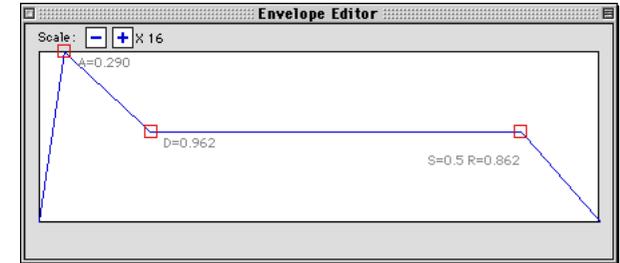
The Event Sequencer Cell has a window for entering Notes and Controller Events. The Event Sequencer allows you to program arrangements, melodies, arpeggios, basslines, automated mixing, filtering, effects and more!
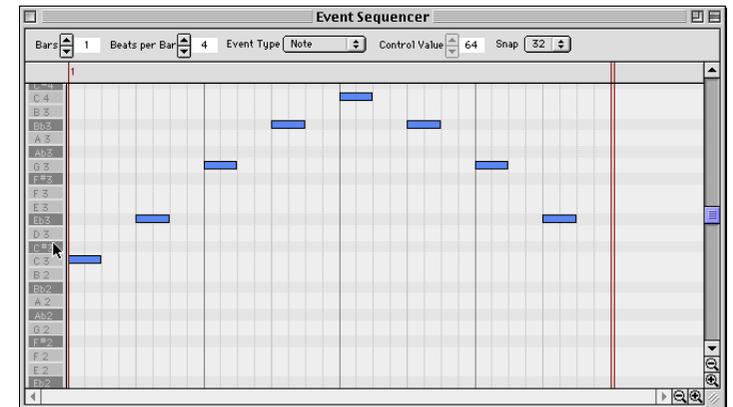
Using the Cell Edit Window's Dials, Numerical Displays and Sliders

The Cell Edit window has dials which represent the knobs on a piece of music hardware, numerical displays similar to LCD readouts.

There is more functionality built into these controls than first meets the eye. Here is a quick guide to some of them:

Multiplier:
Sets Range

x2 (+1 Octave)

increment
decrement
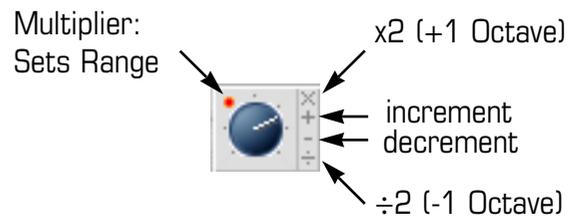
÷2 (-1 Octave)

Command-Click – returns the dial to its default setting (although certain dials, e.g. frequency of a sample, this fits to tempo)
Control-Click – -1 Octave
Option-Click – +1 Octave

Click the dial and drag around it to turn it.
As you move the mouse further away from the dial it becomes more accurate.

Control and Option clicking in the dial divide and multiply by 2

The Red multiplier switch on the outside of the dial allows you to set the maximum range. This is particularly useful for setting very low values in oscillator and filters (you might, for example, want to have a very slow oscillator controlling a filter to create a slow sweeping filter effect).
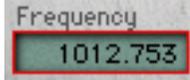
The numerical display also has a few extra features. You can type a value in on the keyboard and it will be entered in the numerical display of the parameter that has the focus (the edge of the Display is highlighted in red when it has the focus).
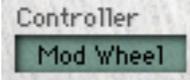
The display for MIDI Controller has a 'learn' feature which can be used to easily setup a MIDI Device to control CellSynth. Click in the display to give it the focus and then move the knob, slider or button (or whatever you have available) on your MIDI device that you wish to use to control the Cell. Now Click once more in the display and the correct MIDI controller will be assigned.

"Tear Off" Sliders

If you find that you can't get the kind of control you want from the dials on the Cell Edit window, click on the display of a parameter you want to adjust and, holding the mouse button down, drag the cursor away from the display. A slider will appear.

Click above the thumb to move it up one notch

Drag the thumb with the mouse

Click below the thumb to move it down one notch

click on an LED to set the resolution

Click on ÷2 or x2 to go up or down by an octave
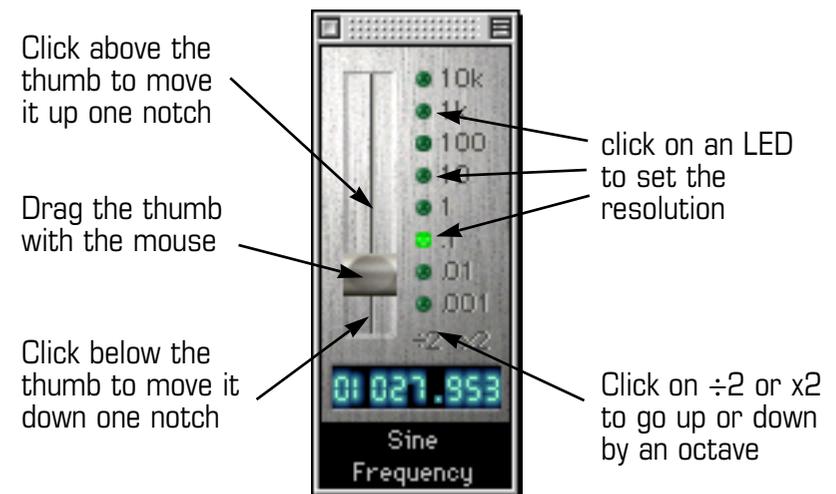
These are CellSynth's 'tear off' sliders (fader). You can drag the slider window to any position you require. Use them to setup mixer like consoles to control various elements of your matrix. These sliders remain open even when you close the Cell Edit window and they are saved with a Matrix file.

Command-F will hide all the sliders.

The only control we haven't yet looked at is the switch. If any parameter can only be on or off, a switch is displayed. No hidden extras here, just a standard on / off switch!

A Summary of How Parameters are Displayed on the Matrix

As we have seen, many of the parameters set in the the Cell Edit window are reflected on the Matrix. This makes it easier to understand how the Cells are behaving and interacting.

White Semi Circle buttons enable modulation input.

White triangle buttons enable audio input

Keyboard button enables MIDI note-on/off control

Red lines show the path of modulation

Blue lines show the path of audio signal

Cell Buttons show cell type and audio muting. Click these to open the editor for the cell.
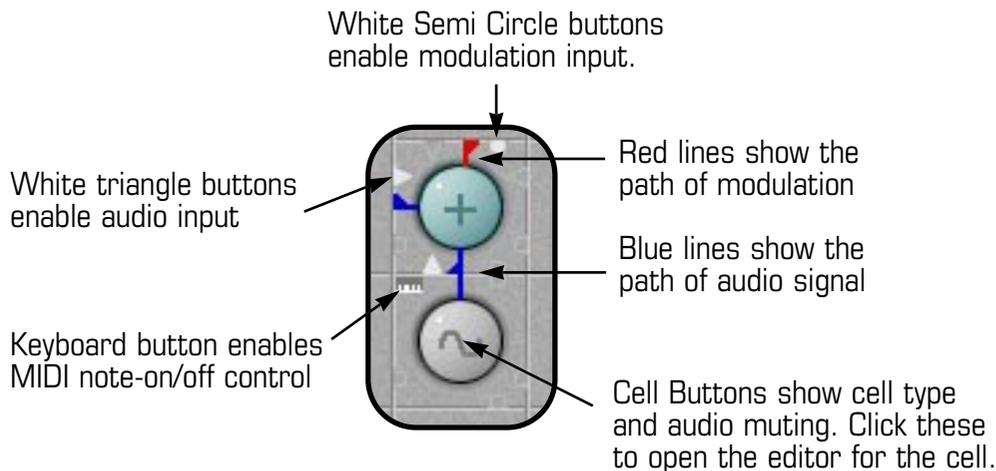
Some Cells also display additional information on their state:

Here is a Mixer Cell. Turn on Invert and the icon displays a minus symbol.

Here is a Panner Cell at its default setting of Mid. Pan to the left and the icon displays it.

You can tell which cell in a Matrix you are editing because its Cell button appears depressed :(and the Cell's symbol is displayed in white.
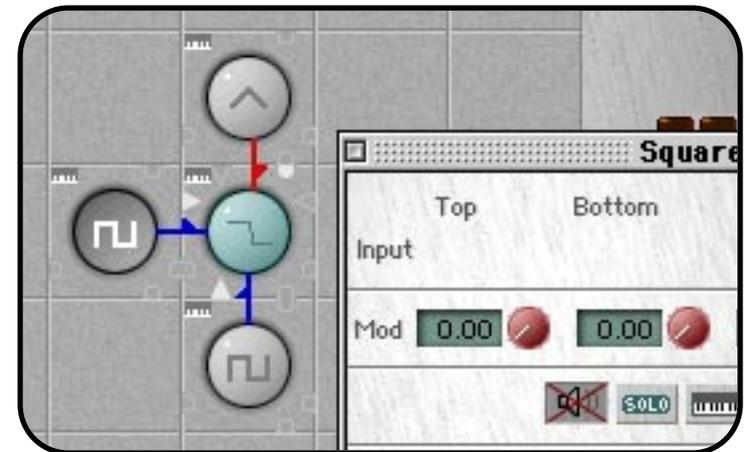
You can also tell from looking at the Cell button, whether its output is heard at output or not (heard=blue, muted=grey).

There is also a third state which has not yet been mentioned. If the button appears flat then it has been disabled.

The disable function can be used to help understand what is going on in a matrix. By disabling a cell it is easy to see what its effect on the overall sound is. You can disable a whole branch of cells by turning off the cell at its root.

Blue:
Active and heard
at stereo output

Grey:
Active and NOT heard
at stereo output
(Command-click)

Flat:
Disabled
(Control-Option-Command-Click)
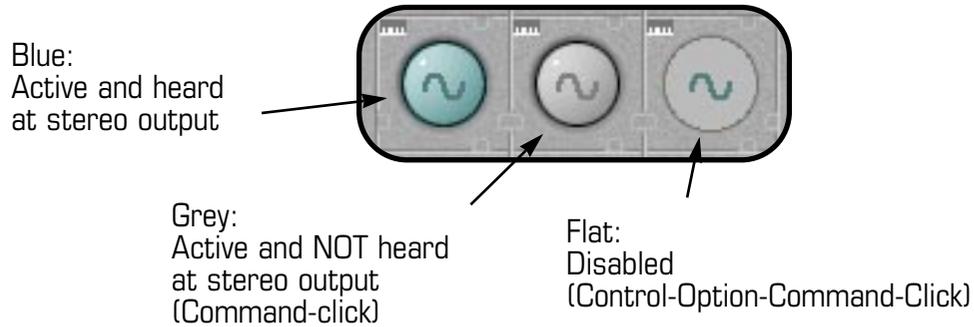
>> As well as the shortcuts shown above, you can also Solo a Cell with a keyboard shortcut, which can help figure out what's doing what on a Matrix.

Control - Click a Cell to Solo.

Control - Click the same Cell again to turn off solo.

You can Control - Click a different Cell to Solo one after another.

A Quick Tour of the Cells

The Generator Cells

Generator cells are located at the top of CellSynth's main window.

Basic Oscillators

The first four generator cells are basic oscillators as used in analog synthesis:

Sine, Square, Ramp (Sawtooth) and Triangle.

The Basic Oscillators have just the parameters that are common to virtually all Cells - **Gain**, **Controller** and **Control Amount.**
They also have a **Frequency** parameter which can either be fixed or modulated by the input.

Gain is the overall output of a Cell. Optimum gain is 1.0.

Controller is the MIDI Controller that will control gain (this is true of most cells (see "Using CellSynth with MIDI" chapter for more information).

Control Amount is the amount of control a MIDI controller has. 127 = maximum and 0 = off.

Harmonic Oscillator

This cell produces a tone consisting of a user specified mix of 32 harmonics starting at the fundamental.

The Harmonic Editor is opened from the Cell Edit Window by clicking on the Editor button.

The Harmonic Editor is used to specify the amplitude of each harmonic (harmonic additive synthesis).

You can enter values from the keyboard or use the pencil tool that appears when you move your mouse into the edit LCD.

When the Harmonic Editor is on screen, Open and Save Harmonic Table options are available on the File menu.

Aside from the Harmonic editor, the Cell Edit window has the same parameters as the other Oscillators.

Noise Generator/Random Number Generator

If the frequency is set to 0 this cell outputs white noise.

If the frequency is > 0 it generates a random number between -1 and 1 at the frequency specified. This has many uses, for example, to produce sample and hold style effects as found on analog synths.

Sync switch on or off. If sync is on, frequency becomes a multiple of the bpm. This would be used, for example, to sync a "sample and hold" effect to the tempo of a song. 1=1/4 note. 2=1/8th note, 4=1/16th note, and so on.

Sample Cell

This cell allows AIFF files to be loaded as sound sources.

When the cell is dragged to the Matrix, a standard File open dialog appears. Select an AIFF file to use.

Samples can be auditioned using the Play button in the dialog.

You can also drag an AIFF file straight from the Finder to the Matrix.

>> *Double clicking on an AIFF file associated with CellSynth (CellSynth's Type and Creator) allows the audio to be auditioned. CellSynth will play the Sample, even if it is not loaded.*

Clicking on the Editor button in the Cell Edit Dialog opens a dialog that allows the Start and End points to be visually positioned.
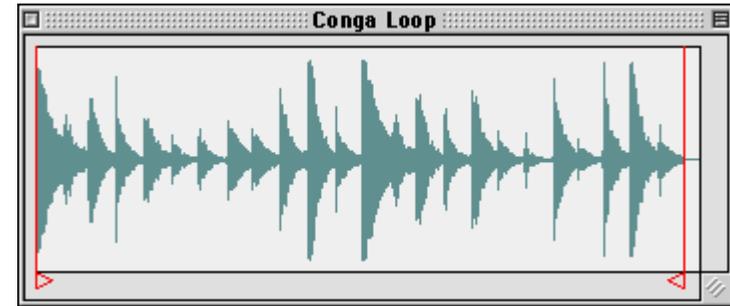
Using Samples is covered extensively in the example in the next chapter: "CellSynth by Example".

DSP Cell Store

The DSP cells, found at the bottom of the CellSynth window, take input from their neighbours and apply their properties to that input. You can use them in the same way that you would an effect unit, or hardware mixer.

Low / Band Pass Resonant Filter

This cell can be switched in the Cell Edit dialog to act as either a Low Pass or Band Pass filter.

The Low Pass filter is similar to that found on analogue synths. It lets the low frequencies through and cuts the high. This will be most familiar as a "wah" effect.

When switched to act as a Band Pass filter, it allows a specified band of frequency to be cut. A row of these cells could be set up to act as a graphic equaliser or a single cell used to cut or boost a specific frequency band.

Comb Filter

This filter is like a fixed flanger or phaser (depending whether invert is on). The signal is fed back on itself with a slight delay. You can control the length of the delay (width) and the amount of feedback. Inverting the feedback creates a phase effect.

If you were to modulate this cell with a Sine Oscillator, for example, it would create a sweeping flange or phaser / chorus effect.

Mixer

Used to route the signal from one part of the matrix to another.

Can also be used to amplify, attenuate and invert the signal passing through it.

Switching on "negative to positive" makes all negative signals passing through into positive signals. One, not immediately apparent, use for this is to make all numbers generated by the random number generator into positive numbers.

Panner

Audio can be positioned in the stereo field using the Panner Cell.

If you applied modulation to this cell you could make it into an auto panner.

Black Box

The Black Box is a stereo spacializer, compressor, limiter, expander and noise gate. It turns a mono signal into a stereo one.

When used as a noise gate, it takes its key from the modulation.

Limiter - works like the studio effect, the signal is limited to the value specified here.
Expander - works like the studio effect, any signal lower than the value specified is increased.
Decay - the number of sample points that the effect is on.

Delay

A simple echo
or:
if the timing of the echo is modulated it serves as a flanger.

Reverb

A stereo reverb that can range from a tiny room to an infinite cavern.

Note:- Reverb is very processor intensive - this should be the first cell you delete if your processor is struggling with a particular matrix.

Envelope

Can be used to shape an audio input or as a free standing envelope.

The envelope shape (ADSR) can be set visually from the Envelope editor by clicking on the editor button in the Cell Edit dialog.
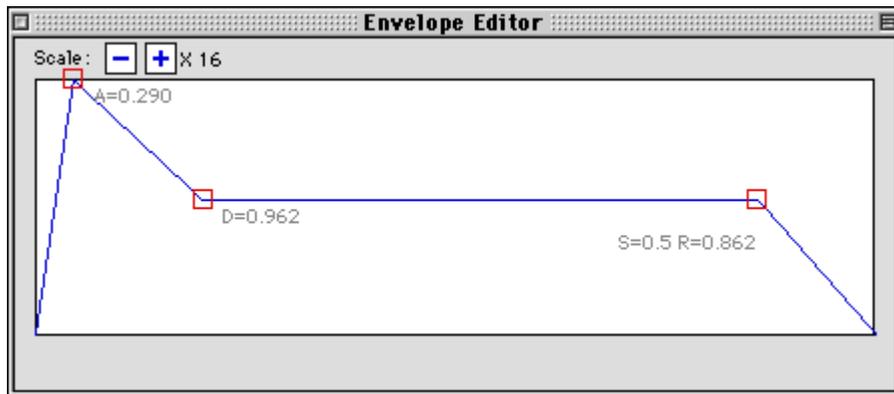
Event Sequencer

The Event Sequencer is like a mini sequencer, allowing Cells to be controlled by MIDI notes or Control Events. This is a very powerful feature, allowing CellSynth to be used as a composition tool, without even needing a separate sequencer. As the event sequencer can be used to modulate any of CellSynth's cells, the uses of this can go far beyond that of a standard sequencer. Just use your imagination.

The Event Sequencer window is opened by clicking on the editor button **EDIT** in the Cell Edit dialog.

A full description of how to use the Event Sequencer comes later in this manual.
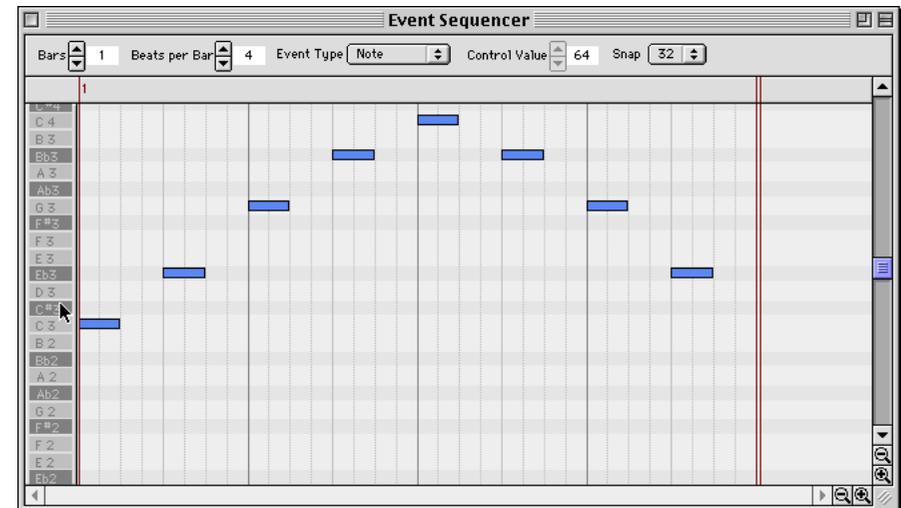
CellSynth by Example

The best way to learn CellSynth is to actually use it. It will soon become clear what the buttons, arrows and indicators are representing.

Although a complicated Matrix may appear daunting at first, it won't be long before you can look at a Matrix and read it, as you would a map, understanding the flow of the signal and what Cell is causing what effect on the resulting sound.

There are many tricks you can use to help you understand what is happening on the Matrix, such as soloing Cells or even disabling them (which, by choosing a strategic Cell, can disable a whole branch.

The first example is described in great detail, and serves as a tutorial (with all the files needed to follow it through, available on the CellSynth CD). It covers many aspects of using CellSynth, and introduces shortcuts and many tips.

After the main tutorial example there are some shorter examples that cover other areas of CellSynth's functionality. The MIDI chapter also has an example you can follow that makes use of the example Matrix files supplied, as does the chapter on the Event Sequencer.

If the information you are looking for is not found in this manual, study the example files provided. Each one has a description of their purpose in the annotation window.

CellSynth as Standalone Sample Player (including sampling CellSynth's output)

The object of this example is to create a simple track consisting of a few samples.

One of those samples will be a sample of a pure CellSynth sound, created with simple oscillators and filters, which is then retriggered with a random start point to create a rhythmic sound (similar to sample and hold).

Learning to create this sound will demonstrate using the oscillators and filters, while the final part of the exercise will demonstrate the use of samples and how they can be synced with CellSynth's internal clock. Effects will also be introduced along the way.

Step 1: Oscillators and Mixer

Drag a Sawtooth Oscillator onto the Matrix.

Now drag a Mixer Icon from the DSP Cell Store at the bottom of the Matrix and drop it to the right of the Sawtooth, and finally, another Sawtooth to the right again (the reason for using two Oscillators will become clear in Step 3).
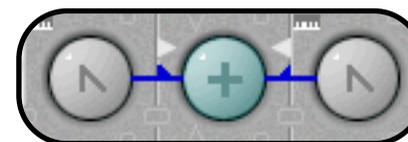
You will notice that the screenshot shows white triangles and blue routing arrows. This means that the output of the two Sawtooth Cells has been routed into the Mixer Cell. To do this open the Cell Edit dialog.

≫ A Cell's parameters are set from the Cell Edit dialog. Click on a Cell to activate the Cell Edit dialog.
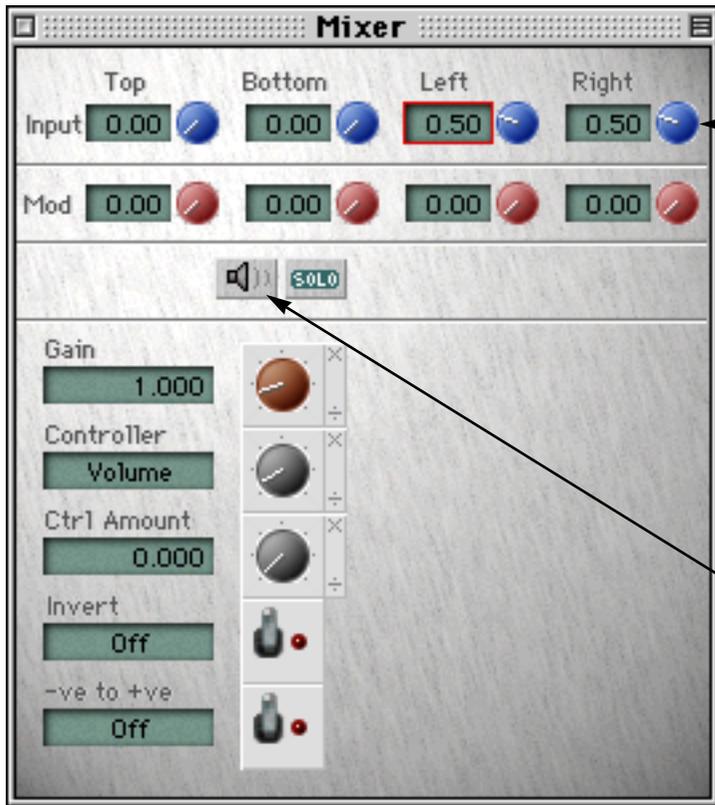
Using the Cell Edit Window has been covered earlier. You might want to take another look.

By setting an input of 0.5 from both the Left and Right Cells you will feed the output of both Sawtooth Oscillators into the mixer.

The optimum gain in CellSynth is 1 (unity gain) so it is a good idea to set the input gain from each Cell to 0.5.

You can either type a value directly into the Parameter window or use the dial.

When you move your mouse over a dial on the Cell Edit Window the cursor will indicate that you can click and drag to alter the setting.

We've taken you the long way round to routing input from one cell to another. Its important to understand the relationship between the Cell Edit Window and what is displayed on the Matrix. There is, in fact, a shortcut to do the same thing:

≫ Clicking on the Triangles routes the signal from one Cell to another.

The last thing remaining to do in this step is to mute the two Oscillator Cells leaving only the output of the Mixer Cell being sent to the Master outs.

Click on the speaker button on the Cell Edit Window. This mutes the cell. (You can also Command Click on the Cell button on the Matrix.)

You are going to mix the output of two cells through a filter. By muting the cell you will ensure that you only hear the output that is routed through the Mixer Cell. If you don't mute the cell you will also hear the cell's own output.

Step 2 - Add a Filter

The next step is to add a filter to the output of the Mixer Cell.

Drag a Filter from the DSP Cell Store onto the tile below the Mixer Cell.

Note:- This Cell defaults to being a Low Pass Filter but can also be switched to act as a Band Pass Filter.
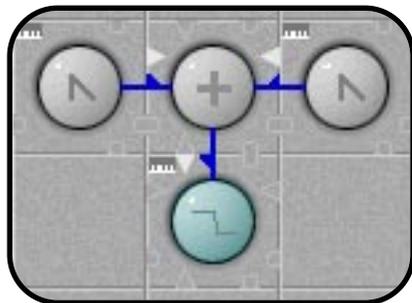
The Low Pass Filter is the kind of filter that you would find on an analog synth. It cuts the high frequencies, only letting the low frequencies through.You may be familiar with the term "wah", which is often used to describe this kind of filter, as in "wah wah guitar".

The Resonance is, in simple terms, the intensity of the filter (the amount of "wah").
In this example the resonance is increased slightly to 0.7.
The plan is to modulate the frequency of the filter to create a sweeping effect.

Step 3 - Modulate the Filter

The Oscillators, as well as being used to produce tones, can be used to modulate other Cells. This is something that will be familiar to those who have used analog synths.

In this case we want to sweep the filter up and down, so the best Oscillator to use will be the Sine wave.

Drag a Sine Wave Cell onto the Matrix, under the left Sawtooth and next to the filter.

This time click the small semi-circle on the filter to allow the Sine wave to modulate the Filter.
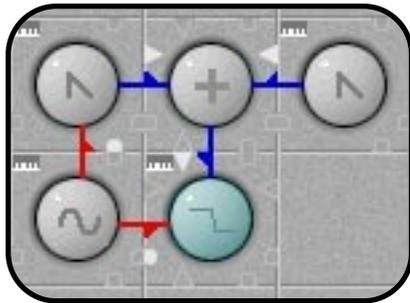
>> The Semi-Circular buttons on each tile allow the tile's Cell to be modulated by the neighbouring Cell's output. This is the shortcut for adjusting the modulation input in the Cell Edit Window.

Adjust the frequency of the Sine wave to create a slow sweep. In this example we used a value of `0.1` (one cycle every 10 seconds).

Making full use of the Sine wave, we are also going to use its output to modulate the Sawtooth Cell above it. By modulating the frequency (pitch) of the Oscillator, it will create a richer sound as it beats against the fixed pitch of the second Sawtooth Oscillator.

Click on the Sawtooth cell to open its Cell Edit window.

Set the modulation input from the bottom to a very small amount. In this case we used `0.004`. The Cell Edit window doesn't display figures to this number of decimal places but you can enter them from the keyboard.

Click in the modulation LCD display to gain the focus (red outline) and type the value you require.

Notice how the LCD display is outlined in red to indicate that it has the focus and will accept your input from the keyboard.

Step 4 - Add a Second Filter to Double the Slope

To get a really dramatic filter sweep, a second filter can be added.

 Drag another Low Pass filter to the position on the Matrix under the first.
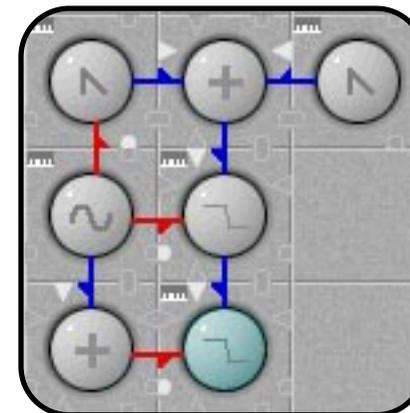
We want to use the same modulation we used on the first filter but how do we route it into the second filter. We could simply use another Sine

Cell but it would be better to route the output of the original Cell into the new Filter. That way any changes made would be replicated in both filters.

>> **The simplest way to route the output of a cell from one place to another is to use Mixer Cells with their gain set at 1 to pass the signal straight through.**

Place a Mixer cell underneath the Sine Cell we are using to modulate the filters.

Take the output of the Sine Cell through the Mixer Cell and use it to modulate the Filter.

Step 5 - Add Reverb and Record

Add a Reverb Cell and route the output of the filters through it.
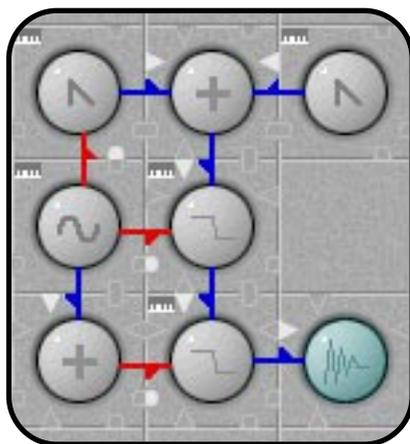
You will notice, in the example Matrix, that all the Cell's are muted except for the output of the reverb. This is the equivalent of taking the

'wet' signal only. and was done purely because it sounded good. If the second filter had been left unmuted you would have had the usual mix of 'dry' and 'wet' sounds.

Now its time to record the output of CellSynth to disk so that it can be loaded back into a Sample Cell.

>> **It takes much less processing power to play a Sample than to create a sound using lots of cells. If your sound is making your Processor work hard then record it and load it back into a Sample Cell.**
You can tell how hard your sound is hitting your processor by displaying the CPU load indicator.

In this case, the main reason we want to record the sound produced by our Matrix is that we can then use one of CellSynth's unusual features to create a rhythmic "sample and hold" type of effect. This is in fact achieved by randomising the start point of the sample. By cutting in at random points in the sample we can change a smooth sweep into a randomly jumping filter, but make it sync to CellSynth's internal clock allowing it to be synced to a tempo.

To record CellSynth's output you have to first show the recording toolbar (Options menu).

To record the sound, click on the record button. Click on Stop when you have enough of your sound recorded (one full sweep of the filter).

You can listen to what you have just recorded with the play button.

To save the recorded audio click on the disk symbol.

The audio is saved as a standard AIFF file.

Step 6 - New Matrix

Now we have recorded the sound of our Matrix, we can dispense with it and start with a new Matrix. You may want to save it in case you want to make any changes later.

>> You can clear the Matrix by pressing Command - b (or going to the Edit Menu and choosing Clear Matrix.).

We want to import a sample into Cell Synth.

There are two ways of achieving this:

1. Drag a Sample Cell from the Generator Cell store onto the Matrix.

You will be prompted for an AIFF file to load. You can audition the files with the "play" button.

2. You can drag any AIFF file directly from the Finder onto the Matrix.
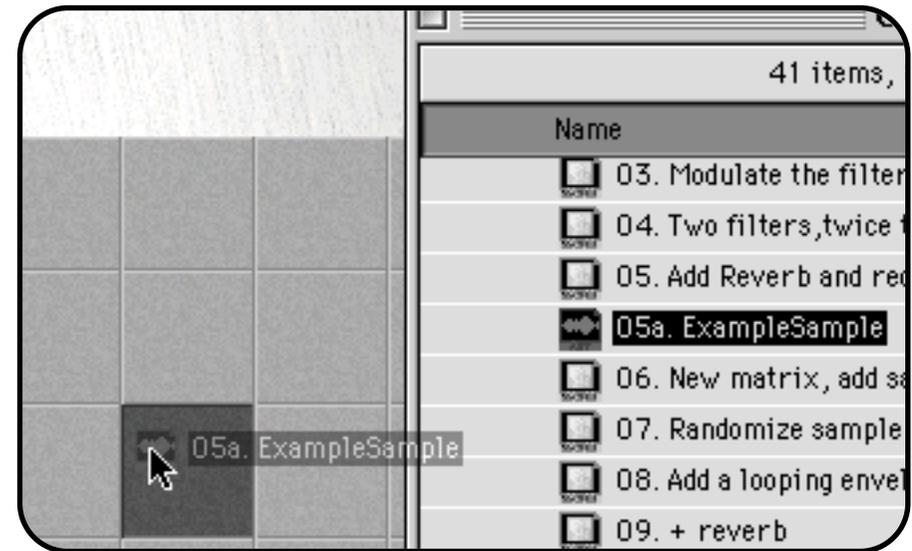
>> CellSynth's audio is saved in AIFF format ready to be dragged or loaded back into CellSynth's Matrix.
You can even audition CellSynth AIFF files when CellSynth is not running. Double click on the AIFF file in the finder and CellSynth will play the sample and then close again.

We are actually going to use the same sample twice, so we need to have two Sample Cells in our Matrix. Instead of dragging two Sample Cells onto the Matrix, we will only drag one on and create another by pressing the Option key on the keyboard and dragging the Cell to another location, which will make a copy. This will mean that, rather than storing two versions of the same sample in the Matrix file, only one will be used but we will be able to apply different settings to each cell.

This will allow us to create a rich sound by playing them back an octave apart and modulating their 'sample and hold' effect differently.

In "real life" you can move the cells around (as described earlier) as the Matrix develops. In this example we have the advantage of knowing exactly where we are going, so drag the AIFF file onto the Matrix, and duplicate the resulting cell (option + drag) into the positions shown:

x2 (+1 Octave)
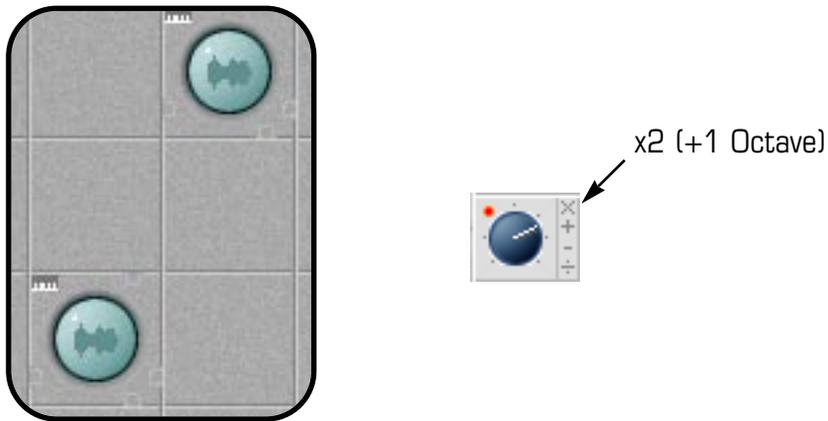
We can use the x2 button next to the dial in the Sample Cell's window to double the frequency of the sample at the top of the Matrix (or option-click on the dial or LCD display), raising its pitch by an octave. Let's call this ExampleSample B, and our original sample ExampleSample A for future reference.

Step 7 - Randomise the Start Point

This step is where we create the "sample and hold" style effect.

 Add a Random Cell.

This cell can produce noise or can be used to randomly modulate another cell, which is the feature we need now.

We are going to use this to modulate the start point of our samples.

Place the Random Cell above the ExampleSample A.

Click on the semi-circle on the top edge of the Sample Cell to allow the Random Cell to modulate the Sample.

Make sure you enable Mod to Start in the Sample's Edit Window.
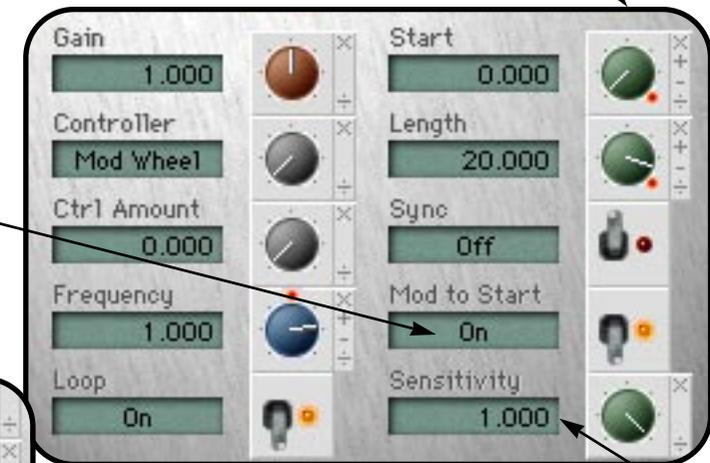
The Random Cell's Sync should be set to On (default) so that the effect produced will be in time with the rest of the samples we are going to add later.

Set Sensitivity to 1.0.

Now we want to route the output of the Random Cell up to the other copy of our Sample (ExampleSample B - which we raised an octave in the previous step). As before we can use a Mixer Cell to do this but we are going to try using the Mixer Cell as an **Inverter** this time.

Place the Mixer Cell above the Random Cell and route the output of the Random Cell into the Mixer using the triangle connector.

Now Modulate the second Sample Cell by linking it to the Mixer Cell with the semi-circle connector (we'll assume from now on that you are familiar with how to route the signal from one Cell to another, either as audio input or as modulation using the triangle and semi-circle connectors on the edges of each tile).
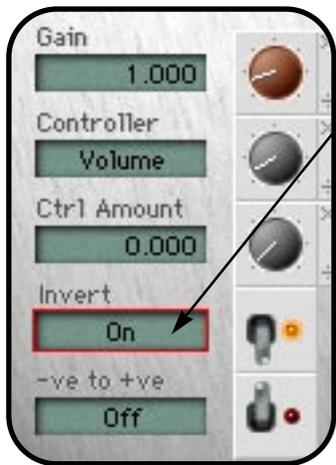
Now open the Mixer Cell's edit window and turn on the invert function. This, as its name suggests, inverts any value that is fed into the mixer.

The effect this has in this example is to ensure that both samples receive a different value, thereby the start point of either sample is never in the same place.

You will notice that the Mixer button on the Matrix changes to reflect that it is now an inverter.

Step 8 - Add a Looping Envelope

We are now going to add a looping envelope to ExampleSample B, which will have an effect similar to using a keyed noise gate, sync'ed to tempo.

Drag an Envelope Cell onto the Matrix below the second sample.
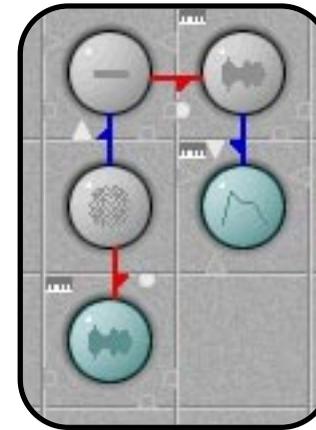
Turn on the Loop function, which starts the envelope again once the decay stage has finished.

By choosing a decay length that is related to the tempo and switching on sync, so that the envelope is triggered in time with the tempo, a gated affect can be achieved

Luckily CellSynth has a feature which makes this very easy to do, so you can put your calculators away!

With the Envelope's Cell Edit Window open, Command click on the Decay dial and the setting will fit to CellSynth's internal bpm, in this case the default 120 bpm will give a value of 0.5 (one beat of 4/4 or a quarter note).

Now Control-Click once to half the value (eighth notes) and once more to half it again (giving us sixteenth notes, which is the value we require to give a fast gated effect).

If you prefer to edit envelopes visually, there is also a graphical editor which you can call up by clicking on the editor button.

>> **The default tempo of CellSynth's internal clock is 120bpm. You can alter this by selecting Set Sync Tempo... from the Options menu.**
Note:- This tempo is ignored if CellSynth is synced to MIDI Clock.

Before moving on to the next stage, mute ExampleSample B by command-clicking on it. This ensures that you only hear the output with the gate effect.

Step 9 - Add Reverb

Drag a Reverb Cell onto the Matrix. You can place it below the envelope so that you will be able to feed both samples through it. Remember that in "real life" you can move the cells around, as described earlier, as the Matrix develops.
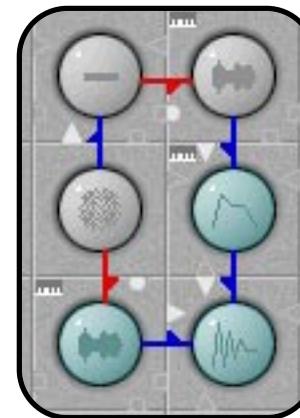
Use the triangle connectors to feed in the input from both samples.

Step 10 - Add the Rhythm
(using the Sync Start to make a simple arrangement)

We have three samples to use as the rhythm, a bass drum loop, a hi-hat loop and another loop with more drums involved. By using the controls provided in the sync dialog (appears when you turn on sync) you can add a basic arrangement even using the Event Sequencer!

Go to the Finder and open up the Tutorial folder. Drag the Bass Drum, HiHat and Drum Loop sample files directly onto the matrix. The position is not important as they will simply be playing loops and not fed into any other cells.
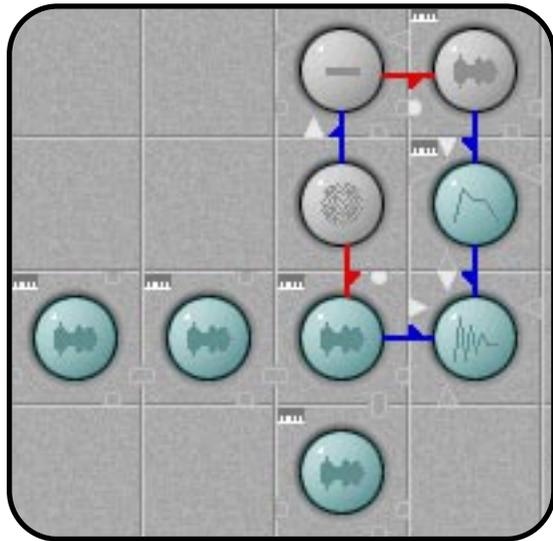
When you switch on Sync you are presented with a dialog that allows you to specify how you want the sample to behave in relation to the sync clock.

Clock Sync

Start at Bar [5]   Beat [1]

Retrigger every [8] beats.

Beats per Bar [4]

Cancel   Ok

Lets make a simple intro, starting with the fast gated CellSynth Sample followed by a 4 bars of bass drum and fast gated CellSynth sample, joined by hi hats at bar 3 for 1 bars before the full rhythm enters at bar five along with the slower and lower CellSynth sound.
As the piece is simple 4/4 time, we will leave all the beats per bar at 4.

We want all samples to start on the 1st beat of the bar so we can also leave the beat field at the default of 1.

The samples vary in length, from a 1 beat bass drum to an 8 beat drum loop. Each sample will have to be retriggered after a suitable number of beats.

Go to each sample one by one and set their start points like so:

ExampleSample B

Bar 1 (also we want to retrigger the sample every 4 beats)

Start at Bar [1] Beat [1]

Retrigger Every [4] Beats

Bass Drum

Bar 3 (this is only a 1 beat sample, so lets retrigger every 1 beat)

Start at Bar [3] Beat [1]

Retrigger Every [1] Beats

HiHat

Bar 4 (this is a 4 beat sample, so retrigger every 4 beats)

Start at Bar [4] Beat [1]

Retrigger Every [4] Beats

ExampleSample A

Bar 5 (this doesn't really need to retrigger as it is set to loop continuously - in the example it is set to an arbitrary 500 beats)

Start at Bar **5** Beat **1**

Retrigger Every **500** Beats

Drum Loop

Bar 5 (this is an 8 beat loop and must loop every 8 beats)

Start at Bar **5** Beat **1**

Retrigger Every **8** Beats

Now, when we start CellSynth, we'll hear our intro.

Step 11 - Add More Stereo
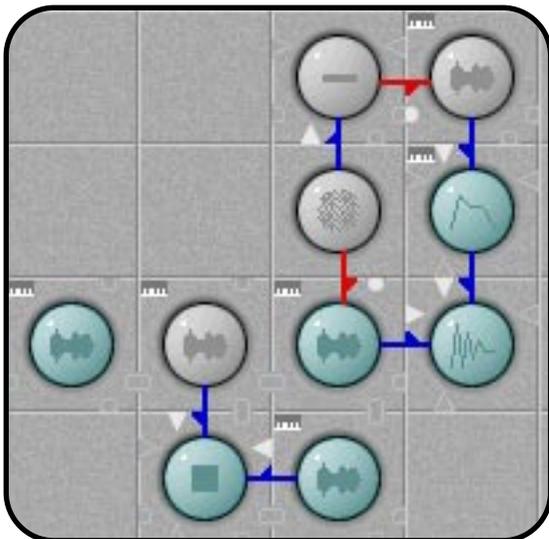
Now, lets round off our example by adding a Spacializer effect to the HiHat and Drum Loop.

You will notice that the HiHat sample is muted to get the full effect of the spacializer.

There! Finished.

Just one more thing…

Let's annotate our Matrix so that we don't forget how it works.

Annotation

From the Options menu, you can choose to show the Annotation Window. To enter your text choose Edit Annotation. You will now be able to enter text in the window.
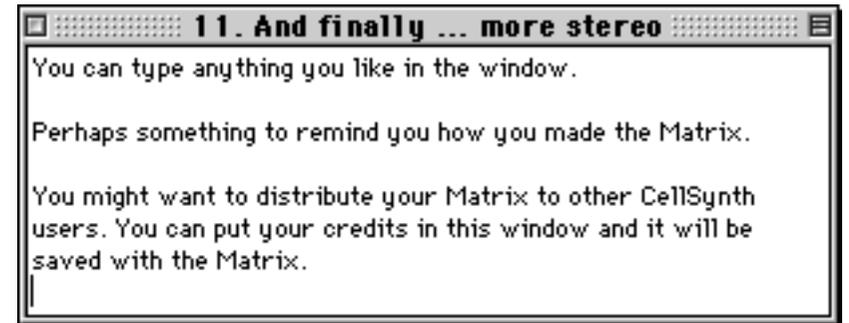
11. And finally … more stereo

You can type anything you like in the window.

Perhaps something to remind you how you made the Matrix.

You might want to distribute your Matrix to other CellSynth users. You can put your credits in this window and it will be saved with the Matrix.

You can type anything you like in the window.

Perhaps something to remind you how you made the Matrix.

You might want to distribute your Matrix to other CellSynth users. You can put your credits in this window and it will be saved with the Matrix.

Well Done!

It may have seemed complicated to get to this point, but as you become familiar with the features of CellSynth, you'll be able to knock out something like this in minutes. It is much more complicated to describe than to do. Having said that, by looking at each step in detail we have covered many of CellSynth's features along the way.

Take a little time to look at the finished example and you will soon get the feel of the flow of sounds you have created, which cells are muted, and why, which cells are used as simple sample playback.

Of course, there are a million and one more things you can do with CellSynth. We haven't even looked at using MIDI yet.

Using CellSynth for Auditioning Drum Loops – Part 1: Recording

This example covers two areas, recording audio and retuning samples to fit to a tempo.

Quite often, when producing music with sampled drum loops, samples taken from sources of varying tempo are retuned so that they can be used together. This can be a tedious task, but CellSynth has some useful shortcuts to make this process much easier.

First, lets look at how you would record samples directly from CellSynth.

Step 1 - Record your Drum Loops

Record your drum loops, either using CellSynth's record function, or your favourite audio application. Once you have them in a format that CellSynth can import, drag them onto the Matrix.

Of course, if you record them through CellSynth, you can use CellSynth's features to process the sound.
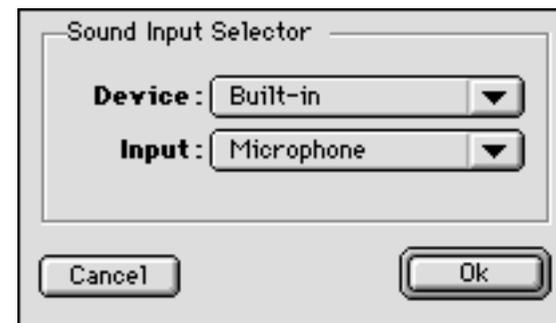
To do this you must first "Enable Sound In" from the Options menu. You will need to choose the input from a standard Sound Manager dialog.
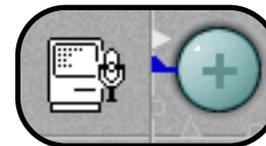
The "Sound In" icon will be displayed in the top left hand corner of the matrix, along with a Mixer Cell, which is used to connect the input to Cell Synths output (otherwise no sound would be heard!)

From here you can feed the input into any combination of Cells, using CellSynth as an effects processor.

Record the resulting sound using the Recording Toolbar (Command-B). Record as close to the number of bars you require.

>> You can choose the location of the Recording scratch disk by selecting "Choose Record Disk..." from the File menu.

Save the recorded audio by clicking on the disk icon on the Recording Toolbar (or Command-B).

>> although not relevant to this particular example, you can set the record time and Fade Length from this dialog, accessed from the File menu:

```
┌─ Set Record / Fade Time ──────────────────┐
│                                            │
│   Record for    [ 600 ] - [ 0 ] Secs       │
│                                            │
│   Fade Length   [  0  ] - [ 0 ] Secs       │
│                                            │
│   [ Cancel ]                  [  Ok  ]      │
└────────────────────────────────────────────┘
```

Drag a Sample Cell to the Matrix, choosing your new file when prompted.

Click on the Cell to open the Cell Edit dialog.

Click on the Sample Button on the Cell Edit dialog and a simple Waveform will be displayed.

You can use this to set the start and end points for the sample.

>> In the Sample Waveform window, you can drag the start and end markers, use the magnifying glass to zoom in (move the mouse over the waveform) and zoom out using the option key or the command key (fit to window).

05a. ExampleSample
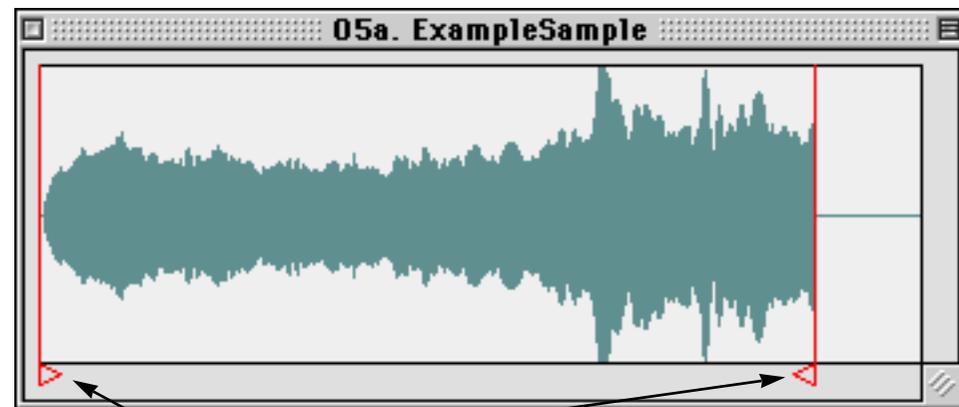
Move the start and end markers until you have a smooth loop.

>> When a sample cell is set to follow MIDI note-on/off the sample always plays from zero to the end mark and then, if looping is on, loops back to the loop point. If key follow is NOT on then the sample always starts from the beginning of the loop.
This example only works if MIDI key follow is off.

Using CellSynth for Auditioning Drum Loops – Part 2: Retuning Samples to Fit to Tempo

Now we can use a useful feature that automatically retunes a sample so that it fits to the tempo (obviously, this will only be useful on samples that don't need to be at a particular pitch).

Open the Sample's Cell Edit Window.
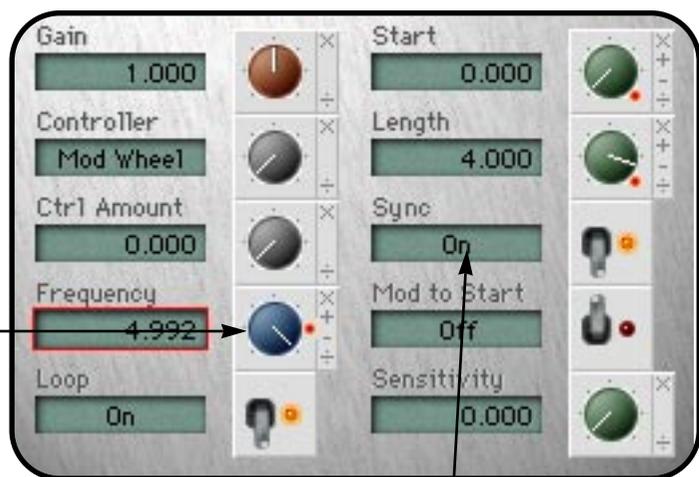
Switch on Sync and enter some appropriate settings in the Sync dialog. See previous example for an explanation.

Now Command-Click on the Frequency dial. This will automatically retune the sample so that it fits to the current tempo.

Fit to tempo assumes your Sample is 4 beats long. If your sample is longer or shorter than four beats use the Control or Option-Click short-cuts to make a quick adjustment.

Now repeat with as many drum loops as you want and you can quickly see which loops work together and which don't.

Once you have found suitable loops you may find they work retuned. If not you can take them into another program for further editing, confident that they sound good together when they are played in sync.

Using CellSynth with MIDI

Setting up CellSynth MIDI

Before you can use MIDI with CellSynth, you must have OMS v2.0 or newer installed on your computer

>> *you can download the latest versions of OMS from the Opcode website, which at the time of writing was at http://www.opcode.com).*

Setting up OMS

From the **Options** menu choose **Set MIDI channel...** in the **MIDI** submenu.

>> *CellSynth defaults to using MIDI channel 1. If you want to change this use the above dialog.*

From the **Options** menu choose **Choose MIDI Input...** in the **MIDI** submenu.

This will display the OMS input selector dialog. Use this to choose your MIDI source as you would in any other OMS application.

Playing Samples and / or Oscillator / Synth Sounds with a MIDI Keyboard

Drag a Sine Cell onto the Matrix.

As you may have noticed, most of CellSynth's cells can be controlled via MIDI Controllers. This control is always available (providing MIDI has been setup correctly). Clicking on a Cell's Keyboard button enables MIDI note-on/off control. This can also be done by clicking the Keyboard button on the Cell Edit dialog.

Keyboard button enables MIDI note-on/off control
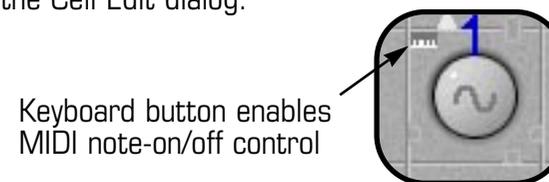
Add an Envelope Cell

A Sine Cell on its own does not give you the control you would expect when playing a sound from a keyboard, as the sound will not stop when you let go of the key. In order that the sound should stop playing when you release the key, you will need to add an Envelope Cell and turn on MIDI note on/off control as described above.

 Drag an Envelope Cell onto the Matrix next to the Sine Cell.

>> *Turning on MIDI note on/off control on an Envelope Cell means that the envelope goes into attack mode when a MIDI note-on is received and release mode when a MIDI note-off is received.*

You have already enabled MIDI note on/off control on the Sine Cell. This means that the MIDI note from your keyboard (sequencer or whatever) is controlling the frequency of the Sine Cell, adjusting the frequency as you play different notes.

By enabling MIDI Note on / off on the Envelope Cell, it means that the note off information is controlling the Envelope Cell so that the note is released when the key is released. This is, of course, how most MIDI controllable synths operate.

You can adjust the envelope parameters manually using the ADSR edit window:
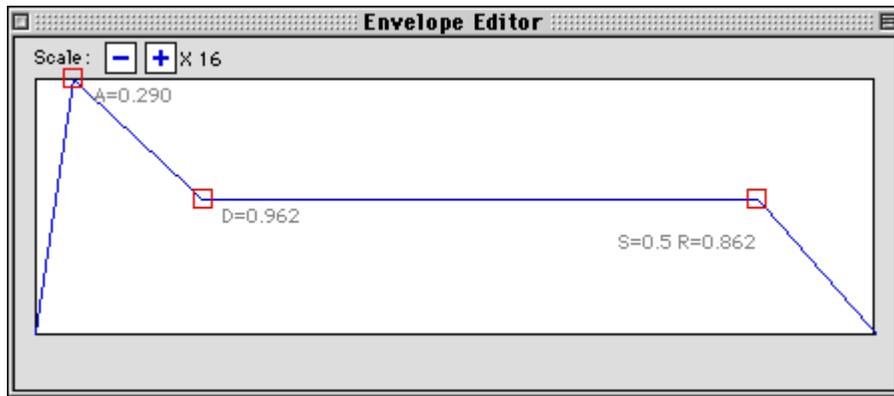
If you leave both Cell's unmuted, you will not hear the effect of the envelope because you will still be hearing the output of the Sine Cell before it has passed through the envelope.
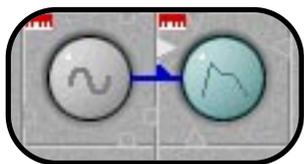
If you mute the Sine Cell (press the mute button in the cell edit dialog or command-click cell in Matrix window) you will only hear the output of the Envelope Cell.

Testing the Sound Using the Keyboard Window

You can easily test your new sound even if you don't have a MIDI controller setup. Open the Keyboard Window by selecting "Show Keyboard Window" from the "Options" menu. You can play the keyboard by clicking on the keys with your mouse.

Testing the Sound Using a MIDI Keyboard

To play from a MIDI keyboard (or any MIDI controller) make sure you have chosen your MIDI input in the OMS dialog accessed from the MIDI submenu item "Choose MIDI input" (as described earlier), and that the Controller is set to output on the same MIDI channel.

CellSynth must be active (click the speaker icon on the Matrix window or press spacebar) before it will receive MIDI from an external controller.
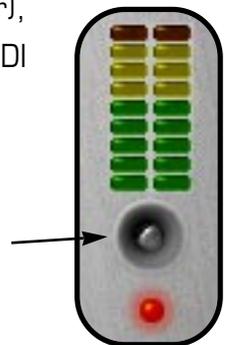
Synchronising to MIDI (or Internal) Clock

CellSynth has its own internal Clock which can be used in a number of ways, such as sync'ing the start point of looped samples, sync'ing looped envelopes to produce a gated effect in time with the music. It is also used to drive the Event Sequencer to produce sequences, arrangements or many other interesting effects.

The tempo of the internal Clock can be set from the "Set Sync Tempo" dialog accessed from the "Options" menu.

```
═══════════════ Tempo ═══════════════
┌─ Set Sync Tempo ──────────────────┐
│                                    │
│   Set Internal Tempo to  120.000  BPM │
│                                    │
│  (This is ignored when "Sync to MIDI Clock" is On) │
│                                    │
│  [ Cancel ]              [  Ok  ]  │
└────────────────────────────────────┘
```
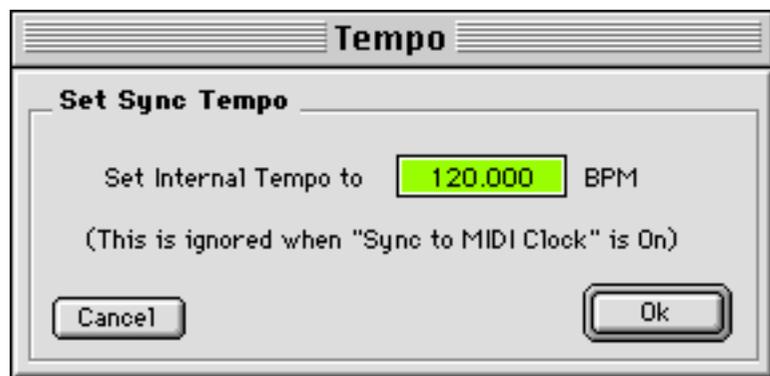
CellSynth can, alternatively, be Sync'ed to MIDI Clock from an external source, such as a Sequencer or any MIDI device that can output MIDI clock. This way CellSynth can be used as part of a larger MIDI setup.

To Sync CellSynth to an external Clock, select "Sync to MIDI Clock from the "MIDI" submenu on "Options" menu.

CellSynth will immediately become active (you will see the Red LED glow), waiting for the MIDI Clock to start.
As soon as CellSynth receives Song Start or Continue, it will start playing in time with the External Clock.

➤➤ There are a number of shortcuts to help sync samples, envelopes and delay lengths to tempo (if sync'ed to external clock set the internal clock to the same tempo):
• Command-Click in a sample frequency dial to fit to tempo.
• Command-Click in a delay dial to fit delay to tempo.
• Command-Click in an envelope dial to fit A, D, S or R to tempo.
Now use Control-Click to divide by 2 and Option-Click to multiply by 2 to adjust the value to the required multiple if necessary.

Using MIDI Control Messages

MIDI Control Messages can be used to great effect with CellSynth allowing it to be controlled from an external source. Because of the flexibility with which you can design your sounds, all sorts of possibilities are available. Assigning Controllers to parameters is made easy by the "learn" shortcut.

Two ways of assigning MIDI Controllers

CellSynth actually has two ways of assigning MIDI Controllers. It is important to understand the Pro's and Con's of each. Each Cell has a main parameter that can be controlled by MIDI Controllers. The controls for setting this up appear in the Cell Edit dialog.

These two parameters are used to assign which Controller will control the Cell and what kind of range it will have. You can Command - Click the Controller LCD to set it to the last Controller received.

You can also assign a value to any Slider. This means that in actual fact, any parameter can be controlled via MIDI. However, this is a low priority function in CellSynth and if your Matrix is hitting your processor hard, you may notice a lag between the adjustment and the response from the Slider.

You can, in fact, assign the same controller in both the Cell Edit dialog and the Fader as we are going to do in this next example, and then you will get a good response and still be able to see the faders move on-screen.

Setting up a MIDI Mixer

A simple, but very useful, example of using MIDI Control Messages is using an external MIDI device to control the Gain (volume) of Cells, enabling the various sounds to be mixed "live".

First you need a MIDI device with several Sliders or knobs which you can assign Control Numbers to. There are many such devices on the market, and many synths now have a generous number of assignable controls.

Make sure your MIDI device is transmitting on the same channel that CellSynth is set to receive (Options-MDI-Set MIDI channel…) and that the MIDI input the MIDI device will be transmitting to has been selected in the "Choose MIDI input" dialog (Options-MIDI-Choose MIDI input).

A good example of a Matrix that has been setup to use with an external MIDI device is "Sample 5 Loop Mixing and Playing" in the Matrix Files folder (and accessible from the pop-up menu at the top of the Matrix window (under Basic Examples 2). This Matrix has been setup to use MIDI controllers 2 to 6. The Control Numbers are optionally displayed (Options menu: MIDI: Show Controller Names) on each Cell in the Matrix Window. You will also notice that five tear off Faders have been setup for easy access.
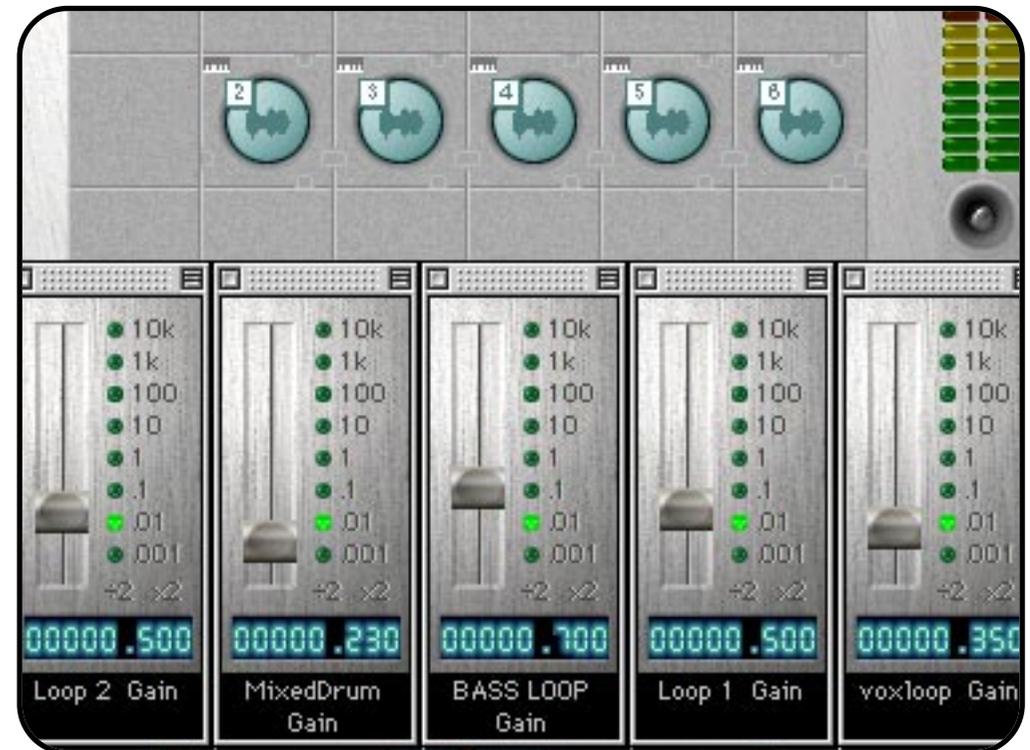
Assigning the MIDI Controller Numbers

Assuming you have set up your MIDI device with appropriate Control Numbers, we can go on to assign the Control Numbers to the correct Parameters.

You can either assign a control value to a parameter in the Cell Edit dialog or, if you plan to use Sliders, it can be done from the Slider itself. See the explanation of the Pro's and Con's earlier in this chapter.

To assign a value in the Cell Edit dialog automatically, move the knob or fader on your MIDI device and then command-click on the Controller Parameter's dial or numeric display and the value received will be set. You can also set this by simply typing in the value or turning the dial until the correct value is displayed. Adjust the Control Amount to give a suitable range.

To create a Slider (which can be used independently of the Cell Edit window and also gives a visual reference of the Parameter's value) click in the Parameter's LCD display and drag:
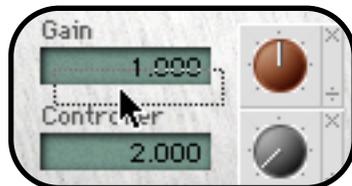
In this example the Sliders are controlling the Gain Parameter of the Sample Cells. Because this is the main MIDI controlled parameter on Sample Cells, and we have already assigned a Controller in the Cell Edit dialog, it is not necessary to set one here. However, in order to see the Slider move on-screen, we can still assign a MIDI Controller to the Slider as well.

Simply move the control on your MIDI device that you wish to use and command-click on the Fader. A dialog will appear with the value CellSynth received from your MIDI device as its default. You can also set the control range from this dialog:
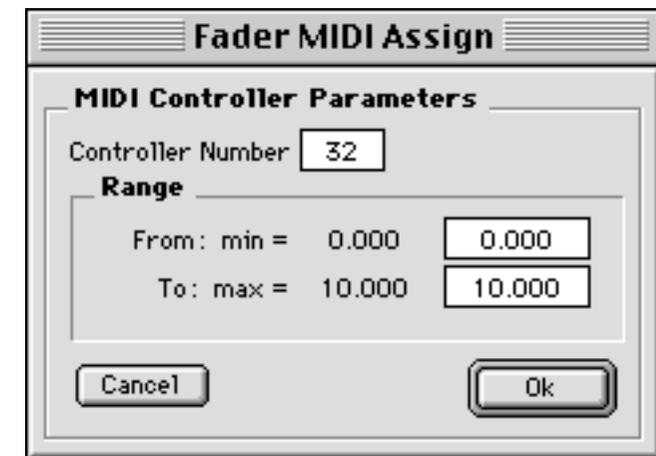
Try experimenting with the Sample 5 Matrix example. Assign some controllers to the Sliders from your own MIDI device.

MIDI Controllers in the Event Sequencer

Whilst we're on the subject of MIDI Controllers, we could take a quick look at how we might use MIDI controllers in the Event Sequencer.

The Event Sequencer is covered elsewhere in this manual but lets remind ourselves that we can use the Event Sequencer to automate or arrange sequences of events using MIDI controllers. Any Cell can be controlled using MIDI controllers and therefore the possibilities are endless. You could automate filter sweeps, volume changes, delay length, pan and so on.

By assigning Controllers to Sliders, any parameter can be controlled, but it should be remembered that MIDI control over Sliders has a low priority in CellSynth. For smooth response try and use the Cell's main parameter assigned in the Cell Edit dialog.

>> *Here are the Cells' Main Controllable Parameters:*

Sine	**gain (also known as volume!)**
Square	**gain**
Sawtooth	**gain**
Triangle	**gain**
Noise	**gain**
Samples	**gain**
Filters	**frequency**
Mixer	**gain**
Panner	**pan amount**
Black Box	**gain**
Delay	**delay length**
Envelope	**gain**
Reverb	**gain**
Sequencer	**none**

…but remember, you can also change the values for Cells that are modulating those heard in the final output.

Setting MIDI keyspan

When designing a Matrix with the idea of playing the sounds from a MIDI keyboard, it can be useful to assign different sounds to different areas of the keyboard. This is known as the Keyspan.

To set the Keyspan of a Cell, open the Cell Edit window and Option-Click on the MIDI Note on/off button.
This will open the Cell's Keyspan window:
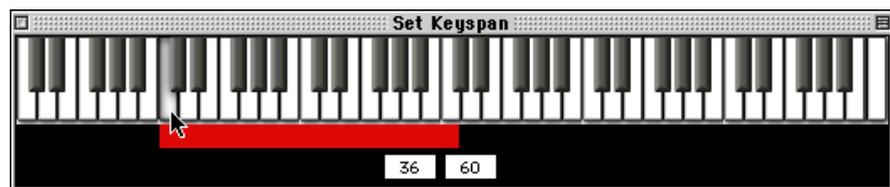
To set the Keyspan, either type in the note numbers manually or click on the note at either end of the current keyspan and drag with the mouse.

How you might use Keyspan

Keyspan means that, although CellSynth only receives MIDI on one channel, you can control several sounds by spreading them across the keyboard. One example of this is if you had individual drum sounds. You could assign a keyspan of one note to each sound so that you can play the full kit from the keyboard.

It also means that you could control them from the Event Sequencer, which you could then use to arrange drum parts. Each cell that has MIDI Note on/off activated will receive the output from the Event Sequencer, so this is one Cell that can be placed anywhere on the Matrix and does not need to be connected to the other Cells on the Matrix.

Each Sample Cell's Keyspan is set to a different single note.
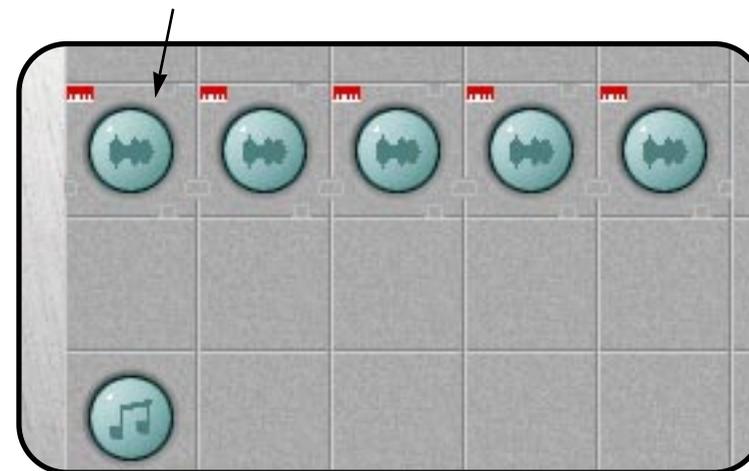
Drum pattern arranged in the Event Sequencer using the five notes assigned to the Sample Cells

Using MIDI Program Change
Messages to Load Matrix Files

If you are using CellSynth with an external sequencer or MIDI controller, you can set up CellSynth to load a Matrix file when it receives a Program Change message.

Place aliases of Matrix files in the MIDI Programs folder.
Those matrices can then be loaded via a MIDI program change.

If you rename the alias files so that they start with a number then they will be correctly sorted.
eg:

if you have aliases called

Bass Synth
Analog Lead
Digi Synth

Then rename them as...

001 Bass Synth
002 Analog Lead
003 Digi Synth

etc

The corresponding number will then be the MIDI program number.

Using the CellSynth Library

CellSynth comes with annotated examples to help you get started. These are stored in the "Matrix Files" folder which means that (as long as you keep this folder in the same folder as CellSynth) they can be selected from the pop-up menu at the top of the Matrix window.

These examples have been designed to demonstrate various features of CellSynth and to help you start thinking of how you might go about designing a sound in CellSynth.

Because designing a sound in CellSynth often involves building the elements of a sound out of several Cells, a useful feature is to be able to save sections of a Matrix in a library to be used again.

CellSynth comes with a library of useful Matrix Files that can be used as "building blocks" when creating your own sounds. These can be selected from the pop-up menu and appear in a submenu called ~Library. You will notice that all the file names begin with the • bullet character. When you open any file starting with the bullet character, the Merge dialog will automatically open.

You can make your own Library of useful "building blocks". Supposing, whilst designing a sound in CellSynth, you have created a killer dub echo effect that really recreates the feel of those old analog beasts, and you want to use it again and again with other sounds you have created. You can save just that part of the Matrix and then merge it into other Matrix files when you need that effect.

If you make a folder within the Matrix Files folder to store your library of files, it will appear as a submenu in the pop-up menu (only displays one folder deep).

If you also name your files pre-fixed with a • bullet character, the Merge dialog will automatically open when you select it from the pop-up menu. The bullet character is Option-8 on US and UK keyboards. You can use the Key Caps utility on your Apple menu to locate it on other keyboard layouts.

Here's Bassy Wah, one of the sounds supplied with CellSynth:
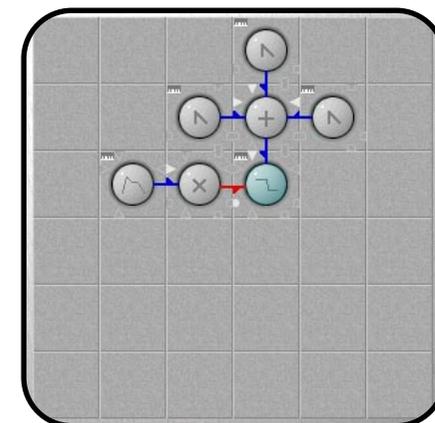
Go to the pop-up menu and select "• Delay Analog Echo Simulation".

The Merge window will appear:
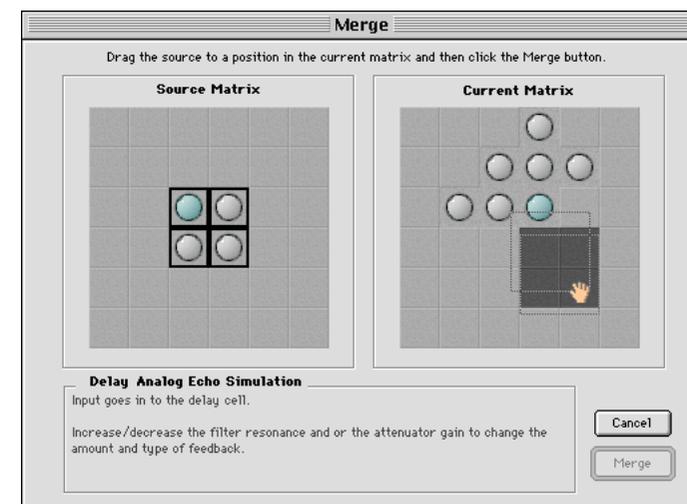
Drag the Cells from the Right Hand Matrix (new) to the position you require on the Left Hand Matrix (old).

This is what you get:
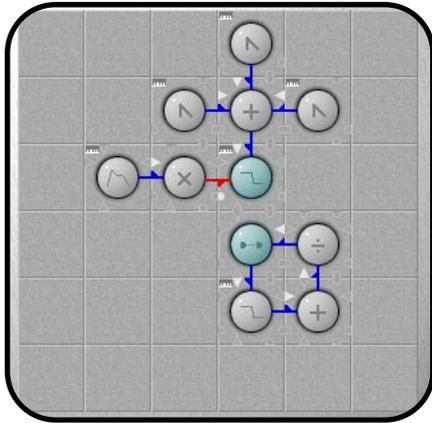
You can now "plug" the bassy wah sound into the echo by routing the signal between the two groups of Cells (feed the signal from the filter to the echo).

Using the Event Sequencer

Overview

The Event Sequencer can be used in many ways to control CellSynth.

These can be broken down into three main categories: Using MIDI Notes to play sounds that have MIDI Note on / off enabled, using the Note values to modulated neighbouring Cells, and finally, Using MIDI Controller to control the parameters of Cells that have had controllers assigned to them.

Using MIDI Notes to control Cells with MIDI Note on / off enabled

Its most obvious function is to play MIDI notes that any Cell that has MIDI Note on/off enabled will respond to.

You can enter sequences that can be used to control synth type sounds, creating basslines, arpeggios, riffs and melodies. You can also play Samples, altering their pitch according to the notes entered.

Remember, although CellSynth only receives MIDI on one channel, you can set the keyspan of each Cell allowing the sounds to be spread across the range of the keyboard (option click Keyboard button in Cell Edit dialog).

Because of CellSynth's flexibility notes can also be used in unusual ways. Read On!

Using Note Values to Modulate Cells

You can still control Cells independently of MIDI if you require.

If you mute an Event Sequencer Cell, it no longer outputs MIDI notes or Control Messages. However, the notes can still be used to modulate a neighbouring Cell if it is connected to it (click the semi-circle). In this way you can control individual Cells and still have other Cells in the Matrix responding to MIDI notes,either from an external MIDI device/sequencer or from another Event Sequencer Cell.

You can also specify the number of bars into the arrangement an Event Sequence starts playing. You could use a number of Event Sequencers, each with a different section of an arrangement. By changing the start times the piece can easily be rearranged.

Using MIDI controllers to Control Cell Parameters

MIDI control messages can also be entered in the Event Sequencer. This means that Cells can be altered using MIDI control messages, for example, filter sweeps can be programmed in, sounds may be brought in and out of the mix by adjusting their Cell's volume, Delay length changes can be programmed in, and so on.

Using the Event Sequencer Window

Open the example file in Basic Examples 2 called "Samples 1 Playing via MIDI".
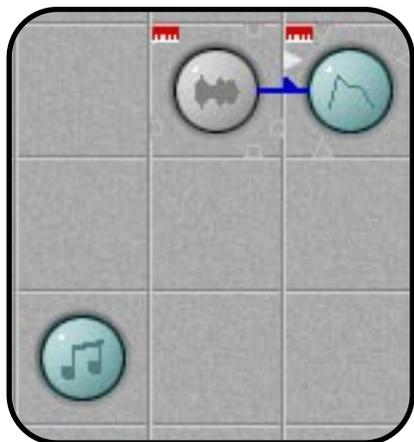
Drag an Event Sequencer Cell to the Matrix. Unless you plan to modulate another cell directly rather than use MIDI notes, you can place it anywhere on the Matrix. Any Cell that has its MIDI note on/off activated will receive the notes you enter in the Event Sequencer.

Open the Cell Edit window. We'll look at the options available once we have entered our sequence, so lets click on the Edit button [EDIT] to go straight to the Event Sequencer window.

The Event Sequencer has a simple arpeggio already programmed in. This can be useful for testing a sound without having to programme in your own sequence and also give you an idea of how the Event Sequencer works. There are some other examples provided on the CellSynth CD.

➤➤ When the Event Sequencer window is active, Import Sequence... and Export Sequence... become available on the File menu.

First lets clear the default sequence. Select Clear Sequence from the Edit menu (or use the shortcut command-b)

Before entering any notes we need to set up the sequence correctly. Look at the controls at the top of the window.

First set the number of bars. We'll make a short repeating sequence two bars long, so change the "Bars" value to "2".

We want four beats in each bar so we can leave the beats per bar at "4".

➤➤ The Event Sequencer has two modes, one for entering notes and another for entering Controllers. The Event Type pop-up is used to switch between the two modes.

Leave the Event Type pop-up on Note so as we will enter some notes first.

Finally, you can alter the snap value. In this case we'll leave it on 32, giving a fine degree of control without turning snap off completely.

How to enter the notes

You will notice the notes of the keyboard are displayed down the left hand side of the Event Sequencer window. You can scroll up and down using the scroll bars (which also have buttons to zoom in and out)
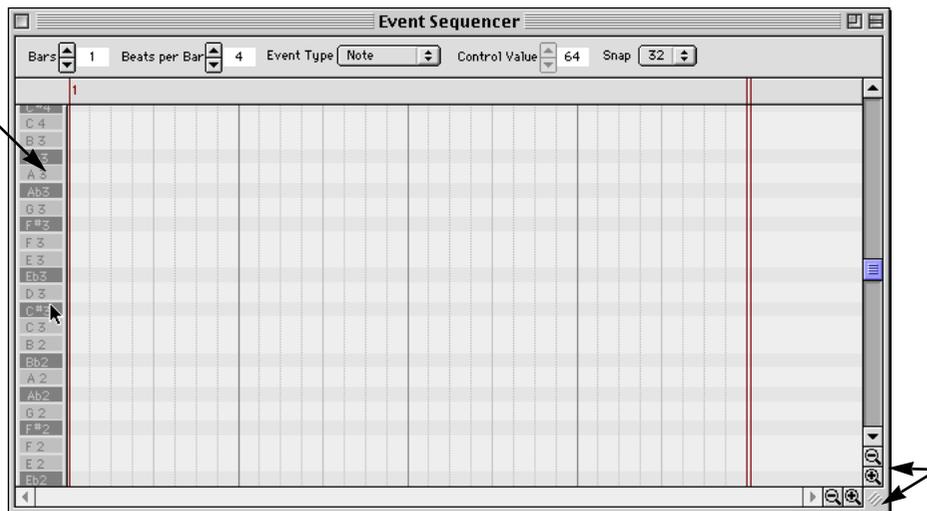
Hold down the Control key and the cursor will change to a pencil signifying that you can enter a note when you click the mouse.

The bars are marked with solid grey lines for each beat and subdivisions (32) as dotted lines. The bar lines are marked in red.

Find the position in the bar that you wish to enter your note and, referring to the notes on the left of the window, click to enter a note. The length of the note will depend on how you set the snap control. The default is 32, so the note will fill one square on the grid.

Once the note has been entered you can move, lengthen or delete it by using the mouse and modifier keys:

Move the mouse near the end of the note to stretch it. The cursor changes to a finger. Click to stretch.

Move the mouse over the note and when the open hand is displayed you can click and drag the note to a new position.

Hold down the Control key. The cursor changes to a pencil, as when you entered the note. Move it over a note and it changes to an eraser. Click to delete the note.

You can mute a note by command clicking on it. The note has a cross though it when disabled.

Other keys are:

 Option key for zoom in (drag marquee to choose zoom area)

 Option-Shift to zoom out.

➤➤ **You can double click in the Event Sequencer window to start playing from the nearest beat.**

Enter a sequence of notes and you should hear your notes played on the bass sample from Samples 1 "Playing via MIDI".

Inserting Controller Events

Now lets experiment by entering a Controller.

Switch the Event Sequencer into Controller mode using the Event Type pop-up. Notice that the Controller numbers are now displayed down the left side of the Event Sequencer window.

Now, again using the Control key on the keyboard, insert a Controller Event on the line that represents the Controller Number that you want to use. In this example lets use 50.
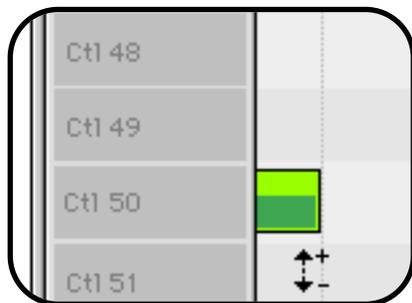
You can change the value of the Controller from the control at the top of the Event Sequencer window or by moving your mouse so that it is near to the right hand edge of the Controller event.

The cursor will change to signify that you can click and drag the mouse up or down to change the value. The level is displayed graphically inside the Controller event. Change the value of your event to 20. Keep your eye on the Control Value at the top of the Window.

Enter some more events for Controller 50 at regular intervals and increase the value so that it peaks at a 100 at the end of bar one and is nearly back to 20 by the end of bar 2.
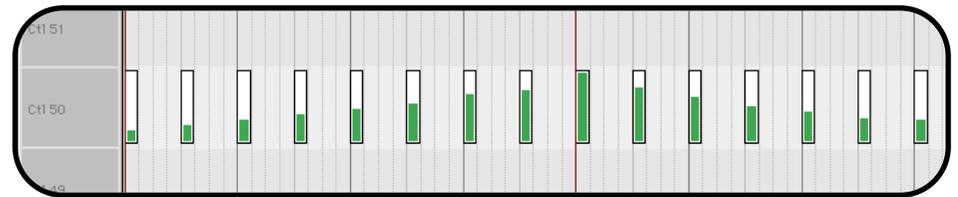
Now click on the Matrix window to bring it to the front and open the Sample Cell's Edit window. You now need to assign the same controller number to the Sample Cell, so change the Controller value to 50 and, so that we have the full range available, set the Control Amount to 127.

Press the space bar on your keyboard to play from the start of the sequence.

You should hear the Bass sample rising and falling in volume as the sequence loops. Use the spacebar on your keyboard to stop CellSynth playing. You can make any adjustments you need and use the double

click method to audition them. When you are satisfied close the Event Sequencer window.

Lets take a quick look at the parameters in the Cell Edit dialog.

You can choose whether your sequence loops and whether it syncs to the bar. If you switch sync on you will get the chance to specify at what bar the sequence should start, what beat it should start on and how many beats per bar it is. This way you can start your sequence at a specific point in the arrangement. You can even use several Event Sequencer Cells and bring them in at different bars, arranging your piece of music in sections. This would make it easy to try different sections in different orders, simply by changing their start bar.

CellSynth Reference Guide

Keyboard Shortcuts

Matrix Window
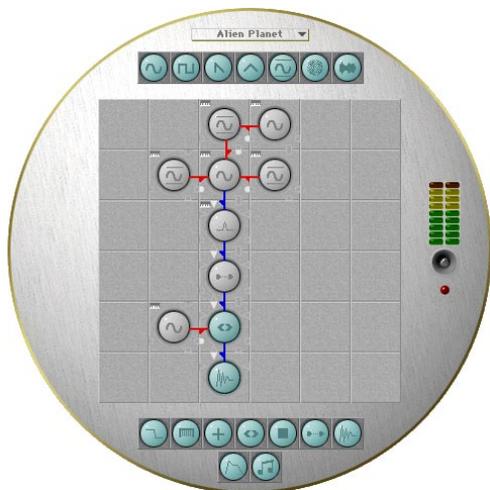
on keyboard:

Space Bar	play/stop
Tab	select next cell
Arrows (cursor)	select cell
Cmd + Arrow	move selected cell
Cmd + Shift + Arrow	copy selected cell
Enter / Return	open editor for selected cell
Delete	delete selected cell

with mouse:

Shift + Click	a cell to select / deselect
Cmd + Click	a cell to mute it
Control + Click	a cell solo it
Option + Drag	selection to copy

Cell Edit Window
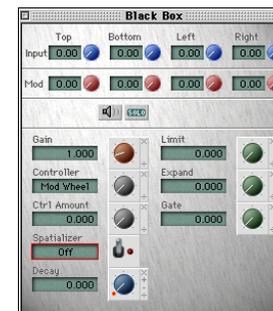
on keyboard:

Escape or Clear	closes the edit window
Tab	select next parameter
Up/Down	select parameter
m, s or k / e	mute, solo or keyboard / editor
Numbers	type a number and it will be entered directly into the selected parameter
Shift + Arrow	select cell in Matrix window
Shift + Enter	edit selected cell in Matrix
* (asterisk)	multiply value by 2 (1 octave)
/	divide value by 2 (1 octave)

with mouse:

Cmd + Click	in a dial to reset it to default value
Cmd + Click	in sample frequency dial to fit tempo
Cmd + Click	in a delay dial to fit delay to tempo
Cmd + Click	in an envelope dial to fit A, D, or R to tempo
Control + Click	a dial to divide by 2
Option + Click	a dial to multiply by 2

Event Sequencer
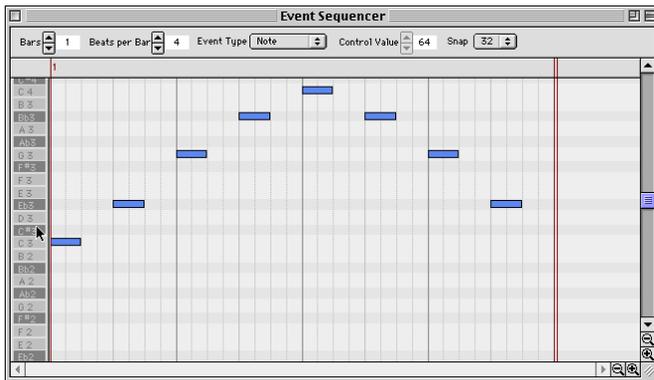
on keyboard:

Arrows / Tab	select cell
Shift + Arrows	extend selection
Control + Arrows	move by snap amount
Option + Arrows	duplicate selection
Cmd + Arrows	scroll
Option + Cmd + Arrows	zoom

with mouse:

Control + Click	insert / delete event
Option + Click	zoom in
Option + Shift + Click	zoom out
Option Drag	copy / duplicate
Cmd + Click	mute event
Double Click	play from cursor

Menu Items

Open Matrix...
Load a previously saved Matrix file.

A "Matrix" is the name given to a CellSynth patch or program.

Merge Matrix...
Displays the Merge window which lets you extract cells from a saved Matrix and insert them into the current Matrix.

Close
This is only used to close some of the editing windows when using CellSynth.

Save Matrix...
To save the current Matrix in memory to disk.

If you save the file into the "Matrix Files" folder then the Matrix will be available in the popup menu in the round window. This can be a shortcut to aid loading favourite files.

Import/Export...

Only active when a Harmonic editor windows or Event Sequencer window is open.

Allows you to open or save harmonic tables or sequence files.

Save Recorded Audio...

To save the audio currently in the record buffer.

Use this after you have recorded audio that you want to keep.

CellSynth saves audio files in AIFF format.

Choose Record Disk...

CellSynth buffers its recordings to a temporary disk file. This menu option allows you to select the disk or folder that you want to use as a record buffer.

Set Record & Fade Times...

Displays a dialog that lets you set the length of the recording and a fade out length.

Edit	
Can't Undo	⌘Z
Cut	⌘X
Copy	⌘C
Paste	⌘V
Clear Matrix	**⌘B**
Select All	**⌘A**
Preferences...	

Undo

Some (but not all) action in CellSynth are undoable.
Moving dials or sliders and cell deletions are undoable.

Undo can be particularly useful after accidentally moving a dial.

Clear Matrix (Clear Sequence)

Clears the current Matrix by deleting all of the cells and sets default values for tuning, volume and MIDI.

If an Event Sequencer window is open, and has the focus, this option becomes Clear Sequence.

Select All

Selects all the cells in the Matrix, or if the Event Sequencer window is open, and has the focus, this option selects all events in the sequence.

Preferences...

Shows a dialog that allows you to set the size of the CellSynth audio output buffers.

If the audio output stutters you could try adjusting the buffer size.
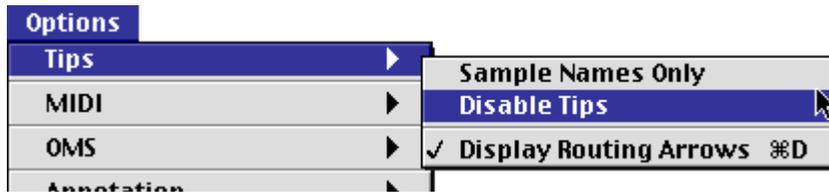
Sample Names Only

This limits the display of tooltips to just the names of the audio files in the sample cells and the names of Event Sequencer cells.

Disable Tips

Disables the display of tooltips.

If you get annoyed by the tooltips, select this menu item!

Display Routing Arrows

Enables or displays the display of routing arrows in the Matrix.
Blue arrows show the routing of audio form one cell to another.
Red arrows show the routing of modulation from one cell to another.
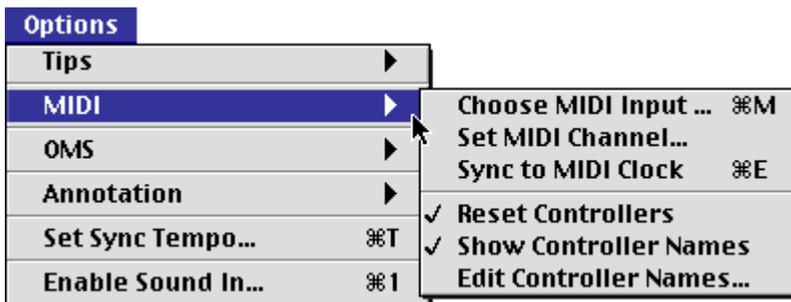
Choose MIDI Input...

Opens the OMS input selection dialog.

To choose the MIDI source that will control CellSynth.

Set MIDI Channel...

Displays a dialog that lets you choose the MIDI channel that CellSynth will use.

Sync to MIDI Clock

This activates CellSynth and puts it into a wait state.
CellSynth will start playing when it receives Song Start and MIDI clock messages.

Note:- This overrides the internal tempo setting and CellSynth will now play at the same tempo as the MIDI clock.

Reset MIDI Controllers

When this option is on (menu item is ticked) CellSynth will reset all MIDI controller values when started.
When the option is off, the controller values are left in their previous state.

Example:- You send MIDI control messages to adjust the volume of cells in a matrix. When this option is on and you stop and restart CellSynth , the volume will be reset.
If the option is off the volume will be left as it was before restarting.
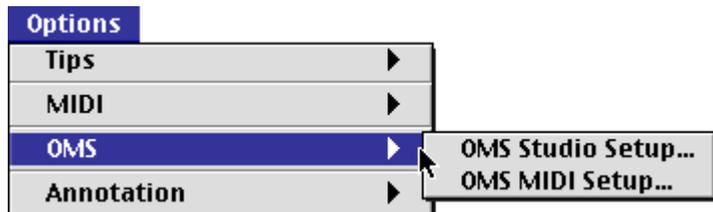
OMS Studio Setup & MIDI Setup

These menu items call up the OMS Studio Setup and OMS MIDI Setup applications. Refer to your OMS documentation for details on how to use them.
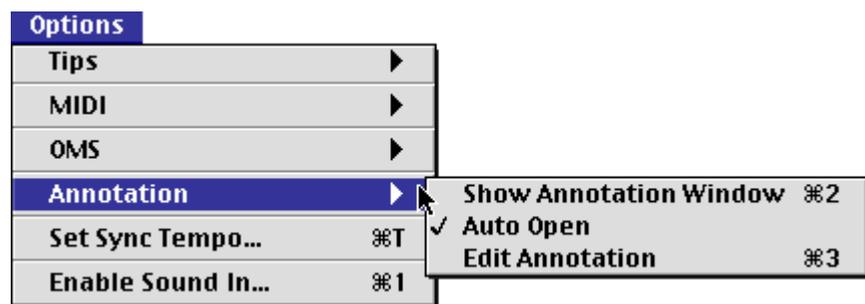
Show Annotation Window...

Display the Annotation window in which you can type text or comments about the Matrix. This text is also shown in the Merge window.

Auto Open

If this option is ticked and a Matrix file has annotation, the annotation window is automatically opened when the Matrix file is opened.

Edit Annotation...

Enables / Disables typing in the annotation window.

Set Sync Tempo...

Shows a dialog that lets you set the internal clock tempo for CellSynth. The clock is used by cells when the "Sync" switches in Cell Edit windows are on.

Note:- this is overridden when the "Sync to MIDI Clock" option is on.

Enable Sound In...

Lets you select the sound input source for recording audio into CellSynth.

Overload Protection

When enabled, Overload Protection will stop CellSynth if it detects that the processor is overloaded and the System is not responding. If you have a Matrix that is beyond the capability of your processor, this will prevent CellSynth from appearing to "lock up".

Show Recording Toolbar

Shows the tool window that contains the transport controls for recording the output of CellSynth.

Show Keyboard Window

Shows the MIDI keyboard window. This can be used to test and play Matrix files that require MIDI note on/off.

Show Master Window

Shows the Master window. This is used to set the output volume and global tuning for CellSynth.

Another way to open this window is to click on the Peak LEDs in the round window.

CPU Load Indicator

Shows the window that indicates how much processing power CellSynth is requiring. If the LED reaches the red area then the machine is struggling and you should reduce the number of active Cells in the Matrix.

Note:- Reverb Cells are particularly heavy on processing, so if you are using one or more reverbs you should delete these first.

Hide Sliders

Hides / Shows any floating slider windows that are in use. This is useful if you have a lot of sliders and they are covering the main work area.

Cell Edit Parameters

Oscillator Cells - Sine, Square, Sawtooth, Triangle and Harmonic

The parameters that appear on the Oscillator Cells appear on all but a few Cells, with the exception of the Frequency and the Harmonic Editor button, which only appears on the Harmonic Oscillator Cell.

Amount of audio input from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Amount of modulation from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Mutes the audible output from this cell. Cell remains active but cannot be heard

Solo: Mutes output of all cells except this one

Enables MIDI note on to set the pitch or frequency of the cell or trigger an envelope cell.

Opens Harmonic Editor window. (Harmonic Oscillator only)

Output level for the cell.

The MIDI controller that affects this cell. Command+Click to set to last received MIDI control.

The amount of affect that the MIDI controller has.

Oscillator pitch. (Bottom C = 65.406, Middle A = 440, Command Click reset to C, or click LCD and type a number)

Harmonic Editor

The Harmonic Oscillator has an editor window. When you click on the editor button ![editor button] the following window appears:

The musical term for the various harmonics are shown on the left hand side of the window for reference. These are intervals in relation to the fundamental.

	Harmonic Edit	
1	Fundamental	100
2	Octave	0
3	Fifth	0
4	Octave + 1	50
5	Major Third	0
6	Fifth	0
7	Minor Seventh	33
8	Ocatve + 2	0
9	Major Second	0
10	Major Third	0
11	Augmented Fourth	25
12	Fifth	0
13	Major Sixth	0
14	Minor Seventh	0
15	Major Seventh	0
16	Octave + 3	20
17	Minor Second	0
18	Major Second	0
19	Minor Third	0
20	Major Third	0
21	Fourth	0
22	Augmented Fourth	17
23	-	0
24	Fifth	0
25	Minor Sixth	0
26	Major Sixth	0
27	-	0
28	Minor Seventh	0
29	-	14
30	Major Seventh	0
31	-	0
32	Octave + 4	0

You can enter values from the keyboard or use the pencil tool that appears when you move your mouse into the edit LCD.
This sets the relative amplitude of the various harmonics allowing you to create many variations of sound.
You can load and save Harmonic Tables from the File menu, when the Harmonic Editor is active.
There are some examples provided in the "Harmonic Tables" folder installed with CellSynth.

Random / Noise Cell

Used to produce random numbers for modulating other cells or, if set to Frequency is set to zero, to output white noise.
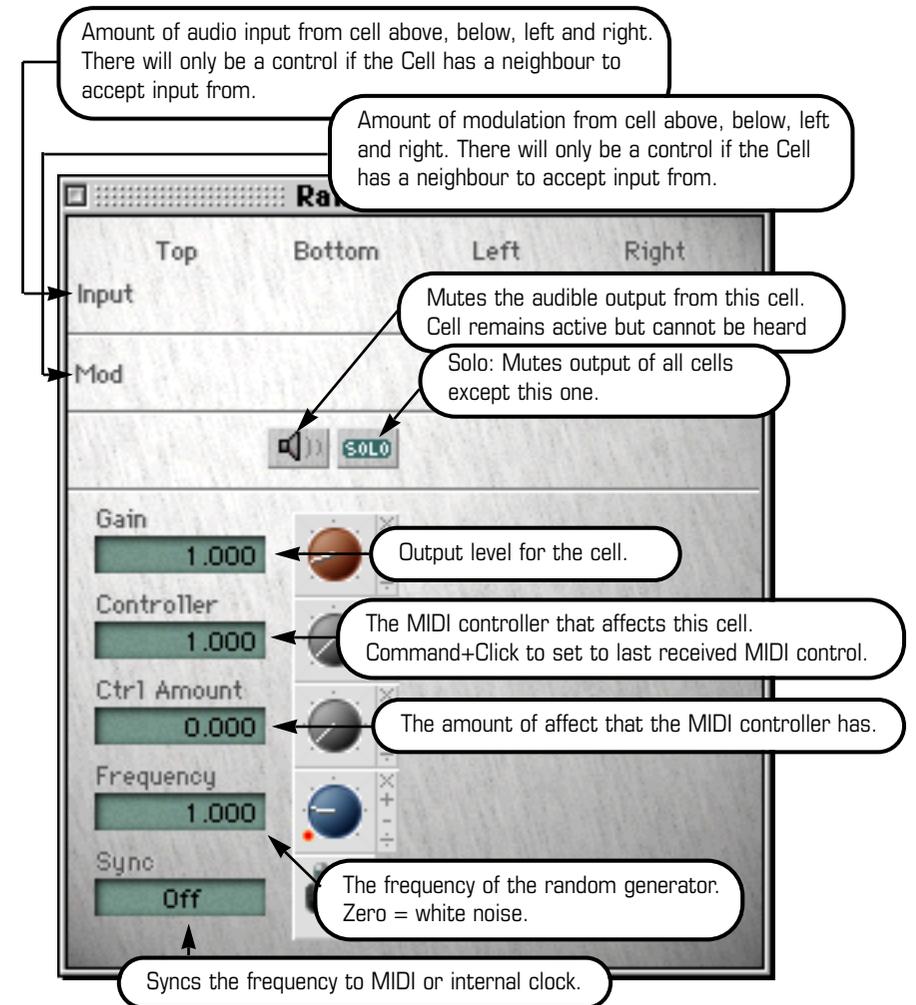
Amount of audio input from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Amount of modulation from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Mutes the audible output from this cell. Cell remains active but cannot be heard

Solo: Mutes output of all cells except this one.

Output level for the cell.

The MIDI controller that affects this cell. Command+Click to set to last received MIDI control.

The amount of affect that the MIDI controller has.

The frequency of the random generator. Zero = white noise.

Syncs the frequency to MIDI or internal clock.

Sample Cell

A Sample player. The sample can be triggered in Sync with CellSynth's internal clock or an external clock. It can be controlled via MIDI Note on / off, either externally or from the Event Sequencer. Modulation can be routed to the Start point of the sample for some very weird effects!

Amount of audio input from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Amount of modulation from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Mutes the audible output from this cell. Cell remains active but cannot be heard

Solo: Mutes output of all cells except this one

Enables MIDI note on to set the pitch or frequency of the cell or trigger an envelope cell.

Opens Sample Editor window.

See Oscillator Cell for info

Playback start point in seconds.

Playback length in seconds.

Used with "Set Sync Tempo" in the "Options" menu. Sample can be triggered at a defined bar/beat.

Routes modulation input to sample start point.

Turns on or off looping from start to end.

Routes modulation input to sample start point.

Multiplies the sampling frequency.
1 = normal. Command Click to fit to current tempo.

Sample Editor

When you click on the Edit button the Sample Editor window appears.
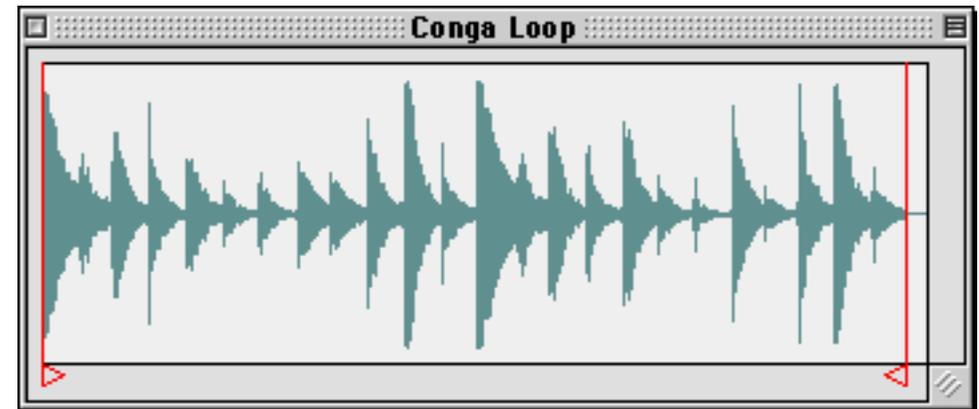
You can set the Start and End points by dragging the red triangles (cursor changes to a hand ✋).

Click on the sample to zoom in (cursor changes to a magnifying glass with a plus sign 🔍).

Option-click on the sample to zoom out (cursor changes to a magnifying glass with a minus sign 🔍)

Command-click on the sample to fit to the window (cursor changes to |↔|)

The sample will always start from the beginning if MIDI Note on/ off is enabled and loop around the marked area.

If MIDI Note on / off is not enabled only the area marked will play.

Low / Band Pass Resonant Filter

This cell can be switched to act as either a Low or a Band Pass Filter. Modulating this cell is like changing the "wah" on a "wah wah" pedal. Modulating it with something like a Sine wave will give a smooth sweep and a random cell will give a "sample and hold" type effect.

Amount of audio input from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Amount of modulation from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Mutes the audible output from this cell. Cell remains active but cannot be heard

Solo: Mutes output of all cells except this one.

Enables MIDI note on to set the frequency of the cell.

Filter type: Lo or Band Pass Filter

Output level for the cell.

The MIDI controller that affects this cell. Command+Click to set to last received MIDI control.

The amount of affect that the MIDI controller has.

The cutoff frequency of the filter.

The amount of resonance or "wah" of the filter.

Comb Filter

The Comb filter has an effect that is similar to a fixed Flanger or Phaser (depending on the state of "Invert"). If you modulate this filter it will act exactly like a Flanger or Phaser!

Amount of audio input from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Amount of modulation from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Mutes the audible output from this cell. Cell remains active but cannot be heard

Solo: Mutes output of all cells except this one.

Amount of Comb Feedback

Inverts the Comb Feedback

Output level for the cell.

The MIDI controller that affects this cell. Command+Click to set to last received MIDI control.

The amount of affect that the MIDI controller has.

Lo Pass Filter cutoff

Width of Comb section

Mixer

The Mixer Cell can be used to route signal around the Matrix, amplify or attenuate, invert the signal, and ring modulate.

Amount of audio input from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Amount of modulation from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Mutes the audible output from this cell. Cell remains active but cannot be heard

Solo: Mutes output of all cells except this one.

Only applies when cell is being modulated. On = ring modulation, Off = amplitude modulation

Output level for the cell.

The MIDI controller that affects this cell. Command+Click to set to last received MIDI control.

The amount of affect that the MIDI controller has.

Inverts the signal going through the mixer.

Makes the negative part of the signal positive.

Panner

Used to position the sound in the stereo image.

Amount of audio input from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Amount of modulation from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Mutes the audible output from this cell. Cell remains active but cannot be heard

Solo: Mutes output of all cells except this one.

Output level for the cell.

The MIDI controller that affects this cell. Command+Click to set to last received MIDI control.

The amount of affect that the MIDI controller has.

Balance between left and right. 0 = L, 1= MID, 2 = R

Black Box

Can widen the stereo image as well as working like a Noise Gate and an Expander.

Amount of audio input from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Amount of modulation from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Mutes the audible output from this cell. Cell remains active but cannot be heard

Solo: Mutes output of all cells except this one.

See Oscillator Cell for info

Any signal above this threshold is decreased. zero = off.

Any signal below this threshold is increased. zero = off.

Threshold below which nothing is passed through the box. zero = off.

The amount of time that the effect lasts before retriggering. zero = off.

Turns a mono signal into a wide stereo image.

Delay

Digital Delay effect. The delay length can be modulated.

Amount of audio input from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Amount of modulation from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Mutes the audible output from this cell. Cell remains active but cannot be heard

Solo: Mutes output of all cells except this one.

Inverts the feedback signal.

Output level for the cell.

The MIDI controller that affects this cell. Command+Click to set to last received MIDI control.

The amount of affect that the MIDI controller has.

The amount of delay in millisecs. Command Click to set to current tempo.

The amount of feedback (or repeats).

Reverb

Digital Reverb effect.

Amount of audio input from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Amount of modulation from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Mutes the audible output from this cell. Cell remains active but cannot be heard

Solo: Mutes output of all cells except this one.

The amount of hi frequency falloff. 0 = none, 1 = normal, 3 = max.

Output level for the cell.

The MIDI controller that affects this cell. Command+Click to set to last received MIDI control.

The amount of affect that the MIDI controller has.

Multiplies the room size or reverberation delay.
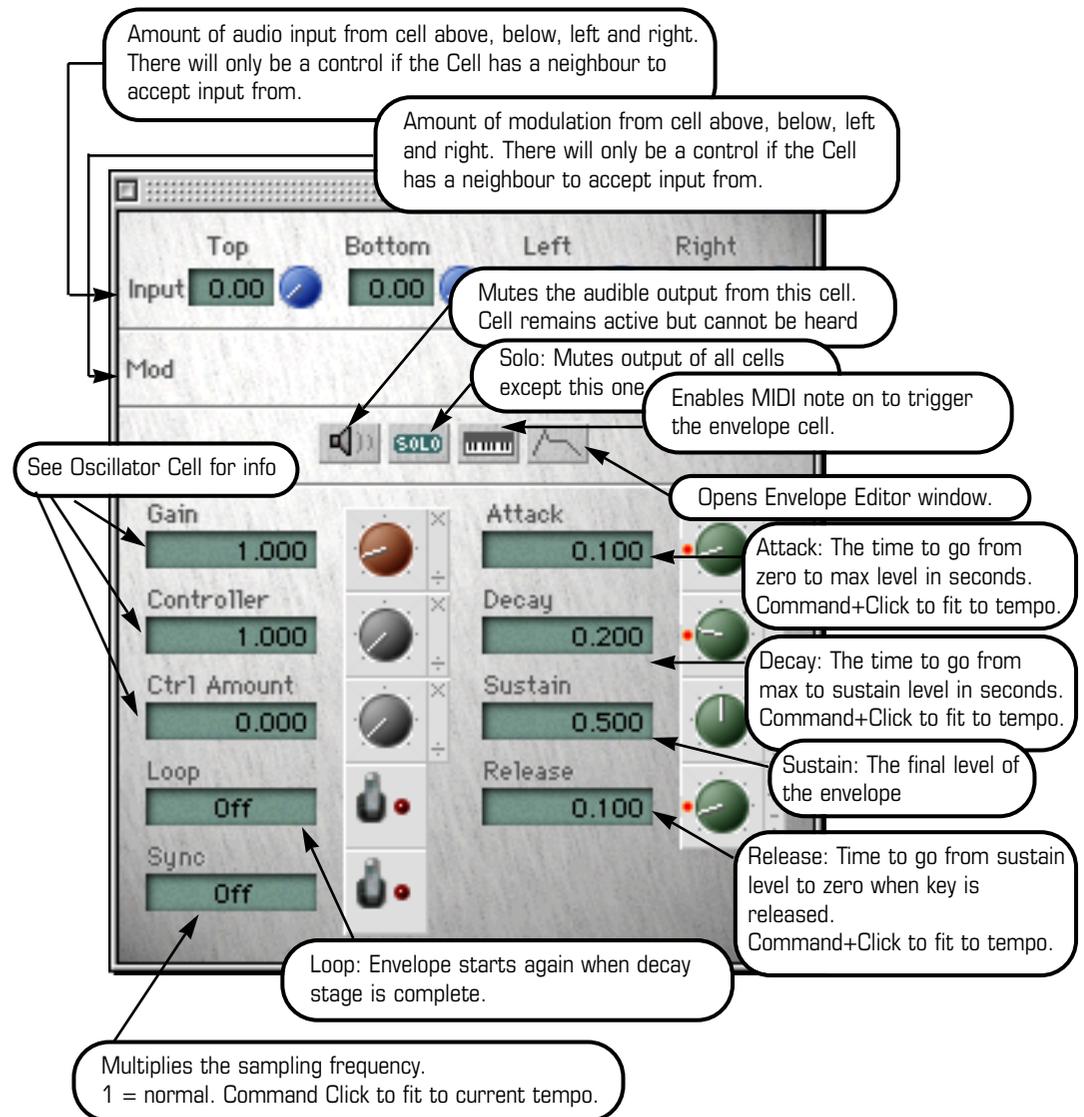
The length of the reverb.

Envelope

Can be used as a free standing envelope or with MIDI note on / off (the envelope goes into its decay phase when MID note off is received.. There is an Edit window for visual editing of the envelope.

Amount of audio input from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Amount of modulation from cell above, below, left and right. There will only be a control if the Cell has a neighbour to accept input from.

Mutes the audible output from this cell. Cell remains active but cannot be heard

Solo: Mutes output of all cells except this one.

Enables MIDI note on to trigger the envelope cell.

See Oscillator Cell for info

Opens Envelope Editor window.

Attack: The time to go from zero to max level in seconds. Command+Click to fit to tempo.

Decay: The time to go from max to sustain level in seconds. Command+Click to fit to tempo.

Sustain: The final level of the envelope

Release: Time to go from sustain level to zero when key is released. Command+Click to fit to tempo.

Loop: Envelope starts again when decay stage is complete.

Multiplies the sampling frequency. 1 = normal. Command Click to fit to current tempo.
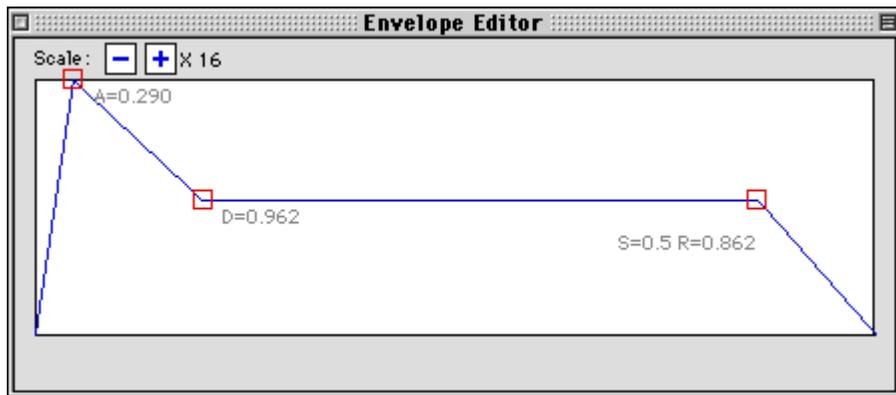
Envelope Editor

You can adjust the envelope visually by dragging the Attack, Decay and Sustain points on the graph with your mouse.

When you adjust Decay, sustain may be affected and likewise, adjusting Sustain may affect the Release time.

The values will be displayed as you move the points.

Event Sequencer

The Event Sequencer is like a Mini Sequencer. You can enter Notes (which can either be output as MIDI notes or used to modulate a cell directly). You can also enter MIDI Controllers and, by assigning Controllers to Cell's parameters, you can program in all sorts of events, for example, volume changes (automate a mix), filter frequency changes, delay length changes, and so on...
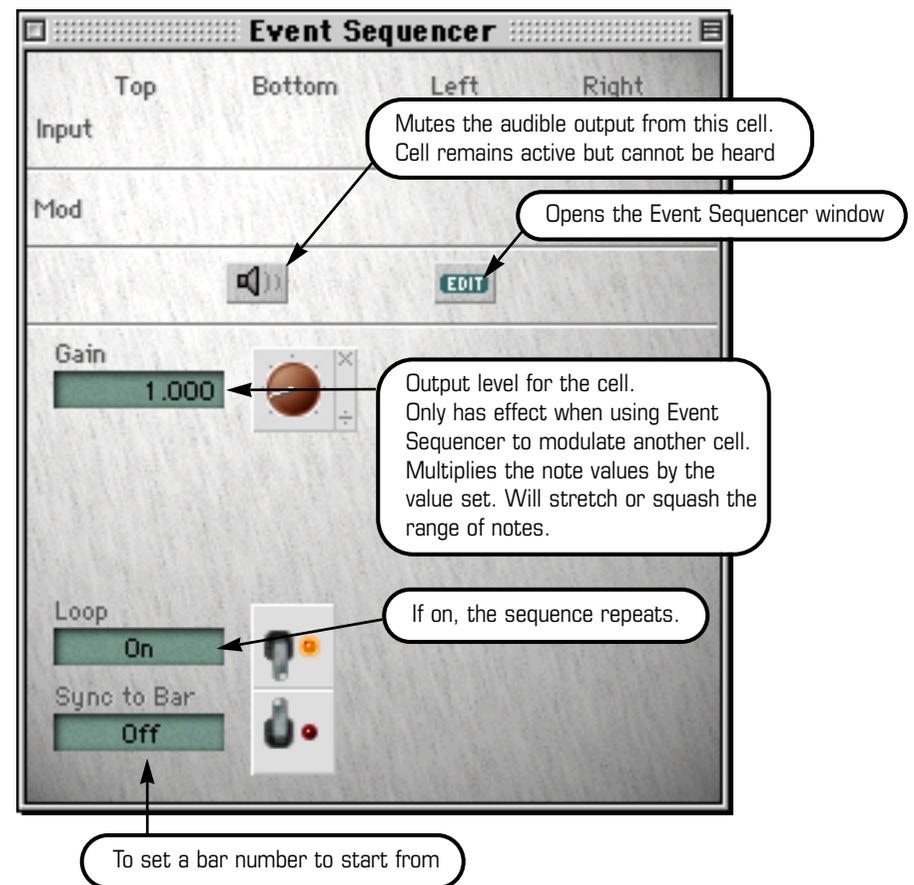
When you click on the Edit button, the Event Sequencer window opens:

Event Sequencer Window

Set the length of the sequence in bars

Set the of Beats per Bar

Choose whether to enter Notes or Controllers

Set the Control Value of the highlighted Controller (only available in Controller mode).

Snap value (4, 8, 16, 32 or Off)

Event Sequencer

Bars 1   Beats per Bar 4   Event Type [Note]   Control Value 64   Snap [32]

1

C 4

When you switch the Event sequencer in to Controller mode, the Controller numbers appear down the left hand side of the window.

Command - click to mute note or controller.

G 3
F#3

Pointing the mouse at the end of a note will display the finger cursor. You can click and drag to lengthen or shorten a note

Bars 1   Beats per

Ctl 47

Ctl 48

Ctl 49

Ctl 50

Ctl 51

Ctl 52

Ctl 53

When the mouse is pointing at a note the hand cursor is displayed. You can click and drag to move a note

Control key displays the pencil. Click to enter note or controller.

Control key displays the eraser when over a note or controller. Click to delete note or controller.

Enter a Controller in the same way as notes: press the control key so the pencil cursor appears. Click to enter a Controller in line with the number you have assigned to the parameter you wish to control.
To adjust the value with the mouse, point near the right edge of the controller and the mouse changes to the cursor shown. Drag up to increase the value and down to decrease.

Option key turns the cursor to a magnifying glass. Click to fit to window, drag to select area of zoom.

Zoom in and out horizontally and vertically (independently)