KRISTAL AUDIO ENGINE

REFERENCE MANUAL

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GETTING STARTED

KRISTAL Audio Engine is a powerful multi-track recorder, audio sequencer and mixer – ideal for anyone wanting to get started with recording, mixing and mastering digital audio.

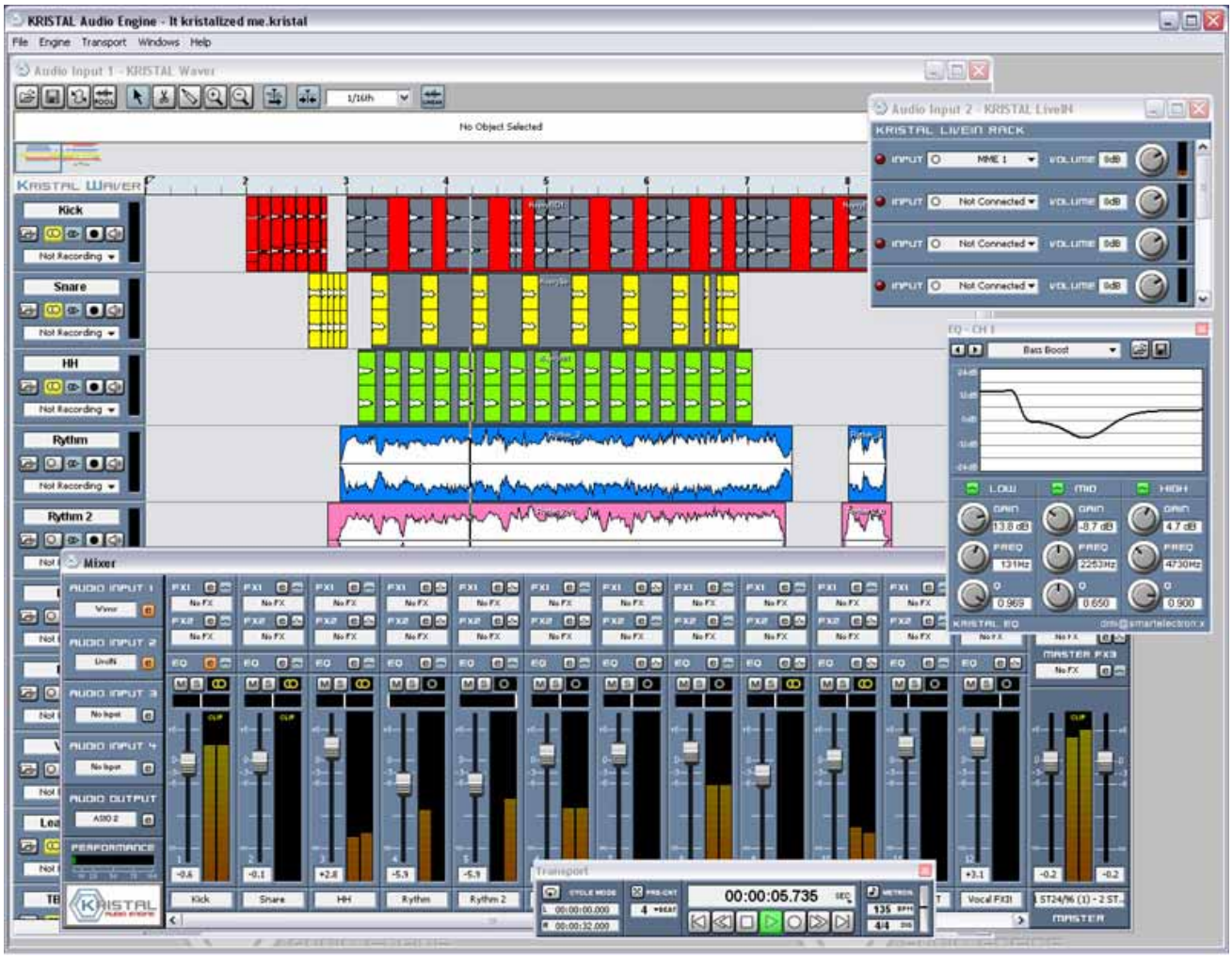
It is designed as a modular system. The main application provides a mixing console, while the audio sequencer, live audio input and so on are loaded as separate PlugIns.

KRISTAL Audio Engine is **FREEWARE** for personal, educational and non-commercial use.

SYSTEM REQUIREMENTS

PC	"State of the art" machine (> 1 GHz recommended)
OS	Windows XP or 2000 (Win98/ME requires latest Internet Explorer 6.0, WinNT is not supported!)
Display	1280 x 1024 recommended, 1024 x 768 minimum
Sound	ASIO-compatible sound card recommended, but should work with everything else, too

Latest Version: KRISTAL 1.0.1 (06/01/2004) for Windows (3.51MB)



ASIO vs. MME

The performance you get from KRISTAL will depend to a large extent on your audio hardware and its drivers.

Generally, audio devices can be divided into two categories: those that support 'ASIO', and those that don't.

ASIO

ASIO (Audio Streaming Input Output) is a proprietary 'industry standard' for music applications, developed by Steinberg Media Technologies GmbH. It provides multi-channel audio I/O (input and output) at very low latencies and high sample rates.

In order to take advantage of ASIO, you need specially-written ASIO driver software for your audio hardware. This should be supplied by the manufacturer - if in doubt, check their website for updates.

Note: the I/O ports of ASIO devices can be accessed via MME (see below) as well, meaning that they appear twice in the KRISTAL Audio Engine menus. However, ASIO and MME devices used together in a project will not be 'in sync'!

How to disable ASIO/MME devices

MME

MME (Windows Multimedia Extension) is the standard built-in audio driver architecture of the Windows Operating System.

Any audio device can be used with MME: no special driver software is required.

> Because of its limitation to two-channel stereo audio, and high input-to-output latency, MME is not really the best choice for music applications.

Project Management

KRISTAL stores your musical work in KRISTAL Project files (*.kristal). When starting a new project, you should create an empty folder first (e.g. in "My Documents").

Next select 'File' - 'Save As...' from the main menu bar and type in a name for the new Project file.

Audio files created by recording are stored in a 'Media' sub-directory, automatically created in the same folder as the Project file.

> If the project was not saved yet, recorded audio files are stored in "My Documents\KRISTAL Media Files".

(Note: Please do not store your projects in the KRISTAL application folder, because they could be deleted by the Uninstaller!!!)

KRISTAL Project files

A KRISTAL Project file contains:

- Mixer settings (Volume, Pan, EQs, etc. for all channels)
- Sample Rate, Tempo and Time signature settings
- the state of all Plug-Ins in use
- in general, a KRISTAL Waver Arrangement
- the current Window Layout
- and some Meta information (see below).

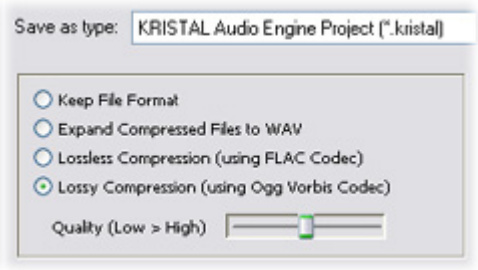
> The KRISTAL Waver Plug-In allows to store Arrangement files (*.waver). Please note that Arrangement files only contain settings relevant to the KRISTAL Waver Plug-In (no Mixer and effect settings, etc.).

Moving projects ('Save to New Folder')

To move a complete project (including all recorded audio files) to a new location, use the 'Save to New Folder' feature. It can be accessed via the 'File' menu of the main menu bar.

A dialog appears where you can select the new project location and name.

Additionally, you can choose between four compression options:



- **Keep File Format**: Audio files are simply copied to the new location "as is".
- **Expand Compressed Files**: FLAC or Ogg Vorbis encoded audio files are decoded to Wave Files (*.wav). This option could be useful e.g. if you received a compressed project (see below).
- **Lossless Compression**: Encodes all audio files using lossess compression (FLAC). The file size shrinks approximately by 2:1. (For more information on FLAC see http://flac.sourceforge.net.)
- **Lossy Compression**: Encodes all audio files using lossy compression (Ogg Vorbis). The file size shrinks approximately by

20:1. Please note that the audio quality will be reduced during this process, depending on the 'Quality' setting! (Fore more information on Ogg Vorbis see http://www.vorbis.com.)

Compressing a project's audio files could be useful e.g. if you want to send a snapshot to a friend or co-worker via e-mail, or share your project on the web.

Project Meta information

Meta information saved with the Project file comprises

- 'Project Title',
- 'Author',
- 'Description'
- and a short 'ToDo' list.

It can be edited by selection 'File' - 'Project Information...' from the main menu bar.

Additionally, the dialog displays the project location on your harddisk and the Sample Rate.

Note: the Sample Rate can be changed in Audio Setup.

Key Features

KRISTAL Audio Engine

- 16 audio tracks
- 32 Bit floating point audio engine
- 44.1 to 192 kHz sample rate*
- Downmix to 16/24/32 Bit audio files
- 3-band parametric EQ &
- 2 VST insert slots per channel
- 3 VST master effect slots
- ASIO low latency audio driver support
- 4 KRISTAL PlugIn slots
- Load/Save KRISTAL project files
- Supported file formats: WAVE, AIFF, FLAC, Ogg Vorbis

The following Plug-Ins are included in the KRISTAL package:

KRISTAL Waver

- the sequencer PlugIn for KRISTAL
- multichannel harddisk recording via ASIO/MME
- ASIO input monitoring
- audio clip arrangement
- audio clip fade-in/fade-out/crossfade
- unlimited undo/redo
- AES 31 Export

KRISTAL LiveIN

- connect your mic/guitar and play thru KRISTAL using VST effects in realtime

KRISTAL Effects Plug-Ins

- KristalMultiDelay
- KristalChorus
- KristalReverb
- Kristalizer

* The available sample rates depend on the audio hardware you are using

KRISTAL User Interface Overview

When starting KRISTAL Audio Engine one or more of the following components appear on your screen.

Click a component to learn more about it...

1. Mixer
2. Transport Panel
3. Channel EQ
4. KRISTAL Waver
5. KRISTAL LiveIN

The KRISTAL Mixer

1. Audio Inputs
2. Audio Output
3. Performance Meter
4. Channel Strips
5. Master Channel

1. Audio Inputs

In the top-left of the mixing console window are four Audio Input 'slots', where you can choose an audio source to connect to.

By default, 'Audio Input 1' has the KRISTAL Waver PlugIn selected (although this is optional). The others default to 'No Input'.

Click on 'Waver' or 'No Input' and a pop-up menu appears. Here you can choose which of KRISTAL's 'input PlugIns' you want to use: the 'KRISTAL Waver' PlugIn, or the 'KRISTAL LiveIN' PlugIn.

- The KRISTAL Waver PlugIn is a powerful multi-track recorder, supporting up to 16 tracks, with extensive non-destructive audio editing capabilities. Since each Audio Input slot can host its own KRISTAL Waver PlugIn, a total of 64 audio tracks is theoretically available (although only 16 of these can be connected to the mixer simultaneously).

- The KRISTAL LiveIN PlugIn allows you to route any external sound source connected to your computer (for example, a microphone or a guitar) directly into the mixer, where it can be processed in 'real time' via VST effects PlugIns and the channel EQs.

Clicking the e button beside each of the input PlugIn slots opens or closes the main 'editor' window for the selected PlugIn. In the case of KRISTAL Waver, this is the main audio sequencer arrangement window.

2. Audio Output

The Audio Output pop-up menu allows you to choose which of your computer's audio devices will be used to play sound from KRISTAL.

The available options will depend upon what hardware and drivers you have installed.

Clicking the e button beside the Audio Output slot opens a control panel where you can adjust special settings for chosen device. Only some (ASIO) sound card drivers provide this functionality.

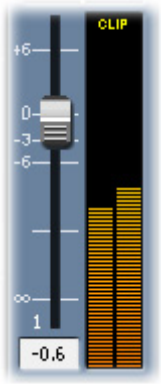
3. Performance Meter

The Performance Meter shows what percentage of your computer's available processing power KRISTAL is using.

Ideally, you should try to keep the meter below about 75% in order to get the best 'real time' performance from your system.

If you find your computer is struggling (e.g. unresponsive mouse pointer, interruptions in the sound), you may need to reduce the number of VST effects or audio tracks in your project – perhaps by exporting a mixdown of some or all of the tracks.

4. Channel Strips



KRISTAL's mixer window features a total of 16 channel 'strips', much like those you'd find on a conventional hardware mixing console. Each channel strip offers the same basic controls:

A vertical 'fader' allows you to control the level or volume of the sound passing through the mixer channel.

By default the fader is set to '0.0', meaning that the level of the incoming signal is unchanged. Moving the fader down reduces the volume, moving it up increases it. Right-clicking the fader resets it to 0.0dB.

To the right of each fader is an animated meter, which displays the changing level of the signal.

If the level of the signal exceeds a certain threshold, a 'CLIP' warning will appear at the top of the display.

You should be careful when mixing not to allow any of the mixer channels to clip, as excessive clipping can result in unpleasant-sounding distortion in the final mix. If a signal clips, lower the fader slightly and click on the CLIP warning to reset the display. If it still clips, lower the fader again and repeat the process until no CLIP warnings are displayed.

Above each channel fader is a 'pan' control (a small horizontal display, containing a vertical bar).

- If a **mono** signal is connected to the channel, dragging the 'bar' to the left or right allows you to control on which side of the overall stereo 'image' the sound will sit.
- If a **stereo** signal is connected to the channel, the pan control adjusts its 'balance', i.e. the relative levels of the left and right channels.

Above the pan control are the 'mute' and 'solo' buttons, labelled 'M' and 'S' respectively.

- Activating the mute button mutes the channel, i.e. the affected channel can't be heard in the final mix.

- Activating the solo button mutes **every other** channel, i.e. **only** the affected channel can be heard in the final mix.

Beside the mute and solo buttons is a small display which indicates whether a mono or stereo signal is connected to the channel. A circle icon appears when a mono signal is connected; two inter-locked circles appear for stereo signals.

Above the mute and solo buttons, each mixer channel has its own independent effects and EQ.

These are explained in their own sections of the manual.

5. Master Channel

The Master Channel (at the far right of the mixer window) is similar to the other mixer channels, except that it is used to control the **overall** level of the stereo mix.

While the other mixer channels have one fader, the Master Channel has two. By default these are 'linked', so that moving one causes the other to move as well.

Right-clicking either of the Master Channel faders resets both to '0.0'. Holding 'Alt' while dragging allows the faders to be adjusted independently.

The Transport Panel

1. Cycle Mode and Locators
2. Pre-count
3. Transport buttons, Time display
4. Metronome, Tempo, Time signature

1. Cycle Mode and Locators

KRISTAL can be set to automatically cycle or 'loop' round a section of an Arrangement.

This might be useful for rehearsing a part prior to recording an overdub, for example.

Cycle mode is activated by clicking the 'CYCLE MODE' button.

Before activating Cycle mode, you must specify a section of the arrangement to cycle around, by setting the Left and Right 'locators'. This can be done by holding 'Ctrl' and clicking on the timeline ruler at the top of the KRISTAL Waver window. Left-clicking sets the position of the Left locator, right-clicking sets the position of the Right locator.

The 'L' and 'R' displays show the exact positions of the Left and Right locators, in either seconds, samples or bars and beats (see 'Time display' below for more information about the different time formats).

For reasons of sanity, KRISTAL will ignore Cycle mode when the Left and Right locators are set less than 1 second apart!

2. Pre-count

Pre-count can be activated by clicking the 'PRE-CNT' button.

With Pre-count active, KRISTAL pauses for a 'count in' before starting to Play or Record.

You can set the length of the Pre-count by choosing the desired number of beats (1 to 10) from the pop-up menu (the default is '4').

Pre-count can be useful simply because it allows you a few moments to 'prepare yourself' before recording a take.

3. Transport buttons, Time display

KRISTAL's Transport buttons are very like the controls you'd find on a conventional tape or hard-disk recorder.

From left to right:

'Locate start' jumps the playback marker back to the start of the song.

Rewind' moves the playback marker backward in time.

'Stop' halts playback or recording.

'Play' starts the playback

'Record' begins recording (see Recording for more details).

'Forward' moves the playback marker forward in time.

'Locate end' jumps the playback marker forward to the end of the song.

The Transport controls can also be accessed via keyboard shortcuts.

Above the Transport buttons is the Time display, which shows the current position of the playback marker, in the current time format.

You can change the current time format on the pop-up menu in the bottom right-hand corner of the Time display.

The available time formats are:

- Seconds ('SEC' appears in the time display). Time will be expressed as "**HH.MM.SS.ms**"
- Samples ('SAM' appears in the time display). Time will be expressed as raw sample frames.
- Bars and Beats ('BAR' appears in the time display). Time will be expressed as "**Bar.Beat.16th.Remainder"**

The time format chosen in the Transport Panel does not affect the time format used in the KRISTAL Waver window: both can be set independently.

4. Metronome, Tempo, Time signature

The Metronome can be activated by clicking the 'METRON.' button.

When active, it plays a simple 'click' on each beat to indicate the current tempo.

The vertical slider on the far right allows you to adjust the metronome volume to a comfortable level.

Beneath the 'METRON.' button is the Tempo field, which by default shows '120 BPM' ('Beats Per Minute').

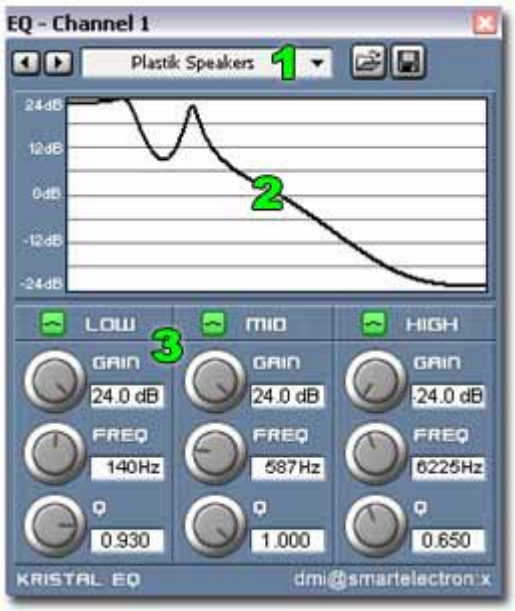
Double-clicking the Tempo field allows you to enter a new value.

Beneath the Tempo field is the Time Signature field, which by default shows '4/4'.

Double-clicking the Time Signature field allows you to enter a new value.

'4/4' means 'four beats to the measure' (sometimes called 'common time'). This is probably the setting you'll want to use most often. Other common time signatures include '2/4', '3/4' ('waltz time'), 5/4 and 7/8. (Many others are possible, but are unlikely to be required often.)

Channel EQs



1. EQ Presets
2. EQ Curve Display
3. Low, Mid and High Bands

Using EQ

Each KRISTAL mixer channel has its own three-band parametric equalizer or 'EQ', which you can use to 'shape' the sound.

EQ can be used either subtly to fine-tune sounds as an aid to mixing, or 'creatively' as a way of making drastic alterations to the sound.

- Each channel EQ can be toggled on or off by clicking the 'activate' button.
- Clicking the button opens the editor window, where you can access the EQ controls.

1. EQ Presets

At the top of the EQ editor window is a pop-up menu from which you can recall several 'presets' e.g.:

- 'Flat' is the default, and is effectively 'EQ Off'.
- 'Bass Boost' boosts the low-frequency content of the sound, to emphasise the bass.
- 'Sparkle' boosts higher frequencies, to emphasise the brightness in the sound.
- 'Telephone Vox' cuts the low and high frequencies, while boosting the mid-range. Try it on vocals!

The 'load' and 'save' buttons beside the preset menu allow you to save and re-load your own EQ presets. You can save individual presets as *.fxp files, or whole banks of presets as *.fxb files.

2. The EQ Curve Display

The EQ Curve Display (frequency response) is like a 'graph' of the equalization being applied.

The horizontal axis of the graph represents the range of audible frequencies; 'left to right' corresponds with 'low to high'.

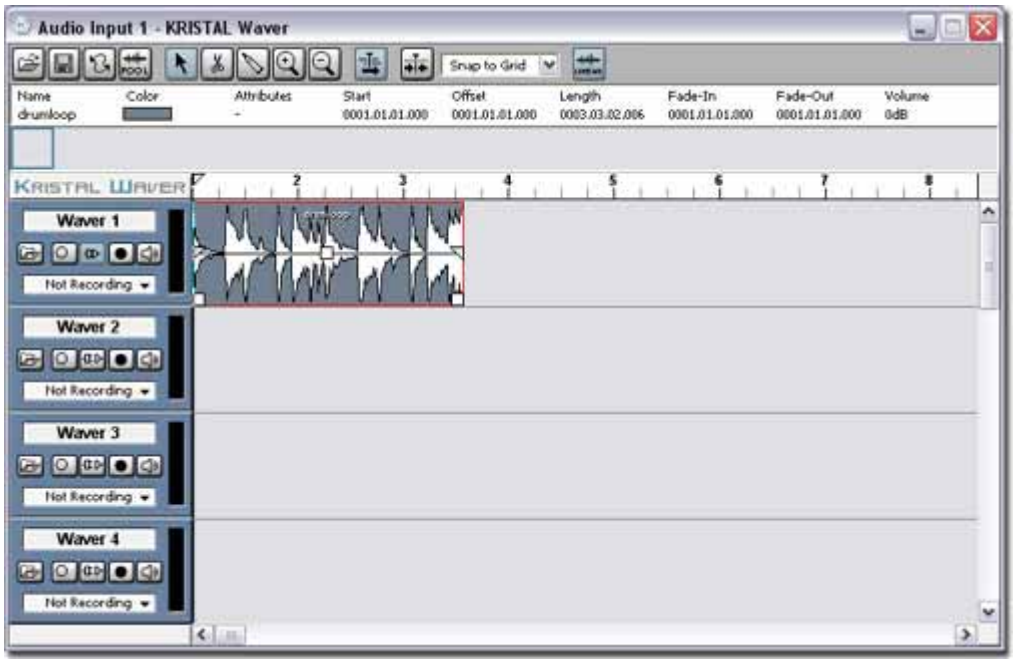
The vertical axis represents the amount of 'cut' or 'boost' applied.

3. The Low, Mid and High Bands

The channel EQs allow you to adjust Low, Mid and High frequency 'bands' in the sound independently. Each of the three bands offers the same controls:

- 'Gain' adjusts the amount of cut or boost to be applied.
- 'Freq' controls where in the overall frequency spectrum the affected band will be.
- 'Q' determines the 'width' of the affected frequeny band (i.e. the 'sharpness' of the EQ curve).

KRISTAL Waver



What is KRISTAL Waver?

KRISTAL Waver is KRISTAL Audio Engine's audio sequencer Plug-In.

It provides the main workspace in which you'll do most of your recording, editing and arranging, and offers a variety of powerful tools to make your work as quick and easy as possible.

The User Interface

If you've ever worked with an audio sequencer or hard-disk recorder before, you'll probably be able to figure out the basics without any trouble.

> Even if you're a newcomer, absolutely the best way to learn KRISTAL is by using it, so feel free to Minimize this browser window for now, and start playing! A lot of KRISTAL Waver's features are fairly self-explanatory - and if you do get stuck, you know where to come for help...

KRISTAL Waver's user interface can be broken down in to the following basic components:

- The Waver Toolbar
- The Waver Arrangement
- Track Controls

In the course of looking at these, we'll also pause to talk about a couple of basic KRISTAL concepts:

- Audio Parts
- The Waver Pool

KRISTAL LiveIN

1. What is KRISTAL LiveIN

The KRISTAL LiveIN Plug-In allows you to route any external sound source connected to your computer (for example, a microphone or a guitar) directly into the mixer, where it can be processed in 'real time' via VST effects Plug-Ins and the channel EQs.

The rack allows you to select up to 8 mono or stereo inputs at once. For more live channels, simply load the LiveIN Plug-In twice.

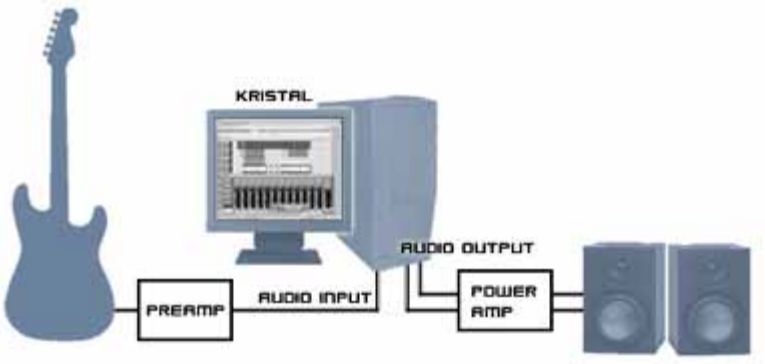
The LED on the left-hand side lights up if the incoming signal exceeds the maximum dynamical range (Clipping).

Click on the icon to toggle between mono and stereo input.

Select the input channel from the popup menu. To differentiate ASIO from MME channels, they are marked with different icons. The inputs of ASIO cards only appear if the driver is selected as Audio Output and if they are activated in Preferences.

The incoming signal can be amplified (or damped) by up to +6dB with the 'Volume' knob.

2. Connection diagram



The above image shows a simple connection diagram example for live performance and/or recording of an analog instrument.

How to record with KRISTAL Audio Engine

Here you find a step-per-step guide on how to record audio tracks with KRISTAL Audio Engine.

Before you start recording with KRISTAL, ensure that your instrument or microphone is connected properly to your computer's audio card. Click here for a connection diagram example.

1

First select KRISTAL Waver as 'Audio Input 1' on Mixer window. By default, this is done automatically at startup.

2

(If you want to record from a multi-channel ASIO sound card, ensure that the driver is selected as Audio Output and the input channels are activated in Preferences.)

3

In KRISTAL Waver window, simply click on the 'record' button of track 'Waver 1' or select an input port from the 'Track Input' pop-up menu.

Clicking the record button selects the first free input port, which is usually the first MME device - take note, ASIO users!

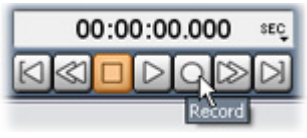
4

The record button lights up red to indicate that the track is ready for recording. The animated VU meters to the right will start flickering, in accordance to the incoming audio signal.

Click the 'monitor' button to pre-listen the incoming audio signal.

Monitoring in KRISTAL is supported for ASIO cards only! MME users may use the Windows Volume Control Panel to monitor 'Mic' or 'Line In'.

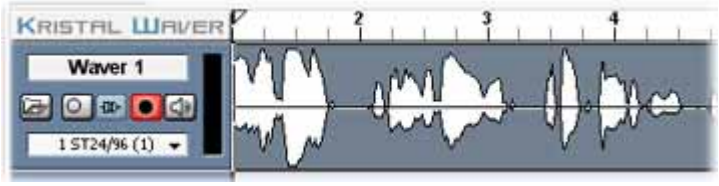
5



Now click the 'record' button in Transport Panel to start the actual recording.

The record button of track 'Waver 1' will start blinking to indicate that a recording is in progress. The Time Display starts counting...

6



Finally, click  stop on Transport Panel to stop recording.
The waveform of the recorded audio data will be displayed on track 'Waver 1'.

Mixdown & Bouncing

Assuming you have already spent endless hours working on your new song, and you have reached the point where you want to burn it on Audio CD, you need to create a 'Mixdown' of your project.

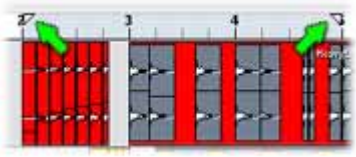
This process combines the audio data of all tracks, including all dynamic modifications like Volume, Pan and effects into a single Stereo (or Mono) audio file.

A Mixdown can also be useful to free up some resources (audio tracks and CPU performance) for further creative working.

To render a single track or parts of a track with their Fade and Volume settings, use the 'Bounce' feature described below.

How to create a Mixdown

1



First set the Left and Right locator, to mark the start and end position of the Mixdown.

> You can set the locators by holding 'Ctrl' and clicking on the timeline ruler in KRISTAL Waver window. Left-clicking sets the position of the Left locator, right-clicking sets the position of the Right locator.

2

Next select 'File' - 'Export Mixdown...' from the main menu bar.

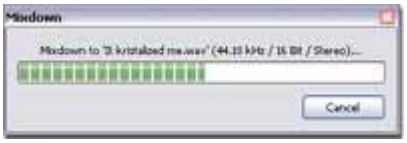
A dialog appears where you can type in a name for the audio file and specify the 'Bit Depth' and whether the file should be Mono or Stereo.

3

By default, a Wave File (*.wav) is created. You can override this by selecting a different file format from the 'Save as type' list.

Please note that some formats may require different settings (e.g. Ogg Vorbis has a 'Quality' slider only).

4

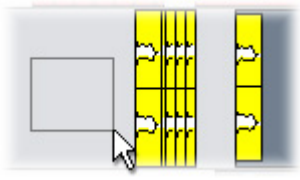


Click 'Save' to start the Mixdown. A progress indicator appears... this may take a while.

Bouncing

Contrary to a complete Mixdown of your project, 'Bouncing' only affects a single track - or even just parts of a track.

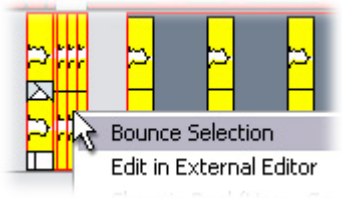
1



First select all audio parts on a track which should be bounced.

This could be done e.g. by clicking somewhere in the empty space of the track and dragging the appearing 'rubber' rectangle.

2



Right-click and select 'Bounce Selection' from context menu.

3

A new audio file is created in the 'Media' sub-directory of the current project, containing the rendered section of the track.

You can 'Undo' the bounce action just like any other edit.

'Edit in External Editor'

KRISTAL Waver provides several tools for **non-destructive** audio editing on Arrangement level. However, to edit audio files directly, an external Audio Editor is required.

You can configure KRISTAL to switch easily from its Arrangement window to the external application:

- Nominate your prefered Audio Editor in Preferences dialog.
- In KRISTAL Waver window, select any audio part, pointing to the audio file you want to edit.
- Right-click and choose 'Edit in External Editor' from context menu.
- The audio file will be released by KRISTAL and automatically open in the Audio Editor.
- When you have finished editing, close the Audio Editor and select '**Unlock and Refresh**' from context menu in KRISTAL Waver.
- All permanent changes made to the audio file will be reflected in the Arrangement.

Please note that during editing with external applications, all audio parts pointing to the edited audio file(s) will be 'muted' in KRISTAL!

Using VST Effects

KRISTAL supports VST effects Plug-Ins to be used as 'inserts' in each audio channel and in the master section of KRISTAL mixer.

Effects can be used to influence the sound of the recorded audio material in a song. Typical effects include e.g. Reverb, Chorus, Flanger, Distortion,... etc.

> VST (Virtual Studio Technology) is a proprietary 'industry standard' for audio effects Plug-Ins, developed by Steinberg Media Technologies GmbH. There are hundreds of compatible Plug-Ins (free and commercial) available on the web. A good place to look for is e.g. http://www.kvr-vst.com.

The following VST effects Plug-Ins are installed automatically with KRISTAL Audio Engine:

- KristalMultiDelay, a powerful Delay/Filter Plug-In
- Kristalizer, a simple dynamics tool
- KristalChorus, a Chorus/Flanger Plug-In
- KristalReverb, a Reverb Plug-In

Installing VST Effects

To use a VST Effect with KRISTAL, it must be installed in one of the following locations:

- the 'global VST Folder', shared by multiple host applications (e.g. "C:\Program Files\Vstplugins")
- the 'Plugins' folder in KRISTAL application directory
- one of three freely assignable locations, which can be nominated in Preferences dialog

How to use insert and master effects

Each Channel Strip in KRISTAL Mixer window contains its own independent effect section.

1

Click the 'No FX' field and select an effect from the list.

2

An editor window appears, providing controls to manipulate the effect parameters, and the effect will be activated (see below).

> Some VST effects Plug-Ins provide their own 'custom' editor window. For others, KRISTAL creates a so called 'generic' editor window.

At the top of the editor window is a pop-up menu from which you can recall several effect 'programs'.

The number of programs and their settings depend on the effect you are using.

- Clicking the 'edit' button opens (or closes) the effect editor window, where you can access the effect parameters.
- Each effect can be toggled on or off by clicking the 'activate' button.
- Click the and buttons to navigate through the effect programs.
- The 'load' and 'save' buttons beside the preset menu allow you to save and re-load your own effect presets. You can save individual presets as *.fxp files, or whole banks of presets as *.fxb files.

KristalMultiDelay

What is KristalMultiDelay?

KristalMultiDelay is a powerful Delay/Filter Plug-In with 10 individual channels.

Tip: You find some additional presets for this Plug-In in "<KRISTAL Audio Engine>\Presets\KristalMultiDelay".

The Channel

The Channel input

The first parameter of each channel (the little right arrow) is the input port which will feed the channel with audio data. You can choose between the Plug-In inputs or outputs, four internal channels or no input (displayed as '***').

The Delay section

- **Sync** turns on host time syncing.
- **Time** is the delay time in samples - or if synced, in bars.
- **Feedback** determines how much of the delay buffer's output will be fed back into the delay buffer.
- **Volume** controls the signal level.

The Filter section

- **Filter Type**: You can choose between four filter types (or no filter) for the channel. The filter types are: Notch, Low-Pass, High-Pass and Band-Pass.
- **The X-Y Pad**: The horizontal position represents the 'Cut-off' of the filter and the vertical position represents the 'Resonance'.

The Channel output

The last parameter of each channel is its output port. You can choose between the Plug-In outputs, four internal channels or no output (displayed as '***').

Wet/Dry Mix

This controls the mixing of the input signals and the delay channel signals.

Note about Routing: You can route a channel output to a channel input, but this only works from left to right.

Kristalizer

What is Kristalizer?

Kristalizer is a simple dynamics tool, which can be used as limiter or distortion effect.

Parameters

Gain The incoming signal is amplified by up to +6dB (0dB means no amplification).

Threshold The signal is limited at the specified level, producing a digital distortion effect.

> A threshold of 100 per cent means no distortion. The lower the threshold, the earlier a distortion is audible.

Drive The outgoing signal is amplified by up to +9dB.

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KristalReverb

What is KristalReverb?

KristalReverb simulates a 'room' of various sizes through which the input sound is played.

Parameters

Room Size Controls the size of the simulated room.

Width Specifies the length of the reverb time.

Damping Controls the 'damping' of higher frequencies, which produces a more smooth sound.

Freeze This button 'freezes' the current reverb signal and repeats it again and again.

Dry The level of the input signal.

Wet The level of the reverb signal.