The quadraSID Manual

the virtual instrument of the legendary SID chip found in the Commodore 64 home computer

a reFX software synthesizer

reFX
Fritz-Kohl-Str. 11
55122 Mainz
Germany

email:support@refx.net
www.refx.net

Version 1.5 released on 1st December 2005

Contents

1 Introduction

Thanks for trying or buying reFX's quadraSID.

About quadraSID

The quadraSID is a multitimbral, polyphonic VST instrument. It emulates as well as excels the legendary SID chip found in the Commodore 64 home computer, popular in the 1980s.

Main features:

- Up to four independent SIDs are emulated with a single quadraSID plug-in.
- Each SID has three oscillators and a fourth "Galway-noise" channel.
- Enhanced SID-emulation, each oscillator can have its own vol, pan & filter.
- Build-in arpeggiator for each oscillator with five selectable replay-modes.
- Four LFOs, four ENVelopes and eight COMbiners as modulation sources.
- ENVelopes have up to eight curve-points and a user-assignable loop.
- Each MIDI-Ctrl can be used as a modulation source.
- Lots of other additional modulation sources.
- Programmable Wavetables for each oscillator allowing real weird effects.
- Three play-modes per SID-chip: Unision, Polyphonic and Multitembral.
- Nine modulation destinations, among them PWM and WaveTable offset.
- Three different quality settings for each chip (lofi, normal and hifi).
- Output-bit-depth selectable per chip (4, 8, 12 and 16bit).
- Chip-selector to get the original sound from the 6581 AND the 8580.
- Beta-tested by Chris Hülsbeck, the C-64 SID guru.
- Very low CPU consumption.

Please make sure to visit http://www.reFX.net for sound-patches and the latest updates.

quadraSID demo version

About quadraSID Demo Version

If you are using the demo version of quadraSID please note the following limitations of the demo version:

- Demo version works only 15 minutes! After this you'll have to restart your VST host to be able to use quadraSID again.
- Demo version can't save or load song and presets.

The full version of quadraSID can be ordered from:

http://www.reFX.net/

2 Installation

Minimum PC system requirements

- Pentium III @ 600MHz or better (and equivalents)
- Minimum 128Mb RAM
- Hard disk requirement: 6Mb
- Operating System: Windows 98/98SE/ME/2000/XP
- Graphics (minimum): 16-bit 800x600
- Host: Any that supports the VSTi interface (e.g. Cubase SX, Chainer, etc.)

Installing quadraSID on a PC

To install quadraSID on your PC, do the following:

1. Extract the contents of the downloaded zip file
2. Double-click the "quadraSID Setup.exe" and follow the instructions on screen.
3. Load your host software and load the quadraSID VSTi
4. Make some noise. Enjoy.

Minimum Mac system requirements

- Mac G3 600 or better
- Minimum 128Mb RAM
- Hard disk requirement: 6Mb
- Operating System: Mac OS X version 10.2 or later
- Graphics (minimum): 16-bit 800x600
- Host: Either with VSTi support (e.g. Cubase SX) or with AU (AudioUnit) support (e.g. Logic)

Installing quadraSID on a Mac

To install quadraSID on your Mac, do the following:
1. Extract the contents of the downloaded zip file
2. Double-click on the "quadraSID" package and follow the on-screen instructions.
3. Load your host software and load the quadraSID VSTi/AU
4. Make some noise. Enjoy.

3 Quickstart

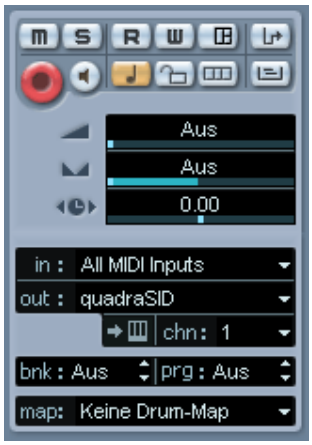
This section contains a step-by-step guide to how to load the quadraSID plug-in into your host application and how to get some sound out of it. We will describe how to insert quadraSID into a Cubase and Logic project – if you are using any other host software, please read the documentation provided with your host software.

Please make sure that quadraSID is installed properly and launch your host application. We will show you quadraSID's basic operation with the most common sequencers.

Using quadraSID with Steinberg Cubase SX/Nuendo

Cubase and Nuendo use instrument slots; please open your "VSTi Rack" from the devices menu and click on an empty slot. A list of all your installed instruments appears. Choose quadraSID, and it will be loaded.

Now it's time to create a new midi track and route the output of this track to quadraSID's midi input.



If you have a properly configured system, you should be able to hear sound coming out of your new plug-in by playing on your midi keyboard now.

To step to the next preset, click on the arrow down in quadraSID's GUI or use the arrow up to select the previous presets. If you want to display the list of all sounds, press the left mouse button on the name of the current preset.

Using quadraSID with Apple Logic Express/Pro

Create a new song and double-click on one of the "AudioInst" tracks, and Logic's mixer will appear. Now move the mouse pointer to the first grey field above the AudioInst channels meter and click and hold it.

You will see a list with your installed plug-ins; select "Stereo -> AU Instruments -> reFX -> quadraSID". Select the midi track in Logic´s arrange window and start playing on your midi keyboard.

To step to the next preset, click on the arrow down in quadraSID's GUI or use the arrow up to select the previous presets. If you want to display the list of all sounds, press the left mouse button on the name of the current preset.

General information

Each SID-chip in quadraSID can be used either as a single- or multi-timbral instrument. You basically have four completely independent synthesizers, each with its own settings etc. The only thing that the different chips share, are the presets.

MIDI channels 1-4 control the first SID-chip. Channels 5-8 the second one and so on.

quadraSID comes with 128 high quality and ready-to-go presets, so it might be a good idea to step through the factory bank and hear what quadraSID has to offer.

Saving presets and banks

Presets are loaded and saved using the mechanism provided by quadraSID's own user interface. Banks of 128 presets can be saved and loaded, as well as individual presets (or instruments as VST refers to them). Simply use the appropriate "Load preset" or "Load bank" buttons to load one preset or a whole bank. You can also use the "Save preset" or "Save bank" button to save a single preset or a whole bank. Using these buttons ensures compatibility with other quadraSID users no matter which platform or host they use.

quadraSID always loads with its internal default bank of patches.

To create a new bank, simply edit the patches in quadraSID then save the bank. Individual patches are saved from and loaded into the active patch slot.

4 Reference

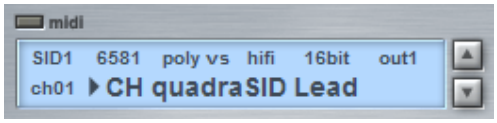
Basic Functions

Once quadraSID is loaded, you will see the plug-in with the editor enabled, but first let's start with the rack-mode and its functions.

You'll find the basic functions on this panel.

MIDI Indicator
The MIDI Indicator lights up whenever quadraSID receives MIDI messages.

SID Configuration Line
This displays allows you to control the settings for each of the four SID chips (from left to right):



- SID1: selects the SID chip (SID1 to SID4)
- 6581: selects the type of SID chip (6581 or 8580)
- poly vs: selects the playmode (unison: the incoming notes are played by all four SID chips, poly: use quadraSID as a polyphonic instrument, poly vs: plays polyphonic sounds with voice stealing, multi: play up to four different sounds independently)
- hifi: defines the output-quality of the chip - the higher the quality the less the anti aliasing (lofi, nrml, hifi)
- 16bit: sets the output for the select SID chip (4, 8, 12 or 16bit)
- out1: sets the output-channel of the selected SID chip (out1 to out4)
- ch01: selects the MIDI channel (channel 1-3 and gw04; gw means "Galway Noise")

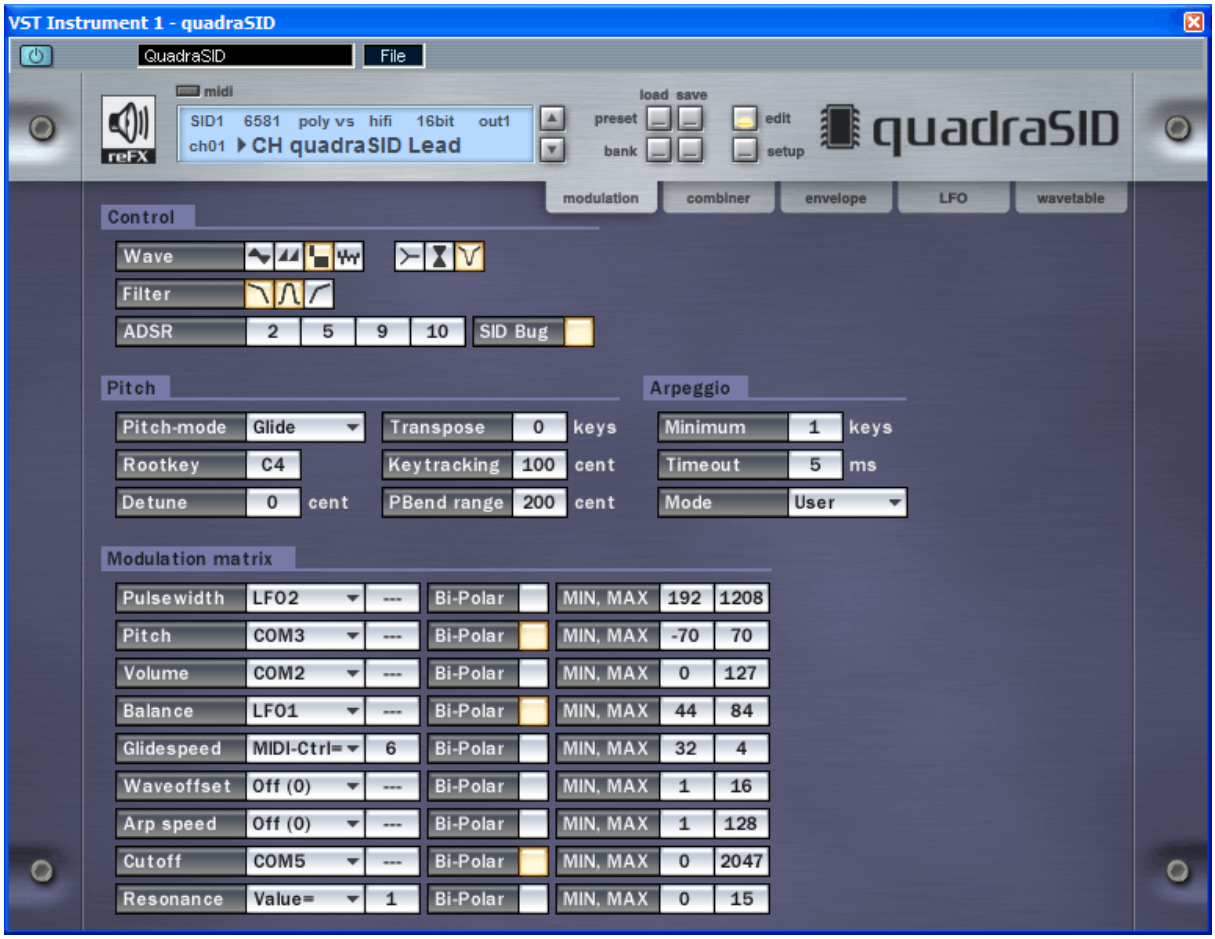
These settings are explained in greater detail later.

Preset name
This is the name of the preset that is currently selected for this MIDI channel. If you click on the preset name, a list of all 128 loaded presets will appear for direct selection. Clicking on the small triangle left of the preset name allows you to rename the preset.

Next Preset/Previous Preset
Use these two buttons to select the next or previous preset.

Preset/Bank Load & Save
To load and save your preset bank or single preset, use these four buttons.

Edit Page
Toggle the edit page on and off. If the edit is on, you'll see the full quadraSID user interface:



Setup Page
Press to enter the setup page. On the setup page there are three global switches which effect ALL four SID-chips for this bank/song.

Enhance Sound
When enabled, certain frequencies are boosted for a more bombastic sound.

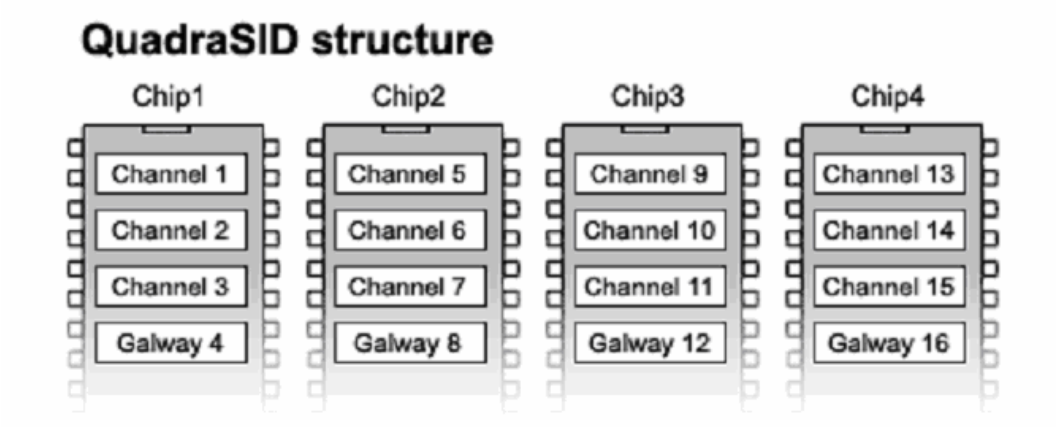
Route all chips to output 1
All SID-chips are routed to output 1. This function can be used if your host does not support the four single outputs properly. The output setting for each SID-chip will be ignored.

Patch selection depends on playmode
When enabled and you select a patch, depending on the playmode (unison, poly or multi) of that SID-chip, successive (unison) or three times the same (poly) patch are selected for the other MIDI channels. In multi-mode patches are always selected independently.

Structure of quadraSID

quadraSID is a multitimbral synthesizer, consisting of four SID Chips (that's like four Commodore 64s), each with four channels. (Three SID channels + a fourth Galway-Noise channel.)

Each channel on a chip can respond to its own midi channel, so each instance of quadraSID can use 16 unique sounds (4 chips x 4 channels).



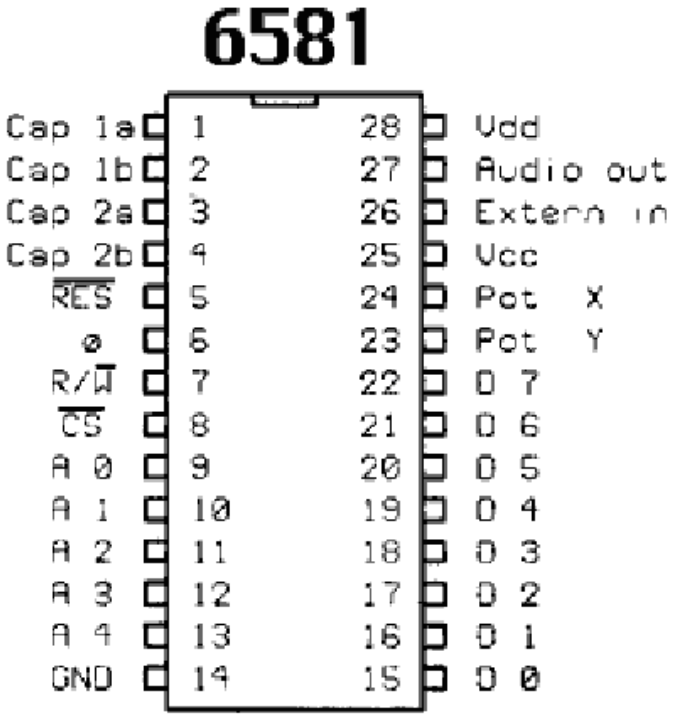
You usually select (or create) a patch to play on a channel. The difference between quadraSID and normal synthesizers is that the sound usually is monophonic.

Another difference and this is important: You are always working directly into the memory of the synthesizer. So if you are editing a patch, the changes you make are saved as you do them. This makes it possible to select a patch in all channels, and thus edit all channels simultaneously.

Each channel on a chip is monophonic, but you can assign the chip to play polyphonically. This is done by letting the chip play all three channels simultaneously (or sequentially), hence you have three note multi-timbrality/polyphony. More on this in the chip / patch settings section.

Needless to say, you can load several instances of quadraSID. Hence, in Cubase SX for example, you can have 32 x 16 = 512 SID sounds going simultaneously. You'd need 128 units of Commodore 64s to do the same, although it would probably LOOK pretty cool!

The Original SID Chip

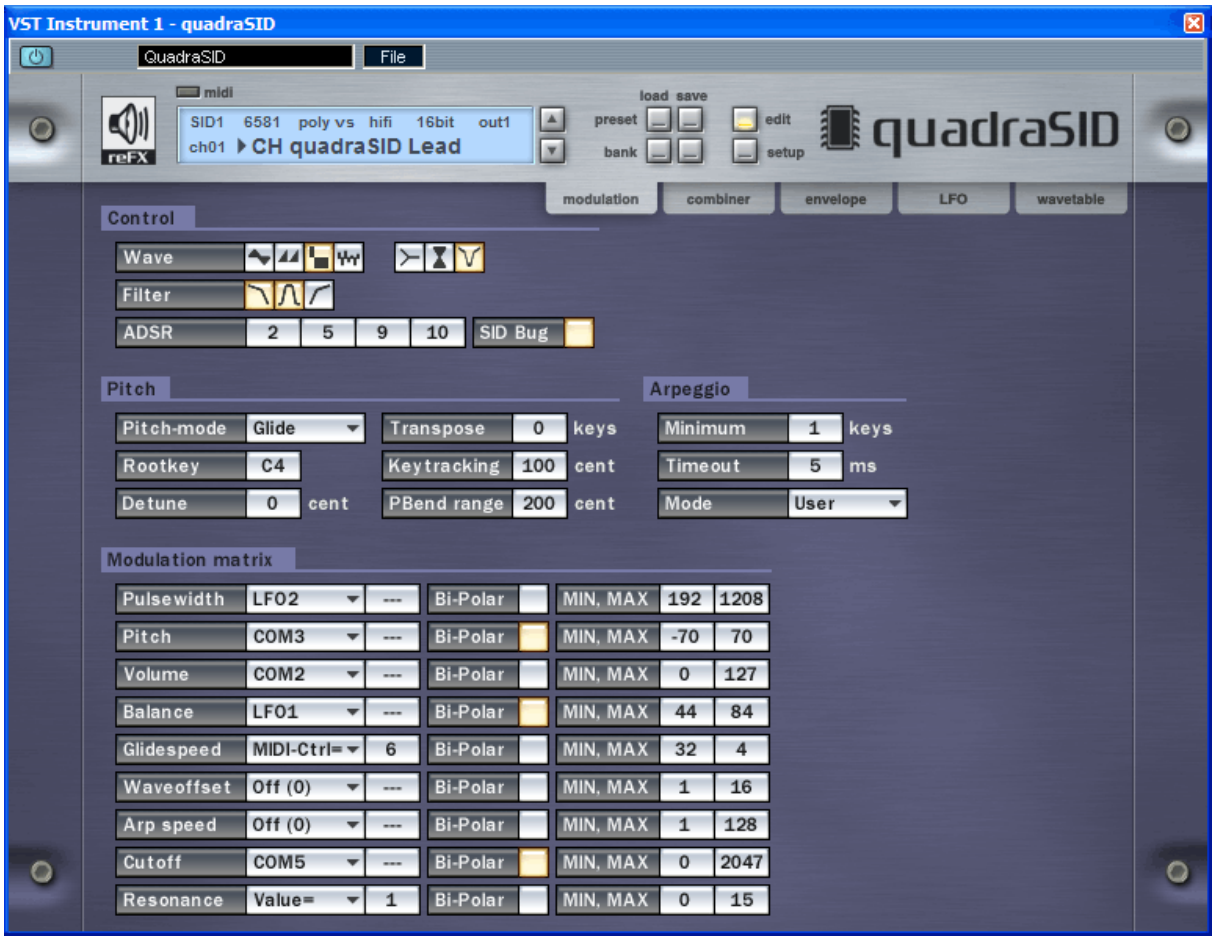


This is what the 6581 version looks like. It is a 3-voice synthesizer chip.

There are two versions of the SID chip, the other being named 8580. The main difference between them is the sound of the filters, and the effect of combined waveforms. The 8580, the later of the two chips, has smoother sound but less effective filters.

The 8580 was used in the newer C64, the C64G and the flat-boards.

User Interface



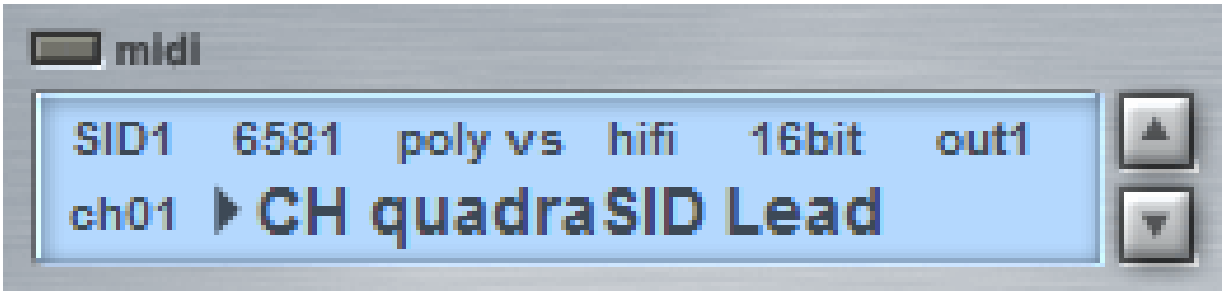
The modulation page is the first you see when opening the instrument from your host. It is where the most important settings for the current patch, are managed. In addition to this, your VST host will probably add its own VST-Wrapper-GUI around this image.

Always Visible Controls

The top part of the main window is always visible, no matter what page you are in. This is where you select the chip you are working with, and which channel on that chip. Remember you are always working on a single patch; you cannot do changes to several patches at once.

Also remember you are always working directly on the patch, not a temporary memory. Any changes you do are saved instantaneously.

Chip Controls



SID1
Chooses the SID chip you are working on (1 to 4). The rest of this section assumes you are working on chip no 1.

6581
Here you select which model of the SID chip you want quadraSID to emulate. Please read the section "About the Original SID Chip" to learn the difference between 6581 and 8580 models. The setting is individual for each chip.

poly vs
Chooses what mode the chip should operate in:

unison	Means that the chip plays all three channels simultaneously. That means that for channel 1, 2 and 3, every time a note-on signal is received, all three of the channels respond. You can use this to create complex or ultra fat sounds. See the FAQ section for a good usage tips on the 1/3, 2/3 and 3/3 patches.
Poly / poly vs (default)	Means that the chip plays all three channels sequentially/cyclically. This means you can play three-note polyphony. If you want to play a specific patch polyphonic, you need to select this patch in all three channels, and set the chip mode to poly/poly vs. If you have a different patch on each channel, you will hear each of the sound cycle as you press keys. If **poly vs** (voice stealing) is selected, new notes will kill older notes. Otherwise new notes are ignored.
multi	Means that each channel responds to its own MIDI channel. For chip no. 1 this is MIDI channels 1, 2, 3 and 4. For the next chip it is MIDI channels 5, 6, 7 and 8, and so on. This is practically multitimbrality, but monophonic on each channel.

hifi
Chooses what mode the chip should operate in. The higher this value is, the better sound quality is and the less aliasing problems occur, especially with higher frequencies. However, better quality means more CPU power is needed. The setting is individual for each chip.

lofi	The SID-chip operates at half the hosts' sample-rate, introducing even more aliasing for that special lofi edge.
nrml	Chip operates at the hosts' sample-rate.
hifi (default)	Four times oversampling with a proprietary high-quality filter are used to remove most of the aliasing. This mode take more CPU then lofi and nrml, but it also sounds the best and closest to a real SID-chip.

16bit
Selects the bit-depth of the SID-chip in question. It can be adjusted in 4bit steps starting as low as 4bit up to 16bit.

out1
Routes the SID-chip to a specific stereo-output. Four seperate stereo-outputs are available.

ch01
This is the channel you are currently working on. The value can be 1 to 3 or the fourth noise channel. Please see the section on the Galway Noise channel regarding the noise channel.

Patch Selector
Here you can select from the supplied patches. The complete patch memory of the quadraSID is saved together with your song in the host. Please note you are always working directly on the current patch, not a temporary buffer.

If you hold down SHIFT while you select a patch, the three adjacent patches are loaded into the three channels of this chip. This is very convenient for unison-mode, when you want to select three adjacent patches.

If you hold down CTRL while you select a patch, the same patch is loaded into the three channels of this chip. This is also convenient for poly-mode, when you often want the same patch in all three channels.

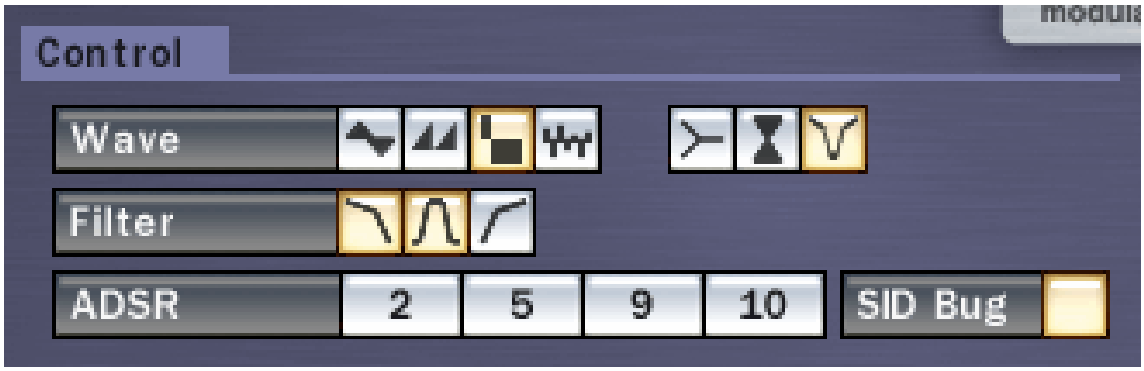
Navigational Buttons

These buttons (located on the top right corner of the quadraSID GUI) control which settings page is currently shown. When pressing any of the buttons, you are taken to the different pages of the quadraSID.

modulation	Shows the main settings page that has the control settings, pitch, arpeggio and modulation-matrix sections.
combiner	Shows the combiners page that has the eight programmable combiners.
envelope	Shows the envelopes page that has the four envelopes.
lfo	Shows the low-frequency-oscillator page that has the four LFOs.
wavetable	Shows the WaveTable that can be used to program custom control sequences.

Modulation Page

Control Settings



Wave
Here you set the oscillator type, ring modulation, hard sync and filter settings. Please note, if the wavetable is in use, these settings have no effect. You will find the same wave section in the Wavetable page.

The first four buttons set the oscillators on or off:

Triangle	Flute-like sounds.
Saw	Squeaky sounds.
Pulse	Extra wide effect when pulse-width-modulated.
Noise	Effects and drums.

You can have several (or all, or none) oscillators active simultaneously. This can create some wild oscillator sounds. Due to a bug in the SID-chip, switching on the noise-oscillator together with other oscillators mutes the output.

The last three buttons on this line control various sound modulating parameters:

 Ring Modulation

Ring modulation is two audio signals multiplied. The typical result is a metallic, overtone-rich sound.

- If Ring Modulation is turned on for Channel 1, the TRIANGLE output of channel 1 is the result of Ring Modulation of Channel 1 and 3. You MUST set the waveform to TRIANGLE for the Ring Modulation to be audible. (You might want to turn off the output of Channel 3 to avoid hearing it by modulating the volume by 0).

- If Ring Modulation is turned on for Channel 2, the TRIANGLE output of channel 2 is the result of Ring Modulation of Channel 1 and 2. Again, waveform must be TRIANGLE to hear the ring modulation.

- If Ring Modulation is turned on for Channel 3, the TRIANGLE output of channel 3 is the result of Ring Modulation of Channel 2 and 3. Again, waveform must be TRIANGLE to hear the ring modulation.

Note: each channel is ring modulated with the previous channel (and 1 with 3).

And do remember that you won't hear any ring modulation unless you turn on the TRIANGLE oscillator for the channel to be ring-modulated.

 Hard Sync

Hard sync is when one audio signal resets the waveform of another, every time it starts a new duty cycle. The SID chip allows hard-sync between channels:

- When Hard-sync is turned on for Channel 1, the fundamental frequency of Channel 1 is synchronized with Channel 3. In order to hear any noticeable sync effect, you would usually modulate the pitch of Channel 3 rather drastically.

- When Hard-sync is turned on for Channel 2, the fundamental frequency of Channel 2 is synchronized with Channel 1.

- When Hard-sync is turned on for Channel 3, the fundamental frequency of Channel 3 is synchronized with Channel 2.

Note: each channel is hard-synced with the previous channel (and 1 with 3).

 FilterThis turns on/off the filter for this channel.

Filter
When the filter is turned on, you can use the following three states:

 Lowpass Only frequencies below the cut-off level pass through.

 Bandpass Only frequencies around the cut-off level pass through.

 Highpass Only frequencies above the cut-off level pass through.

Just like the oscillators, you can have several filters active at once. The output of the enabled filters is simply summed. The effect is like using the EQ controls on your ghetto blaster (which is a good thing).

ADSR

This is the amplitude envelope of the channel, Attack Decay Sustain Release.
- Attack: The time the envelope takes to reach full level
- Decay: The time the envelope takes from full level to the sustain level
- Sustain: The level at which the envelope should sustain
- Release: The time it takes for the envelope to fade out (after key release)

The values range from 0 to 15. The following table explains what these values mean:

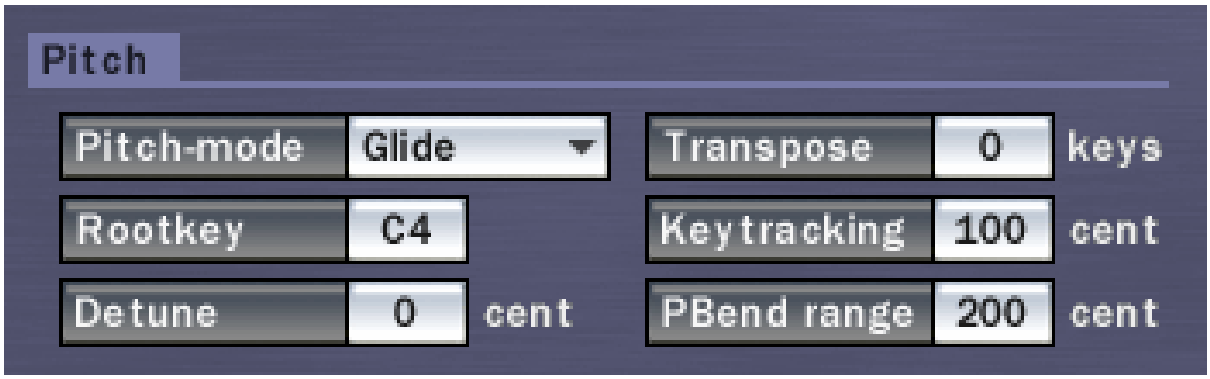
Value	Attack Rate	Decay/Release Rate
0	2 ms	6 ms
1	8 ms	24 ms
2	16 ms	48 ms
3	24 ms	72 ms
4	38 ms	114 ms
5	56 ms	168 ms
6	68 ms	204 ms
7	80 ms	240 ms
8	100 ms	300 ms
9	250 ms	750 ms
10	500 ms	1.5 s
11	800 ms	2.4 s
12	1 s	3 s
13	3 s	9 s
14	5 s	15 s
15	8 s	24 s

Note that Sustain is a "level", and not a "rate" like the others. This ADSR implementation might be too coarse for fine controlling the amplitude envelope. Don't worry. You can override this envelope by setting the values to 0, 0, 15, 15, and use one of the four envelopes to modulate the volume via the modulation matrix.

SID Bug

In the original SID-chip is a bug affecting the ADSR-envelope (nobody's perfect). Sometimes the first few milliseconds of the attack-phase were delayed. To emulate this bug, check this box. Since the resetting of the ADSR-envelope sometimes causes audible artefacts, you are advised to leave this ON.

Pitch Controls



Pitch-mode
Controls how the pitches of the notes are transformed from previous note to current note.

Immediate	No legato or glide. The note is played at the correct pitch immediately.
Glide	Legato. When playing a note, and pressing a new one, the sound glides from the previous to the new. The *Glidespeed* value in the modulation matrix sets the speed of the glide.
Arpeggio	Classic videogame effect. When holding down several keys, the sound is arpeggiating between the held notes. When arpeggiating fast enough, this creates the illusion of playing a chord. You adjust the speed of the arpeggio with the *Arp speed* value in the modulation matrix.

Rootkey
Determines which key the scale starts from. This is only meaningful if Keytracking is set to something else than 100 cents. For example, if Keytracking is 10 cents, and Rootkey is A3, then pressing C4 would generate a pitch 30 cents higher than A3.

Detune
Detunes the sound up to ±50 cents.

Transpose
Transposes the sound up to ±127 keys.

Keytracking
Defines how many cents there are between each note in the scale. Default value is 100 cents. Typical application for this setting is user defined scales or

special effects.

PBend range
Sets the range of the pitch bend wheel in cents. 1200 cents is equal to one octave. To set the PBend range to 2 notes, you would enter 200 cents.

Arpeggio Controls

Minimum
Defines how many keys must be held down before the arpeggio starts. This is also useable as a playing- or programming aid. When you press one key less than selected, the arpeggio will release after the timeout has elapsed, when you press the right number of keys the arpeggio will start anew. So with only one finger you can start/stop the whole arpeggio.

Timeout
This is a playing aid for real-time playing: When the number of keys held is less then the arpeggio-minimum, the arpeggio will continue to sound until the timeout has elapsed.

Mode
Defines the arpeggio mode:

User	The notes are played in the same order as they are pressed down.
Up	The notes play from the lowest to the highest.
Down	The notes play from the highest to the lowest.
UpDown	The notes play up **and** down.
Random	The notes are played randomly.

Modulation Matrix

The modulation matrix is a where you set, or modulate, parameters of the current patch. It is very flexible, and together with the combiners you have extreme fine control over quadraSID.

The general use of the modulation matrix is to have a parameter (e.g. Volume), to be modulated by a source (e.g. MIDI-velocity) or you can define a static value for the parameter.

Be aware that all modulation in quadraSID is in a range between 0 and 1, and every external (or internal) controller is scaled to this range. For example, the movement of a CC fader originally generates values from 0 to 127, but in quadraSID this is scaled from 0 to 1. So when a CC value of 64 is send, quadraSID interprets it as 0.5.

Bi-Polar
Sets how the incoming value should be interpreted. If the modulation source is Bi-polar (e.g. a Bi-polar LFO) you should turn Bi-Polar on so quadraSID knows how to 'read' the value and scale it to the min/max values given.

MIN, MAX
The minimum and maximum are the limits of the modulation or value. If you set minimum and maximum to 0 and 1024, you can then modulate between these limits. If you want the value to be static at 1024, you select Value from the dropdown and set it to 1. (1 x 1024 = 1024).

Here is a list of the parameters you can modulate:

Mod source	Description
Pulsewidth	The pulsewidth of the square waveform oscillator. Typical application is to have a LFO modulate this parameter slowly, to animate the sound.
Pitch	The pitch of the oscillator. Typical application is to modulate this parameter subtly by LFO, to add vibrato.
Volume	The volume of the channel. Typically this would be modulated by note velocity, or an envelope if you find the SID-ADSR envelope too coarse.
Balance	The stereo-balance of the sound.
Glidespeed	How fast to glide from one note to the next. The Pitch-mode has to be set to Glide for this to have any audible effect.
Waveoffset	Which step in the wavetable to play. Please see the section on the wavetable for a closer explanation of the waveoffset.
Arp speed	The speed of the arpeggio. For syncing the arpeggio to the sequencer, you can set the Arp speed to Song tempo. If you need the arpeggio faster/slower than the song, but in sync, use higher/lower min, max values or a combiner to multiply the Song speed with a fixed value to make it fit.
Cutoff	The cutoff frequency of the filter.
Resonance	The resonance of the filter. The original SID chip had a maximum value of 15, quadraSID has enhanced the resonance eight times to 127.

And here is a list of the modulation sources:

Parameter	Description
MIDI-Ctrl =	The specified MIDI controller. You can select any MIDI controller. MIDI range: 0-127. The input is scaled to be between 0 and 1.
Key On	The numeric value of the last MIDI note being pressed. MIDI range: 0-127. The input is scaled to be between 0 and 1.
Key Off	The numeric value of the last MIDI note released (note off). MIDI range: 0-127. The input is scaled to be between 0 and 1.
Vel On	The velocity of the last MIDI note being pressed. MIDI range: 1-127. The input is scaled to be between 0 and 1.
Vel Off	The velocity of the last MIDI note released (yes, some MIDI keyboards send note-off-velocity). MIDI range: 0-127. The input is scaled to be between 0 and 1.
Aftertouch	The value of MIDI-channel-aftertouch. MIDI range: 0-127. The input is scaled to be between 0 and 1.
Pitchbend	The value of MIDI pitchbend. MIDI range: -8192 to 8192. The input is scaled to be between -1 and 1.
Value =	A static value. This would usually be between 0 and 1. For example, if Minimum and Maximum are set to 0 and 127, a Value = 0.25 will set the target to 32.
Off (0)	The static value of 0.
Half (.5)	The static value of 0.5.
On (1)	The static value of 1.
Songspeed	The speed of the song in BPM divided by 1000. (This is to scale the value to between 0 and 1). A tempo of 120 BPM would be recalculated to 0.12
Alternate	The value alternates between 0 and 1 for each new note being pressed on this channel.
Key#Cha	The number of keys held down on this channel.
Key#Chip	The number of keys held down on this chip.
Key#all	The number of keys held down on on all chips in this quadraSID.
LFO 1 - 4	LFOs 1 to 4.
ENV 1 - 4	ENVelopes 1 to 4.
COM 1 - 8	Result of COMbiners 1 to 8.

Please note some MIDI controllers (like CC64 for hold pedal) might give unexpected results when used as modulation sources in quadraSID. These are On/Off controllers, and dependent on host/hardware they can send values like 0, 63, 64 and 127.

LFO Page

An LFO (Low Frequency Oscillator) is an oscillator that runs continuously at very low speed, typically not audible, but very usable for modulation. Some common applications are using an LFO to modulate pitch (for vibrato), or modulate filter cut-off (for filter sweeps). The LFO page contains four LFO controls, but each works like the others.

The signal from the LFOs can be used directly in the modulation matrix or through the combiners.

LFO

Shape
There are five different shapes available (Sinus, Triangle, Sawtooth, Square and Random).

Speed
The speed ranges between 1 and 2047.

Offset
Sets the offset when syncing the LFO.

Sync mode
Defines when to restart the LFO at Offset:

None	The LFO is never restarted; it continues to run all the time.
First	When the first key on this channel is pressed the LFO is restarted.
Every	Every time a key is pressed on this channel the LFO is restarted.

Bi-polar
When switched on the values generated range from -1.0 to +1.0, the centre being 0 (good for pitch-effects), when switched off the generated values range from 0 to +1.0, the centre being +0.5.

Granularity
Sets how fine the oscillator is. Ranges from 1 (fine) to 2047 (coarse).

Combiner Page

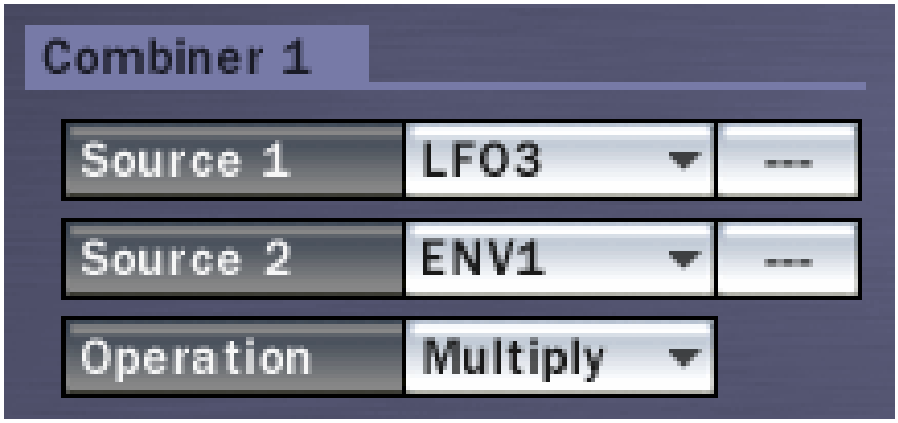
A combiner, quite simply, combines two signals. You can also decide how the signals should be combined. You can for example combine an LFO with an ENVelope, for making the LFO change over time. You can also use combiners to reverse values, or scale them. The combiner page contains eight combiners, but each works like the others.

The results can be used as sources for other combiners or for the modulation matrix.

Note 1
You can have a combiner use itself as a source. The internal processing speed of quadraSID is 200 Hz. Therefore, when routing a combiner to itself, the output of the combiner is fed to itself with a 5 millisecond delay.

Note 2
The outputs of the combiners are limited to values between -1 and 1.

Combiner



Source 1
This defines the first parameter for the combiner.

Source 2
This defines the second parameter for the combiner.

Operation
Defines the operation that is executed using the two parameters to generate the combiner output. There are nine different operations that can be used:

Add	Combiner Output = Source1 + Source2
Sub	Combiner Output = Source1 – Source2
Multiply	Combiner Output = Source1 * Source2
Invert	Combiner Output = -Source1
Mix	Combiner Output = Source1 * 0.5 + Source2 * 0.5
Mirror upper	Combiner Output = abs(Source1) This means that any negative input of Source1 will be turned to positive. Positive input stays positive.
Mirror lower	Combiner Output = -abs(Source1) This means that any positive input of Source1 will be turned into negative. Negative input stays negative.
Crop upper	Negative values of Source1 will be turned to zero (0). Positive values stay positive.
Crop lower	Positive values of Source1 will be turned to zero (0). Negative values stay negative.

Envelope Page

In quadraSID you have, per patch, four Envelopes which define a changing value over time. Up to eight values can be set for each envelope. Start- and End-loop-points make sure that each Envelope can have its own attack-, sustain- and release-phase. Envelopes can be used to change several aspects of the sound like pitch, volume, balance, speeds etc. They can be bi-polar and thus generate values between -1.0 and +1.0 or they can be unipolar and generate values in the range 0.0 and +1.0.

Envelope Definitions

Sync
Defines when the envelope is restarted.

First	The envelope restarts when the first key is pressed. As long as a key is held down, the envelope won't restart.
Every	The envelope restarts whenever a key is pressed.
Inter	Makes sure that the envelope restart is interpolated with the current release and thus a smoother transition is possible.

Release
Defines how the envelope is released.

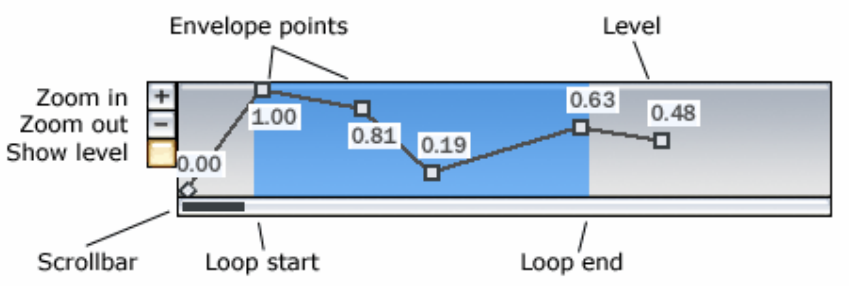
Never	The envelope is never released. If there is a loop in your envelope, it will loop forever.
Last	The envelope is released when the last note is released.
Every	The envelope is released whenever any note is being released.

Bi-polar
When switched on the values generated range from -1.0 to +1.0, the centre being 0. When switched off the generated values range from 0 to +1.0, the centre being +0.5. You will see the envelope shift respectively in the editor when changing this setting, giving you a visual clue of how it works.

Loop
When checked, the envelope loops between the loop markers. When selected (yellow), the envelope is sustained at the next-last point. How to set the loop points is explained below.

Rates
This displays the rate (time it takes) from one point to another. The starting point is always at 0, and does not have a rate. So if you add a point to an empty envelope, its rate is displayed in the first box.

Graphical Envelope Editor



The envelope editor lets you edit the envelope- and loop-points graphically.

Navigation
By clicking the ⊞ or ⊟ buttons you can zoom in or out on the time-axis. This is useful for detailed or grandiose envelope work. Press the ▢ button to toggle the display of the points' numeric value.

Points
To insert a new envelope point, simply click on an empty area in the editor.

To delete a point, right click on it.

To move an existing point together with its following points, click on it with the left button, and move it around while holding the button down.

To move an existing point individually, hold down SHIFT while moving it. This will move the point without adjusting the others.

Loop
To edit the loop-start and loop-end, you simply click and hold down the mouse button near the loop-start or loop-end. Do NOT click **on** an envelope point, but on the left or right hand side of the loop-border.

If you delete an envelope point that is being used as a loop-point, the loop is moved to the previous envelope point.

You can set the loop to one single point (sustaining it). If there is no loop active, the envelope sustains by itself at the next-last point.

The envelopes can be used as sources for combiners or directly in the modulation matrix.

WaveTable Page

The WaveTable in quadraSID is a list of instructions how to process the sound as it evolves over time. You can change the oscillators, the feature-controls and pitch. WaveTables can be used for all sounds needing fast, controlled pitch changes (arpeggios, short sequences, effects). Through the use of a loop-point one can even have sounds having a different attack-waveform for the oscillator and then using another for the remaining sustain & release phase.

If you have ever used a tracker or phrase sequencer; yes, the wavetable is kind of like a tracker/phrase sequencer. You decide how long the "pattern" will be, and at what speed it will run. And the beauty of it is, you can trigger this pattern on every note.

WaveTable

Length
Defines the length of the wavetable. The amount of displayed rows changes accordingly. If set to 0 the wavetable is not used.

Speed
Set the speed in which the wavetable is processed. If set to 0 the modulation-matrix destination "WaveOffset" is used, otherwise the "WaveOffset" destination is ignored. Please see the section dedicated to the WaveOffset, it's a very powerful option.

Sync mode
Defines when the wavetable is restarted.

First	The wavetable restarts when the first key is pressed.
Every	The wavetable restarts whenever a key is pressed.

WaveTable Entry
Each wavetable-entry is numbered on the left-hand side. There is a maximum of 16 entries. The bright numbered entry is the loop-point; meaning that after all available entries have been processed this will be the entry where the wavetable restarts.

The oscillator- and feature-controls have exactly the same meaning as on the main-page.

The pitch value can be set to Transpose or Fixed. When Transpose is set, the following value is added to the key pressed. When Fixed is set, the following value is the note to be played.

When shift-clicking the controllers, all buttons below will get the same value.

WaveOffset
Waveoffset is a way to modulate the stepping of the wavetable. By setting the Speed of the wavetable to 0, you can use the WaveOffset parameter in the modulation matrix to step through the table in any manner.

Examples of usage:

- You could have an LFO modulate the waveoffset, and by this create wild tempo shifts.

- You could use a MIDI controller to modulate the waveoffset, and by this step up or down in the table by moving a fader.

- You could have Key-Note modulate the waveoffset, meaning you'd have each step in the wavetable on a separate key on your keyboard.

The possibilities are almost endless.

How to set it up is probably best explained by an example:

1. Select the "CH Scaled Arpeggio" patch.
   As you see it uses a wavetable with 8 steps.

2. Set the Wavetable Speed to 0.

3. Set LFO1 to the following values:
   Shape: Sine
   Speed: 200
   Offset: 0
   Sync mode: None
   Bi-polar: On
   Granularity: 1

4. Set the Waveoffset in the modulation matrix to the following:
   Mod source: LFO1
   Bi-polar: On
   Min: 1
   Max: 8

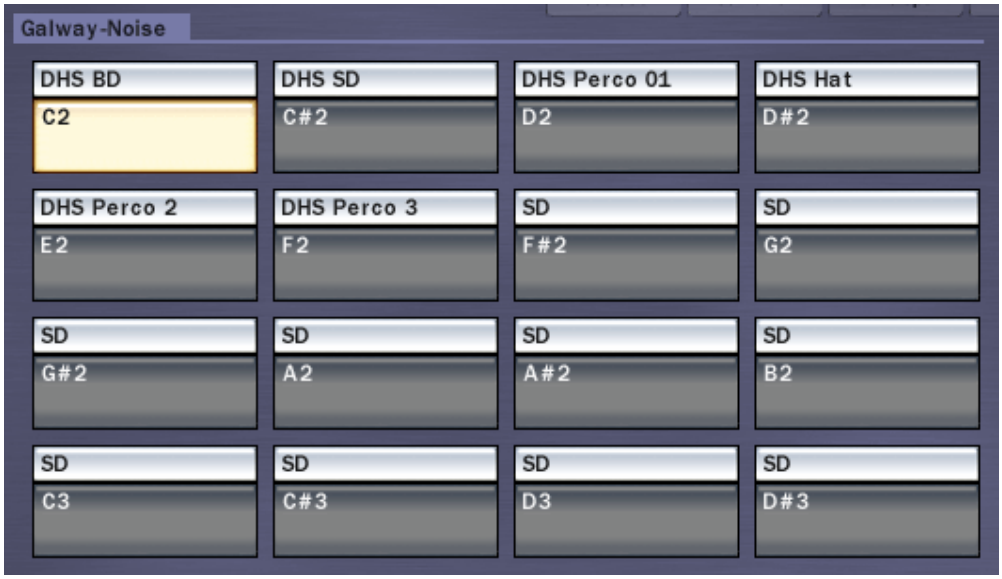
The effect you hear is a sinus stepping up and down the wavetable. What you have is LFO1, swinging between 1 and 8, with 4 as the centre (since Bi-polar is on).

Try to set the LFO shape to Triangle. Now you have a linear stepping thru the table.

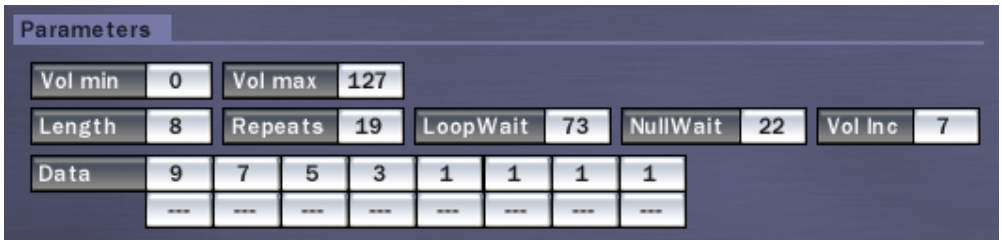
Galway Noise Page

The map shows 16 boxes, each for a key between C2 and D#3. You can change the name of the sound on this key just like a patch. By clicking on box, you set this key to be the currently editable in the Parameters Editor.

Galway-Noise



Parameters Editor



Vol min
The minimum volume of the sound with the lowest velocity (1).

Vol max
The maximum volume of the sound with the highest velocity (127).

Length
The number of entries in the data table.

Repeats
How many times a single step in the data-table should be repeated. Generally, increasing this increases the duration of the sound.

LoopWait
This is multiplied with the value of the current step in the data table, and the result (x) is used for holding the output x cycles.

NullWait
This is an extra hold option – hold the output for another x cycles.

Vol Inc
Add this to the volume output for each repeat.

Data Table
Each of the steps in the table has a value. This value is used together with Loopwait to create the waveform.

The basic theory behind the noise channel, as written above, is to manipulate the output volume of the chip. In quadraSID this channel generates a sawtoothish/squareish waveform (depending on the values). By having small values in the table, extremely fast, percussive noises can be achieved.

The synthesis is not trivial to understand, neither trivial to explain without mathematics and code examples, so feel free to fool around with the parameters until you get a sense of how it works. As a suggestion, try to reduce the table to Length 1, and set the first step to 1. Then try the different parameters to hear the effect on this single step. Now adjust the step value, and when you feel adventurous, increase the table length...

Frequently Asked Questions

This section is for frequently asked questions, stuff that didn't fit elsewhere and plain trivia.

What is the bi-polar checkbox for?
When switched on the values generated range from -1.0 to +1.0, the centre being 0. When switched off the generated values range from 0 to +1.0, the centre being +0.5.

How do I make a vibrato effect?
A vibrato is usually made with an LFO that is modulated by the modulation wheel. Here's an example on how to typically do it in quadraSID:

1. Select the "CH Accordeon" patch

2. Set LFO1 to:
   Shape: Sinus
   Speed: 1600
   Offset: 0
   Sync Mode: None
   Bi-polar: ON
   Granularity: 1

3. Set Combiner1 to:
   Source 1: Midi-Ctrl= 1
   Source 2: LFO 1
   Operation: Multiply

4. In the main page, modulation matrix, set:
   Pitch: COM1
   Bi-Polar: ON
   Min, Max: -64, 64

There, when using the modwheel, you will now add more and more vibrato to the sound.

How do I save the current patch I am working with?
You don't need to. You are always working directly on the patch; meaning if you close the quadraSID window, and save your song, all the memory of quadraSID is saved.

Why are some patches named Xxxxx 1/3, 2/3 and 3/3?
The patches named with 1/3, 2/3 and 3/3 are specifically designed to exploit the unison feature. Simply set the play-mode to unison and select the first

patch into the first channel of the SID-chip. The other channels are automatically set to the 2/3 and 3/3 patch. Now play a few notes and you'll discover some very fat sounds.

5 Appendix

MIDI Control

Appendix A – MIDI Implementation Chart

quadraSID supports the following midi messages:

Function		Txd	Rxd	Remarks
Basic Channel	Default: Change:	x x	1-16 1-16	Messages are always received on all channels
Mode	Default Messages	x x	Mode 1 x	OMNI Mode is always on
Note number	Sound range	x	0-127	
Velocity	Note On: Note Off:	x x	o o	
Aftertouch	Keys: Channels:	x x	x o	
Pitchbend		x	o	
Control Change		x	o	
Program Change	Actual No.	X	o	
System Exclusive		X	x	
System Common	Song Pos: Song Sel: Tune:	x x x	x x x	
System Real Time	Clock: Commands:	x x	x x	
Aux Messages	Local On/Off: All Notes Off: Act. Sensing: Reset:	x x x x	x o x x	

Txd: Transmits MIDI message
Rxd: Receives MIDI message

o = implemented
x = not supported

Appendix B – MIDI Continuous Controller Support

In addition to the messages specified in the MIDI Implementation Chart, quadraSID can be controlled MIDI controllers. All controllers are free routable, please refer to the "Modulation Matrix" section of this manual for detailed instructions how to configure and use MIDI controllers.

Appendix C – quadraSID Credits

Created and programmed by Michael Kleps.

Manual written by Pasi Keränen, Mathias Reichert and Michael Kleps.

VST PlugIn Technology by Steinberg Media Technologies GmbH.

Appendix D – Support Info

We have tried to keep quadraSID as bug-free as possible, but you never can be 100% certain things work as they should in the world of software. So, if you encounter any problems, or you have suggestions for future revisions, don't hesitate to contact our technical support at:

support@refx.net

Or come and visit us at:

www.refx.net

Thank you.