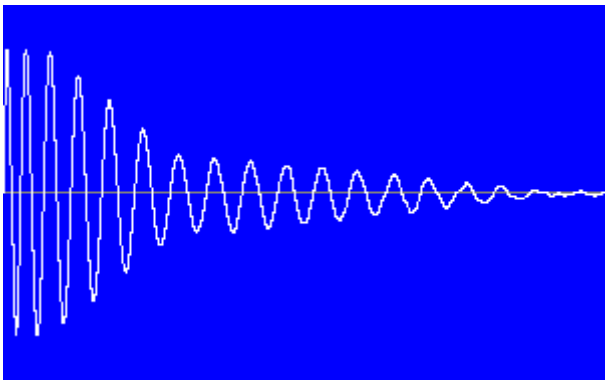
frEDrums

Programmed by Fred Bolder



Last changed: 31-10-2024

Foreword

frEDrums is a MIDI sound module and synthesizer for electronic drums. This Windows software is programmed by Fred Bolder. You can download it for free from the following site:
https://fredbolder.github.io/fredrums/

frEDrums works under Windows 7, but Windows 10 or Windows 11 is recommended.
The free version has the following functionality:

- Playing samples controlled by one or more MIDI devices like an e-drum or a percussion pad
- Assigning the samples to the drum pads, the way you like, by entering up to 8 note numbers per sample
- Layering samples
- Selecting a volume curve per sample
- Selecting a pitch curve per sample
- Reversing a sample
- Adding effects like reverb and delay to a sample
- Choking cymbals
- Playing different samples depending on the position of the hi-hat pedal
- Saving and opening a configuration
- Using Easy Setup to create the instrument list from scratch
- and more.....

If frEDrums works good on your computer and with your drum set, you can buy it to have the following extra functionality:

- Filtering a sample or a signal from the build-in drum synthesizer by using one or two filters (in series or parallel)
- Creating your own instrument from scratch by using the built-in very advanced synthesizer (Subtractive, Additive, PM, FM, Wave shaping and Physical modeling)
- Creating 3 different user volume curves (defined by 5 points) per configuration
- Editing the volume envelope and the filter envelope per sample
- Smooth transitions between samples depending on how hard a drum is hit
- Apply volume changes to all instruments with two clicks
- Creating 3 different user pitch curves (defined by 5 points) per configuration
- Creating 8 different pitch sequences, which makes it possible to create complete songs with drums, bass, piano etc.
- Playing the sample with the current settings immediately in the instrument dialog box
- Using a switch (controlled by a drum or cymbal) to enable or disable samples to be able to play more instruments with the same number of drum pads
- Setting an edr file that will be opened when Edrums starts
- Exporting a drum synthesizer sound to a WAV file
- Using the Fast Settings tab

Feel free to send an e-mail to fgh.bolder@gmail.com if you have a question or feedback.

Disclaimer

Although a lot of care is taken to create frEDrums, Fred Bolder cannot be held responsible for any data loss, virus, computer bug or damage to the computer, speakers etc. (which is very unlikely). That said, avoid low frequency output signals. Also make sure that the volume is not too loud.

Quick start

If the Microsoft .NET Framework Runtime is not yet installed on your Windows computer, you need to download and install it.
http://dotnet.microsoft.com/download

frEDrums uses the Microsoft XNA Framework which you need to download and install.
http://www.microsoft.com/en-us/download/details.aspx?id=20914

Download and install frEDrums.
https://fredbolder.github.io/fredrums/

Connect the MIDI output of your electronic drum set to a USB port of your computer. Mostly you need only a USB A-B cable. If your drum set has a DIN-MIDI connection, you need also a USB/MIDI interface.
http://www.m-audio.com/products/view/midisport-1x1

Start frEDrums.exe.

Switch on your drum set.

Press the Start button. If you play the drums, there is a big chance that you will hear the drum samples, but normally you need to change instrument settings like MIDI note numbers and velocity curves. It is a good idea to take time to figure out which settings works best for you and your drum set. You can save the configuration to an edr file by choosing Save from the File menu.

TIP: Read the Easy Setup chapter.

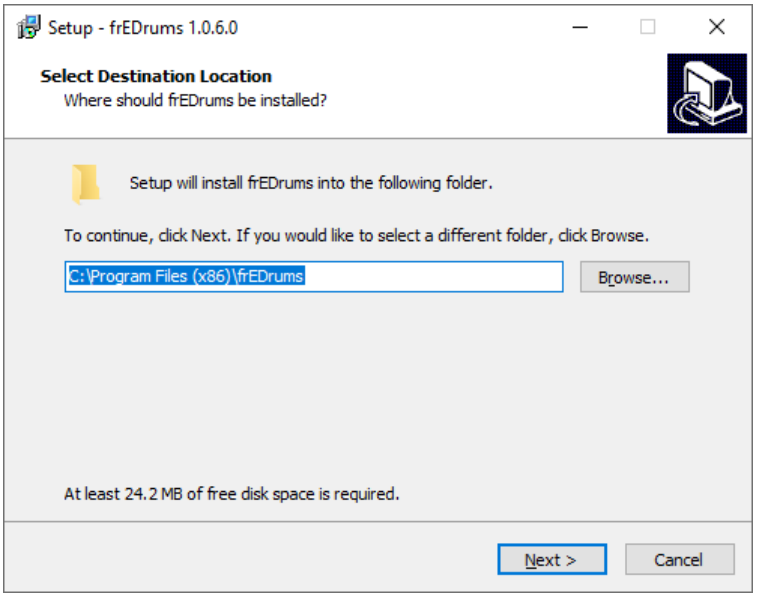
Installing and starting frEDrums

If the Microsoft .NET Framework Runtime is not yet installed on your Windows computer, you need to download and install it.
http://dotnet.microsoft.com/download

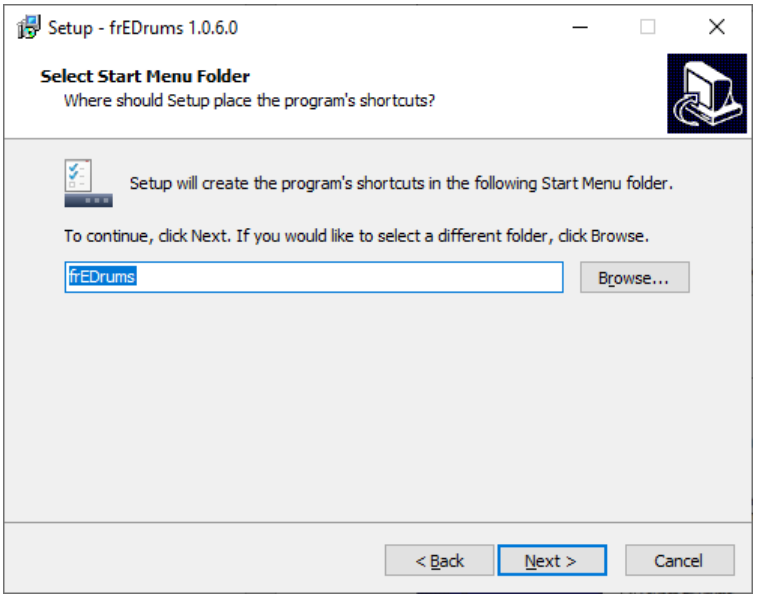
frEDrums uses the Microsoft XNA Framework which you need to download and install.
http://www.microsoft.com/en-us/download/details.aspx?id=20914

Go to:
https://fredbolder.github.io/fredrums/

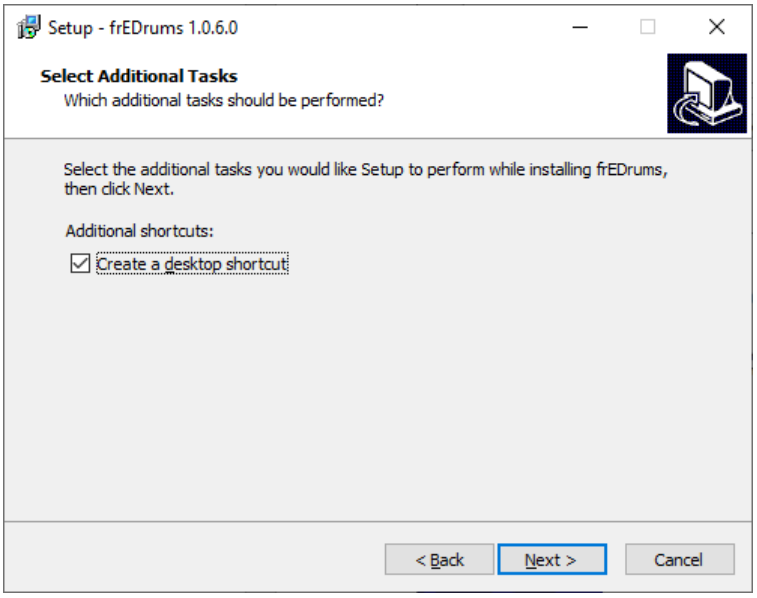
Click with the right mouse button on “Download and install frEDrums” and choose something like “Save target as” or “Save link as...”.
Choose the folder where you want to save the file and press the Save button.
Click with the right mouse button on the Windows Start button and choose File Explorer.
Browse to the folder where you have saved fredrumssetup.exe.
If you don’t see the file, the download might have failed or the file is removed by your virus scanner and you have to recover it.
Double click on fredrumssetup.exe (keep in mind that the extension can be hidden).
Press the Yes button, if a question like “Do you want to allow this app from an unknown publisher to make changes to your device?” appears.



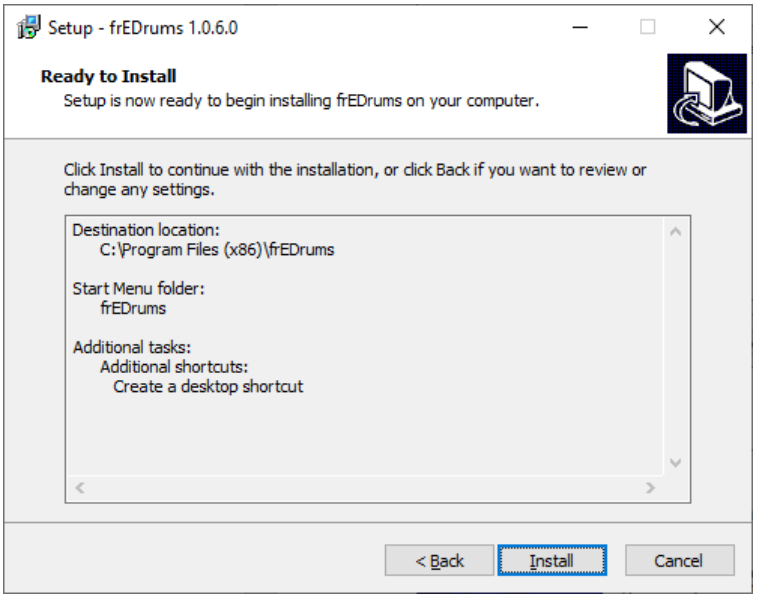
Normally you don’t need to change the folder where frEDrums will be installed and you can just press the Next button.
If you want to change the folder, you can press the Browse button.



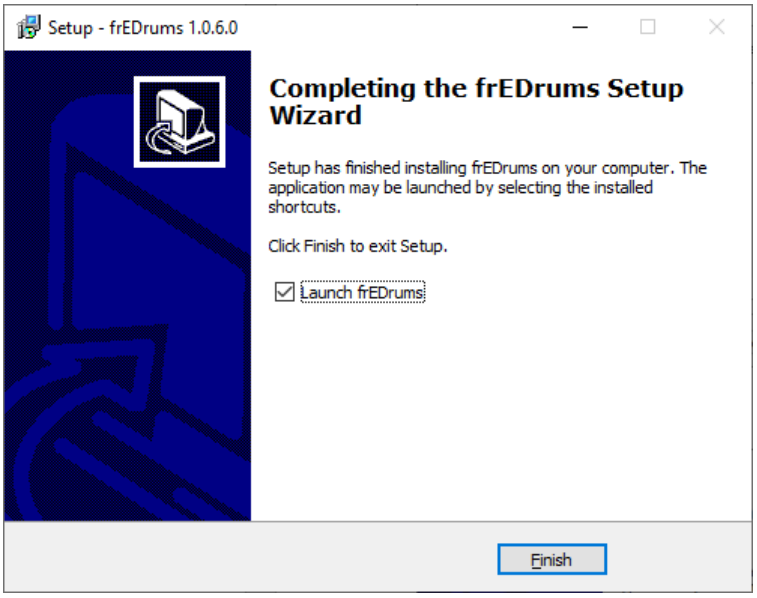
Press the Next button.



Check “Create a desktop shortcut” if you want to be able to easily start frEDrums from your desktop.
Press the Next button.



Press the Install button.



If you don't want to start already frEDrums, uncheck "Launch frEDrums".
Press the Finish button.

Starting frEDrums

After you have installed frEDrums, you can start it by double clicking on the frEDrums shortcut on your desktop or by choosing from the start menu frEDrums and again frEDrums. You can also go (with the File Explorer) to the folder where you have installed frEDrums and double click on frEDrums.exe (keep in mind that the extension can be hidden).

Connecting your drum set to your computer

Nowadays most electronic drum sets can be connected to a computer with a USB A-B cable.

If your drum set has a DIN-MIDI connection, you need also a USB/MIDI interface.
http://www.m-audio.com/products/view/midisport-1x1

Connect the MIDI output of your drum set to a USB port of your computer or to the MIDI input of the a USB/MIDI interface (which has to be connected to the computer).

Start frEDrums (frEDrums.exe) and switch on your drum set. When you connect for the first time, it is best to temporary enable the logging by checking Update log. This way, you can see if everything works fine.

In frEDrums, press the Start button. If there are more MIDI devices connected to your computer, the Select MIDI devices dialog box appears. If you want, you can select all MIDI devices, since frEDrums can handle messages from multiple MIDI devices at the same time. This way you can easily expand your drum set by adding a MIDI drum pad.

When you connect, you should see in the log something like:
MIDI device(s) found
MIDI port 0 opened successfully

When you want, for example, to change a setting, you have to close the MIDI port(s) by pressing the Stop button.

Creating, opening and saving a configuration

Make sure that the MIDI ports are closed by pressing the Stop button.
An frEDrums configuration file has the extension .edr.

New

Choose New from the File menu or press Ctrl-N to create a new configuration. The question "Create a new configuration?" will appear. Press the Yes button to proceed. Depending on the settings, a default instrument list will be created as a handy starting point. If you want to start from scratch, you can choose Delete all from the Instruments menu. When you always want to start with an empty list, it is better to change the settings (see chapter Changing the application settings).

Open

Choose Open from the File menu or press Ctrl-O to open an existing configuration. frEDrums comes with some configurations for the Roland TD-1K and the Roland SPD-6, since the software is tested with these drums. The files are in the map where you have installed frEDrums (by default: C:\Program Files (x86)\frEDrums).

Save

Choose Save from the File menu or press Ctrl-S to save the current configuration. If the file already exists, a question appears if you want to replace the file. Press the Yes button to overwrite the existing file. Before replacing the file, a backup with the extension .bak will be created. When you overwrite for example Snare_drum_01.edr, there will be a backup created with the name Snare_drum_01_edr.bak. When necessary, you can rename the backup to an edr file.
Keep in mind that on most computers you need Administrator rights to save a file under C:\Program Files (x86)\

Adding and deleting instruments

Make sure that the MIDI ports are closed by pressing the Stop button.

Add

Select the row where you want to insert the new instrument and choose Add from the Instrument menu. If there is no row selected, the new instrument will be inserted at the top. In the Instrument dialog box that appears, you have to fill in at least a note number (see chapter Editing instruments). Of course you need also to choose a sample file or to create your own waveform.

Create copy

Select the instrument that you want to copy and choose Create copy from the Instrument menu.

Delete

Select the instrument that you want to delete and choose Delete from the Instrument menu. Press the Yes button when the question “Delete selected instrument?” appears.

You can delete all instruments by choosing Delete all from the Instrument menu. Press the Yes button when the question “Delete all instruments?” appears.

If you have accidentally deleted an instrument, you can recover it by choosing Undo from the Assist menu.

Moving an instrument

Moving the instruments can result in a more logical order. You can, for example, arrange the instruments in the same way as you see them on sheet music.

Move up

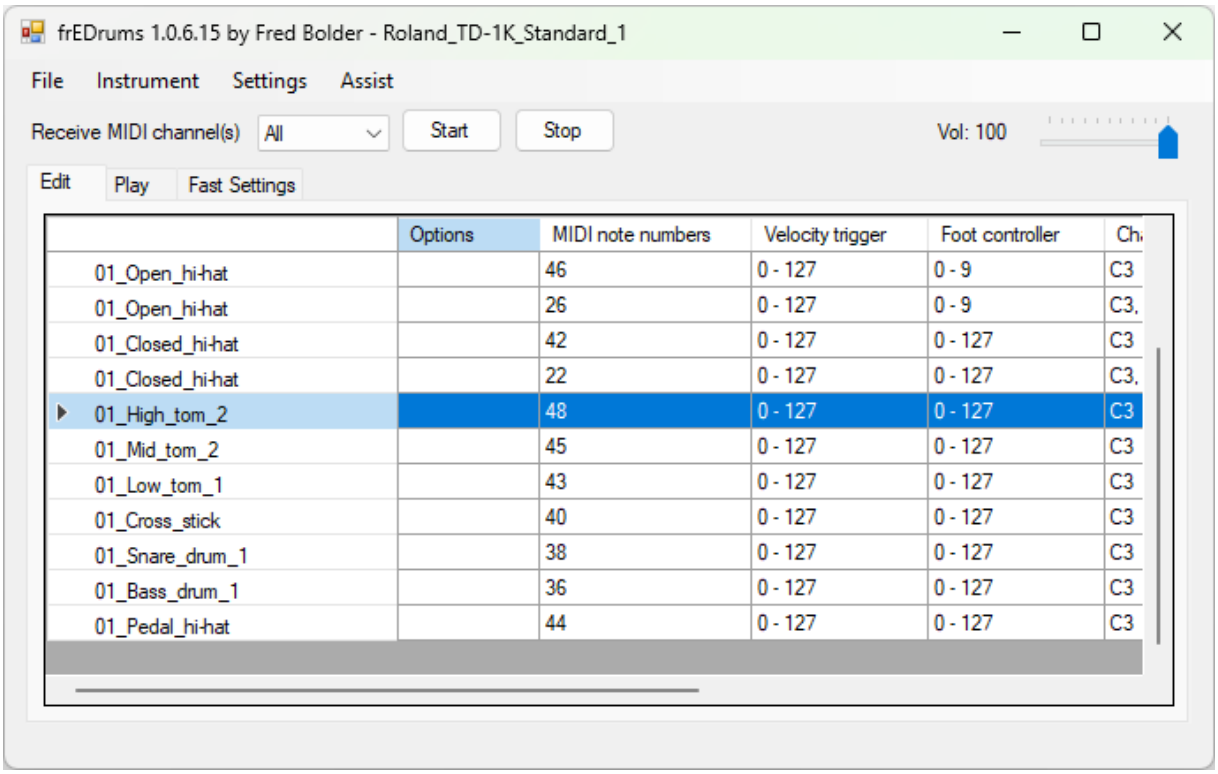
Select an instrument and choose Move up from the Instrument menu or press Ctrl-U to move the instrument one position higher in the list.

Move down

Select an instrument and choose Move down from the Instrument menu or press Ctrl-D to move the instrument one position lower in the list.

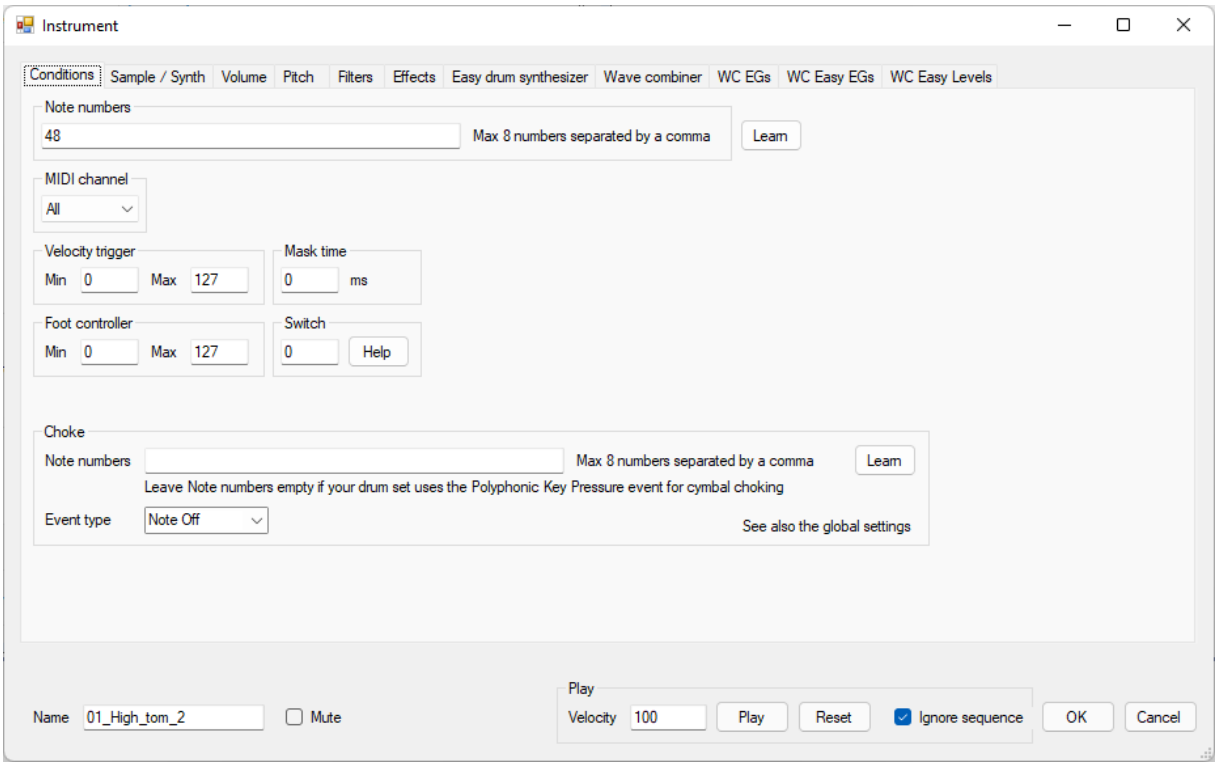
Editing instruments

You can only edit an instrument when the MIDI ports are closed and there is no pitch sequencer playing. The reason for this is, that this way there is no locking necessary, which makes the performance during playing better. You can close the MIDI ports by pressing the Stop button.



Double click on an instrument or select an instrument and choose Edit from the Instrument menu. Right click on an instrument to hear it.
In the Instrument form that appears, you can click with the left mouse button on blue values to type the new value instead of using a slider.
When entering a frequency, it is often also possible to enter a musical note (C2, Ab3, F#1).

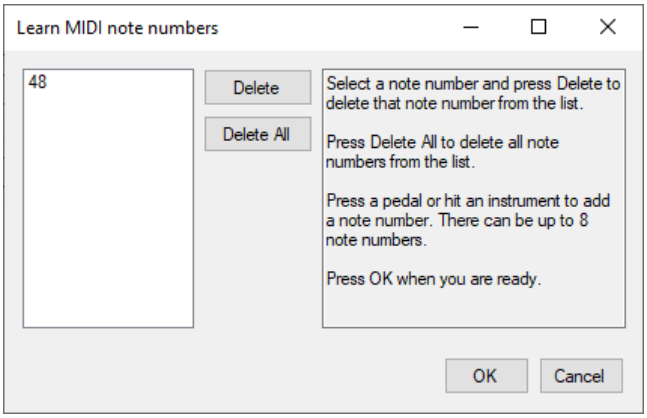
Conditions



On this tab you can adjust the conditions on when the instrument is played. The instrument is played only when the received MIDI message match all conditions.

Note numbers

If a MIDI Note On message with one of the specified note numbers is received and also the other conditions (like velocity trigger) are met, the instrument will be played. You can specify up to 8 note numbers, by separating them with a comma.
If you don't know which note number a specific drum pad sends or you don't want to type the number, you can press the Learn button.



Select a note number and press Delete to delete that note number from the list. Press Delete All to delete all note numbers from the list. Press a pedal or hit an instrument to add a note number. There can be up to 8 note numbers. Press OK when you are ready.

Alternatively you can hit that drum pad and read the received Note On message in the log. Make sure that Update log is checked and that you have pressed Start.
You can layer instruments by using the same note number.
If Note numbers contains only 128 and the Pitch is set to 0, you can play a note range. The pitch of the range C3 (48) - C5 (72) will be calculated. When you play a note outside this range, you will hear that note from the nearest octave within the range. When the original sample or synth sound has not the same frequency as the C, the notes are transposed.

MIDI channel

If there are more MIDI devices with a different MIDI output channel are connected to your computer and you want to use the same note number triggering a different instrument depending on the MIDI device, you can set the MIDI receive channel of the instrument to a specific MIDI channel instead of All. This can be very handy when you can not change the note number, but you can set a different MIDI output channel.

Velocity trigger

To prevent very soft (not real) hits to trigger the instrument, you can set a minimum velocity value. Make sure that ghost notes still trigger the instrument.
Velocity triggers are also useful to trigger different samples depending on how hard a drum is hit.

Example	
Instrument 1 Filename: 01_Snare_drum_1 Note numbers: 38 Velocity trigger Min: 0 Velocity trigger Max: 90	Instrument 2 Filename: 01_Snare_drum_2 Note numbers: 38 Velocity trigger Min: 91 Velocity trigger Max: 127

Mask time

You can set a mask time to prevent double triggering. When you hit a drum, a timer starts. The following hits that are within the set mask time will be ignored. The default value of the mask time is 0. Change it only when you have double triggering problems and keep it as low as possible.

Foot controller

It is possible to play different samples depending on the position of the hi-hat pedal. This is very useful for the different hi-hat sounds, but it can also be used for other instruments.
This software uses the Foot Controller MIDI event to determine the pedal position. The value 0 is totally open and the value 127 is totally closed. When testing with a Roland TD-1K, the value 90 was received for the totally closed position.
Take a look at the configuration Roland_TD-1K_Standard_1. You can see two the same open hi-hats samples in the instrument list. One of them is used for the half open sound. It has a different volume envelope to make it sound shorter.

Switch

Registered users can use a switch. With a switch, you can switch an instrument on or off or you can execute a command. The switch is controlled by playing on or more specified instruments. It is also possible to control the switch by a program change event (see Changing the application settings).

Value	Description
0	The switch is not used for this instrument.
1	The instrument is switched on when the switch is in position 1.
2	The instrument is switched on when the switch is in position 2.
3	The switch is controlled by this instrument.
4	Reset all pitch sequence counters

After pressing the Start button, the switch is always in position 1.

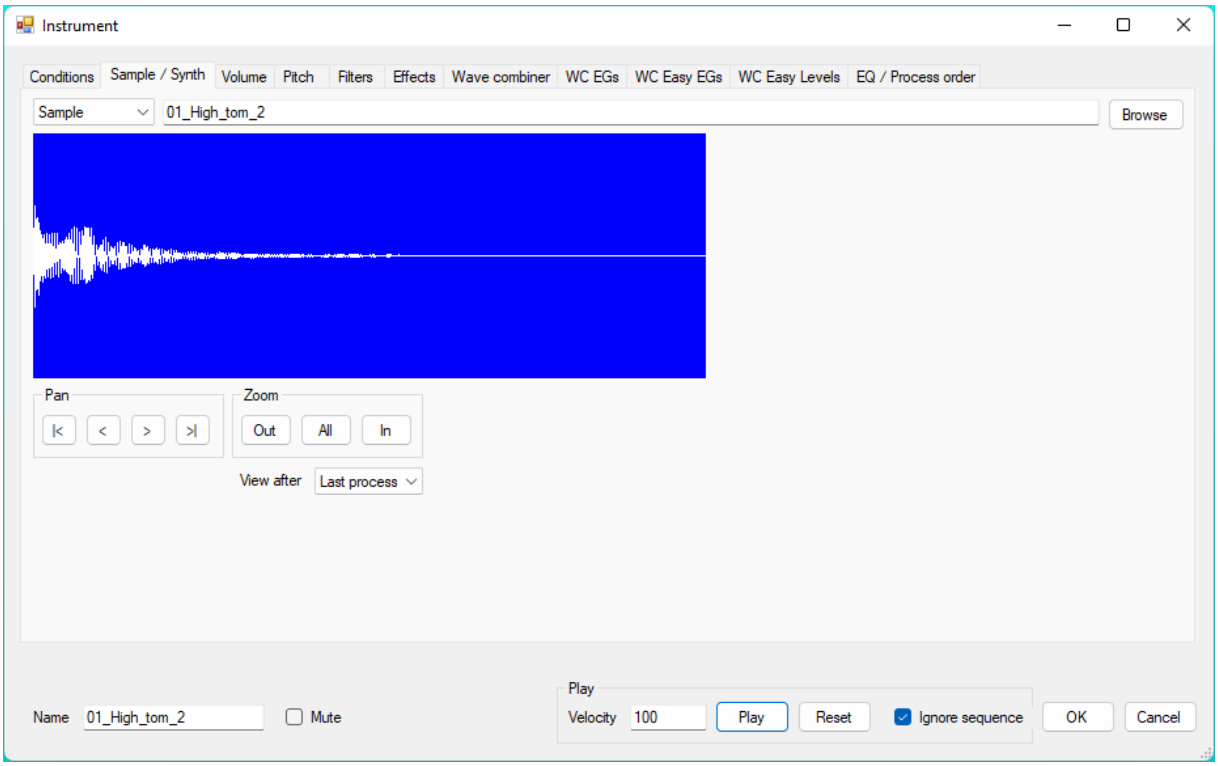
In the following example, the snare drum sound changes into a cross stick sound, when you press the hi-hat pedal. The next time that you press the pedal, it changes back to the snare drum. When you hit the hi-hat, you will always hear the closed hi-hat. You can decide for yourself, if you want to hear the instrument that controls the switch. In this example the volume is set to 0.

	Options	MIDI note numbers	Velocity trigger	Foot controller	Change volume	Pan	Pitch	Switch
01_Crash_cymbal_1		49, 55	0 - 127	0 - 127	C3	0	0	0
01_Crash_cymbal_2		57, 52	0 - 127	0 - 127	C3	0	0	0
01_Ride_cymbal_1		59, 51	0 - 127	0 - 127	C3	0	0	0
01_Closed_hi-hat		22, 42, 26, 46	0 - 127	0 - 127	C3	0	0	0
01_Mid_tom_1		48	0 - 127	0 - 127	C3	0	0	0
01_Mid_tom_2		45	0 - 127	0 - 127	C3	0	0	0
01_Low_tom_2		43	0 - 127	0 - 127	C3	0	0	0
01_Cross_stick		38	0 - 127	0 - 127	C3	0	0	2
01_Snare_drum_1		38	0 - 127	0 - 127	C3	0	0	1
01_Bass_drum_1		36	0 - 127	0 - 127	C3	0	0	0
01_Pedal_hi-hat		44	0 - 127	0 - 127	=0	0	0	3

Choke

If your drum set uses a Note Off or Note On event for cymbal choking, you can here enter the note number(s) and select the event type.
If your drum set uses a Polyphonic Key Pressure event for cymbal choking, make sure that you leave Note numbers empty (unless you want also another cymbal choking trigger) and that Ignore Polyphonic Key Pressure event for cymbal choking (see chapter Changing the application settings) is unchecked.
If you don’t know which events your drum set uses, you can check the logging (see chapter Trouble shooting). Roland drum sets use mostly a Polyphonic Key Pressure event for cymbal choking.

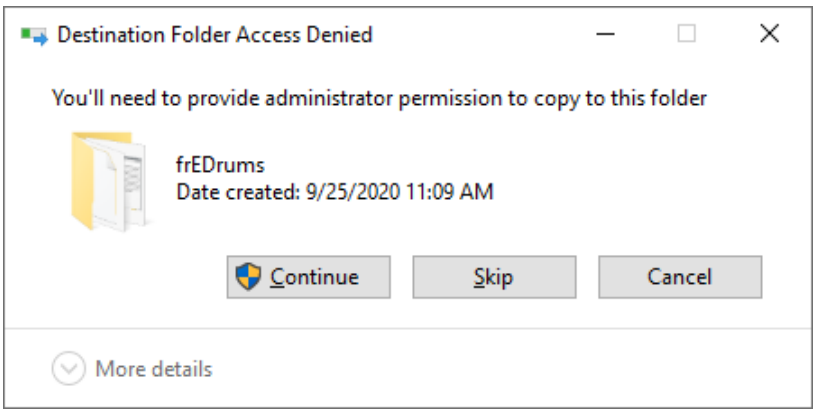
Sample / Synth



You can choose a sample file or create an instrument from scratch by using the built-in drum synthesizer. You can also use the Easy drum synthesizer.

Sample

For the instrument in this example, the sample 01_High_tom_2.wav is used. You can choose another sample by pressing the Browse button. Alternatively you can type the filename without extension. The sample files are located in the folder in which frEDrums is installed. The filename must be specified without path. If you choose a file from another folder than the application folder, the message “Only files from the application map can be used.” or “Invalid filename” will appear.
You can also use samples from the internet or your own samples by copying them to the application folder. Probably you will get the following message.



In that case, press Continue. If you don't have Administrator rights and you want to use other samples, it is better to install frEDrums in another folder.

Make sure that the sample files meet the following specifications.

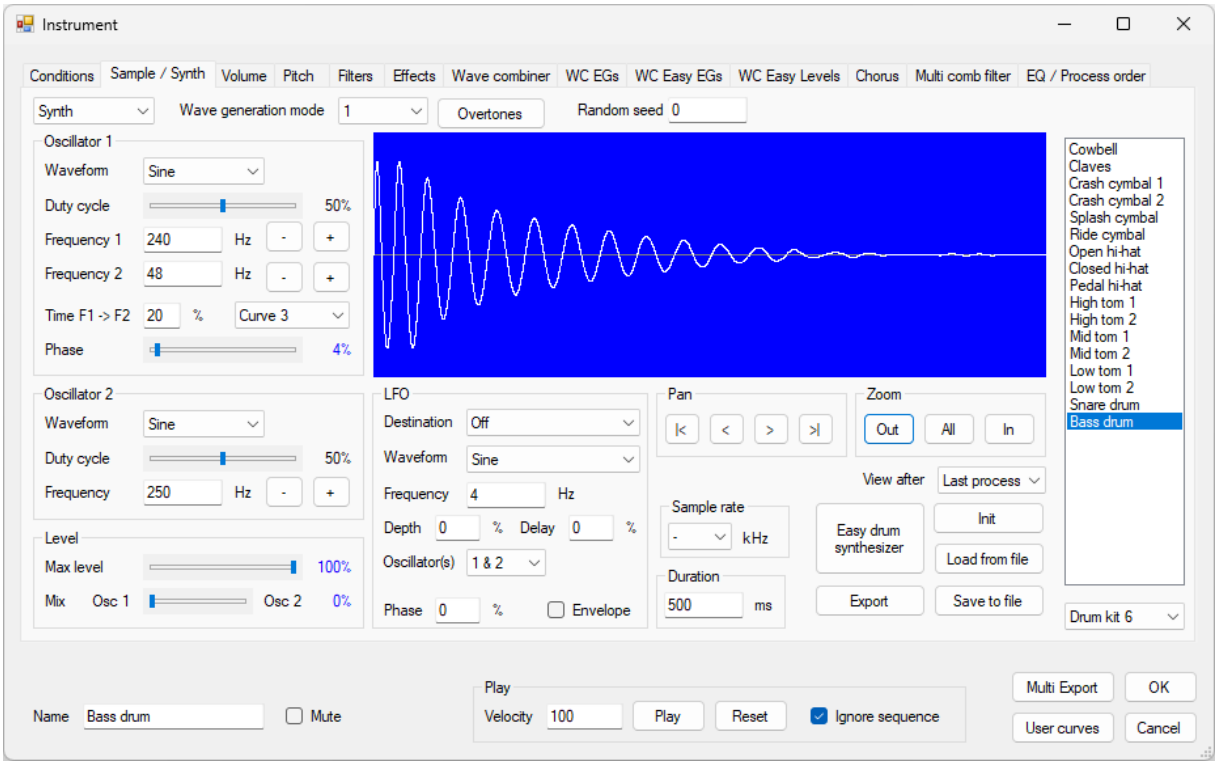
Format	Channels	Bit depth	Bit rate	Sample rate
WAV	2 (stereo)	16-bit	1411 kbit/s	44.1 kHz

For stopping the open hi-hat sound, the names (not file names) of all hi-hat instruments are important. See the explanation of the name of an instrument further in this chapter.

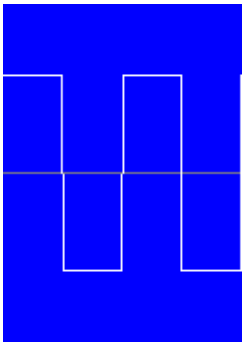
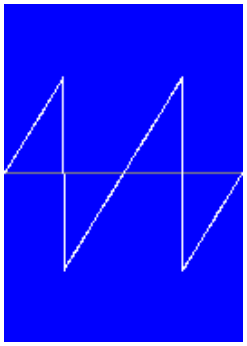
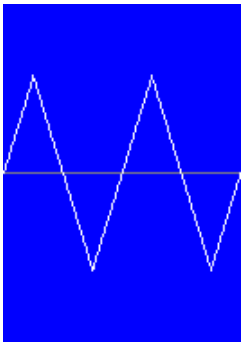
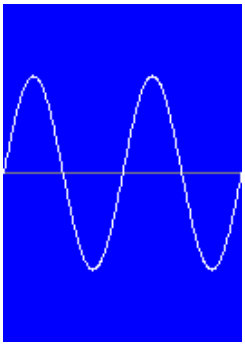
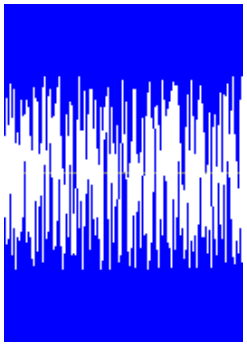
The picture shows the waveform of the sample. You can zoom and pan. It is also possible to see the waveform after the selected process. Select Last process if you want to see the final waveform.

Read the Useful links chapter for free samples!

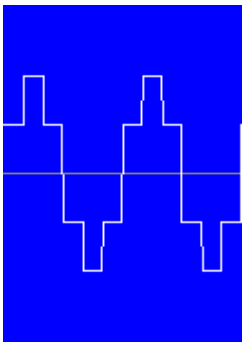
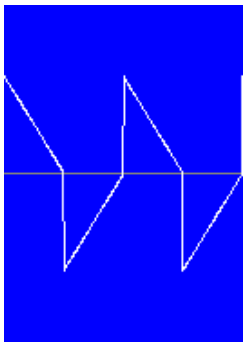
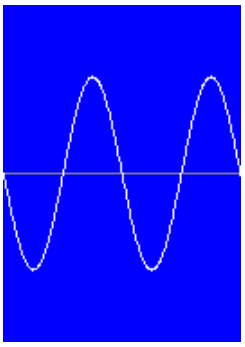
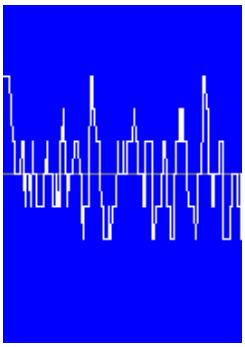
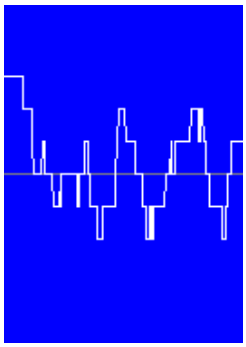
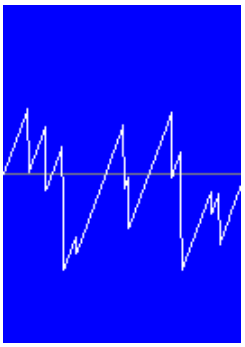
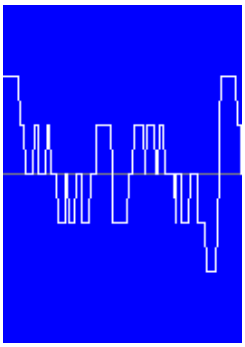
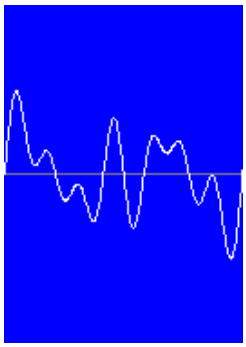
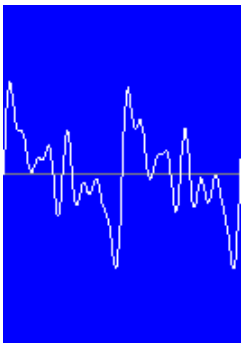
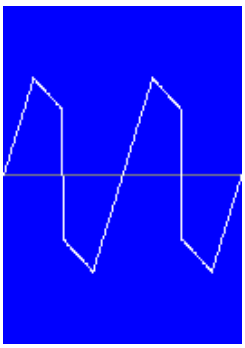
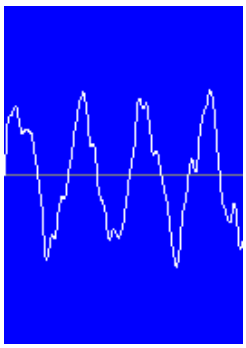
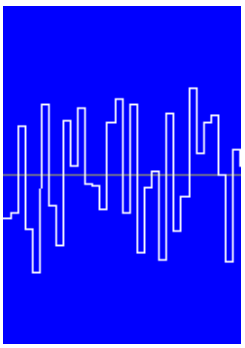
Synth



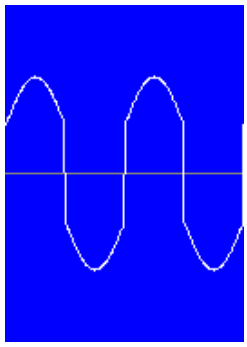
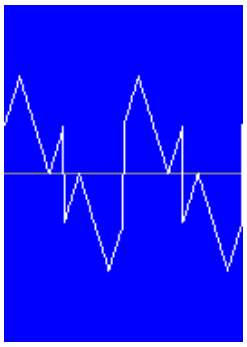
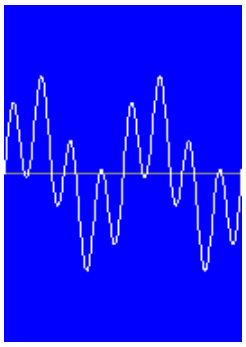
Registered users can create an instrument from scratch by choosing Synth. There are two main oscillators which you can mix the way you like with the Mix setting. If the value is set to 0%, you hear only Oscillator 1 and if the value is set to 100%, you hear only Oscillator 2. For Oscillator 1 you can choose one of the following basic waveforms.

 Square	 Saw	 Triangle
 Sine	 White Noise	Pink Noise Brown Noise Noise and HPF * Noise and LPF * Noise and BPF * * The oscillator frequency is used for the filter frequency

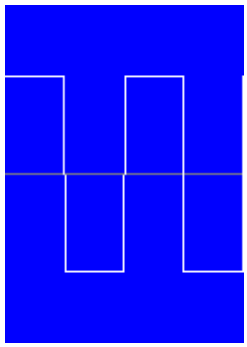
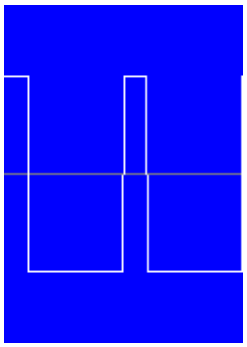
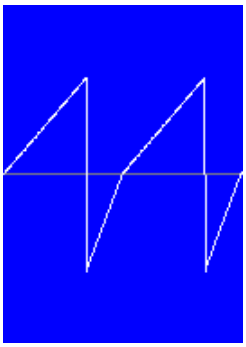
For Oscillator 2 you can choose the same waveforms and additional special waveforms.

 Special 1	 Special 2	 Special 3
 Special 4 (metal)	 Special 5 (metal)	 Special 6 (metal)
 Special 7 (cowbell)	 Special 8 (bell)	 Special 9 (organ)
 Special 10	 Wave combiner	 Sample & hold

By combining the two oscillators, you can get waveforms like the following.

 Osc 1: Square Osc 2: Sine	 Osc 1: Square Osc 2: Triangle Freq osc 2 = 2x freq osc 1	 Osc 1: Sine Osc 2: Sine Freq osc 2 = 4x freq osc 1

With the Duty cycle parameter you can set the pulse width (1 - 99%). You can adjust the pulse width for all available waveforms, except Special 4-9, Sample & hold, Wave combiner and noise. Here are some examples.

 Square, 50%	 Square, 20%	 Saw, 70%

With the Frequency parameters you can adjust the pitch. You can also enter a musical note (examples: C2, Ab3, F#1). Oscillator 1 has two Frequency parameters. Frequency 1 is the start frequency and Frequency 2 is the end frequency. With Time F1 -> F2 you can set the time (percentage of the duration) that it must take to change the frequency from the start frequency to the end frequency. You can select a curve for this (See chapter Envelope curves).

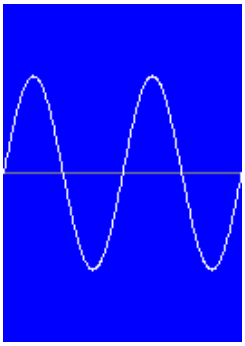
For percussion instruments the start frequency is normally higher than the end frequency, but you can also set a higher end frequency. If you want a constant frequency, you must fill in the same value for Frequency 1 and Frequency 2. With the + and - button after a Frequency parameter you can increase or decrease the frequency by 1 semitone. For drums it sounds often good when the start frequency is two times the end frequency (one octave higher). If you click with the right mouse button on an input box, you can easily choose the frequency of C0-C5. Here are the frequencies in Hz of the C note.

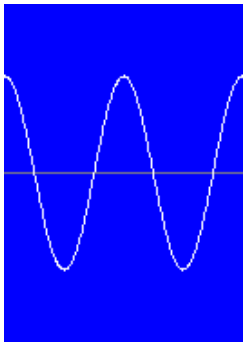
C0	C1	C2	C3	C4	C5	C6	C7	C8
16.35	32.70	65.41	130.81	261.63	523.25	1046.50	2093.00	4186.01

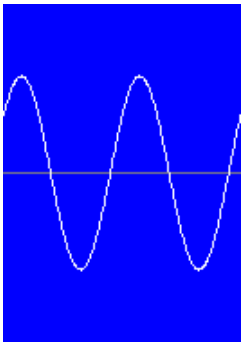
You can also choose “Copy from other freq” to copy the frequency from the other input box or “2 x other freq” to make the frequency two times the other frequency. In the following table you can see which input box is the “other” input box.

Current input box	**Other input box**
Oscillator 1 Frequency 1	Oscillator 1 Frequency 2
Oscillator 1 Frequency 2	Oscillator 1 Frequency 1
Oscillator 2 Frequency	Oscillator 1 Frequency 2

With Phase you can set the start position within the waveform. Here are some examples with a sine, but it works also for the other waveforms (except noise).


Phase = 0%


Phase = 25%


Phase = 10%

The Phase setting can be used to get the click sound of a drum. For a sine or triangle, the click is the loudest at 25% (90°) or 75% (270°), since there are the top values. If you enable the click sound in the Easy drum synthesizer, the phase will be set to 25%. If you want a softer click, you can adjust it with the Phase setting.

With Max level you can set the top value of the waveform.

There is a LFO (low frequency oscillator) available to modulate the waveforms. For special sound effects, you can set the LFO also to a high frequency. The following waveforms are available for the LFO:
Square, Saw 1 (/|/|/|/|), Saw 2 (|\|\|\|\), Triangle, Sine, Sample & hold, Exponential decay, Multi ramp 1 and Multi ramp 2
One Multi ramp 1 period consists of two ramp downs in the first half and one ramp down in the second half. One Multi ramp 2 period consists of four ramp downs .
With the Destination parameter you can choose if you want to modulate the pitch (vibrato), the volume (tremolo) or the pulse width (PWM). You can choose which oscillators have to be modulated by the LFO. For a natural modulation, it is best to set the Sine waveform. Use the Depth parameter to set the amount of modulation. Modulating the pitch or pulse width has no influence on Special 4-9, Sample & hold, Wave combiner and noise. With Delay you can set the time (percentage of the duration) when the LFO must start. With the Phase parameter, you can set at which point (percentage of a period) a waveform has to start.
It is possible to set the LFO in Envelope mode. In this mode, the LFO works only for one period of the waveform. This is very handy when you want for example a shorter decay for only one oscillator. In that case, you can use the Saw 2 waveform and set the depth to 100%. The higher you set the LFO frequency, the shorter will be the decay time.

With Duration you can set the length of the sound.

A higher Sample rate can make a better sound, but it takes more time to generate the sound. If the Sample rate is set to ”-”, the Sample rate setting from the global settings is used. The formant filter is made for a sample rate of 44100 Hz, so if an instrument is using a formant filter, it is better to set the sample rate of that instrument to 44100 Hz.
Keep it mind that almost all presets are made with a sample rate of 44100 Hz. They can sound different with another sample rate, especially when phase modulation is used.

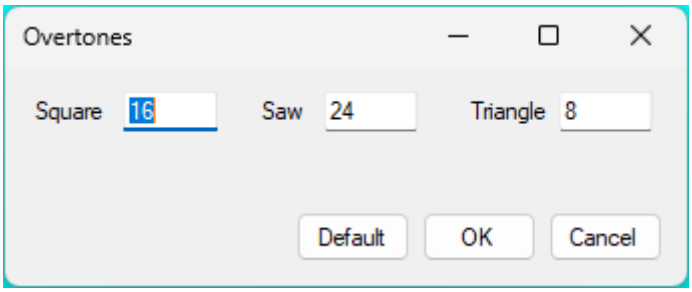
If the Wave generation mode is set to 1 and the frequency and the phase don’t change, the time of a cycle is always the same. In that case, depending on the sample rate and the frequency, the frequency can not always be very precise. For musical notes it is mostly precise enough, but when slowly changing the frequency, it might not be fluently and you will hear little steps.
If the Wave generation mode is set to 2, the following waveforms are generated in a different way.

Oscillator 1	Square, Saw, Triangle, Sine
Oscillator 2	Square, Saw, Triangle, Sine, Special 3, Special 4, Special 5, Special 7, Special 8, Special 9
Wave combiner	Sine, Square, Saw 1, Saw 2, Triangle, Special 1, Special 2, Special 3, Special 4, Triangle 2, Sinc 1, Sinc 2, Sinc 3, Special 5, Special 6, Special 7, 2 x Sine, 2 x Square

In that case, the waveforms are made with sine and/or cosine partials and the tuning is more precise, because the time per cycle can be different with the same frequency and phase. This setting is often suitable when you make sounds with slow pitch changes.

Try the following:
- Press Init and click on Yes.
- Set the Waveform of Oscillator 1 to Sine.
- Set Frequency 1 to 500 Hz and set Frequency 2 to 450 Hz.
- Set Time F1 -> F2 to 100%.
- Press Play and you will hear that the pitch changes in little steps.
- Set the Wave generation mode to 2.
- Press Play and you will hear that the pitch changes fluently.
- Try also different Wave generation mode settings with the Waveform set to Square and Frequency 2 set to 475 Hz.

In other situations it can sound better when Wave generation mode is set to 1. I added the Wave generation mode setting when I could not make the vibrato of a violin sound good.
Press the Overtones button to adjust the number of overtones for Wave generation mode 2.



If you set a high number of overtones (maximal 100), the shape of the waveform will be more precise, but this is often not better. A lower number of overtones results in faster waveform generation and less chance of aliasing. It is a good idea to try different settings to hear which sound you like better. You can set the number of overtones per instrument.

Set Random seed to another value than 0, if you want the noise to be consistent. If you are using the Karplus-Strong method, this can be handy if you want the timbre to be consistent.

While creating a waveform, you can also see how it looks. This can be very helpful. It is possible to zoom and pan. Especially for high frequencies or long durations this is necessary. It is also possible to see the waveform after the selected process. Select Last process if you want to see the final waveform. See also the chapter Process order.

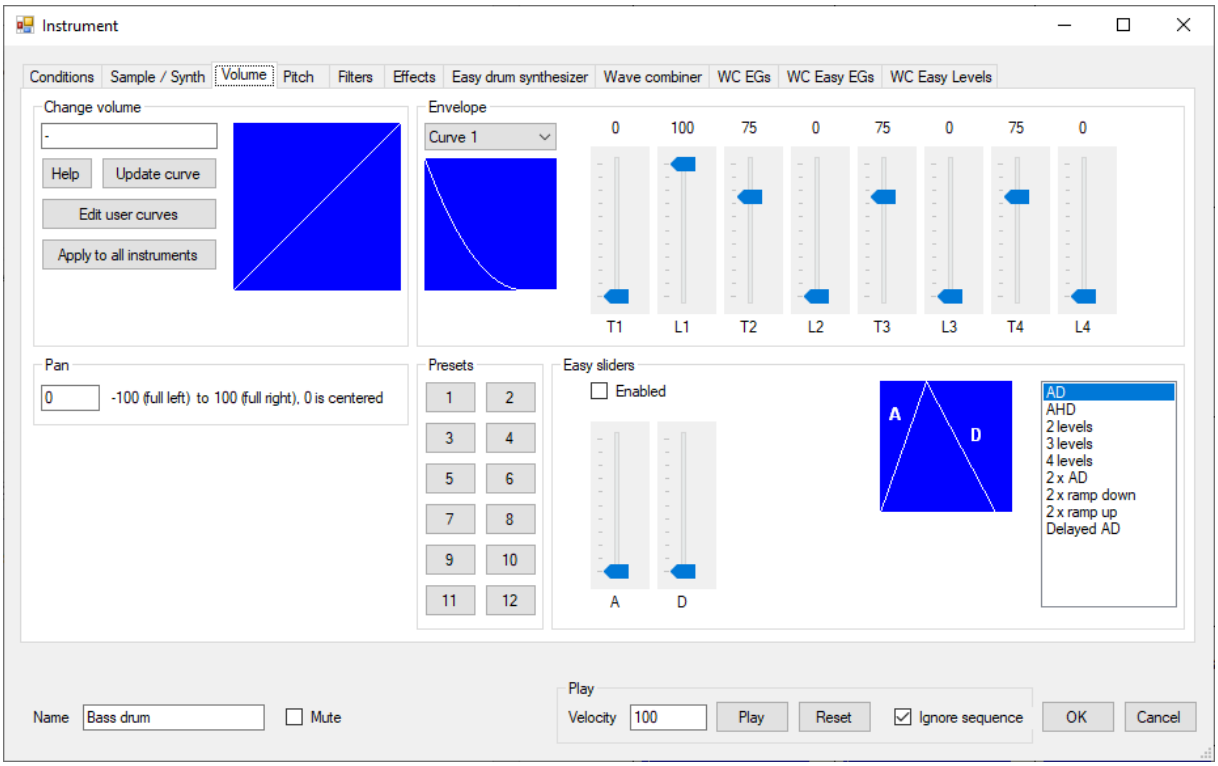
For your convenience there are a lot of ready to use presets (9 complete drum kits) available.

CC1	Crash cymbal 1	CB	Cowbell
CC2	Crash cymbal 2	CL	Claves
SC	Splash cymbal	HT1	High tom 1
RC	Ride cymbal	HT2	High tom 2
OH	Open hi-hat	MT1	Mid tom 1
HH	Closed hi-hat	MT2	Mid tom 2
SD	Snare drum	LT1	Low tom 1
BD	Bass drum	LT2	Low tom 2

Choose a drum kit and click on a preset to load it, but keep in mind that also the envelopes, filters and effects will be changed. Registered users will hear the instrument when they load a preset.

Press the Init button to start from the default settings.
You can save the current sound to an eis (frEDrums Instrument Settings) file by pressing the Save to file button. If the file already exists, a question appears if you want to replace the file. Press the Yes button to overwrite the existing file. Before replacing the file, a backup with the extension .bak will be created. When you overwrite for example Snare_drum_01.eis, there will be a backup created with the name Snare_drum_01_eis.bak. When necessary, you can rename the backup to an eis file.
You can load a frEDrums sound by pressing the Load from file button. Make sure to check that out, for even more sounds than the presets.
Press the Export button to export the current sound to a WAV file.

Volume



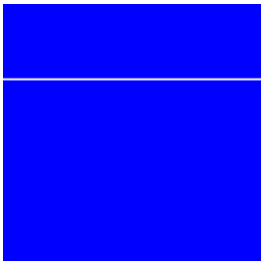
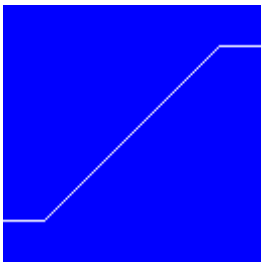
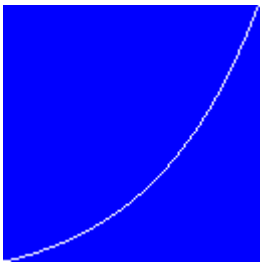
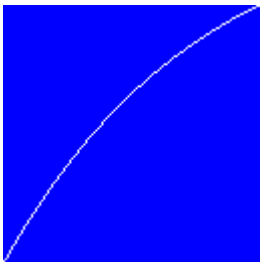
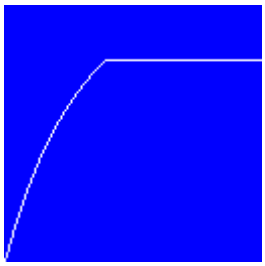
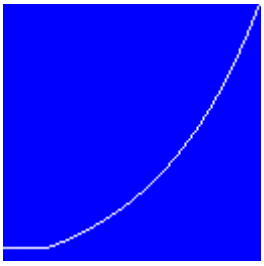
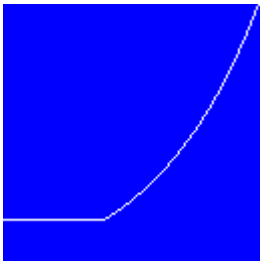
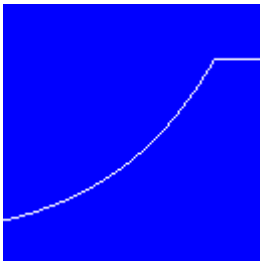
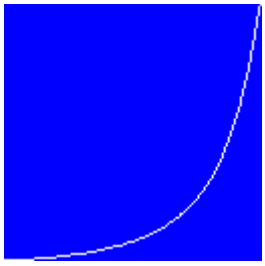
You can change the volume in many different ways. If you press the Help button, you will get the following information.

Syntax:
cv, cv, ... (c = command, v = value)
Max 5 volume changes per instrument

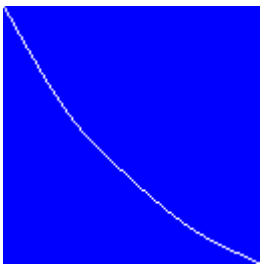
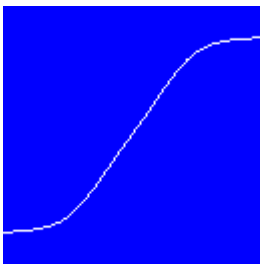
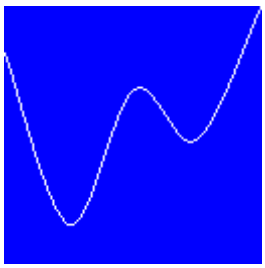
Commands:
= = Sets the volume to the specified value (0-127)
+ = Increases the volume by the specified value
- = Decreases the volume by the specified value
C = Curve 1-9 (7-9 = user curves)
U = Sets the volume to the specified value if it is higher than the specified value
L = Sets the volume to the specified value if it is lower than the specified value
S = Scale to percentage

Examples:
=100 (Sets the volume to 100)
-10, L20 (Decreases the volume by 10 and sets the volume to 20 if it is lower than 20)
S25 (Divides the volume by 4)

The curve is updated automatically, but if you press the Update curve button, you will get also an error message if the entered data is invalid.
The order in which you type the volume changes is important. Here are some examples with the result.

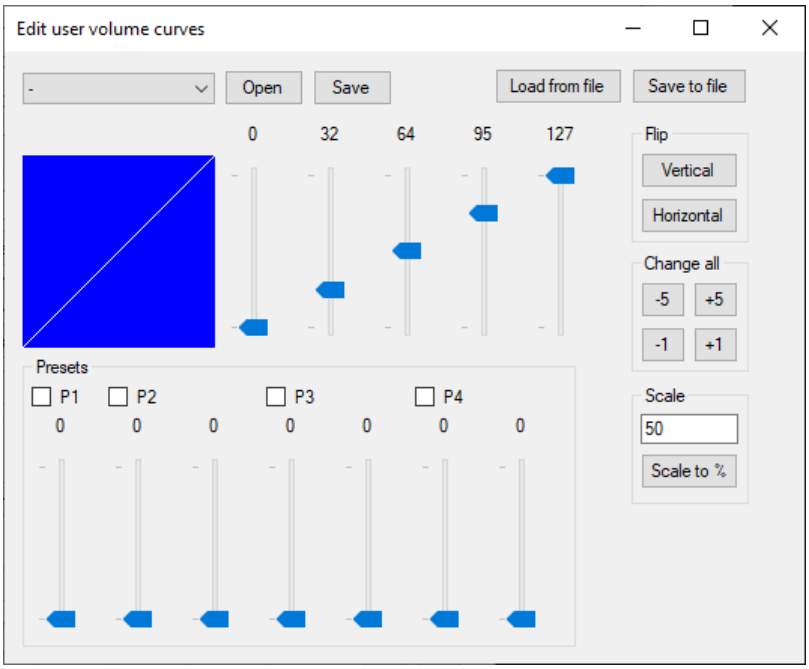
 =90	 -20	 +20	 +20, U100
 L20, U107	 C3	 C5	 C6, U100
 L20, C3	 C3, L20	 C3, +20, U100	 C3, C3

Which curve you need depends mostly on the drum or cymbal, the sample and your playing style. Fill in a hyphen (-), if you don't want to change the volume.
Here are some examples of curves that registered users can create.

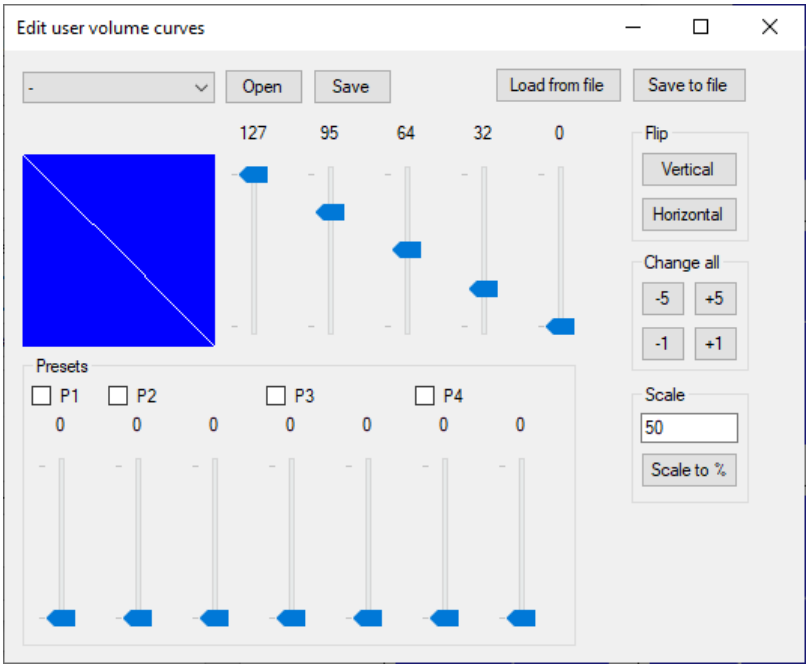
 127, 95, 64, 32, 0	 127, 74, 41, 16, 0	 15, 23, 64, 104, 112	 104, 19, 86, 61, 127

Press the Edit user curves button to edit or create a user curve. Unregistered users can edit a user curve, but the curve can not be saved. If an unregistered user opens an edr file in which user curves are used, the following warning appears:

frEDrums is not registered on this computer. Therefore the user curves will be ignored.



A user curve is defined by 5 points. The horizontal values are always 0, 32, 64, 95 and 127. You can adjust the vertical values (results) with the sliders at the right of the curve. You can move the sliders with the mouse or the keyboard (Up = +1, Down = -1, PgUp = +5, PgDn = -5). On the previous picture you can see that the volume is not changed, because the vertical values are the same as the horizontal values. Take a look at the following picture.

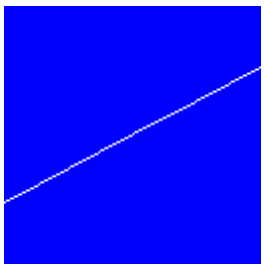
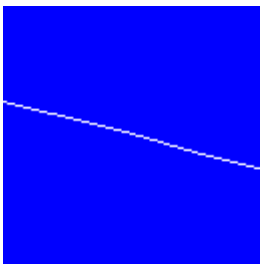
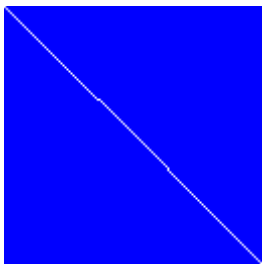
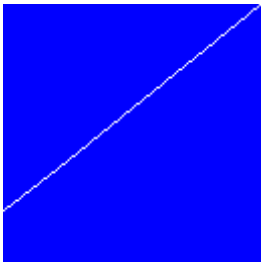
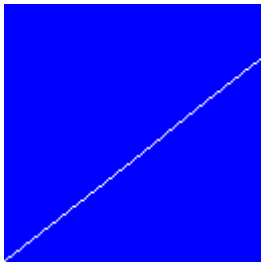
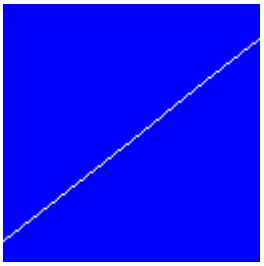
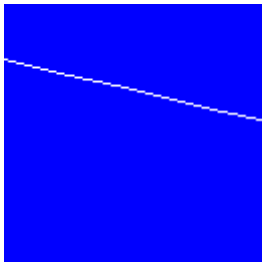
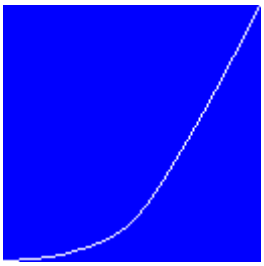
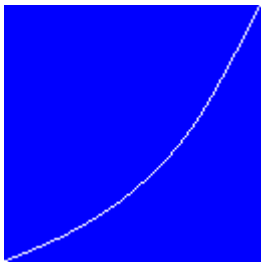
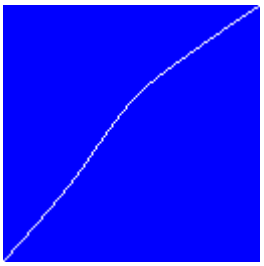
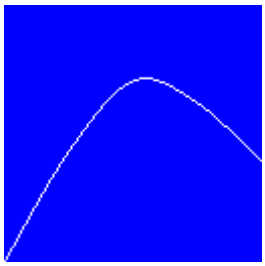
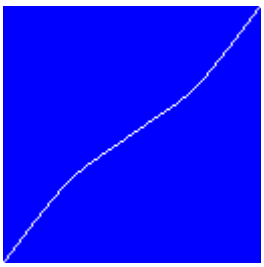
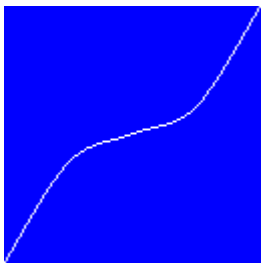
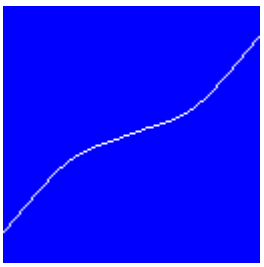
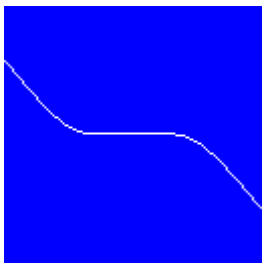


A low value becomes high and a high value becomes low. This means that the harder you hit the drum, the softer the sound will be. By using this curve, you can make smooth transitions between samples. Here is an example. Let's assume that the curve on the previous picture is saved as the user curve 1 (C7).

Instrument 1 Filename: 01_Snare_drum_1 Note numbers: 38 Change volume: C7	Instrument 2 Filename: 01_Snare_drum_2 Note numbers: 38 Change volume: -

If you hit very soft, you will only hear snare drum 1. If you hit normal, you will hear both snare drums. If you hit very hard, you will only hear snare drum 2.

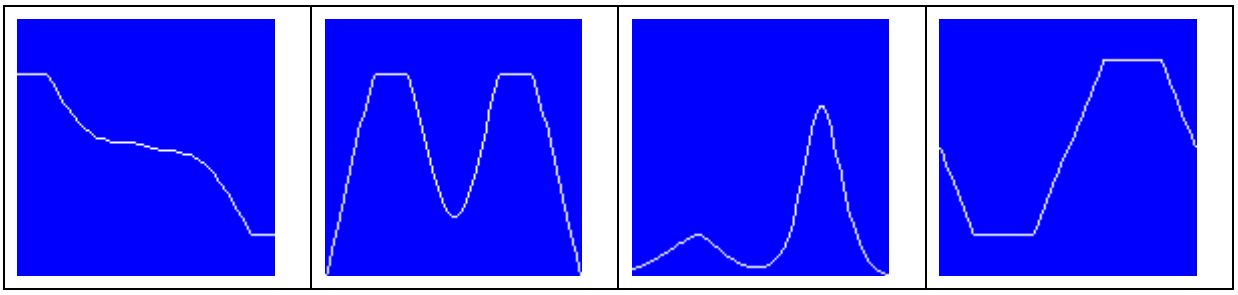
By using the sliders at the right, you can easily make the curve you want. To make it even easier, you can use the presets. There are four presets. Every preset has one or two sliders. To use a preset, it has to be checked. If you want, you can check all boxes. They are just there to prevent accidental changes. By moving a preset slider, the sliders at the right of the curve will move. Here are some examples of what you can do with the different presets.

 P1: 0	 P1: 30	 P1: 80	 P1: 127
 P2: 25, 127	 P2: 0, 100	 P2: 10, 110	 P2: 100, 70
 P3: 20, 127	 P3: 35, 127	 P3: 80, 127	 P3: 90, 50
 P4: 0, 40	 P4: 0, 50	 P4: 15, 50	 P4: 100, 67

You can use the presets also to arrive fast to the kind of curve you want and then adjust the curve a little with the sliders at the right.
You can flip the curve easily by pressing the Vertical button or the Horizontal button. With the buttons under Change all, you can move the curve up or down. If you move the curve too high or too low, the shape of the curve will change.
You can scale to a percentage by filling in a percentage and pressing the “Scale to %” button.

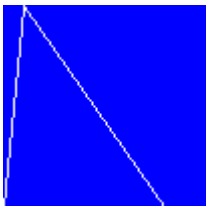
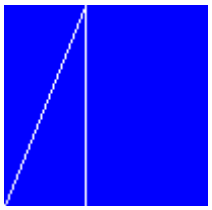
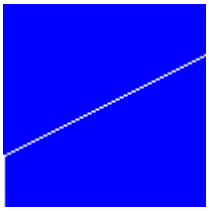
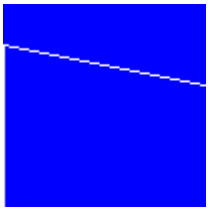
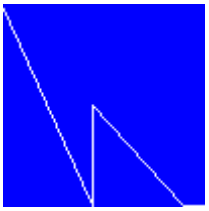
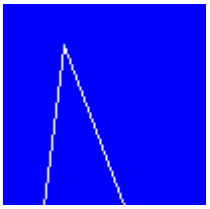
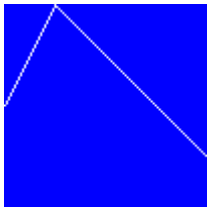
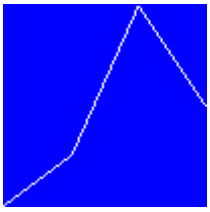
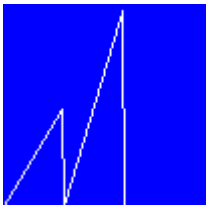
You can save the curve (if you are a registered user) by first selecting a user curve and then pressing the Save button.
You can edit an existing user curve by selecting the curve and then pressing the Open button. By pressing the Save to file button, you can save the curve to a file that you can open by pressing the Load from file button. This is handy when you want to use the same user curve in more edr files.

The user curves can, just like the other curves, be combined with other volume changes. This way you can create the following curves. The examples are a little extreme, but perhaps you will need something like that.



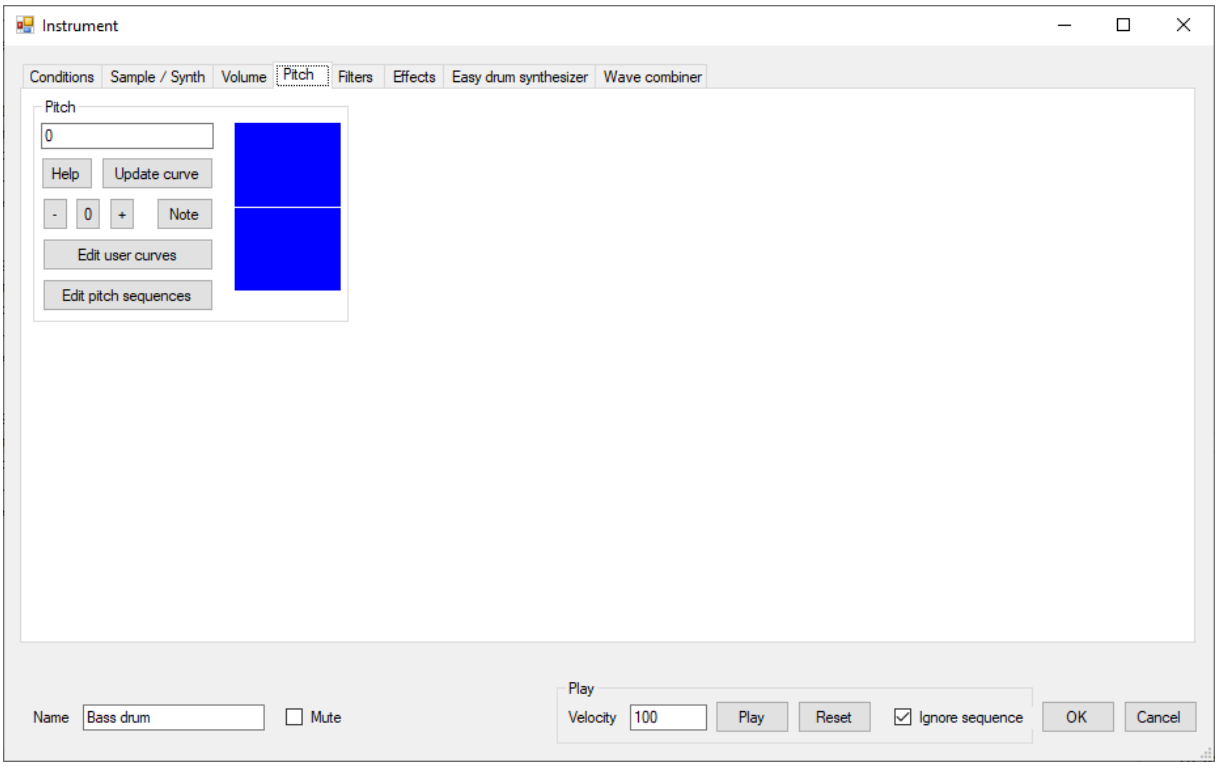
Registered users can press the Apply to all instruments button to set the current volume changes for all instruments.

Registered users can also edit the volume envelope. The envelope works different than the envelopes in most musical instruments. With the sliders at the right of the envelope, you can adjust the envelope. T1 - T4 are points of time as a percentage of the total sample duration. Therefore T2 cannot be lower than T1, T3 cannot be lower than T2 and T4 cannot be lower than T3. When you move a slider, other sliders will move automatically when needed. L1 - L4 are volume levels as a percentage. With the envelope, you cannot make the duration of the sound longer than the duration of the original sample, because T1 - T4 are points on the time line of the sample. It is possible to make the duration of the sound shorter than the duration of the sample. You can do this by setting L4 to 0 and T4 to a value of less than 100.
If T1 is 0, the start volume is L1. If T1 is greater than 0, the start volume is 0. The end volume is L4. Above the picture of the envelope you can select the envelope curve (See chapter Envelope curves). Often you don’t need T4 and L4. In that case you can click with the right mouse button on the picture and choose Copy L3/T3 to L4/T4. It is also possible to copy the settings from a filter.
It is a good idea to try all presets to understand what you can do with the envelope.
To be able to create a complex envelope, there are many sliders. If you want just a simple envelope, it can be unhandy to have all that sliders. Therefore there are even more sliders available, but these sliders are very handy and control all the envelope sliders. With only a few sliders, you can create very fast and easy a simple envelope. To use the easy sliders, you must enable the Enabled checkbox. This is to prevent accidental changes. Here are some examples of what you can do with the sliders.

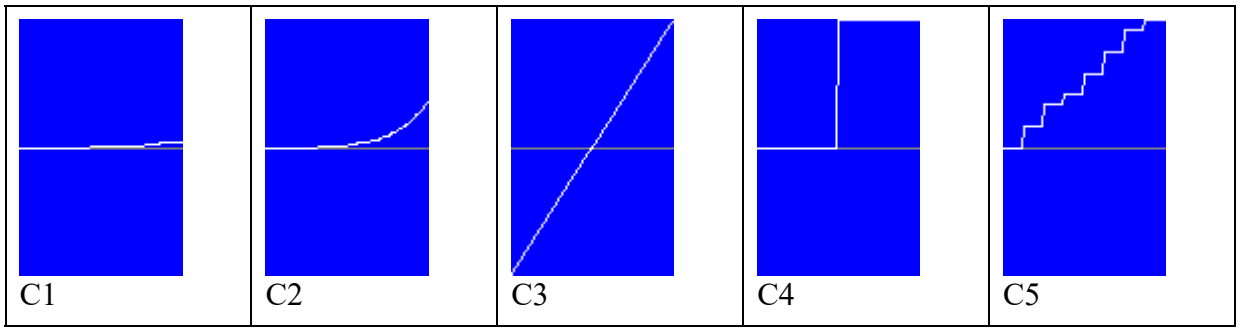
 AD: A (0), D (40)	 AD: A (0), D (100)	 AD: A (10), D (70)	 AD: A (40), D (0)
 2 levels: 1 (100), 2 (0)	 2 levels: 1 (0), 2 (100)	 2 levels: 1 (25), 2 (75)	 2 levels: 1 (80), 2 (60)
 2 x ramp down: 1 (100), D (60), 2 (50)	 2 x ramp down: 1 (100), D (90), 2 (50)	 AHD: A (30), H (20), D (10), L (70)	 Delayed AD: T (20), A (10), D (30), L (80)
 3 levels: 1 (50), T (25), 2 (100), 3 (25)	 4 levels: 1 (0), 2 (25), 3 (100), 4 (50)	 2 x ramp up: A (60), 1 (50), 2 (100)	

With Pan you can control the balance between left and right (0 = centre, -100 = full left, 100 = full right). Keep in mind that the original balance of a sample is not always centre, so even when Pan has a value of 0, it can be that you hear the sound more left or right. Also think of the following. A floor tom is often located at the right, so the drummer wants to hear it at the right, but the audience expects to hear it at the left.

Pitch

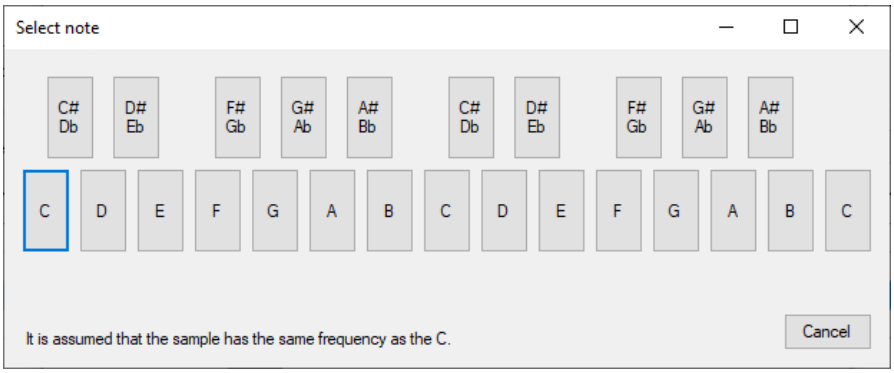


If you want for example to tune the toms, you can change the Pitch value. 0 is the normal pitch of the sample. 100 makes the frequency one octave higher and -100 makes the frequency one octave lower. Registered users can immediately hear how it sounds by pressing the Play button.
It is also possible to make the pitch dependent on the velocity (how hard you hit the drum), by filling in a curve (C followed by the number of the curve). The curve is updated automatically, but if you press the Update curve button, you will get also an error message if the entered data is invalid. The curve C1 is very nice when you want the pitch to become a little higher when you hit the drums hard.
Here you can see most of the curves that you can use.

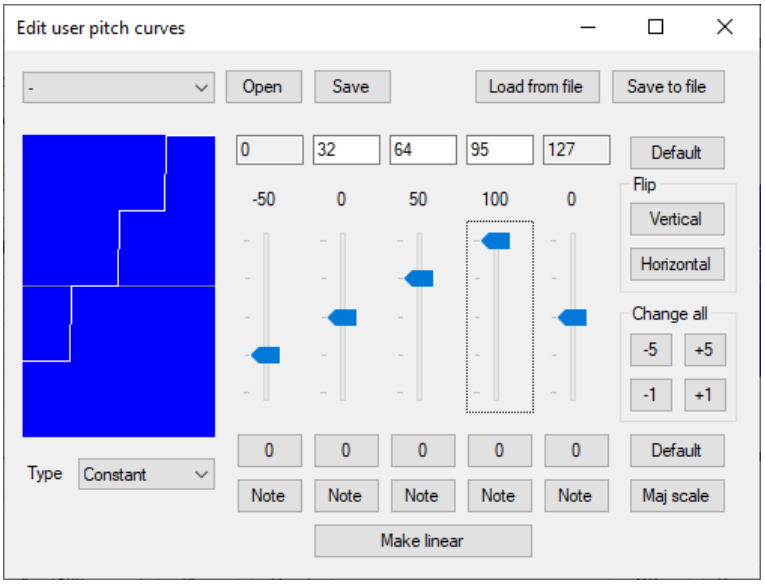


Under the edit field, there are 3 handy buttons. Press the 0 button to set the pitch to 0. Press the + button to increase the pitch to the next note on the major scale. This is very useful when you want to use your drums as a melodic instrument. Press the - button to decrease the pitch to the previous note on the major scale. Registered users will hear the sound when 0, + or - is pressed.

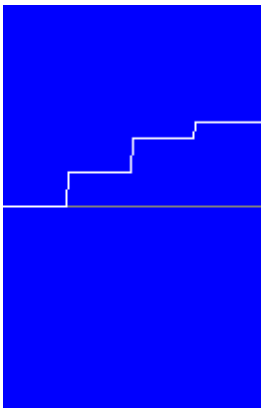
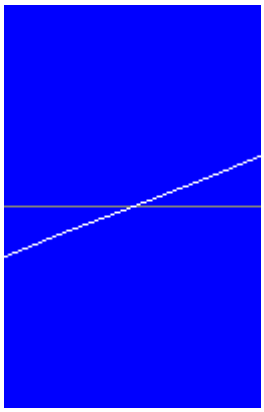
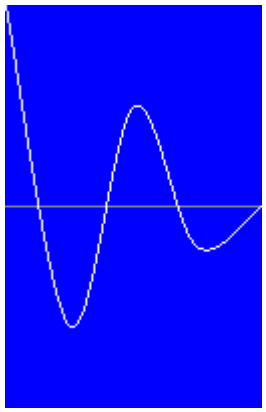
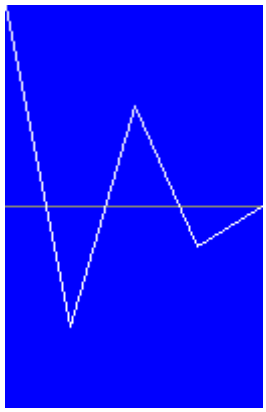
With curve C5, you can play notes that are on a major scale, depending on how hard you hit the drum. When you use this curve, it is best to set the volume to a constant level.
If you press the Note button, there appears a piano keyboard, from which you can select a note. When the original sample has not the same frequency as the C, the notes are transposed.



Registered users can create user pitch curves by pressing the Edit user curves button.



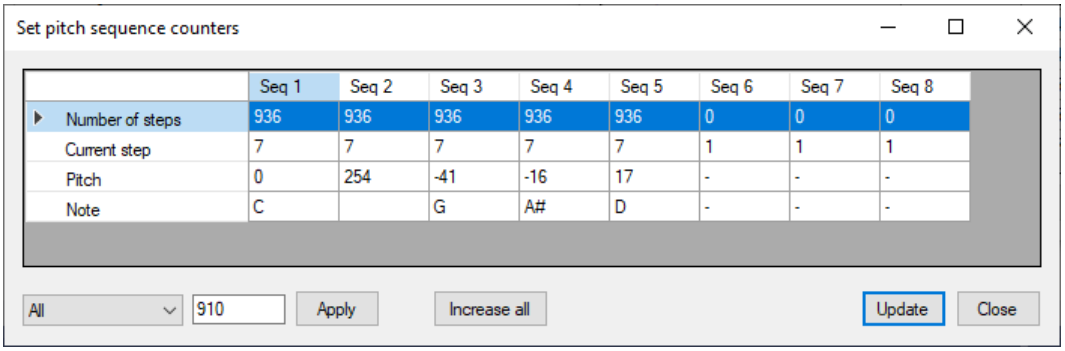
A user curve is defined by 5 points. The horizontal values are by default 0, 32, 64, 95 and 127, but if you like, you can change 3 of them a little (min: -10, max: +10). Press the Default button to set the default values. You can adjust the vertical values (results) with the sliders at the right of the curve. You can move the sliders with the mouse or the keyboard (Up = +1, Down = -1, PgUp = +5, PgDn = -5). You can set a value easily to 0 by pressing the corresponding 0 button. You can set all the values to 0, by pressing the Default button at the right of the 0 buttons. Press a Note button to select a note from a piano keyboard,
There are 3 possible curve types (Constant, Linear and Smooth). Here are some examples of curves that you can create. The horizontal values for the examples are set to default.

			
Constant 0, 17, 34, 42, 59	Linear -25, -12, 0, 12, 25	Smooth 100, -60, 50, -20, 0	Linear 100, -60, 50, -20, 0

You can flip the curve easily by pressing the Vertical button or the Horizontal button. With the buttons under Change all, you can move the curve up or down. If you move the curve too high or too low, the shape of the curve will change.
You can create a linear line from the first value to the last value by pressing the Make linear button.
You can set the values to the first part of a major scale by pressing the Maj scale button.

You can save the curve (if you are a registered user) by first selecting a user curve and then pressing the Save button.
You can edit an existing user curve by selecting the curve and then pressing the Open button.
By pressing the Save to file button, you can save the curve to a file that you can open by pressing the Load from file button. This is handy when you want to use the same user curve in more edr files.

Registered users can create 8 different pitch sequences (S1 - S8). With the pitch sequencers, you can create complete songs with drums, bass, piano etc. Unregistered users can play along with the included songs.
The pitch sequences can be used in two different ways. You can start them from the main form by pressing the Start button on the Play tab and play along with it. Press the Stop button to stop the sequences. When you press again the Start button, the song will continue from where it stopped. Press the Reset button if you want to start from the beginning.
By pressing the Set button, you can set the current step of all pitch sequence counters

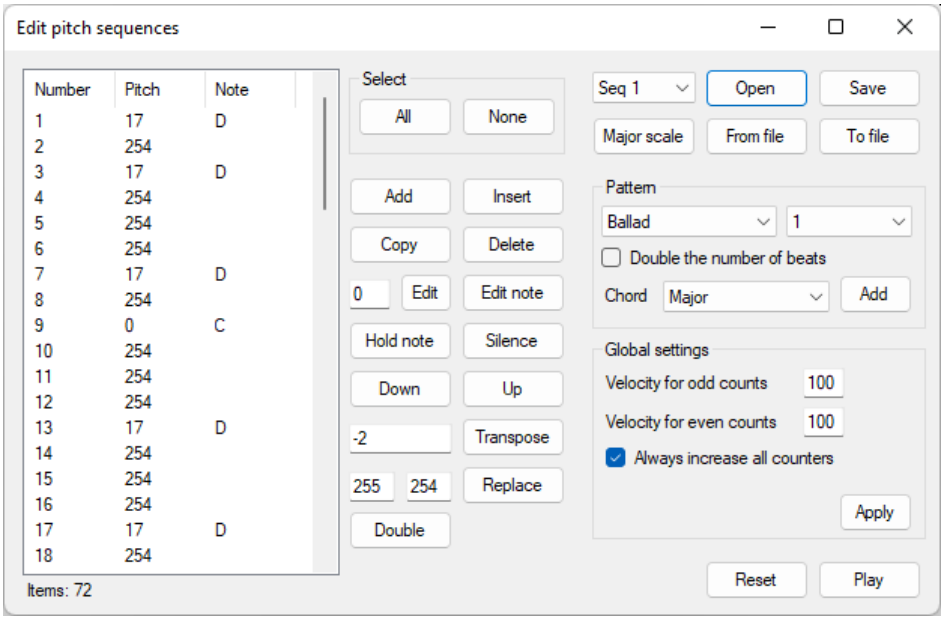


You can also set the counters while a song is playing. Choose the sequence(s) that you want to set, fill in the step number and press the Apply button. For a song, you should set all

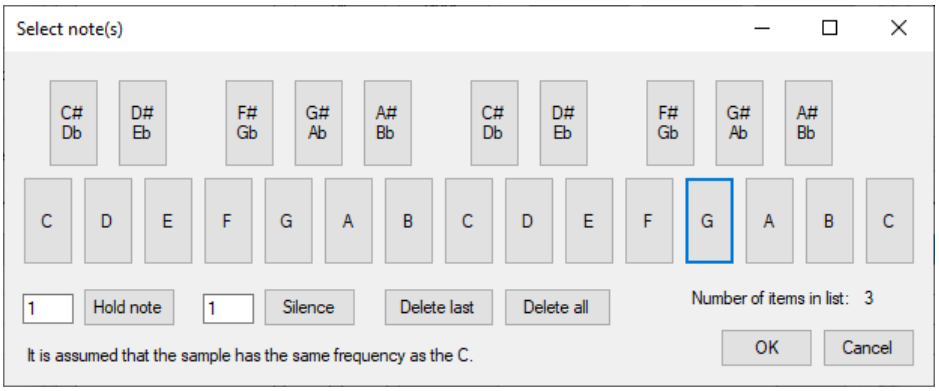
sequence counters to the same value. If for a sequence the value is higher than the number of steps, it will be corrected. When a song is playing, the current step values are updated automatically. The values are not updated when the song is controlled by the drums. In that case you can press the Update button.

Press the Sync Start button to start the sequences from the beginning when you hit a drum. When the Loop option is enabled, the song will be repeated until you press the Stop button. The second way to use the pitch sequencers is by playing the drums without starting the sequencers. In that case the song is following your tempo and dynamics. If you slow down, the songs plays slower and if you play loud, the song plays loud. For the included songs it is important to hit the hi-hat or the crash cymbal continuously, since these instruments are used to determine the tempo and velocity. With every hit on the hi-hat or crash cymbal, the sequencers go to the next step. Feel free to use other instruments to control the songs, by changing the MIDI note numbers. For a song, all pitch sequences should have the same number of steps.

Press the Edit pitch sequences button to edit or create a pitch sequence.



Press the Add button or the Insert button to add notes. The difference between Insert and Add is that for Insert there has to be first one row selected where the notes will be inserted and when using Add, the notes will be added at the end of the list.



Press the notes that you want to add and press the OK button when you are ready.
When pressing the note buttons, you will hear the current sample from the Instrument form.
To hold (254) a note during more steps, set the number of extra steps and press the Hold note button. Use the Silence button to add a rest (255). When you have made a mistake you can delete the last item in the list by pressing the Delete last button or you can delete all items by pressing the Delete all button. It is handy to practice first, delete all notes and then create the sequence or a part of it. It is no real-time recording. Before creating a song, it is important to determine which note correspond with one step. The sequencers don't work with a time signature, but they just play step by step. For example, the included song "To Zeibekiko tis Evdokias" has 9 beats per measure and is mostly written in 9/4.

To copy items (notes and/or rests), select first the items in the list and then press the Copy button. The question "Insert copy after selection?" will appear. If you answer Yes, the copied items will be inserted after the selection. If you answer No, the copied items will be added at the end of the list.
You can select a range by first clicking with the left mouse button on the start of the range and then holding the Shift key and clicking with the left mouse button on the end of the range. By holding the Ctrl key, you can add/remove with the left mouse button more items to/from the selection. Press the All button to select all items and the None button to deselect all items.

To delete items (notes and/or rests), select the items in the list, press the Delete button and press the Yes button.

To edit items, select the items in the list, set the pitch value and press the Edit button. You can also press the Edit note button, if you want to select a note from a piano keyboard. Press Hold note to change the selected items to a hold or press Silence to change the selected items to a rest.

Use the Down and Up buttons to move one selected item down or up in the list.

To transpose notes, select the notes, set the number of semitones (preceded by - to transpose down), Press the Transpose button and press the Yes button. Only pitch values that correspond with a musical note, will be transposed. If the result of a note is out of the possible pitch range, it will be transposed one octave up or down.

To find and replace pitch values, select the items in the list, set the value to find and the replacing value, press the Replace button and press the Yes button.

By pressing the Double button, you can double the number of beats.

You can save the sequence by first selecting a sequence number and then pressing the Save button.
You can edit an existing sequence by selecting the sequence number and then pressing the Open button.
By pressing the To file button, you can save the sequence to a file that you can open by pressing the From file button. This is handy when you want to use the same sequence curve in more edr files.

Press the Major scale button to load the C major scale over 2 octaves.

To add an accompaniment pattern at the end of the list, choose a rhythm and a variation, select the chord type, press the Add button and select the root note of the chord. Depending on the song, you might need to enable “Double the number of beats”, before pressing Add. As the patterns often don’t use the third note of the scale, there is not always a difference between the pattern for a major chord and the pattern for a minor chord.

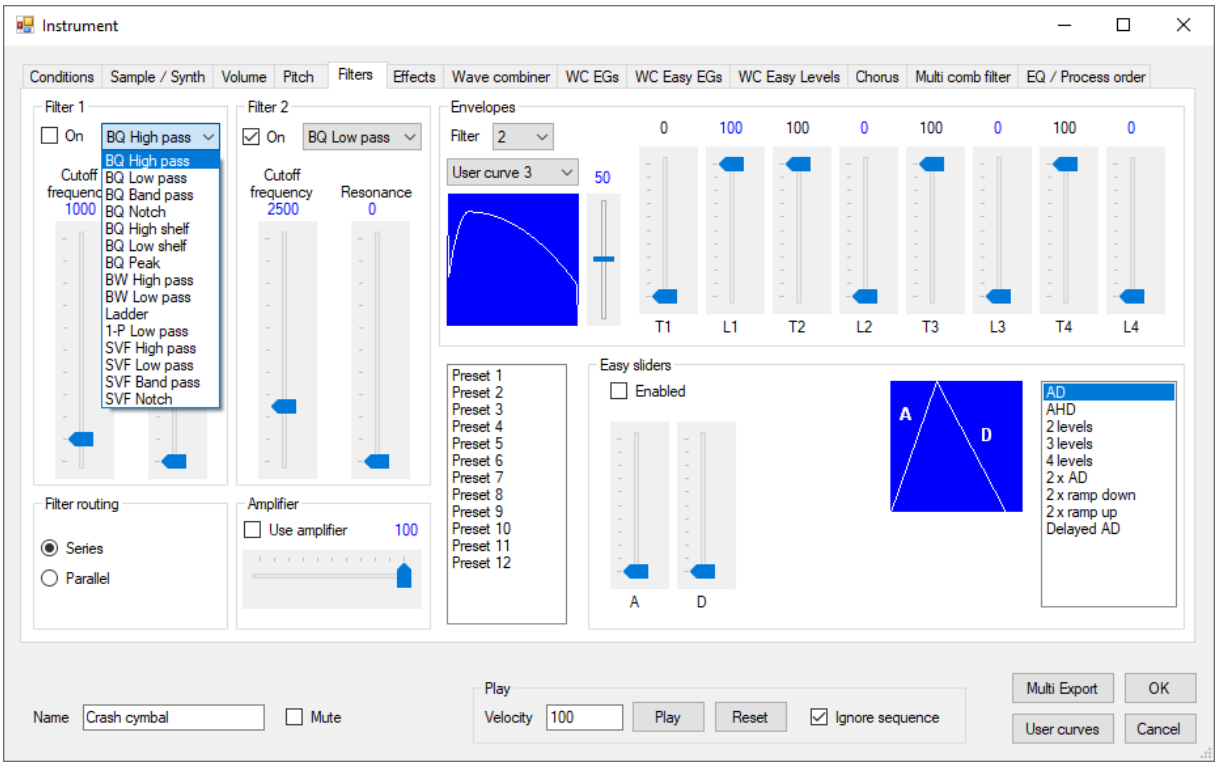
The global settings are the same for all pitch sequencers. After making changes to these settings, you need to press the Apply button.

For the volume of the sequences, two values are used (Velocity for odd counts and Velocity for even counts). You can set the same value for both, but it can be nice to have for example little accents on the odd counts. These settings are ignored when the sequences are controlled by the drums.

Enable “Always increase all counters” when you want to increase the counters of all pitch sequencers, when one instruments with a sequence is triggered. When more sequencers are triggered at the same time, the counters will not increase more than one step.
Sequencers can be also used to make the sound of an instrument more random and thus more human by slightly changing the frequency with every hit. In that case, it is best to disable “Always increase all counters”.

By pressing the Play button, you can hear the current sequence step by step. Press the Reset button to start from the beginning. Select an item in the list and press the Play button to start from that point.

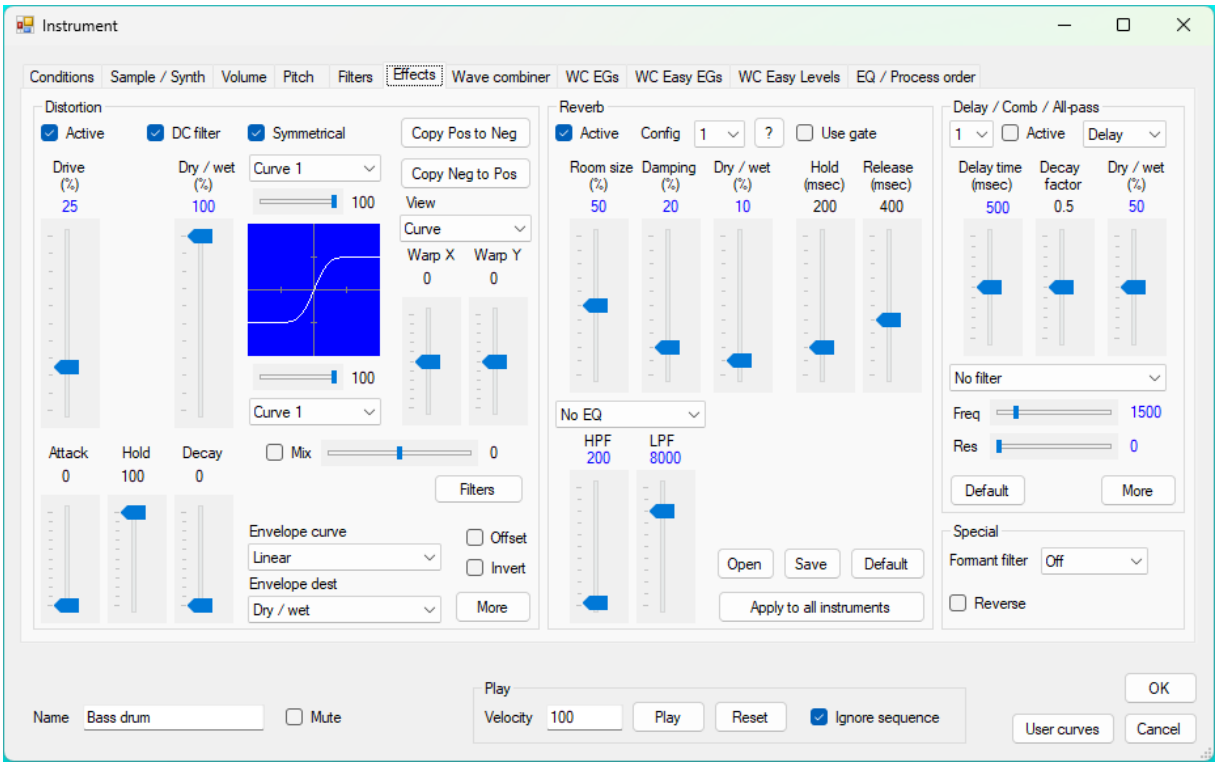
Filters



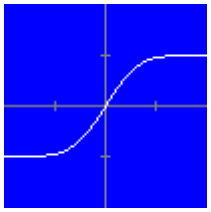
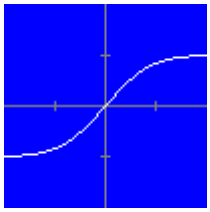
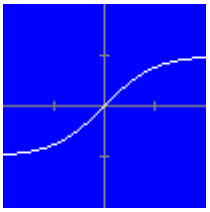
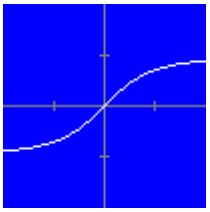
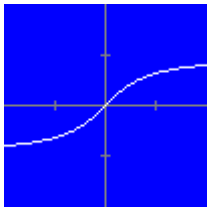
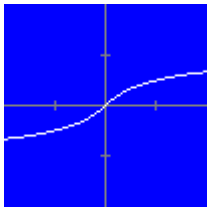
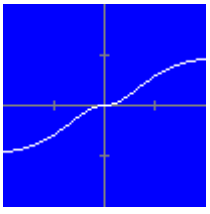
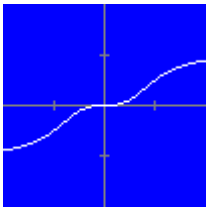
There are two main filters available. The filter type of each filter can be set to high pass, low pass, band pass, notch, high shelf, low shelf, peak, ladder or 1 pole low pass. (BQ = Biquad, BW = Butterworth, SVF = State Variable Filter). Both filters have their own envelope generator. The envelope works different than the envelopes in most musical instruments. With the sliders at the right of the envelope, you can adjust the envelope. T1 - T4 are points of time as a percentage of the total sample duration. Therefore T2 cannot be lower than T1, T3 cannot be lower than T2 and T4 cannot be lower than T3. When you move a slider, other sliders will move automatically when needed. L1 - L4 are frequency levels as a percentage of the cutoff frequency. If T1 is 0, the start frequency is L1. If T1 is greater than 0, the start frequency is 0. The end frequency is L4. Above the picture of the envelope you can select the envelope curve (See chapter Envelope curves). Often you don't need T4 and L4. In that case you can click with the right mouse button on the picture and choose Copy L3/T3 to L4/T4. It is also possible to copy the settings from the volume envelope.
It is a good idea to try all presets to understand what you can do with the envelope.
To be able to create a complex envelope, there are many sliders. If you want just a simple envelope, it can be unhandy to have all that sliders. Therefore there are even more sliders available, but these sliders are very handy and control all the envelope sliders. With only a few sliders, you can create very fast and easy a simple envelope. The easy sliders for a filter envelope work the same as the easy sliders for the volume envelope. Take a look at the Volumes section earlier in this chapter to see some examples.
The filters can be in series or parallel. When the filters are in series, the signal goes into filter 1, the output of filter 1 goes into filter 2 and the output of filter 2 is the result after filtering. When the filters are parallel, the signal goes into both filters and the result is the mix of both filter outputs.
After filtering, a sound can become very soft. Enable the amplifier and set the volume to make it louder.

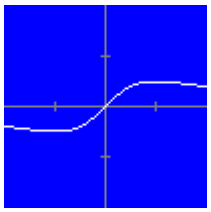
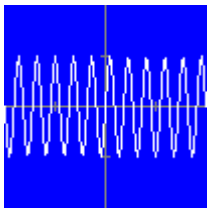
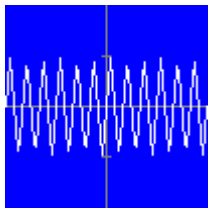
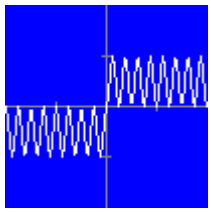
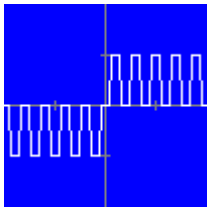
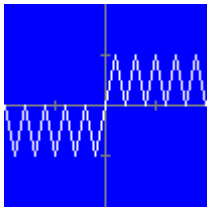
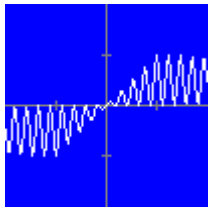
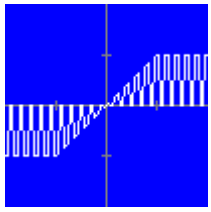
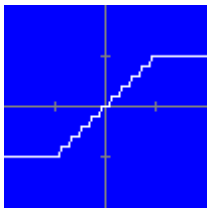
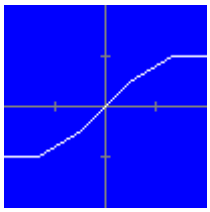
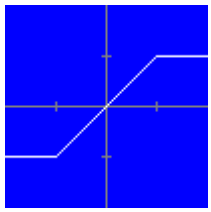
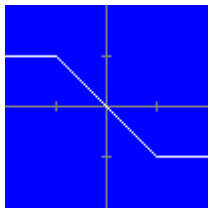
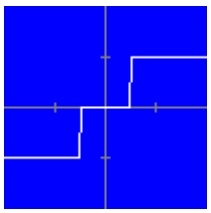
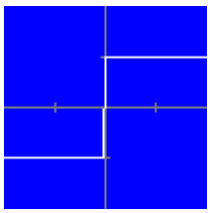
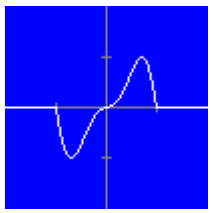
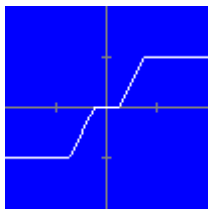
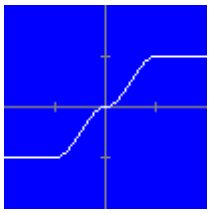
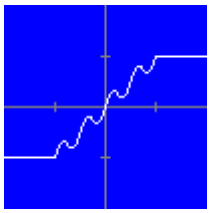
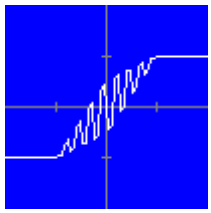
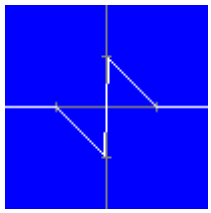
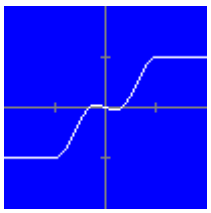
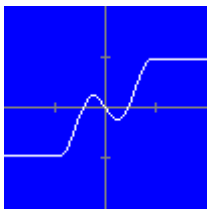
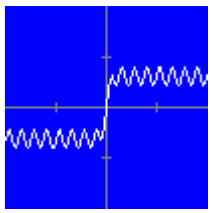
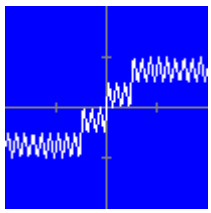
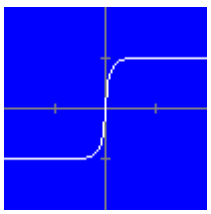
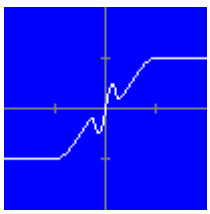
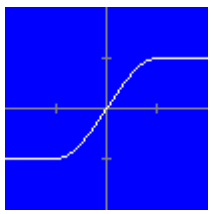
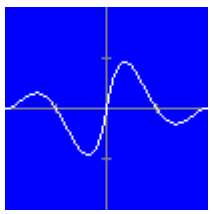
There are many more filters available in frEDrums.
For every Wave combiner oscillator you can set a filter (Low pass, High pass, Band pass, Notch, Ladder and LP 1P) with Command 3. With the Command 3 parameters you can modulate not only the frequency, but also the resonance. It is also possible to filter only a part of the oscillator waveform. In the Wave combiner there is also an extra filter available to filter one carrier or all of them.
For the effects Distortion, Reverb and Delay there are filters available.
In the Equaliser (EQ) there are 10 filters available. For an EQ, the type is mostly set to Peak filter, but you can change the filter type, frequency etc. It is even possible to modulate the frequency, resonance, gain or bandwidth by using the Wave combiner envelopes.

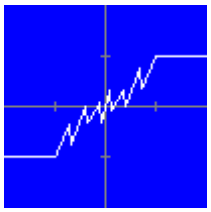
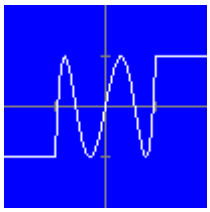
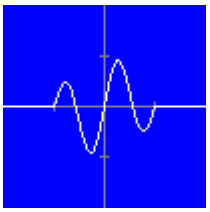
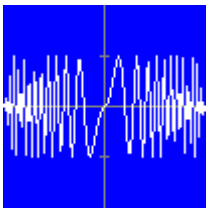
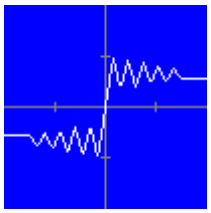
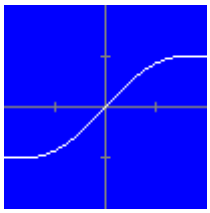
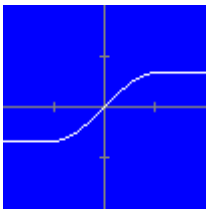
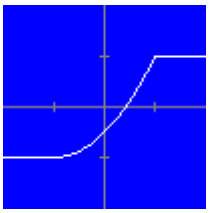
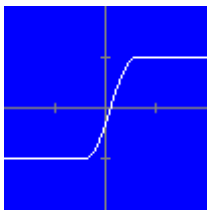
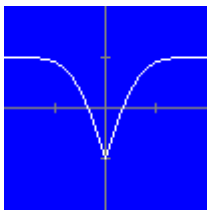
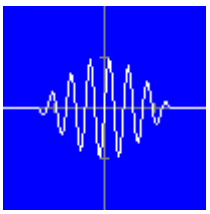
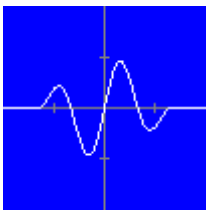
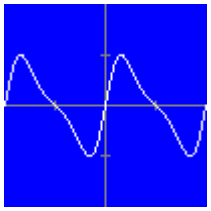
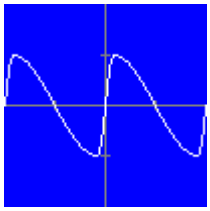
Effects



Use the Distortion effect to make the sound distorted. The Drive parameter(s) control how much the signal is amplified before distorting. If the Dry / wet percentage is 100%, you will only hear the distortion. If the Dry / wet percentage is 0%, you will only hear the dry (unprocessed) sound. You can try different distortion curves to see what you like best. Disable Symmetrical to make an asymmetrical curve. With the curve selector above the picture, you choose the curve for the positive part of the transfer function (right side) and with the curve selector below the picture, you choose the curve for the negative part (left side). Here is an overview of the available curves.

 Curve 1 *	 Curve 2	 Curve 3	 Curve 4
 Curve 5	 Curve 6	 Curve 7	 Curve 8

 Curve 9 *	 Curve 10 *	 Curve 11 *	 Curve 12 *
 Curve 13 *	 Curve 14 *	 Curve 15 *	 Curve 16 *
 Curve 17 *	 Curve 18 *	 Curve 19 *	 Curve 20
 Curve 21	 Curve 22	 Curve 23 *	 Curve 24
 Curve 25	 Curve 26 *	 Curve 27 *	 Curve 28
 Curve 29	 Curve 30	 Curve 31 *	 Curve 32 *
 Curve 33 *	 Curve 34 *	 Curve 35 *	 Curve 36

 Curve 37 *	 Curve 38 * Polynomial (order 2-11)	 Curve 39 *	 Curve 40 *
 Curve 41 *	 Curve 42 *	 Curve 43	 Curve 44 (asym) *
 Curve 45 (asym) *	 Curve 46 (asym) *	 Curve 47 *	 Curve 48 *
 Curve 49 *	 Curve 50 *	User curve 1 User curve 2	

* There is a parameter available for this curve that you can change with a small slider.

Keep in mind that some distortion settings can cause a DC offset. In that case you must change the settings or enable the DC filter.

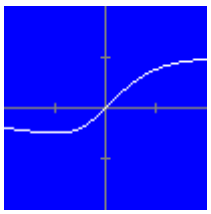
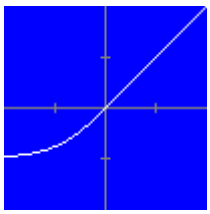
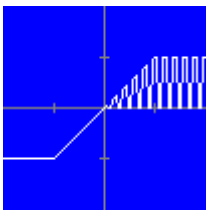
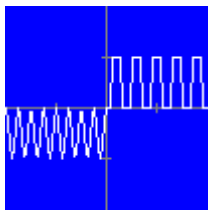
You can also select a curve by clicking on the picture.

Top left (positive part) Left mouse button = Previous curve Right mouse button = First curve	**Top right (positive part)** Left mouse button = Next curve Right mouse button = Last curve
Bottom left (negative part) Left mouse button = Previous curve Right mouse button = First curve	**Bottom right (negative part)** Left mouse button = Next curve Right mouse button = Last curve

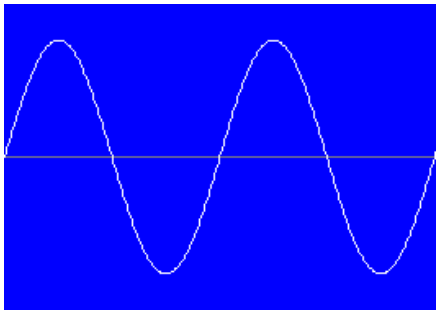
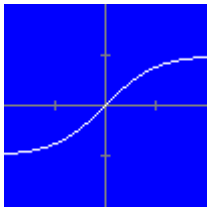
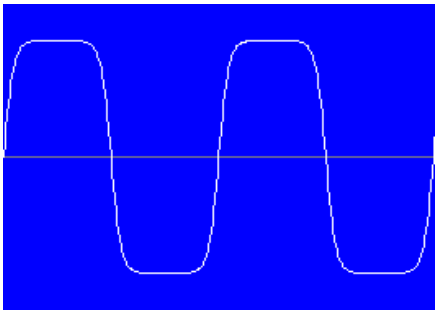
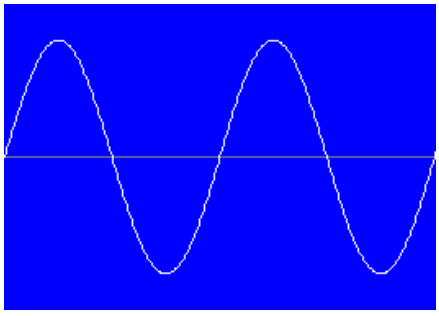
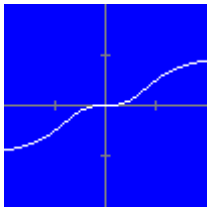
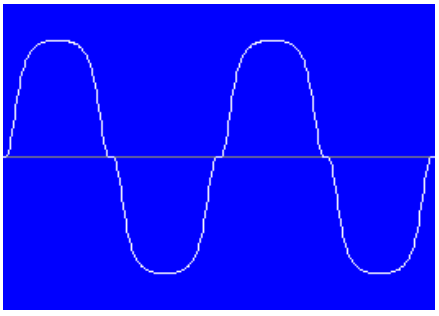
Select the Curve detail view to see the curve in more detail. When you select Curve & Result, you will see the result of a sine wave (without drive) that is processed only by the curve. In that case the curve is displayed in gray.

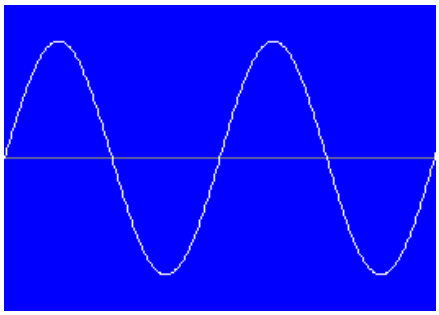
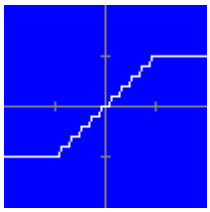
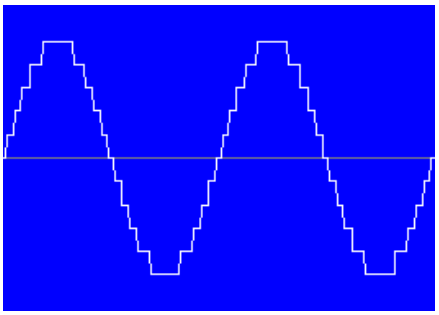
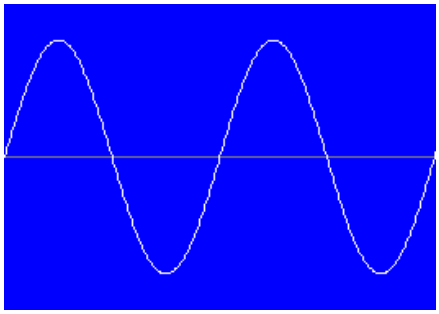
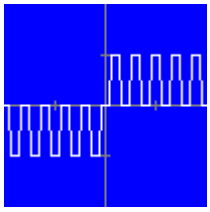
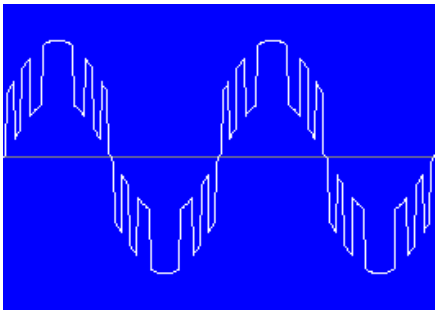
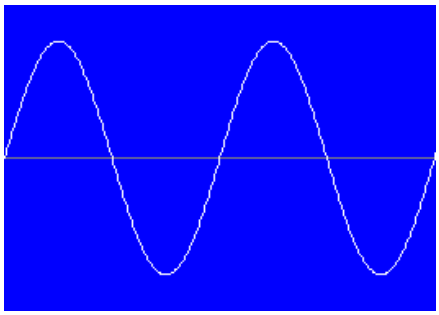
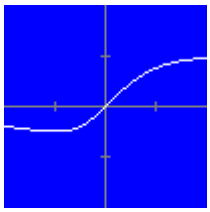
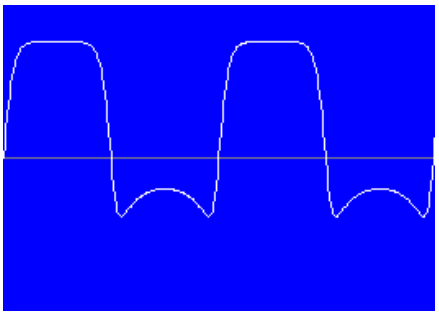
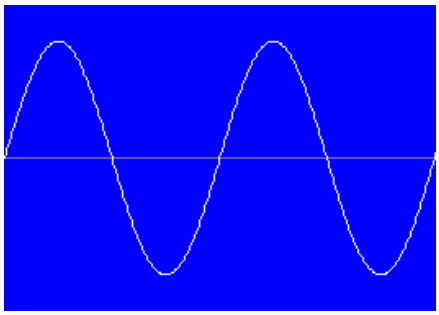
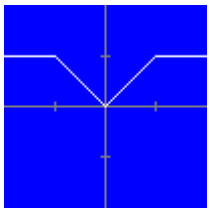
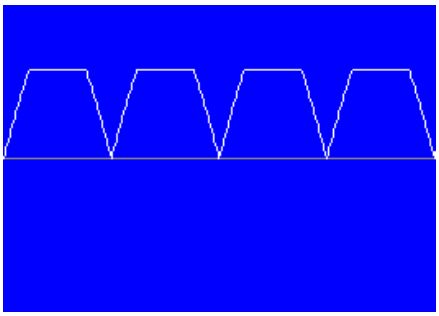
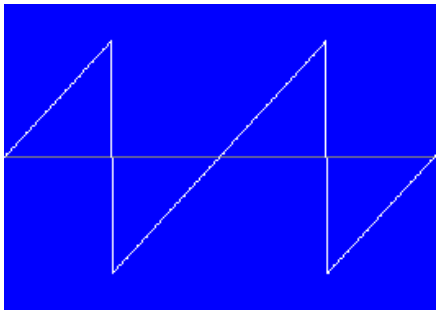
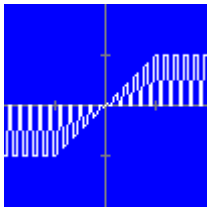
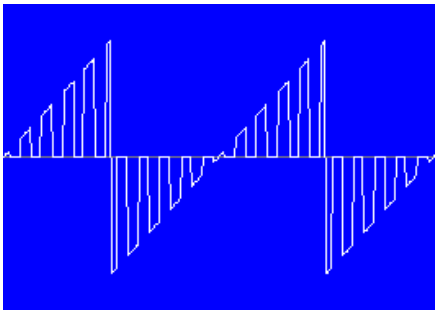
You can also create your own distortion curve by pressing the User curves button.
Choose first if you want to create (or edit) User curve 1 or User curve 2. Depending on the chosen curve on the Instrument form, the curve is interpreted symmetrical or asymmetrical. When a curve is set to “User c1 (asym)” or “User c2 (asym)”, the curve is interpreted asymmetrical, even if Symmetrical is enabled. Therefore it is also possible to mix two asymmetrical curves. If a user curve is interpreted symmetrical, the curve is flipped horizontally and vertically for negative input values. You can also make an asymmetrical user curve with User curve 1 and User curve 2 combined (for example curve 1 for the positive values and curve 2 for the negative values). Of course you can also combine a user curve with a preset curve. See the “User curves” chapter for much more information.

Here are some examples of combined curves.

 Curve 3 / Curve 9	 No distortion / Curve 3	 Curve 16 / Curve 19	 Curve 13 / Curve 12

Here are some examples of the effect of the distortion curve (Warp X = 0, Warp Y = 0).

Input	Distortion curve	Output
	 Curve 3 Drive = 50% Dry / wet = 100%	
	 Curve 8 Drive = 30% Dry / wet = 100%	

	 Curve 17 Parameter = 50 Drive = 0% Dry / wet = 100%	
	 Curve 13 Parameter = 50 Drive = 0% Dry / wet = 50%	
	 Curve 3 / 9 Drive = 50% Dry / wet = 100%	
	 Curve 19 / 20 Drive = 10% Dry / wet = 100%	
	 Curve 16 Parameter = 50 Drive = 0% Dry / wet = 100%	

Warp X controls the shape of the input signal to the transfer curve (0 = no change). Warp Y controls the shape of the output signal from the transfer curve (0 = no change).

With the envelope you can control the dry / wet mix, the drive, the parameter, the warp settings and the bias (or mix in symmetrical mode). The values of Attack, Hold and Decay are percentages of the total sound duration. The sum of the three percentages cannot be higher than 100. The values are automatically corrected.

Attack is the time that it takes to go from 0 to the value that is set by the destination parameter.

Hold is the time that the value stays at the level that is set by the destination parameter.

Decay is the time that it takes to go from the value that is set by the destination parameter to 0.

You can offset the envelope by enabling the Offset option. In that case the minimum value is 50% (instead of 0%) and the maximum value is 100%.
You can invert the envelope by enabling the Invert option.
If you want the distortion during the whole sound, use the following setting:
Envelope dest: Dry/wet, Attack = 0, Hold = 100, Decay = 0, Do not invert the envelope

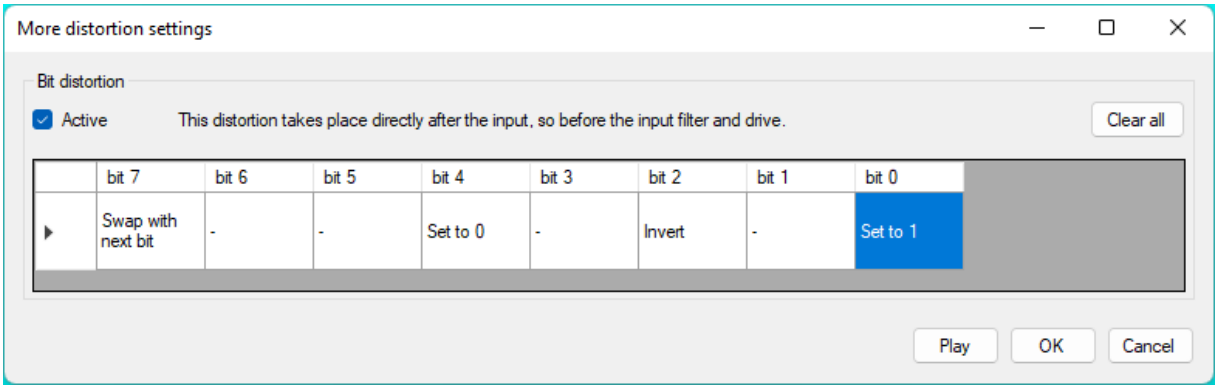
In symmetrical mode you can mix two distortion curves by enabling the Mix option. If the Mix slider value is -100, only the first curve is used. The first curve is the curve that in asymmetrical mode is used for the positive values (when bias is 0). If the Mix slider value is 100, only the second curve is used. You can smoothly morph between the two curves (also with the envelope).
In asymmetrical mode, normally the first curve is used for the positive input values and the second curve is used for the negative input values. Enable the Bias option and move the Bias slider to create an offset.

Press the Filters button to adjust the filter before the distortion (but after the bit distortion) and the filter after the distortion.

The filters influence only the distorted (wet) sound. You can press the Play button or press the Ctrl and Shift keys simultaneously to hear the result.

More distortion settings

Press the More button for additional distortion settings.



Bit distortion takes place directly after the input, so before the input filter and drive. When Bit distortion is enabled (Active), the input signal is converted to 8-bits. This might give already some distortion, even when there is no bit change command active. You can browse through the commands by clicking in the cell under the bit that you want to change. For fast editing the following hotkeys are available:

- = No change, I = Invert, 0 = Set to 0, 1 = Set to 1, S = Swap with next bit

Press the Clear all button if you want no change command to be active.
Here is an overview of the commands.

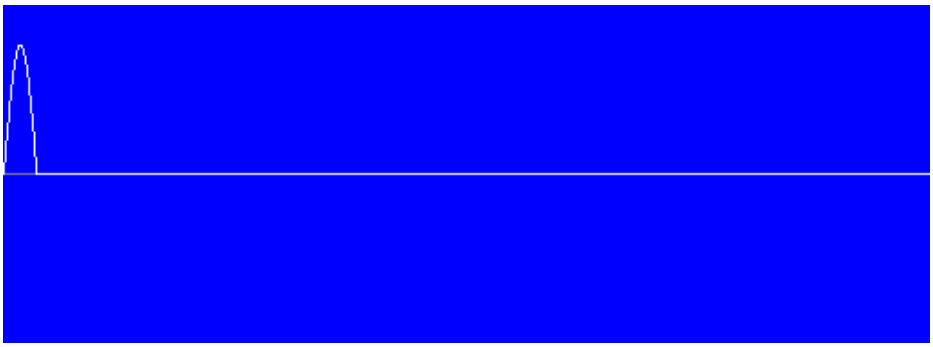
Command	Description
Invert	Inverts the bit, so True becomes False and False becomes True.
Set to 0	Sets the bit to False.
Set to 1	Sets the bit to True.
Swap with next bit	Swaps the value of the bit with the value of the next (from left to right) bit. If you set this command for bit 0, the value of bit 0 will be swapped with the value of bit 7.

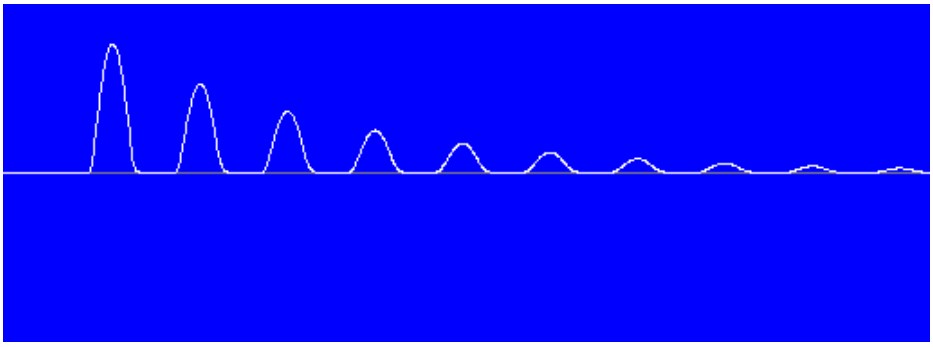
The swap commands are executed from left to right after the other commands.

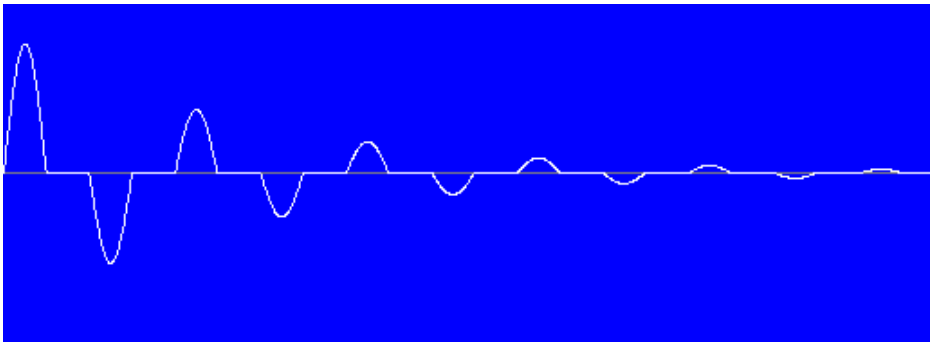
If you want only bit distortion, you can do the following:

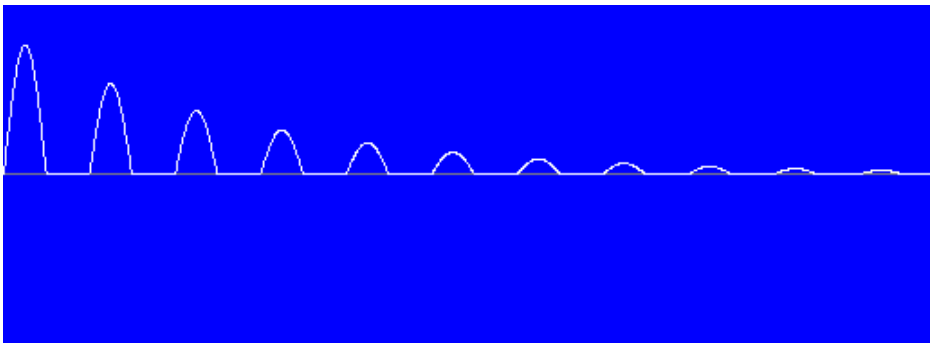
- Enable Symmetrical
- Disable the distortion filters
- Set Drive to 0%
- Set Dry / wet to 100%
- Set both distortion curves to No distortion
- Set Warp X and Warp Y to 0
- Set Hold to 100%
- Set the Envelope curve to Linear and set Envelope dest to Dry / wet
- Disable Offset and Invert

Use the Delay / Comb / All-pass effect to create one or more repeats of the original sound. There are two of these effects available. To edit Delay 1 select 1 in the upper left corner of the Delay effect and to edit Delay 2 select 2.
With the Delay time, you can set the time between the repeats. Instead of using the slider, you can type the value. You can enter a frequency by adding Hz (example: 32.7 Hz). You can also enter a musical note (examples: C2, Ab3, F#1). These ways of entering values are handy for Karplus-Strong synthesis.
If the Decay factor is 0.5, the volume of each repeat will be reduced by half each time.
High frequencies decay faster than low frequencies. To simulate that you can set the filter to "LP filter in feedback loop". For other kind of sounds there are more filter settings available ("HP filter in feedback loop", "BP filter in feedback loop", "LP filtering of wet signal", "HP filtering of wet signal", "BP filtering of wet signal", "1-P LP filter in feedback loop" and "1-P LP filter in feedback loop"). LP stands for low pass, HP stands for high pass, BP stands for band pass and 1-P stands for One pole.
If the Dry / wet percentage is 100%, you will only hear the repeats. If the Dry / wet percentage is 0%, you will only hear the original sound.
Here is an overview of the different delay types that you can choose (Dry / wet = 100%).


Input signal (positive part of sine)

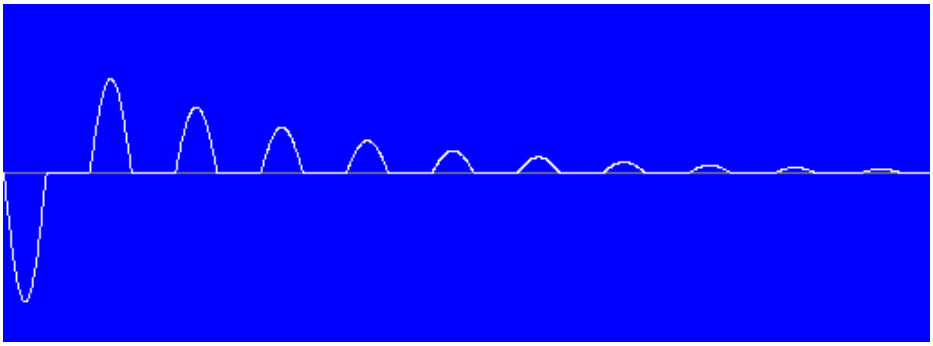

Delay


FB comb 1

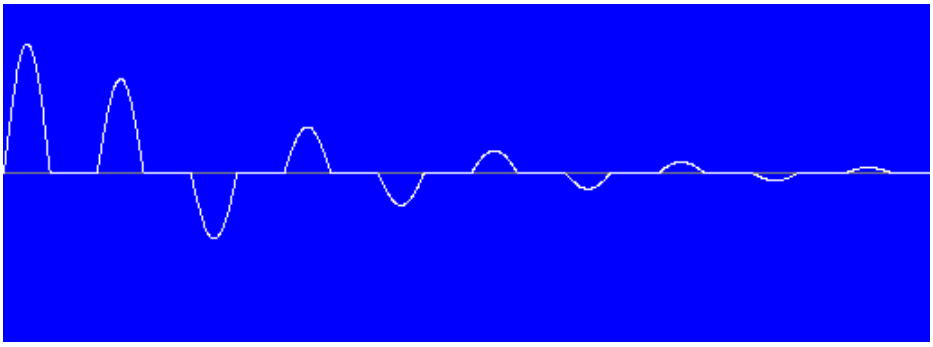


FB comb 2

FF comb

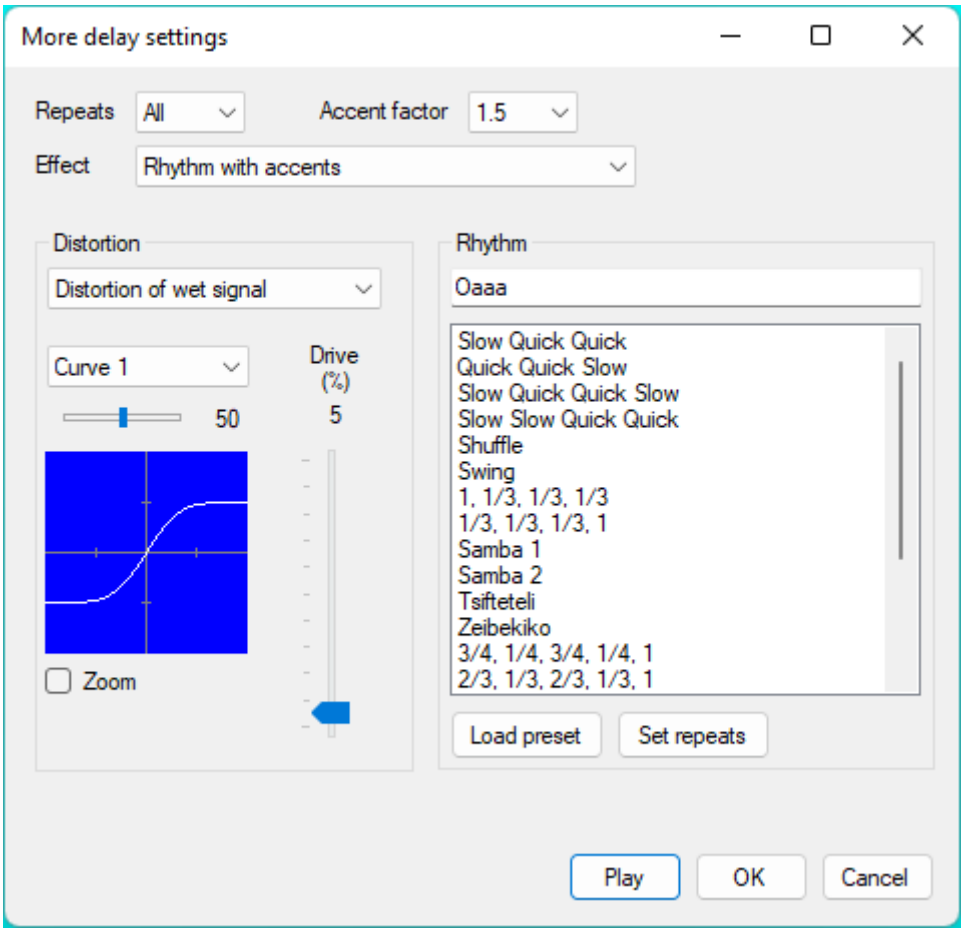


All-pass



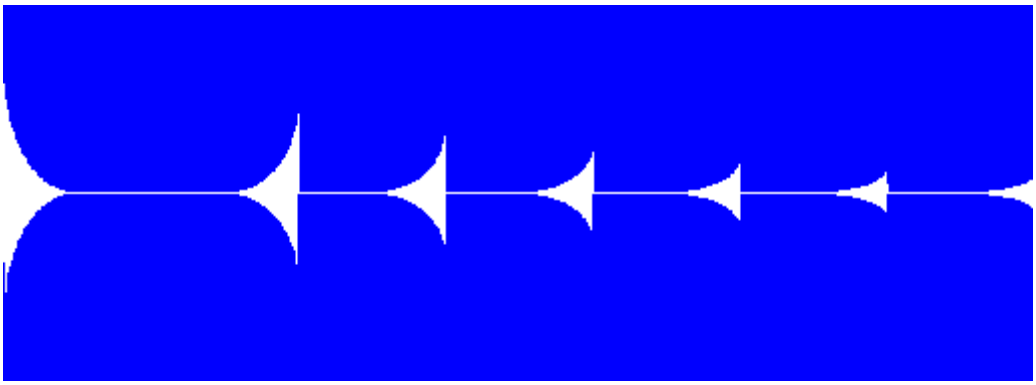
Schroeder All-pass

You can use FF comb if you want a single echo or you can use Delay, press the More button and set Repeats to 1. The More button is only available when you use a Delay.

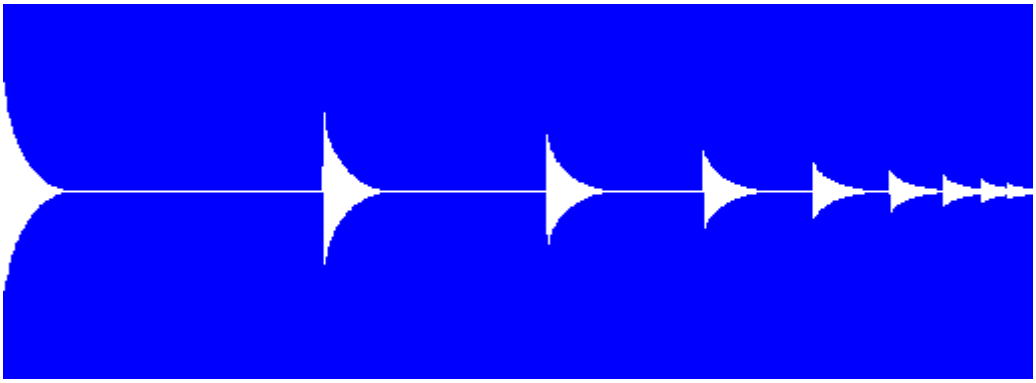


Repeats is the number of echoes, so excluding the original sound.
The following Delay effects are available.

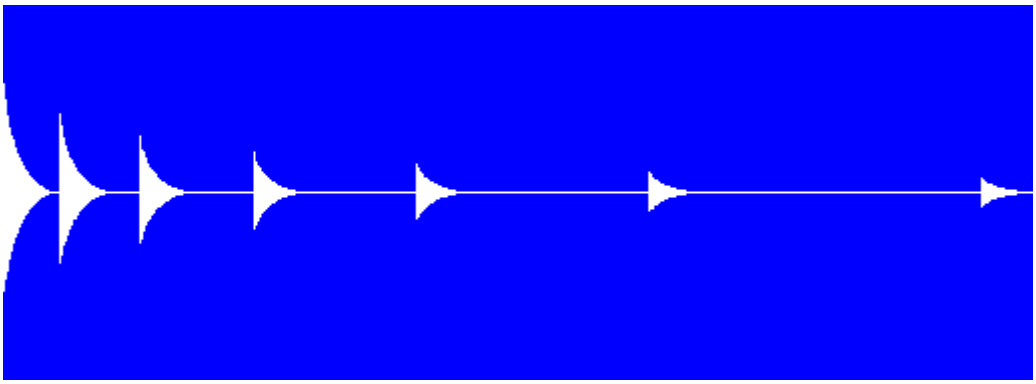
Effect	**Description**
Ping Pong (first L)	First there will be an echo on the left, then on the right etc.
Ping Pong (first R)	First there will be an echo on the right, then on the left etc.
Reverse	For the first echo the reversed input signal is used. Since for the following echoes the previous echo is used, all echoes are reversed in comparison to the original input signal.
Bouncing	The timing between the echoes is like a bouncing ball, so the time between the echoes becomes shorter. For best results, adjust the Repeats setting.
Reverse bouncing	The time between the echoes becomes longer.
Rhythm without accents	The time between the echoes depends on the entered rhythm. There will be no accents.
Rhythm with accents	The time between the echoes depends on the entered rhythm. The uppercase characters in the rhythm string will be accented.



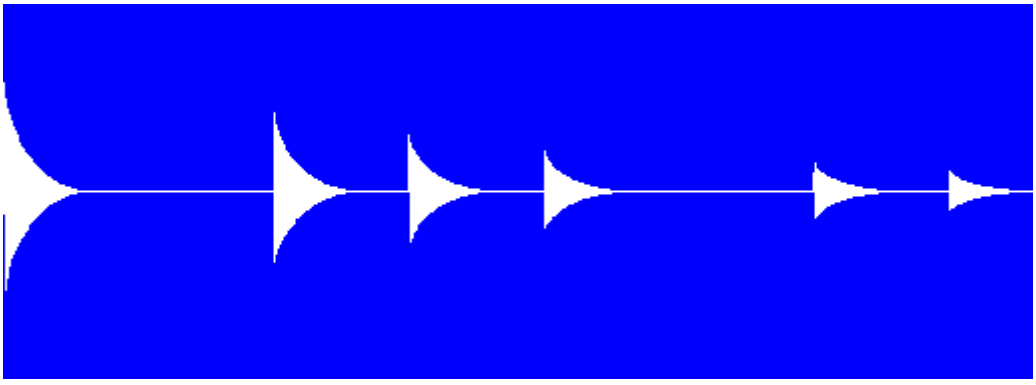
Reverse (Repeats = 6)



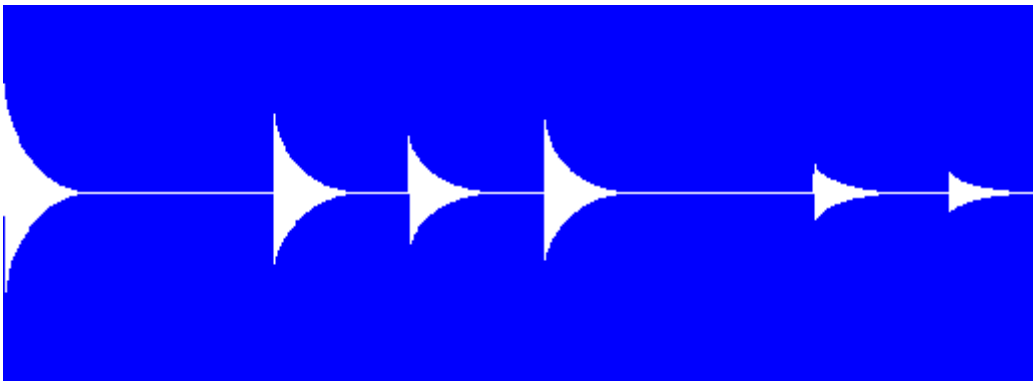
Bouncing (Repeats = 8)



Reverse bouncing (Repeats = 6)



Rhythm without accents (Rhythm = Ohh, Repeats = 5)



Rhythm with accents (Rhythm = Ohh, Repeats = 5, Accent factor = 1.8)

You may need to adjust the Dry / wet percentage for the original input.

There are a lot of rhythm examples available that you can study to create your own rhythms. You can use for example Samba or Shuffle for all kinds of music, but because of the name you know what kind of rhythm you can expect. Select a rhythm and press the “Load preset” button or double click on a rhythm to load it.
If you want only one cycle of the rhythm, you can press the “Set repeats” button.

Here is an overview of the beat values to create your own rhythm. The uppercase characters in the rhythm string will be accented.

Code	**Beat value**	**How to remember**
q	1/4	**q**uarter
h	1/2	**h**alf
t	3/4	**t**hree quarters
o	1	**o**ne
a	1/3	letter **1** of the alphabet
b	2/3	letter **2** of the alphabet

For changing the echoes you can also use distortion. The available curves are the same as with the Distortion effect, but you can not create your own curves within the Delay effect. You can browse through the curves by clicking on the curve picture. You can change a lot of curves with a little slider above it.

Left side of the picture	Right side of the picture
Left mouse button = Previous curve Right mouse button = First curve	Left mouse button = Next curve Right mouse button = Last curve

Enable Zoom to see the curve in more detail.
The distortion is always symmetrical. You can choose to have distortion in the feedback loop or after the wet signal. The Drive parameter controls how much the signal is amplified before distorting.

The Reverb configurations 1-4 are based on the original Freeverb algorithm by Jezar Wakefield. The Reverb configuration 5 is based on a design by Geraint Luff.
You can use reverb to simulate an acoustic space for samples without reverb. A Room size of 100% is like a huge cathedral and 0% is like a closet. The Damping simulates the absorption of high frequencies in the reverberation. If the Dry / wet percentage is 100%, you will only hear the reverberation. If the Dry / wet percentage is 0%, you will only hear the dry (unprocessed) sound. You can press the Default button for a reverb setting that is suitable for most situations. Registered users can press the Apply to all instruments button to set the current reverb setting for all instruments.
When using reverb, there is silence added to the sample (not to the original file), in order to have space for the reverb tail. This should be enough, but if you want a really big reverb, you can add silence to the original sample file or waveform. Keep in mind that too long samples can slow down the performance.
Enable Use gate to shorten the reverb tail. This effect can be used to create very powerful drums. You can hear this in the song “In the air tonight” by Phil Collins. This effect is used for the preset drum kit Electronic 4. Hold is the time from the start of the sound until the moment that the reverb tail has to fade out. Release is the fade out time.
Reverb can generate additional frequencies or a DC offset that you don’t want. In that case you can use EQ. If you don’t want frequencies that are lower than 200 Hz, you can use “EQ after reverb” and set the Highpass value to 200.
When the Reverb configuration is set to 5, the settings Early reflections, Diffuse steps and Feedback filter are available. Early reflections are the first echoes. More diffuse steps make the reverb more dense. When you want to hear more of the original sound in the reverb, you can set less diffuse steps. High frequencies decay faster than low frequencies. To simulate that you can use the feedback filter.
Press the Save button to save the current reverb settings to a file. Press the Open button to load reverb settings from a file.

Use the Formant filter to make human sounds. Alternatively you can use the Command 3 commands F1 - FA in the Wave combiner. With Parameter 1 (which can be modulated) you can morph between two vowels.

Enable the Reverse option, if you want to hear the sample or waveform backwards. Try to reverse a crash cymbal. It sounds great!

Easy drum synthesizer

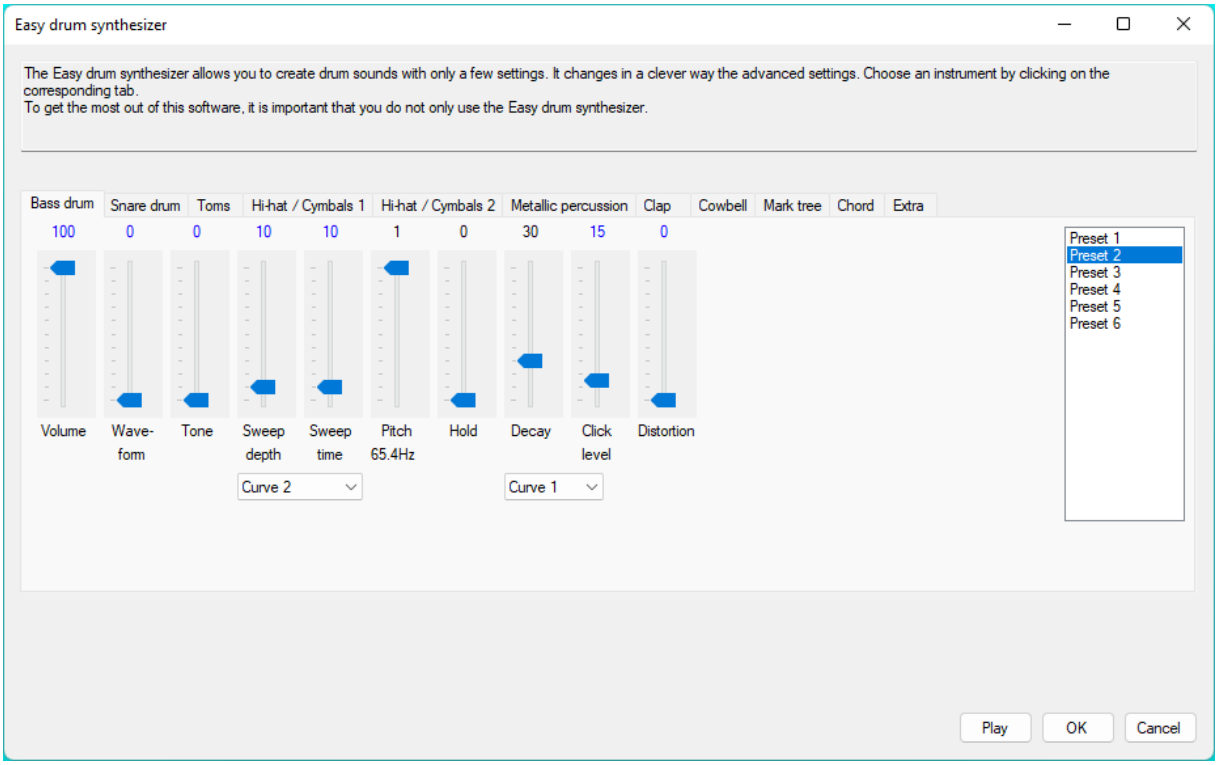
Click on the Easy drum synthesizer button on the Sample / Synth tab of the Instrument form to use the Easy drum synthesizer.

The Easy drum synthesizer allows you to create drum sounds with only a few settings. It changes in a clever way the advanced settings. Choose an instrument by clicking on the corresponding tab.

To get the most out of this software, it is important that you do not only use the Easy drum synthesizer.

See the following pages for information about the different instruments of the drum synthesizer.

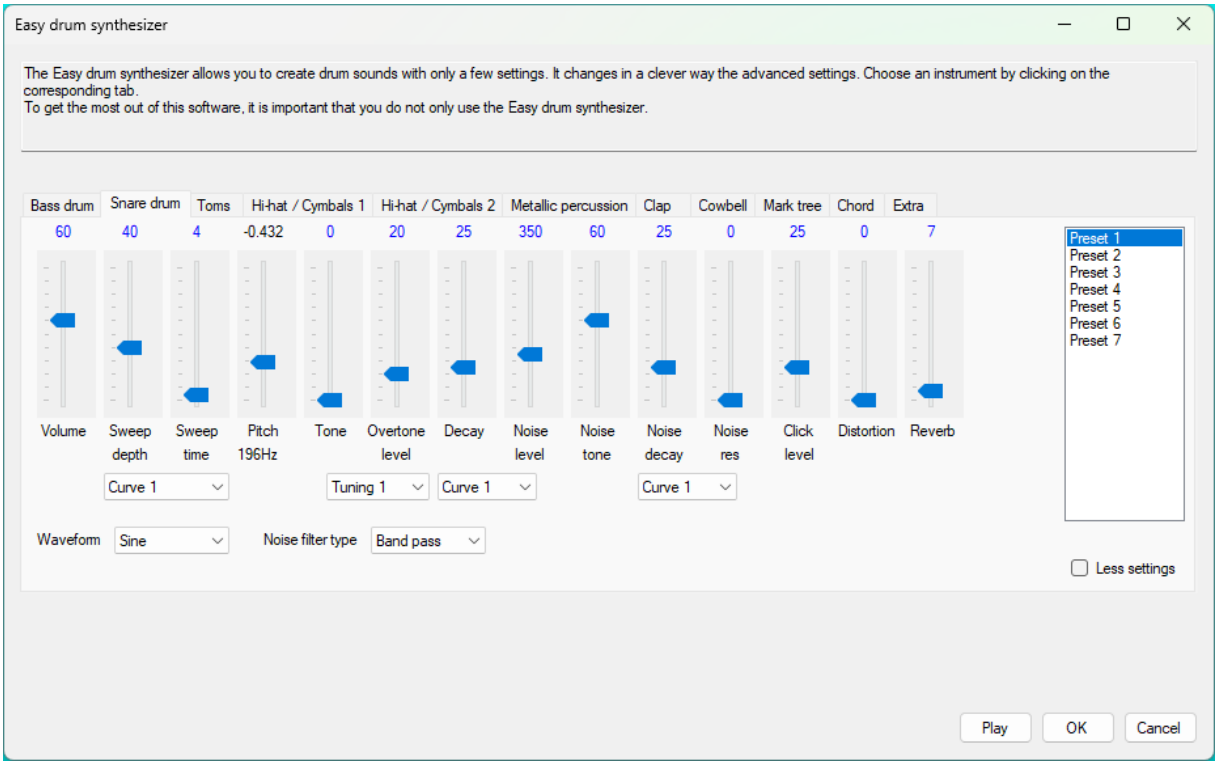
Bass drum



Bass drum settings	
Volume	The volume setting controls the volume of the bass drum sound.
Waveform	For an acoustic bass drum you need a sine wave, but for an electronic sound you can choose another waveform (0 = Sine, 20 = Triangle, 40 = Square, 60 = Saw, 80 = sin(x)^2 * sign(x), 100 = 8 lines sine). Click with the right mouse button on the slider to choose a waveform or move the slider to navigate through the waveforms like a wavetable. This way you can also choose a mix of two waveforms.
Tone	With the Tone setting you can control the brightness of the sound.
Sweep depth	Sweep is the pitch bending at the beginning of the sound. At the moment that a drum is hit, mostly the frequency is higher. The Sweep depth setting controls the difference between the start frequency and the end frequency.
Sweep time	The sweep time is the time (percentage of the duration) that it takes to decrease the pitch from the start frequency until the end frequency. The duration of a bass drum sound (made with the Easy drum synthesizer) is 1 second, so a sweep time of 10 is 0,1 second.
Sweep curve	The sweep curve (under Sweep sliders) is the curve that is used to decrease the pitch from the start frequency until the end frequency.
Pitch	With the Pitch setting you can tune the instrument (1 = 1 octave higher than default, -1 = 1 octave lower than default). If you click with the right mouse button on the Pitch slider, you can choose a musical note.
Hold	This is the time (percentage of the duration) that the volume stays at the same level.

Decay	The decay is the time (percentage of the duration) that it takes to decrease the volume to 0. The duration of a bass drum sound (made with the Easy drum synthesizer) is 1 second, so a decay of 50 is half a second.
Decay curve	The Decay curve (under Decay slider) is the curve that is used to decrease the volume to 0.
Click level	The click level is the volume of the click sound. Set the click level to 0, if you don't want to add a click to the bass drum sound.
Distortion	This setting controls how much the sound is distorted (0 = no distortion). Go the Effects tab for the advanced distortion settings.

Snare drum

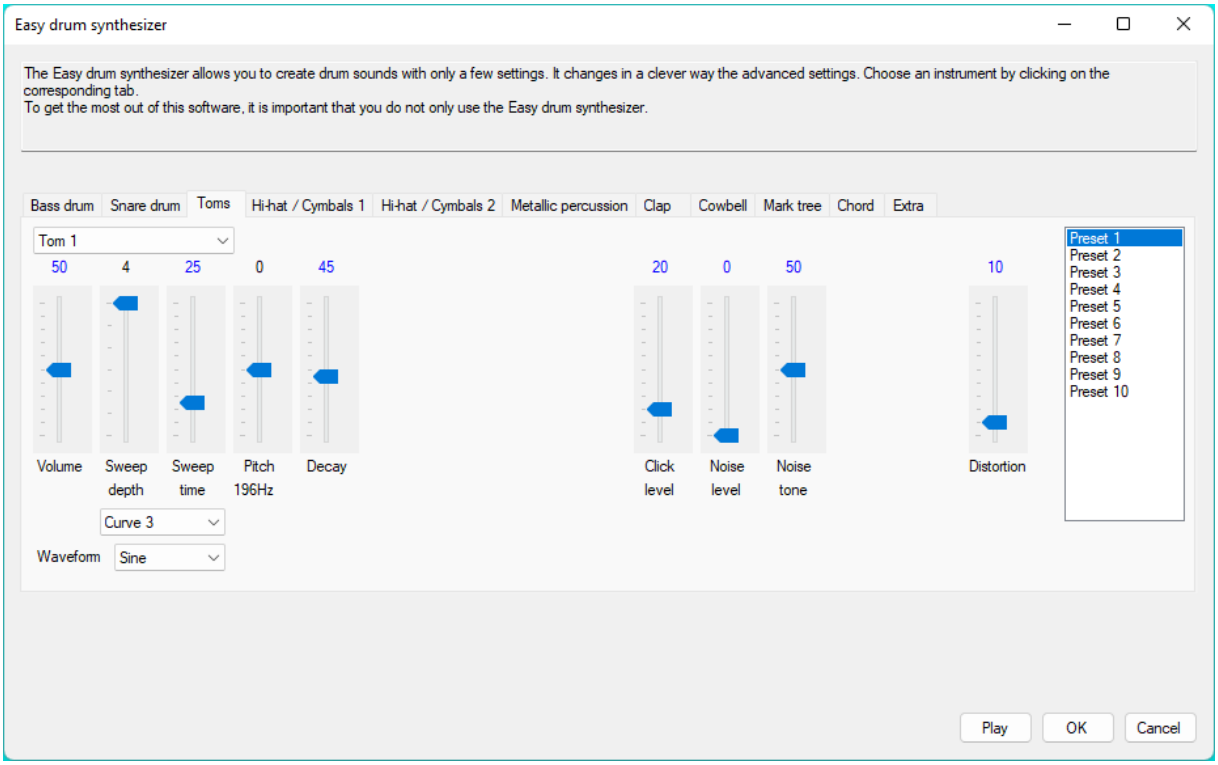


Snare drum settings	
Volume	The volume setting controls the volume of the total snare drum sound.
Sweep depth	Sweep is the pitch bending at the beginning of the sound. At the moment that a drum is hit, mostly the frequency is higher. The Sweep depth setting controls the difference between the start frequency and the end frequency. It is a factor (1-4). With a value of 1, there is no sweep. With a value of 2, the start frequency is 2 times higher than the end frequency.
Sweep time	The sweep time is the time (percentage of the duration) that it takes to decrease the pitch from the start frequency until the end frequency. The duration of a snare drum sound (made with the Easy drum synthesizer) is 1 second, so a sweep time of 10 is 0,1 second.
Sweep curve	The sweep curve is the curve that is used to decrease the pitch from the start frequency until the end frequency.
Tone	With the Tone setting you can control the brightness of the sound.
Overtone level	This setting controls the volume of the overtone.
Tuning	This setting controls the ratio of the overtones.
Pitch	With the Pitch setting you can tune the instrument (1 = 1 octave higher than default, -1 = 1 octave lower than default). If you click with the right mouse button on the Pitch slider, you can choose a frequency or a musical note.
Decay	The decay is the time (percentage of the duration) that it takes to decrease the volume to 0. The duration of a snare drum sound (made with the Easy drum synthesizer) is 1 second, so a decay of 50 is half a second.

Decay curve	The Decay curve is the curve that is used to decrease the volume to 0.
Noise %	Noise % is the mix percentage of the noise. If Noise % is set to 0, you will hear no noise (snares off). If Noise % is set to 100, you will hear only noise.
Noise tone	The noise tone setting controls the cutoff frequency of the bandpass filter that filters the noise. A higher value makes the noise brighter.
Noise decay	The noise decay is the time (percentage of the duration) that it takes to decrease the volume of the noise to 0.
Noise decay curve	The noise decay curve is the curve that is used to decrease the volume of the noise to 0.
Noise res	The Noise res setting controls the resonance of the noise filter.
Click level	The click level is the volume of the click sound. Set the click level to 0, if you don't want to add a click to the snare drum sound.
Distortion	The Distortion setting controls how much the sound is distorted (0 = no distortion).
Reverb	This setting controls the reverb effect (0 = no reverb).
Waveform	You can choose a Sine or a Triangle waveform.
Noise filter type	You can choose a band pass filter or a high pass filter.
Less settings	Enable this option if you want less settings. Settings that are not that important will be hidden and set to the default value. The snare drum presets will sound a little different.

You can save the snare drum settings to a file by pressing the Save to file button. You can load snare drum settings by pressing the Load from file button.

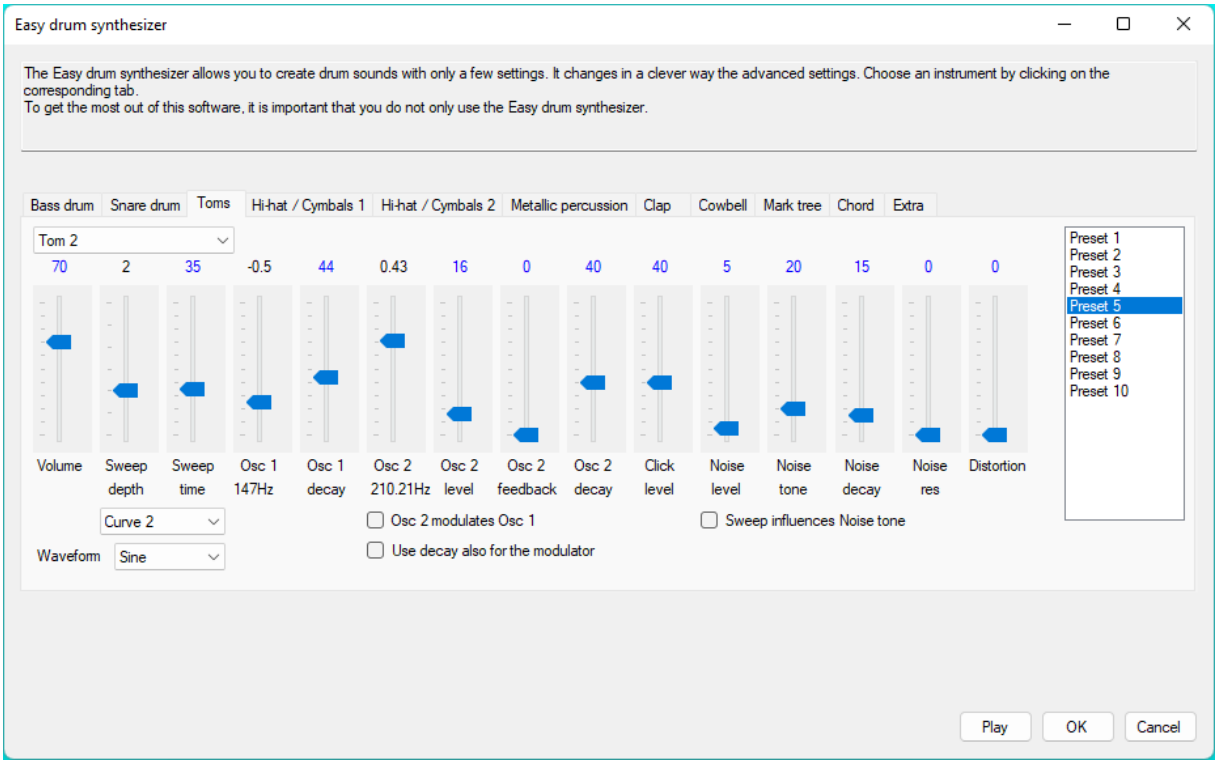
Toms



The Toms tab has more settings. This might look difficult, but it is easy and you can create many different tom sounds. You can use the presets as an easy start and change the settings to hear what effect it has on the sound.
You can save the tom settings to a file by pressing the Save to file button. You can load tom settings by pressing the Load from file button. This is handy when you want to create more toms with a different pitch, but based on the same tom sound.
If Tom 1 (Preset 1-3) is selected, there are less settings. Use Tom 1 to create a simple tom sound, like an 808 tom. Use Tom 2 (Preset 4-6) or Tom 3 (Preset 7-8) to create more complex tom sounds.

Tom 1 settings	
Volume	The volume setting controls the volume of the total tom sound.
Sweep depth	Sweep is the pitch bending at the beginning of the sound. At the moment that a drum is hit, mostly the frequency is higher. The Sweep depth setting controls the difference between the start frequency and the end frequency. It is a factor (1-4). With a value of 1, there is no sweep. With a value of 2, the start frequency is 2 times higher than the end frequency.
Sweep time	The sweep time is the time (percentage of the duration) that it takes to decrease the pitch from the start frequency until the end frequency. The duration of a tom sound (made with the Easy drum synthesizer) is 1 second, so a sweep time of 10 is 0,1 second.
Sweep curve	The sweep curve is the curve that is used to decrease the pitch from the start frequency until the end frequency.
Pitch	With the Pitch setting you can tune the instrument (1 = 1 octave higher than default, -1 = 1 octave lower than default). If you click with the right mouse button on the Pitch slider, you can choose a

	musical note.
Decay	The decay is the time (percentage of the duration) that it takes to decrease the volume to 0. The duration of a tom sound (made with the Easy drum synthesizer) is 1 second, so a decay of 50 is half a second.
Click level	The click level is the volume of the click sound. Set the click level to 0, if you don't want to add a click to the tom sound.
Noise level	The noise level is the volume of the noise. Set the noise level to 0, if you don't want to add noise to the tom sound.
Noise tone	The noise tone setting controls the cutoff frequency of the highpass filter that filters the noise. A higher value makes the noise brighter.
Distortion	The Distortion setting controls how much the sound is distorted (0 = no distortion).
Waveform	You can choose a Sine or a Triangle waveform.



Tom 2 settings	
Volume	The volume setting controls the volume of the total tom sound.
Sweep depth	Sweep is the pitch bending at the beginning of the sound. At the moment that a drum is hit, mostly the frequency is higher. The Sweep depth setting controls the difference between the start frequency and the end frequency. With a value of 1, there is no sweep. With a value of 4, the start frequency is one octave higher than the end frequency.
Sweep time	The sweep time is the time (percentage of the duration) that it takes to decrease the pitch from the start frequency until the end frequency. The duration of a tom sound (made with the Easy drum synthesizer) is 1 second, so a sweep time of 10 is 0,1 second.

Sweep curve	The sweep curve is the curve that is used to decrease the pitch from the start frequency until the end frequency.
Osc 1	With the osc 1 setting you can tune oscillator 1 (1 = 1 octave higher than default, -1 = 1 octave lower than default). If you click with the right mouse button on the Osc 1 slider, you can choose a musical note.
Osc 1 decay	The osc 1 decay is the time (percentage of the duration) that it takes to decrease the volume of oscillator 1 to 0. The duration of a tom sound (made with the Easy drum synthesizer) is 1 second, so a decay of 50 is half a second.
Osc 2	With the osc 2 setting you can tune oscillator 2 (1 = 1 octave higher than oscillator 1, -1 = 1 octave lower than oscillator 1).
Osc 2 level	The Osc 2 level controls the volume or the modulation amount of oscillator 2.
Osc 2 feedback	Use feedback to add harmonics.
Osc 2 decay	The osc 2 decay is the time (percentage of the duration) that it takes to decrease the volume of oscillator 2 to 0.
Osc 2 modulates Osc 1	Enable this option, if you want oscillator 2 to modulate oscillator 1.
Use decay also for the modulator	Enable this option, if you want to use the Osc 2 decay setting also to control the modulation amount.
Click level	The click level is the volume of the click sound. Set the click level to 0, if you don't want to add a click to the tom sound.
Noise level	The noise level is the volume of the noise. Set the noise level to 0, if you don't want to add noise to the tom sound.
Noise tone	The noise tone setting controls the cutoff frequency of the highpass filter that filters the noise. A higher value makes the noise brighter.
Noise decay	The noise decay is the time (percentage of the duration) that it takes to decrease the volume of the noise to 0.
Noise res	The Noise res setting controls the resonance of the noise filter.
Distortion	The Distortion setting controls how much the sound is distorted (0 = no distortion).
Waveform	You can choose a Sine or a Triangle waveform.
Sweep influences Noise tone	With this option enabled, the frequency of the noise is influenced by the sweep.

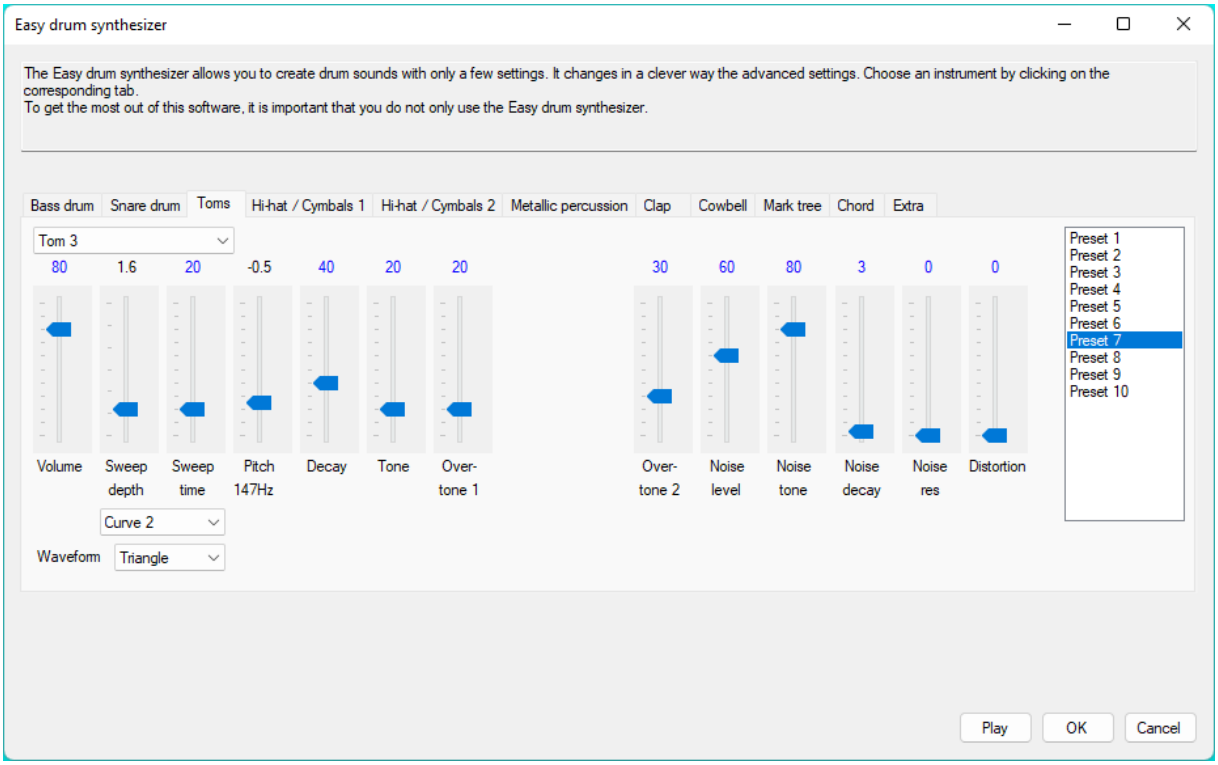
Example 1

- Enable the Easy drum synthesizer.
- Press first the Preset 5 button and then the Play button.
- Move the Osc 1 slider (the one with Hz under it) to tune the tom and press the Play button to hear the result. With Preset 5, values under 0 (196Hz) sound the best. If you click with the right mouse button on the slider, the value will be set to 0.
- Move the sliders Sweep depth and Sweep time to the maximum value and press Play to hear clearly the pitch bending.

Example 2

- Enable the Easy drum synthesizer.

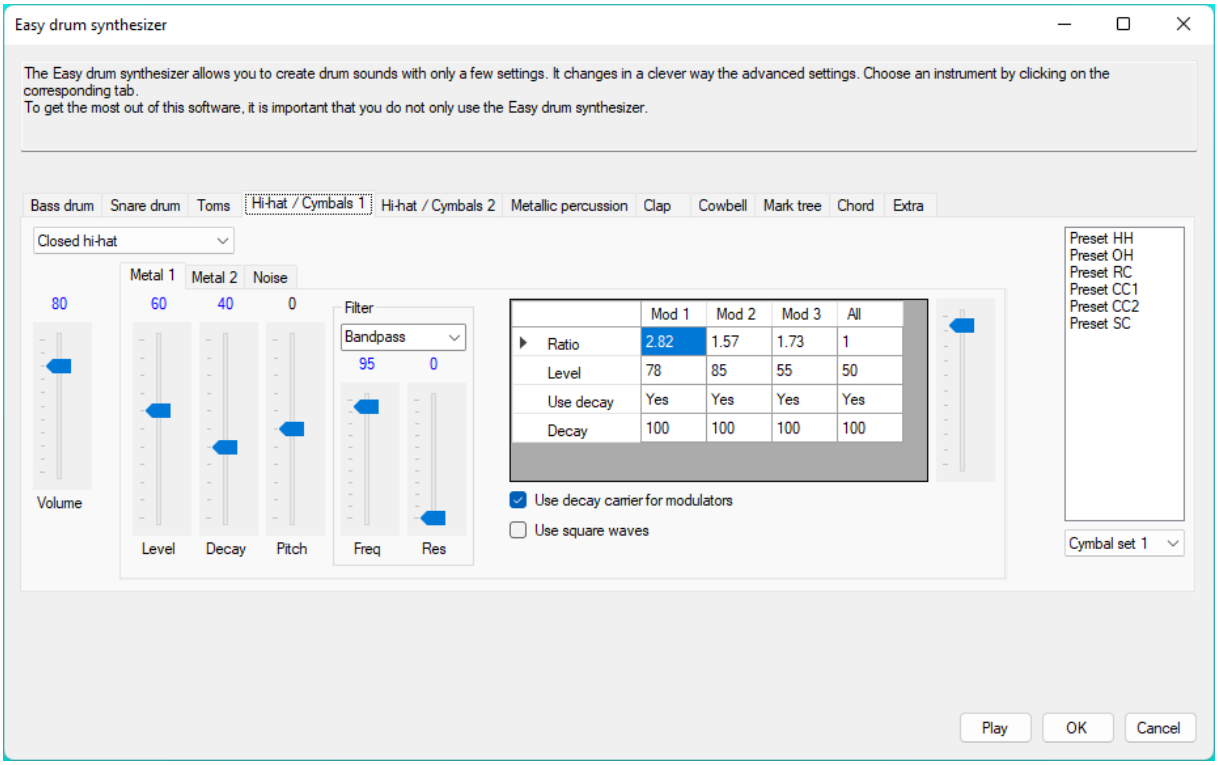
- Press first the Preset 6 button and then the Play button. If you have experience with subtractive synthesizers, it sounds like the cutoff frequency of a lowpass filter is decreased. This is possible in frEDrums, but in this case FM synthesis is used. In frEDrums you can use subtractive synthesis, additive synthesis and FM synthesis. Oscillator 2 is modulating Oscillator 1 which makes the sound brighter. If the modulating amount of Oscillator 2 decreases, the sound becomes less bright.
- Disable “Use decay also for the modulator“ and press the Play button. Now the sound becomes not less bright. You can control the brightness by moving the Osc 2 level slider.
- Move the Osc 2 slider (the one with Hz under it) to different positions and press the Play button to hear different (great and weird) sounds. If you click with the right mouse button on the slider, the value will be set to 0.



Tom 3 settings	
Volume	The volume setting controls the volume of the total tom sound.
Sweep depth	Sweep is the pitch bending at the beginning of the sound. At the moment that a drum is hit, mostly the frequency is higher. The Sweep depth setting controls the difference between the start frequency and the end frequency. With a value of 1, there is no sweep. With a value of 4, the start frequency is one octave higher than the end frequency.
Sweep time	The sweep time is the time (percentage of the duration) that it takes to decrease the pitch from the start frequency until the end frequency. The duration of a tom sound (made with the Easy drum synthesizer) is 1 second, so a sweep time of 10 is 0,1 second.
Sweep curve	The sweep curve is the curve that is used to decrease the pitch from the start frequency until the end frequency. If you click with the right mouse button on the Pitch slider, you can choose a musical note.

Pitch	With the pitch setting you can change the fundamental frequency (1 = 1 octave higher than default, -1 = 1 octave lower than default).
Decay	The decay is the time (percentage of the duration) that it takes to decrease the tom volume to 0. The duration of a tom sound (made with the Easy drum synthesizer) is 1 second, so a decay of 50 is half a second.
Tone	Use the tone setting to change the timbre of the sound.
Overtone 1	The overtone 1 setting controls the volume of the first overtone.
Overtone 2	The overtone 2 setting controls the volume of the second overtone.
Noise level	The noise level is the volume of the noise. Set the noise level to 0, if you don't want to add noise to the tom sound.
Noise tone	The noise tone setting controls the frequency of the bandpass filter that filters the noise. A higher value makes the noise brighter.
Noise decay	The noise decay is the time (percentage of the duration) that it takes to decrease the volume of the noise and the second overtone to 0.
Noise res	The Noise res setting controls the resonance of the noise filter.
Distortion	The Distortion setting controls how much the sound is distorted (0 = no distortion).
Waveform	You can choose a Sine or a Triangle waveform.

Hi-hat / Cymbals 1



The Hi-hat / Cymbals 1 tab has the most settings, but cymbals are also the most difficult to synthesize. For electronic cymbal sounds, you need only a few settings, but if you want to create realistic cymbal sounds, there is more involved.
You can save the cymbal settings to a file by pressing the Save to file button. You can load cymbal settings by pressing the Load from file button.
Select above which kind of sound you want to make. You can choose Closed hi-hat, Open hi-hat or Cymbal (crash, ride etc). The maximum duration of the sound depends on the chosen instrument.

Closed hi-hat	Open hi-hat	Cymbal
100 milliseconds	1 second	2 seconds

For creating a sound, there are 3 sounds available that can be combined. These are Metal 1, Metal 2 and Noise. Click on the tabs to see the settings of the sounds. Every sound has a level slider to control the volume of that sound. Set the level to 0, if you don't want to use that sound.
For every sound you can adjust the decay time, which is a percentage of the maximum duration. For a cymbal, a decay of 50 is 1 second.
Use the pitch settings to adjust the frequency of the carrier. Keep in mind that the carriers are modulated by a modulator to create a metal sound.
For the Metal 1 sound and the Noise sound there is a filter (highpass, lowpass, bandpass or notch) available. With the Freq slider you can adjust the cutoff frequency and with the Res slider you can adjust the resonance.

Metal 1

The Metal 1 sound is created by 3 modulators and a carrier. Modulator 1 modulates the phase of modulator 2, modulator 2 modulates the phase of modulator 3 and modulator 3 modulates the phase of the carrier. For every modulator you can set a ratio.

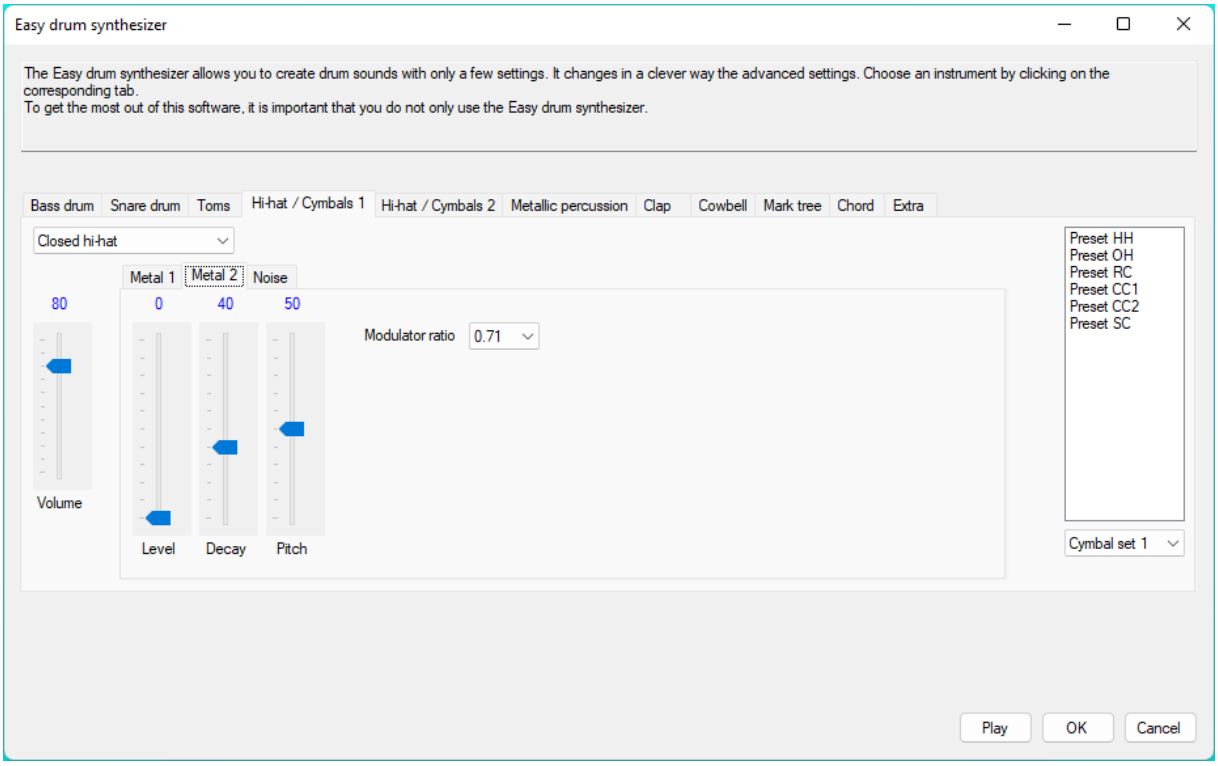
Modulator frequency = Modulator ratio x Carrier frequency

It is difficult to know which ratios you need for a specific sound, but for metallic sounds you need different non-integer (not whole-number) ratios. The best is just to try which ratios sound best. For this, it is good to know that you can also play the current instrument by pressing the Ctrl and Shift keys simultaneously.
You can edit the values in the table by selecting a value and typing the new value or moving the slider at the right of the table. If you edit a value in the All column, all values in that row will be set to that value.

The Level values in the table are the modulation amounts of the modulators. If you set the level of modulator 1 to 0, it gives the same result as if that modulator is muted. If you set the level of modulator 3 to 0, the carrier is not modulated at all (except a little from the LFO if you have chosen a cymbal) and it produces a normal sine wave.

The Decay values in the table are the decay times (percentage of the duration) of the modulators. For a lot of sounds, it is good when the modulator decay times are the same as the decay time of the carrier. In that case you can enable Use decay carrier for modulators. If you don't want a decay time for a modulator, you can set Use decay to No by clicking on Yes.

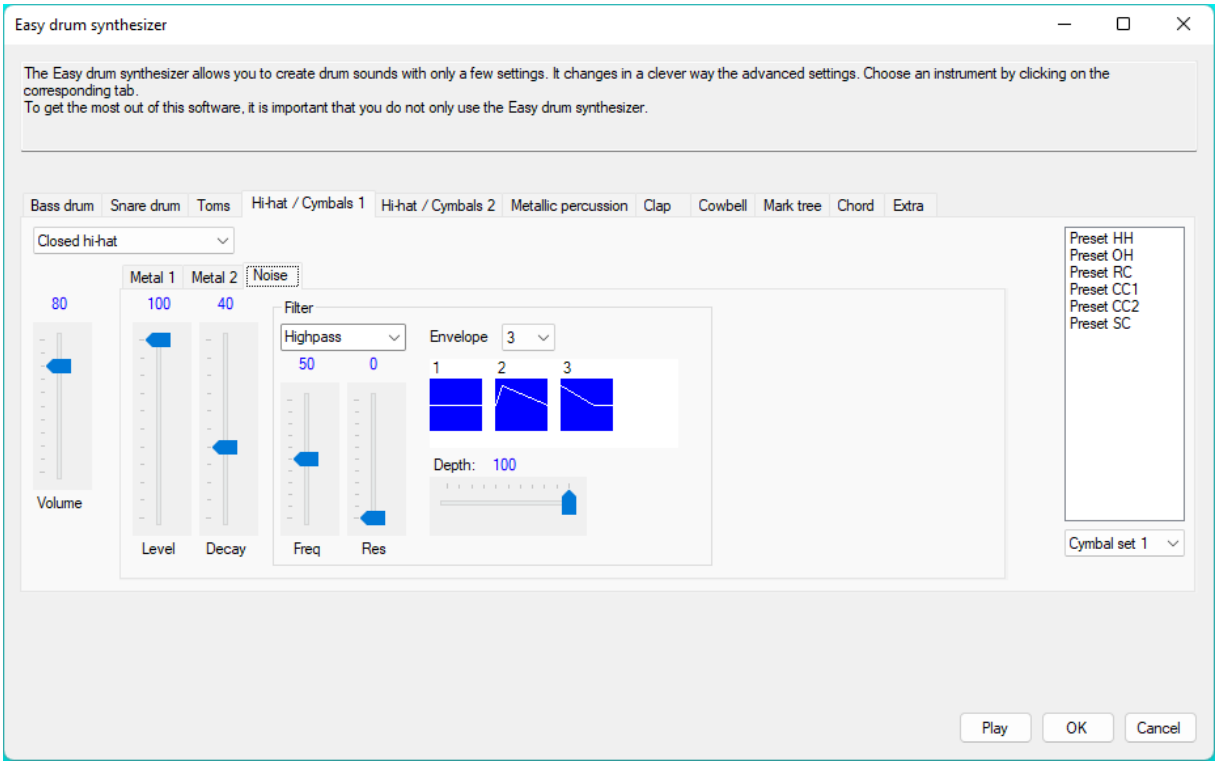
Metal 2



The Metal 2 sound is created by a modulator and a carrier. You can choose the ratio of the modulator.

Modulator frequency = Modulator ratio x Carrier frequency

Noise



For the noise you can select a filter envelope.

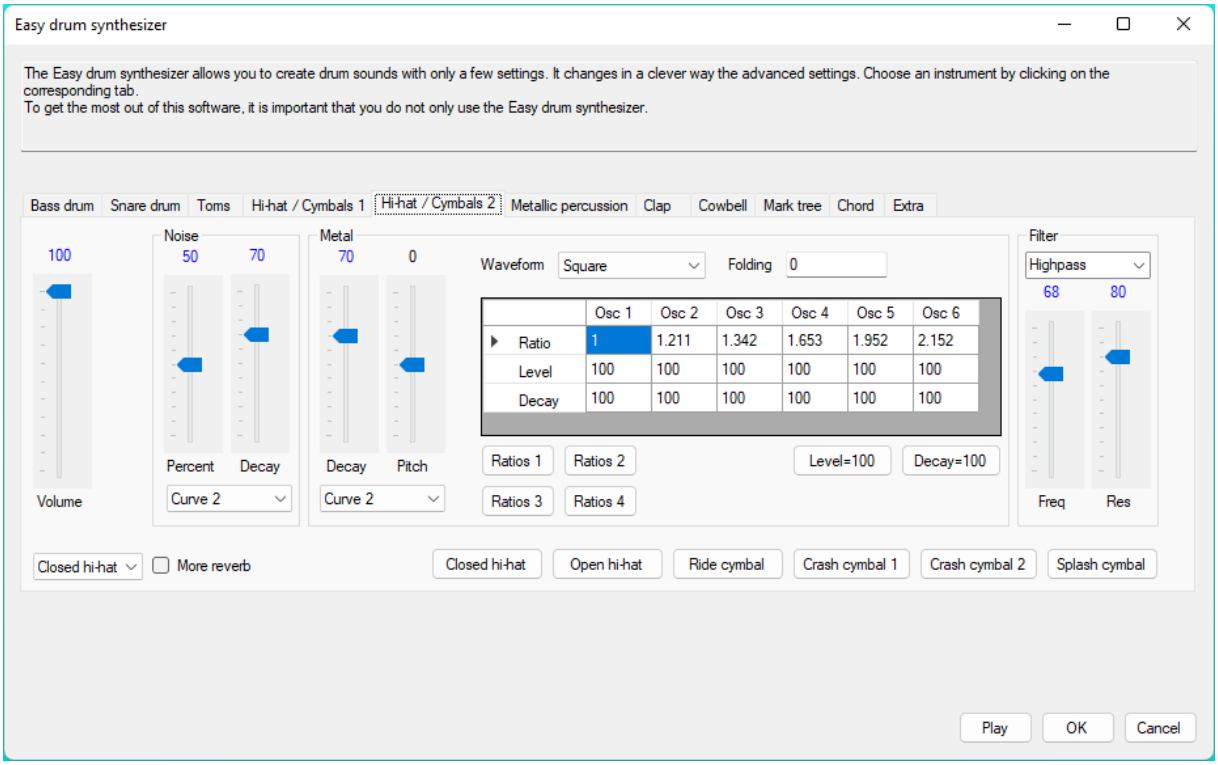
1	The cutoff frequency of the filter is not changed.
2	First the cutoff frequency increases fast and then it decreases.
3	The cutoff frequency decreases depending on the decay setting.

With the Depth slider you can adjust how much the envelope influences the cutoff frequency.

You can use a cymbal set from the presets in Easy Setup!

See also Hi-hat / Cymbals 2 for another way of creating cymbols.

Hi-hat / Cymbals 2



Select below which kind of sound you want to make. You can choose Closed hi-hat, Open hi-hat or Cymbal (crash, ride etc). The maximum duration of the sound depends on the chosen instrument.

Closed hi-hat	Open hi-hat	Cymbal
100 milliseconds	1 second	2 seconds

For creating a sound, there are 2 sounds available that can be combined. These are Noise and Metal.

Noise

With the Percent slider you can adjust the balance between noise and metal (0% = only metal, 100% = only noise). Use the Decay slider to adjust the decay time (percentage of the duration) for the Noise envelope generator. You can also select the curve that will be used.

Metal

The metal sound is produced by 6 oscillators. For the waveform you can select Square, Sine, Triangle and Saw. You can use folding for all these waveforms (except Square) to create extra harmonics. The frequency of a oscillator depends on the Pitch and the Ratio value. If the Pitch slider is set to 0, the base frequency is 200 Hz. You can calculate the frequency of each oscillator by multiplying the base frequency with the ratio. Each oscillator has its own envelope generator. The decay depends on the Decay slider value and the oscillator decay. You can press the “Decay=100” button if you want all oscillator decays to be the same as the slider decay. If you want to set a shorter decay for an oscillator, you can decrease the decay of that oscillator (50% = half the time of the decay slider). If you want some frequencies to be

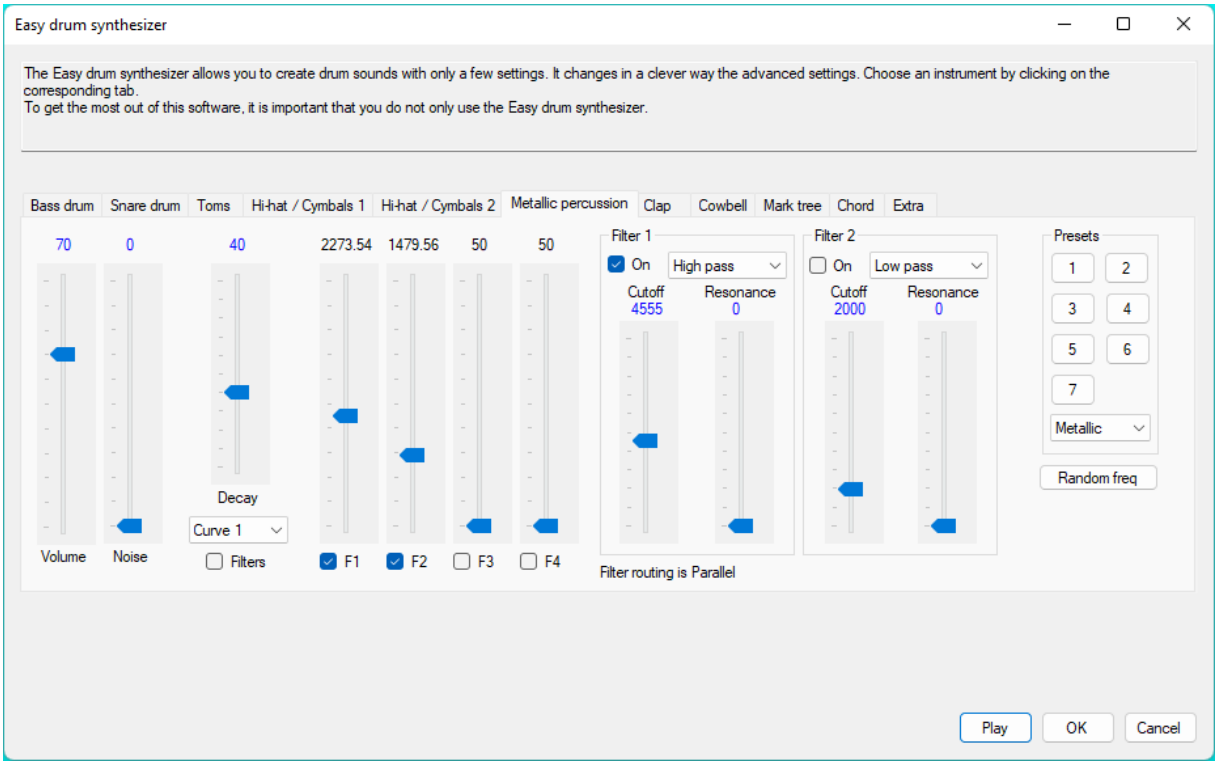
softer, you can decrease the level of the corresponding oscillators. Press the “Level=100” button to set all oscillator levels to 100%. You can use the ratio buttons to set ratios that are suitable for creating metal sounds. You can also use other ratios by typing them in the table. For metallic sounds you need different non-integer (not whole-number) ratios.

Filter

Select the filter type (highpass, lowpass, bandpass or notch). For cymbals mostly a highpass filter is used. With the Freq slider you can adjust the cutoff frequency and with the Res slider you can adjust the resonance.

Enable More reverb if you want a lot of reverb (mostly for a crash cymbal). On the bottom there are some presets that you you can use as a good start. You can use them also in Easy Setup by selecting Cymbal Set 3.

Metallic percussion



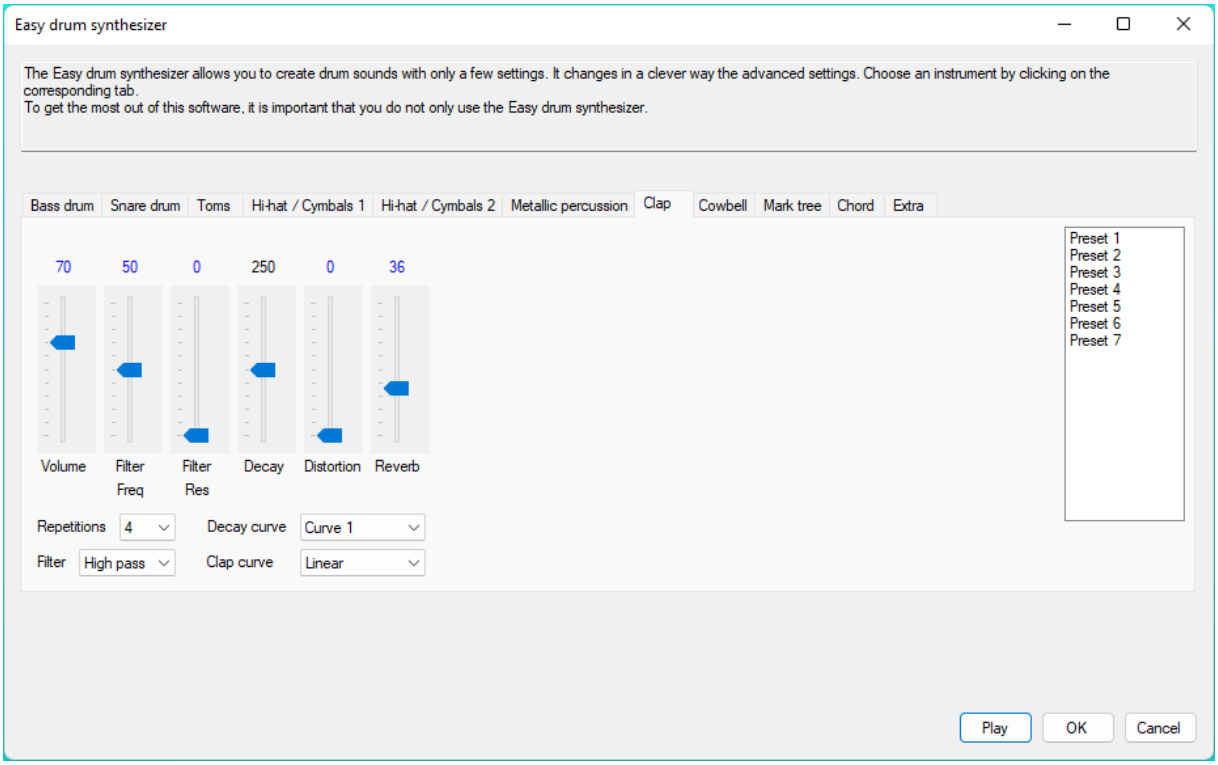
Metallic percussion settings	
Volume	The volume setting controls the volume of the metallic percussion sound.
Noise	With the Noise slider you can adjust the balance between the noise and the oscillators (0% = only oscillators, 100% = only noise).
Decay	The decay is the time (percentage of the duration) that it takes to decrease the volume to 0. The duration of a metallic percussion sound (made with the Easy drum synthesizer) is 1 second, so a decay of 50 is half a second.
Decay curve	The Decay curve (under Decay slider) is the curve that is used to decrease the volume to 0.
Filters	Enable Filters if you want to use the decay settings also for the filter envelopes.
F1 - F4	These are four frequencies that are combined (Uneven) to create a sound that is mostly inharmonic. If the checkbox under a frequency slider is checked, that oscillator is switched on.
Filter 1 / Filter 2	There are two filters available. The filter routing is parallel which means that both filters filter the combined signal from the oscillators and the noise and the outputs from both filters are combined. If one filter is enough, you can disable the other one. The filter type of each filter can be set to High pass, Low pass, Band pass or Notch.

Make sure that you try all presets (Metallic, Cymbals and Other) to see what the possibilities are. This tab is not only useful for metallic sounds.
Press the Random freq button to set the frequency of the enabled oscillators to a random value. Due to the Uneven combining, it is almost impossible to predict the result. Therefore it is handy to press this button until you find a nice sound. Of course the sound depends also on

the other settings, so you might need to change those.
You can save the metallic percussion settings to a file by pressing the Save to file button. You can load metallic percussion drum settings by pressing the Load from file button.

Tip: Try the sounds also with different settings of Combine on the Wave combiner tab. Keep in mind that if you use the Easy drum synthesizer again, this value will be changed if needed.

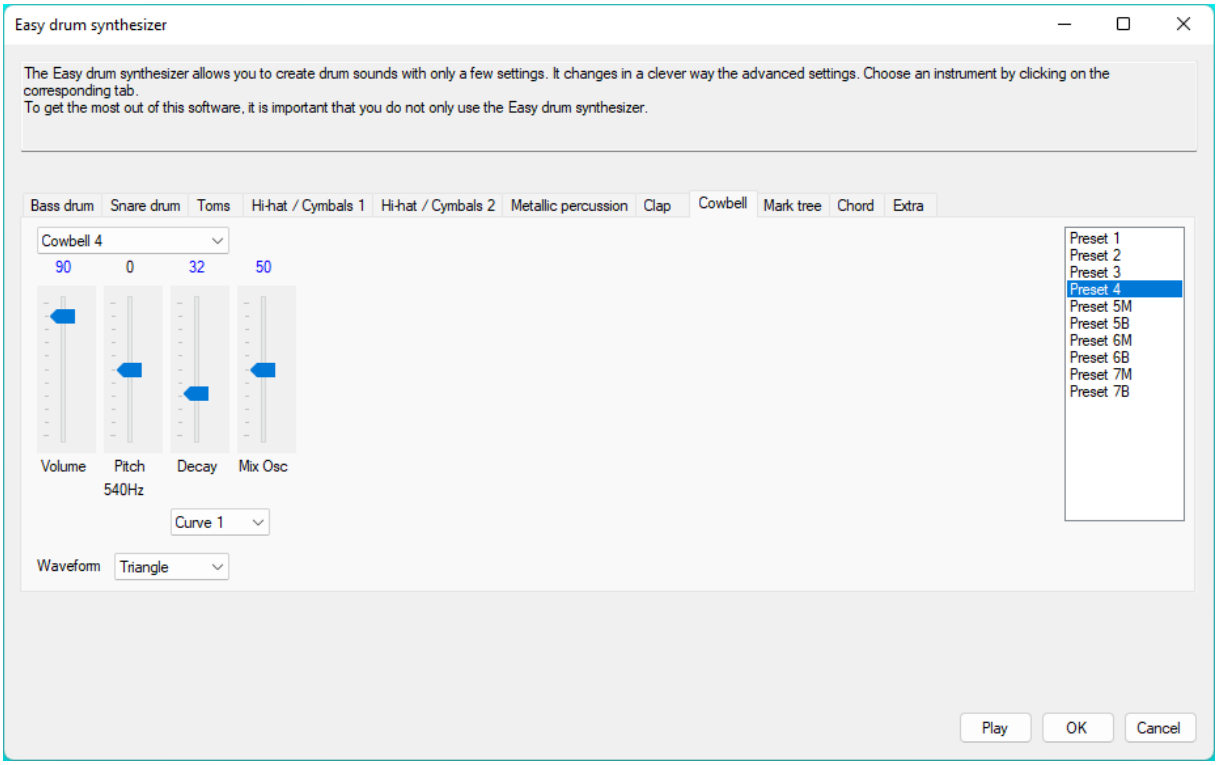
Clap



Clap settings	
Volume	The volume setting controls the volume of the clap sound.
Filter Freq	This setting controls the brightness of the sound.
Filter Res	This setting controls the filter resonance.
Decay	The decay is the time in milliseconds that it takes to decrease the volume to 0.
Distortion	The Distortion setting controls how much the sound is distorted (0 = no distortion).
Reverb	This setting controls the reverb effect (0 = no reverb).
Repetitions	This setting controls the number of times that the clap is repeated.
Filter	This setting controls the type of the filter (high pass or band pass).
Decay curve	The Decay curve is the curve that is used to decrease the volume to 0.
Clap curve	The Clap curve is the curve that is used for each clap. When a special curve is selected, there can be different curves used for the claps. Use Special 1 or Special 2 for overlapping claps. Use Special 3 if you want to use different curves to make the claps more realistic.

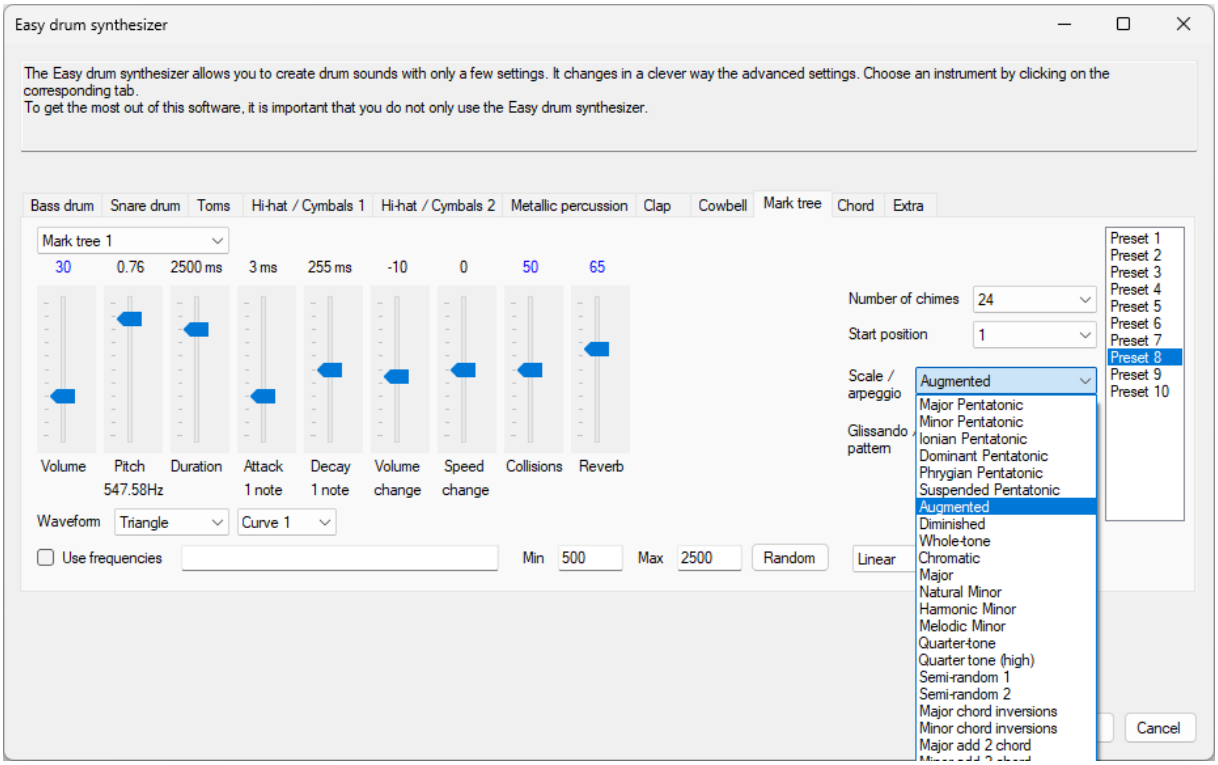
The Clap in the Easy drum synthesizer uses Command 3. Take a look at oscillator 1 on the Wave combiner tab and make your own envelope.

Cowbell



Cowbell settings	
Volume	The volume setting controls the volume of the cowbell sound.
Pitch	With the Pitch setting you can tune the instrument (1 = 1 octave higher than default, -1 = 1 octave lower than default).
Decay	The decay is the time (percentage of the duration) that it takes to decrease the volume to 0. The duration of a cowbell sound (made with the Easy drum synthesizer) is 500 milliseconds, so a decay of 50 is 250 milliseconds.
Decay curve	The Decay curve is the curve that is used to decrease the volume to 0.
Mix Osc	This setting controls the mix between oscillator 1 and oscillator 2 from the Wave combiner when Cowbell 4 is selected.
Stroke	For the cowbells 5, 6 and 7 you can select where the cowbell is hit (Mouth or Body).
Waveform	The waveform setting controls the waveform of all used oscillators from the Wave combiner.

Mark tree (also called bar chimes)



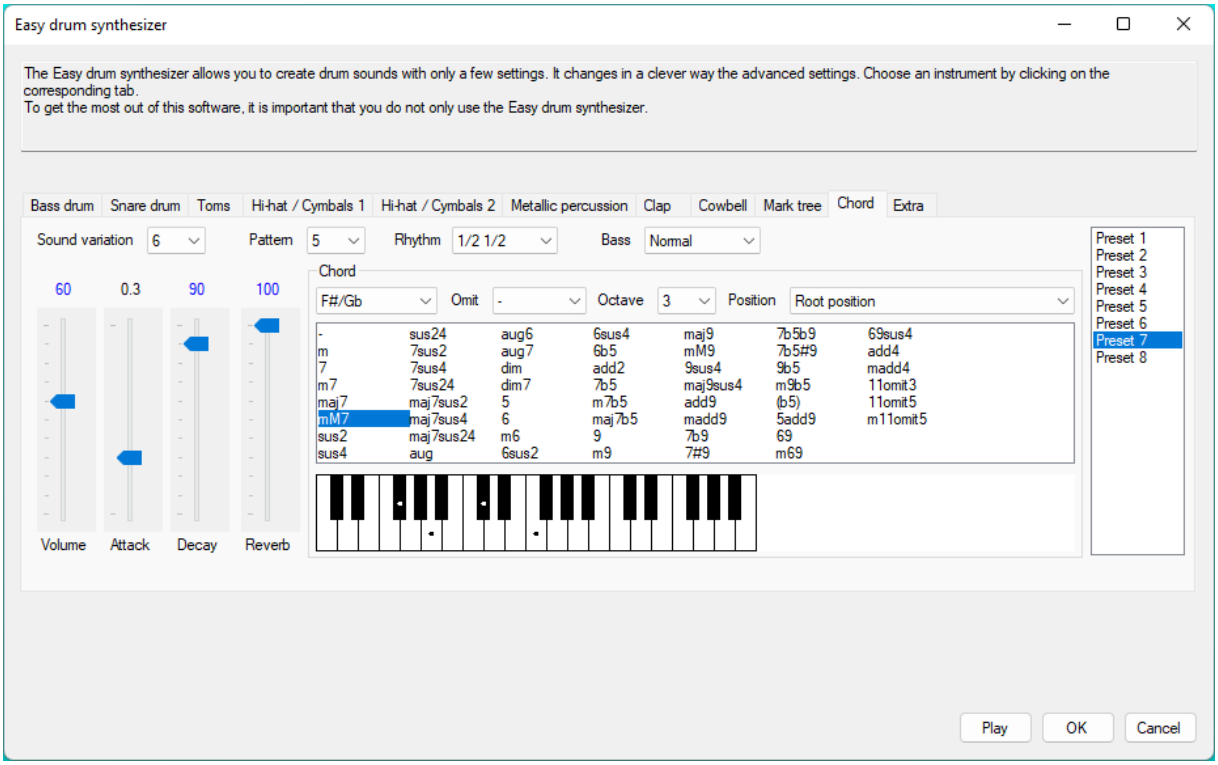
Mark tree settings	
Volume	The volume setting controls the volume of the mark tree sound.
Pitch	With the Pitch setting you can tune the instrument (1 = 1 octave higher than default, -1 = 1 octave lower than default).
Duration	The duration is the total playing time of the mark tree in milliseconds.
Attack 1 note	To avoid a click when a note is played, you can set an attack time in milliseconds.
Decay 1 note	The Decay 1 note setting controls the duration of 1 note. It sounds nice when the notes overlap a little.
Volume change	With a positive value of Volume change, the volume increases gradually and with a negative value, the volume decreases.
Speed change	With a positive value of Speed change, the speed of the hits increases gradually and with a negative value, the speed decreases.
Collisions	This setting controls how much you will hear the collisions (additional hits, because of the swinging of the chimes). It is a delay effect (0 = no collisions).
Reverb	This setting controls the reverb effect (0 = no reverb).
Overtone level	If you have chosen Mark tree 2, you can control the volume of the overtone.
Overtone ratio	This is the factor between the overtone frequency and the fundamental frequency. 2 means that the overtone frequency is two times the fundamental frequency. Click with the right mouse button on the slider for a menu with presets.
Overtone decay	This is the decay of the overtone which is a percentage of “Decay 1 note”. Therefore it can not be longer than the fundamental decay.

Number of chimes	The maximum number of chimes depends on the selected scale/arpeggio, the instrument and the “Use frequencies” option.
Start position	When the selected number of chimes is less than the number of notes of the scale or arpeggio, you can play the higher notes by increasing the start position.
Scale / arpeggio	This setting controls which notes are played.
Glissando / pattern	You can set a rising or falling glissando. Rising means that the notes are played from low to high. Since this setting changes the order, there are scales like random that might sound different than you expect. When the instrument is not Mark tree 2 and the number of chimes is not greater than 12, you can also use combinations of rising and falling. There are also other patterns available.
Curve	This setting controls the curve that is used for a chime.
Waveform	The waveform setting controls the waveform of all used oscillators from the Wave combiner.
Use frequencies	Enable this option if you want to enter your own custom frequencies for the chimes. With the buttons Random and Curve, you can generate a list of frequencies that will be within the defined range (Min and Max).

Mark tree 3 has every note two times (example: CCDDEEFFGGAA).
If the instrument is Mark tree 2, you can define an overtone.

Chord

A chord is a combination of different notes. For example, the C chord consist of the notes C, E and G. On this tab you can create very fast and easy a chord sound that you can play by hitting a drum. By assigning more chord sounds, you can play the chord accompaniment of a song.



Chord settings	
Volume	The volume setting controls the volume of the sound.
Attack	To avoid a click when a note is played, you can increase the attack.
Decay	The decay is the time (percentage of the duration) that it takes to decrease the volume to 0. The duration of a chord sound (made with the Easy drum synthesizer and Pattern set to 1) is 1 second, so a decay of 50 is half a second. When Pattern is not set to 1, the duration is 2 seconds and the decay depends on the number of notes that will be consecutively played.
Reverb	This setting controls the reverb effect (0 = no reverb).
Sound variation	There are some sound variations available. Just try what sound best for you. You can change the sound much more outside the Easy drum synthesizer, but keep in mind that when you open the Easy drum synthesizer again, those settings will be overwritten.
Pattern	This setting controls how the notes of the chord will be played. When Pattern is set to 1, all the notes are played simultaneously. Pattern 12-15 is strumming.
Rhythm	This setting controls the rhythm of the pattern, but it has no influence on the patterns 1, 12, 13, 14, 15 and 19. 2/3 1/3 is a shuffle rhythm.
Bass	Set Bass to Normal, if you want a bass note to be added to the sound. If you want another bass note than the root note of the chord,

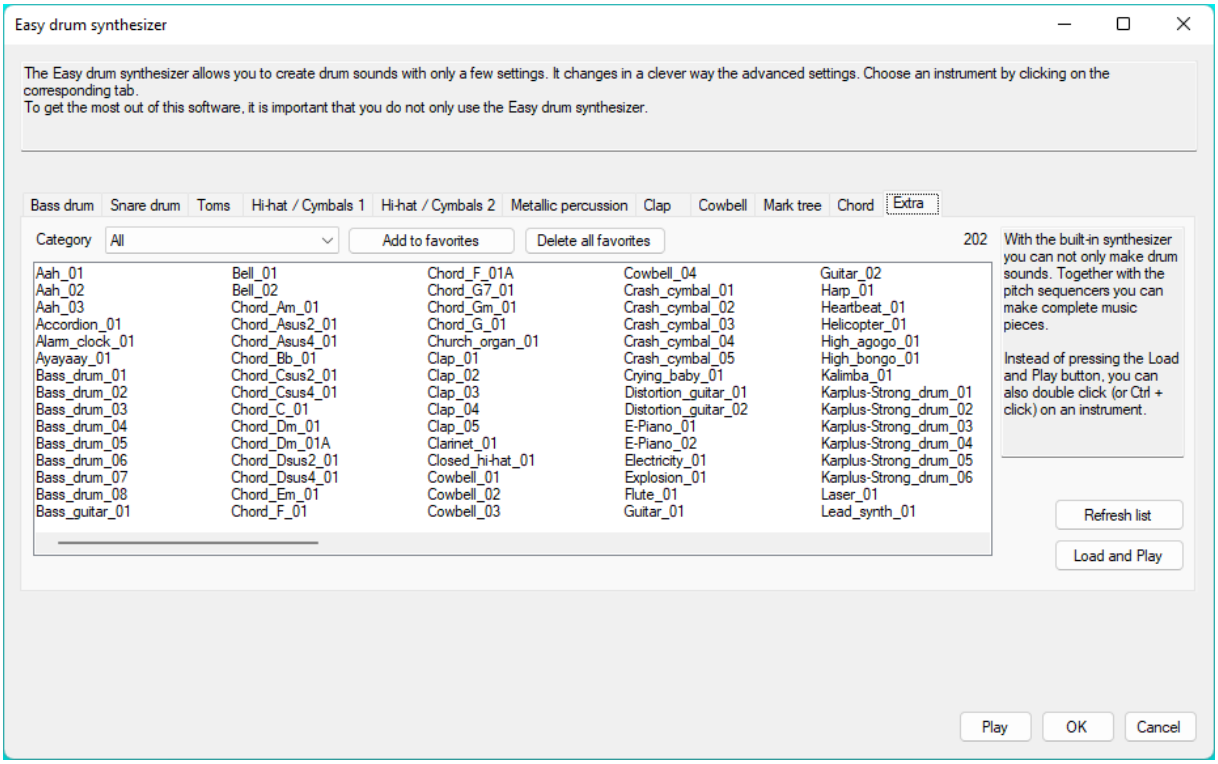
	you can choose it.
Chord	You can define a chord by selecting the root note and clicking on a chord type. There are many chord types available (m, 7, m7, maj7, mM7, sus2, sus4, sus24, 7sus2, 7sus4, 7sus24, maj7sus2, maj7sus4, maj7sus24, aug, aug6, aug7, dim, dim7, 5, 6, m6, 6sus2, 6sus4, 6b5, add2, 7b5, m7b5, maj7b5, 9, m9, maj9, mM9, 9sus4, maj9sus4, add9, madd9, 7b9, 7#9, 7b5b9, 7b5#9, 9b5, m9b5, (b5), 5add9, 69, m69, 69sus4, add4, madd4, 11omit3, 11omit5, m11omit5 and of course the normal major chord (-)).
Omit	This setting omits the selected note for chords with 3 or more notes.
Octave	This setting controls the octave of the root note (in root position).
Position	This setting controls the chord position (root position or an inversion). If the position is set to “Root position (add octave note)” and the chord has less than five notes, a note will be added that is one octave higher than the root.

Keep in mind that there exist many different symbols for the same chord. Here is an overview with some of them.

Symbol in frEDrums	**Alternate symbols**
Cm	Cmin, C-
Cmaj7	CM7, CΔ7, CΔ
CmM7	CmMaj7, Cm#7, C-M7, Cminmaj7
Cm9	Cmin9, C-9
CmM9	CmMaj9, Cm#9, C-M9, Cminmaj9
Caug	C+, C(#5)
Cdim	C°
Cdim7	C°7, Cm6b5
Csus4	Csus
C11omit3	C11no3

Extra

With the built-in synthesizer you can not only make drum sounds. See the tab Extra for examples. Together with the pitch sequencers you can make complete music pieces.
On the Extra tab there are also percussion instruments like a guiro and an agogo. Select an instrument from the list and click the Load and Play button. Instead of pressing the Load and Play button, you can also double click (or Ctrl + click) on an instrument. The settings of the current instrument change and you can use the sound with your drum set. It is a good idea to study the sounds to learn how you can make even better sounds by yourself. A lot of functionality was added after most presets were made.
If you want you can filter the preset list by choosing a category. One of the categories is Favorites. Select a preset and click the “Add to favorites button” to add the preset to the Favorites category. When the Category is set to Favorites, you can remove a preset from the Favorites by selecting a preset and clicking the “Remove from favorites” button.
Press the “Delete all favorites” button if you want to remove all the presets from the favorites category.
The number above the preset list indicates the number of presets that are in the selected category.



Here is information about some of the presets.

Crash_cymbal_05

Cymbals are very difficult to synthesise, but this crash cymbal sounds very realistic. You can change the frequency of operators 1, 4, 7 and 10 for a different timbre. You can also double click on Frequency in the Random column. You will hear a lot of terrible sounds, but also some good ones.

Guitar_02

For this sound, Karplus-Strong string synthesis is used. You can change the pitch by changing the delay time of the Delay effect. You can change the decay by changing the decay factor of the Delay effect. Keep in mind that the delay time also influences the decay. Everytime the waveform is generated, it can sound a little different, because of the white noise which is random. If you want the sound to be always the same, you can use Looped noise for Oscillator (operator) 1 of the Wave combiner or you can set Random seed to another value than 0. Enable the feedback filter of the Delay effect if you want the higher frequencies to decay faster. In that case you might need to increase the decay factor.

High_bongo_01 and Low_bongo_02

You can change the pitch by changing the cutoff frequency of Filter 2. Click on the value if you want to enter a musical note.

Phone_02

The melody is created by the special envelopes of the first 3 wave combiner operators, because one operator has not enough envelope stages. Since the modulation levels are mixed, the value of a modulator has to be 0 at the periods that it doesn't control the melody. It is difficult to set the right levels for controlling the pitch. It is important to know that the right level depends on the number of active modulators. Mute for example operator 4 and operator 5 and the whole melody will be messed up. Normally it is best to mute operators that you don't use, but in this case who cares :-)

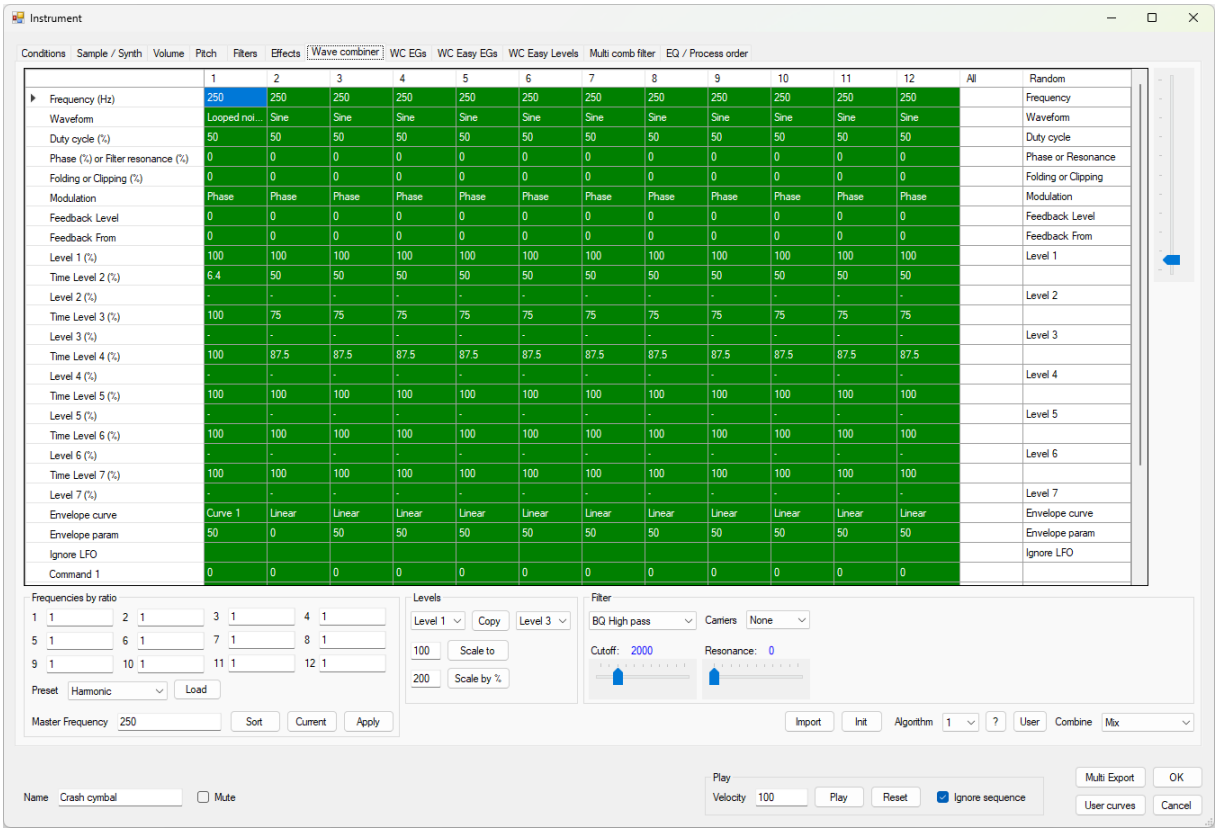
Synth_bass_05

For this sound, Karplus-Strong string synthesis is used. You can change the pitch by changing the delay time of the Delay effect. You can change the decay by changing the decay factor of the Delay effect. Keep in mind that the delay time also influences the decay.

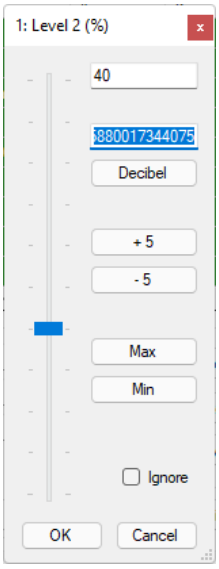
Synth_percussion_15, Synth_percussion_16 and Synth_percussion_17

For these sounds, Karplus-Strong string synthesis is used. You can change the pitch by changing the cutoff frequency of Filter 2. You can change the decay by changing the decay factor of the Delay effect. Enable the feedback filter of the Delay effect if you want the higher frequencies to decay faster. In that case you might need to increase the decay factor.

Wave combiner



With the Wave combiner you can create complex waveforms by combining the waveforms of 12 oscillators. The Wave combiner is very suitable for creating bell, metal and organ sounds. To use the Wave combiner, the waveform of Oscillator 2 (see tab Sample / Waveform) must be set to Wave combiner. You can press Ctrl-W to change some settings to use the Wave combiner. In that case the following changes will be made:



Instrument mode = Synth, Oscillator 2 Waveform = Wave combiner, Mix Osc 1/ Osc 2 = 100%, Max level = 100%, Current tab = Wave combiner

For all 12 oscillators, you can set the Frequency, Waveform, Duty cycle, Phase, Folding, Modulation, Feedback, Envelope times and volumes, Envelope curve, Ignore LFO and commands to modify the waveform. You can mute the oscillators that you don't need.
You can edit the numeric values by typing the value directly in the table or by moving the slider at the right of the table. The other way of editing settings is to double click with the left mouse button on a cell. Depending on the setting, the edit form will look different. You can change the value by moving the slider or by entering the value in the edit box. When editing a volume, you can enter the Decibel value from which the volume level will be calculated. This is handy when you are copying values from a frequency spectrum. Type the value in the second edit box from above and press the Decibel button. When editing a frequency, you can right click on the value field and choose the musical note C0, C1, C2, C3, C4 or C5 from the menu. You can also type a musical note (examples: C2, Ab3, F#1).

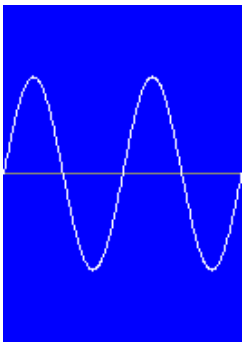
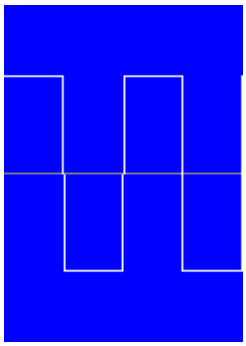
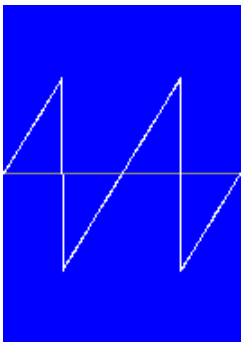
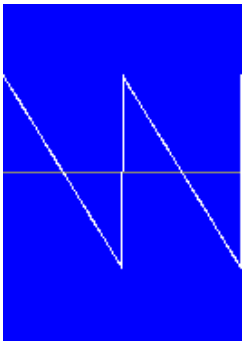
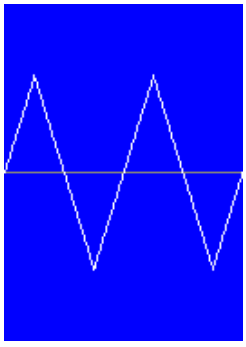
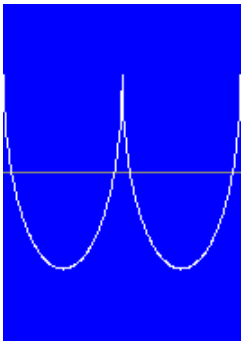
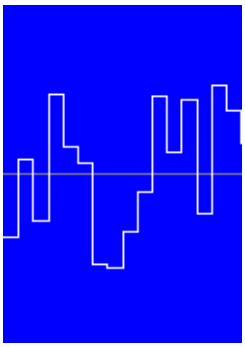
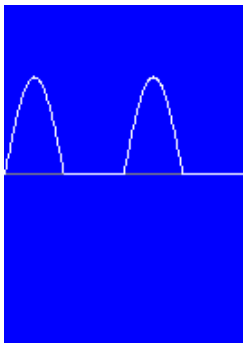
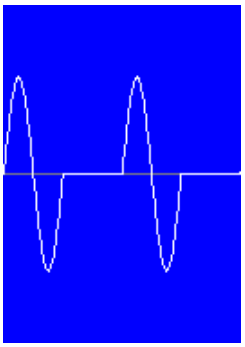
Press the Max button to set the maximum value and press the Min button to set the minimum value. Use the +5 button to increase the value by 5 and use the -5 button to decrease the value by 5. Check Ignore if you don't want to use the Setting. You can ignore Level 2 - Level 7. If you enter an invalid value in the upper edit box, it will turn red. Press OK to apply the setting or press Cancel to reject the change.

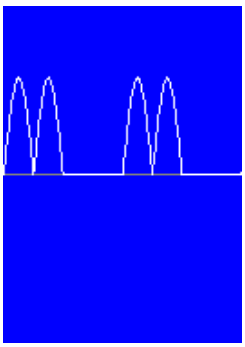
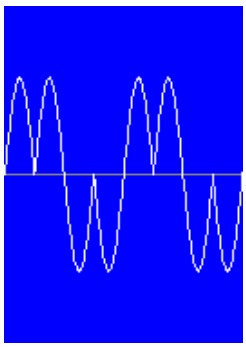
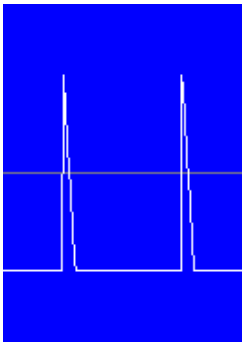
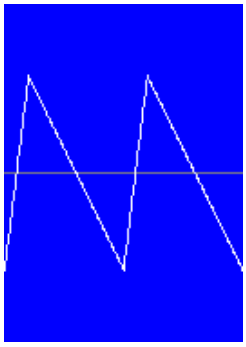
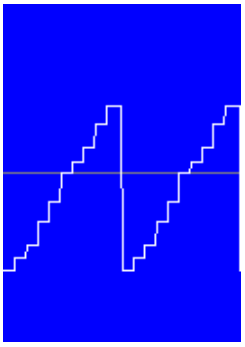
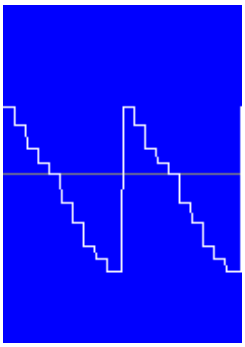
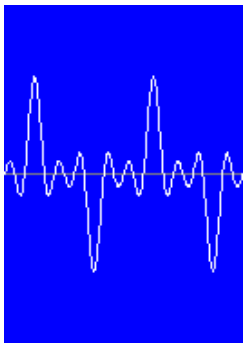
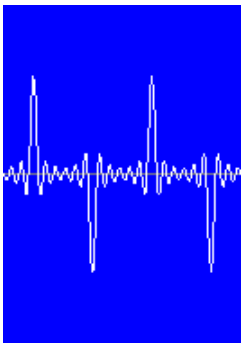
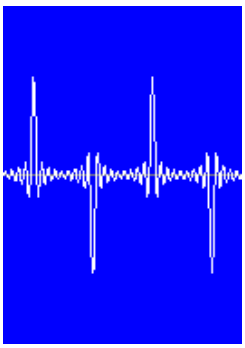
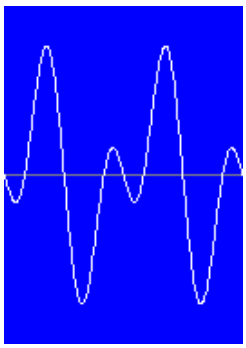
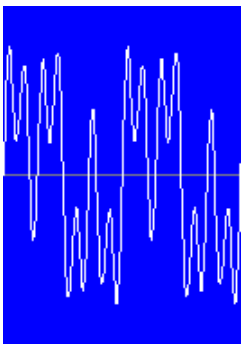
Frequency

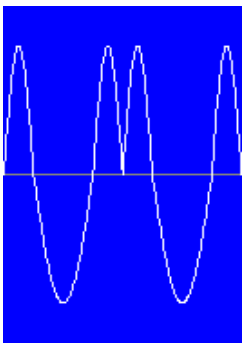
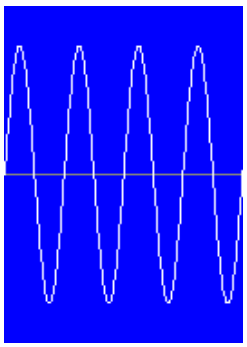
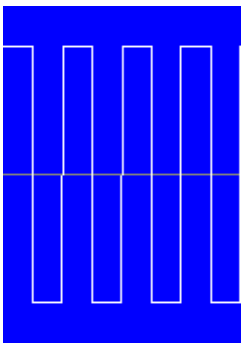
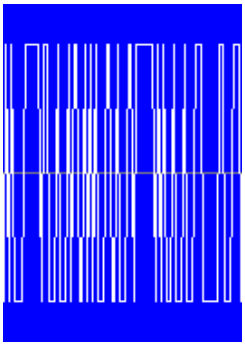
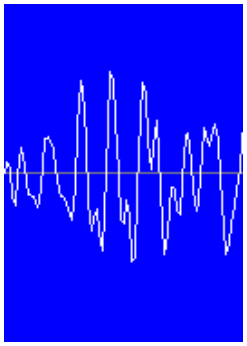
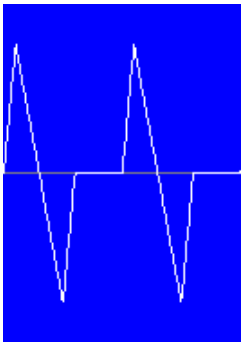
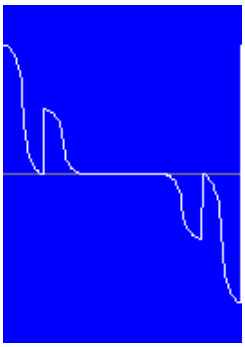
Set the Frequency to change the modulating frequency of a modulator or the pitch of a carrier. If an operator is a modulator or a carrier depends on the Algorithm setting.

Waveform

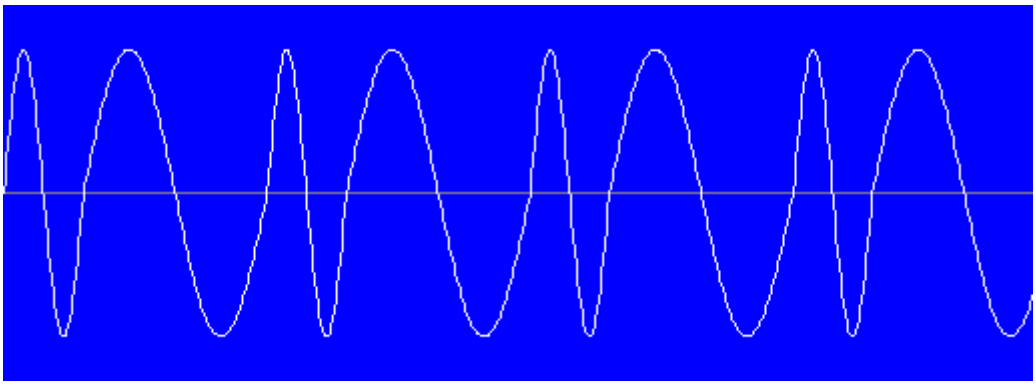
Double click in a cell to change the waveform. You can also change the waveform by using the plus and minus buttons (plus = next, minus = previous, ctrl-plus = last, ctrl-minus = first). You can use one of the following waveforms:

 Sine	 Square	 Saw 1
 Saw 2	 Triangle	 Sweep
 Sample & hold	 Special 1	 Special 2

 Special 3	 Special 4	Noise and HPF * Noise and LPF * Noise and BPF * Noise and Notch * * The oscillator frequency is used for the filter cutoff frequency and the phase setting is used for the resonance.
 Delayed ramp down	 Triangle 2	 Pentatonic up
 Pentatonic down	 Sinc 1	 Sinc 2
 Sinc 3	 Special 5	 Special 6

 Special 7	 2 x Sine	 2 x Square
 Digital noise	 Metallic noise	 Use env as osc 1
 Use env as osc 2	Looped noise Perlin noise * Poisson noise White noise Pink noise Brown noise Blue noise Violet noise * The oscillator frequency is used.	

The Delayed ramp down and Triangle 2 waveforms are very useful for envelopes. With the duty cycle you can control the delay of the Delayed ramp down and the attack of Triangle 2. You can use the pentatonic waveforms to modulate slowly the frequency to get a sequence of musical notes from the pentatonic scale. 2 x Sine and 2 x Square are available to be used with a Duty Cycle that is not 50%.



2 x Sine, Duty Cycle = 30%

When the waveform is set to “Use env as osc 1” or “Use env as osc 2”, the shape of the waveform is defined by the envelope of the operator. In that case, the envelope does not control the volume or the modulation level. Depending on the algorithm, you can modulate the volume with the envelope of another oscillator by setting Command 3 to “M, M”.
The difference between “Use env as osc 1” and “Use env as osc 2” is that with “Use env as osc 2”, the quadrants 1 and 2 together are the same as the whole envelope shape. For the quadrants 3 and 4 the shape is flipped horizontally and vertically. The Duty cycle has influence on “Use env as osc 2”, but not on “Use env as osc 1”. The presets on the WC EGs tab depend on the waveform setting.

Looped noise is very handy if you want always the same sequence of “random” values. With the Duty cycle setting you can control the density of the noise. If the Duty cycle is 50, there will be a random value generated for every sample. The further away from that value, the less random values will be generated. If the Duty cycle is higher than 50, the sample values for which no random value is generated will be the same as the previous value. If the Duty cycle is lower than 50, the sample values for which no random value is generated will be 0.
In combination with physical modeling synthesis, you can easily make very different sounds by only changing the noise density. You can try the following:

Go to the Extra tab of the Easy drum synthesizer.
Select Cymbal_01 and press the “Load and Play” button.
Press the OK button.
Go to the Wave combiner tab.
Select the Duty Cycle field of oscillator 1.
Move the slider at the right of the table to different values and play the sound (hotkey: Ctrl+Shift) after each value change.

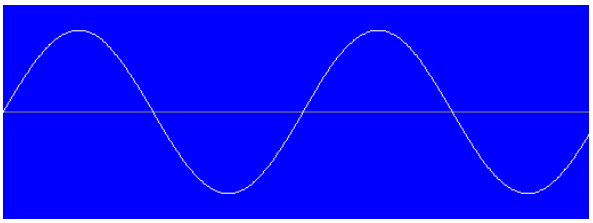
The looped noise with a low density is also very suitable for creating explosion sound (see Explosion_02 on the Extra tab of the Easy drum synthesizer).

Duty cycle

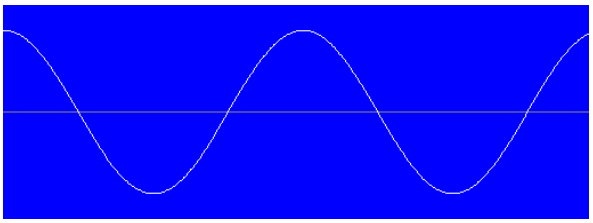
With the Duty cycle parameter you can set the pulse width. You can adjust the pulse width for all available waveforms, except noise, sample & hold and pentatonic.

Phase

With the Phase parameter, you can set at which point (percentage of a period) a waveform has to start. Set Phase to 25%, if you want a sine wave to start at the maximum positive value (90°).



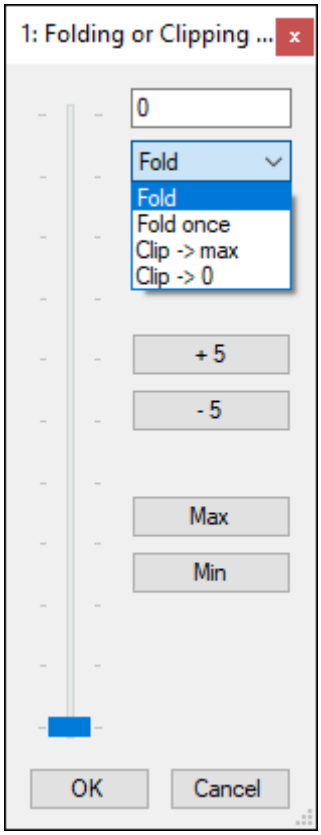
Phase = 0 %



Phase = 25 %

When the waveform is set to a noise, the phase parameter controls the resonance of the filter.

Folding or Clipping



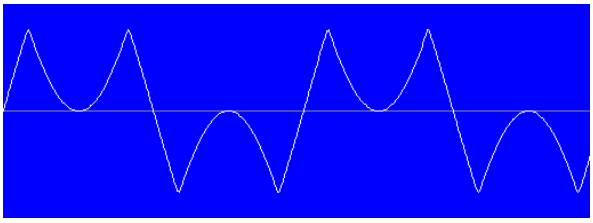
You can use folding to create extra harmonics. This is very useful for metallic sounds. You can use Folding or Clipping for all available waveforms except Square, Delayed ramp down, Sample & hold, Pentatonic up and Pentatonic down.

The following folding and clipping methods are available.

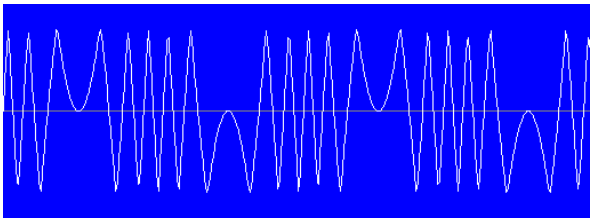
Fold	If a value exceeds the maximum level, it will be folded. If after that it still exceeds the maximum level in the other direction, it will be folded again. This continues until the value does not exceed the maximum level anymore.
Fold once	If a value exceeds the maximum level, it will be folded. If after that it still exceeds the maximum level in the other direction, it will not be folded again.
Clip -> max	If a value exceeds the maximum level, it will be set to the maximum level.
Clip -> 0	If a value exceeds the maximum level, it will be set to 0.

If you use another method than Fold, you will see a high number (> 100) in the table, because the method is also stored in the number. Therefore it is better not to type the value directly in the table when you use another method than Fold.

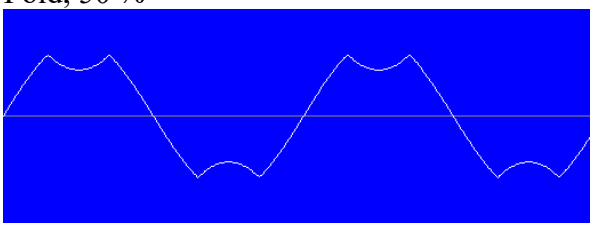
For the following examples, the waveform is set to Sine.



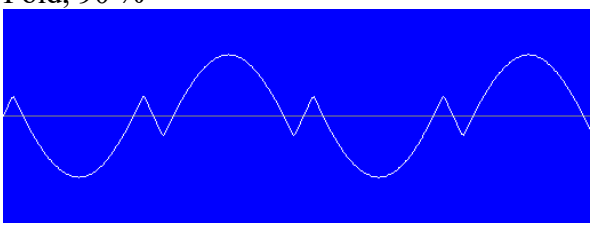
Fold, 50 %



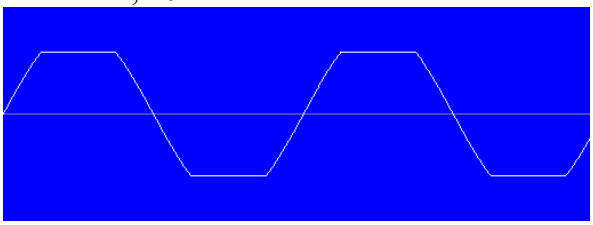
Fold, 90 %



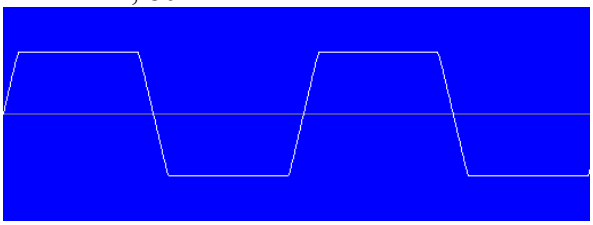
Fold once, 20 %



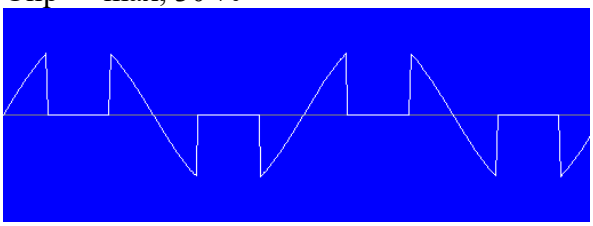
Fold once, 80 %



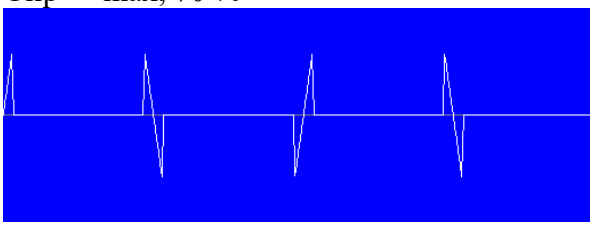
Clip -> max, 30 %



Clip -> max, 70 %



Clip -> 0, 20 %



Clip -> 0, 80 %

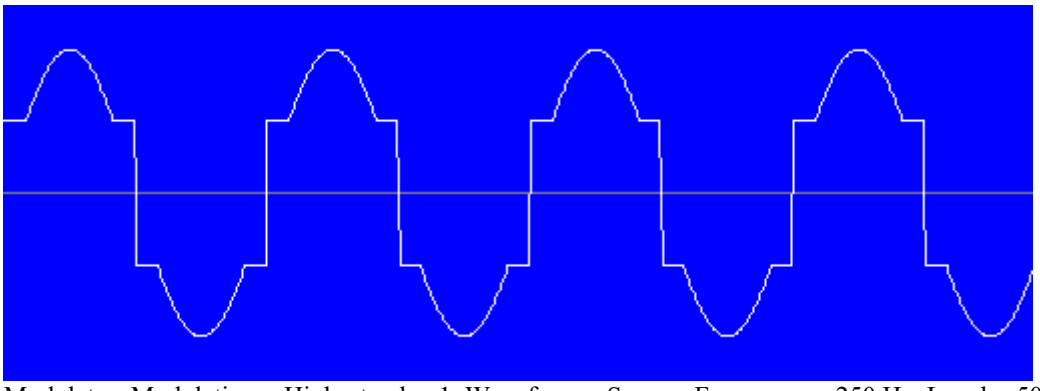
Modulation

For a modulator you can set the following:

Modulation	**Remark**
Phase	Keep in mind that the term FM (Frequency Modulation) is often used when the phase is modulated. When modulating the phase, the frequency is also changing.
Frequency	
Volume	When the average modulation value is 100% negative, the level of the modulated oscillator(s) will be 0. When the average modulation value is 100% positive, the level of the modulated oscillator(s) will be 100%.
Pulse width	The pulse width of most waveforms can be modulated, so not only the square waveform.
Multiply	Multiply is ring modulation, which is often used for creating metallic sounds.
Frequency (max depth = 10 x)	Use this modulation when you need a larger depth than the normal Frequency modulation (for example to create a pitch envelope for a bass drum).

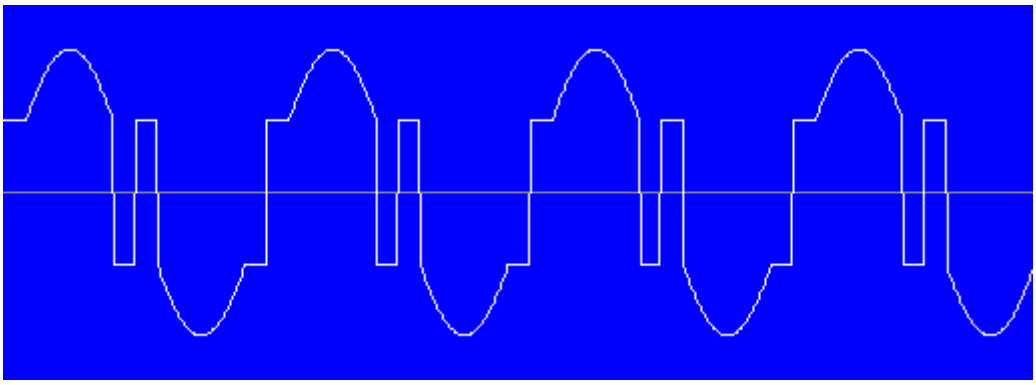
Folding / Clipping	Negative modulation values will be converted to positive values.
Cmd 3 parameter 1	Negative modulation values will be converted to positive values.
Cmd 3 parameter 2	Negative modulation values will be converted to positive values.
Sync	When the waveform position of the modulator is at the beginning, the waveform position of the modulated oscillator(s) will be set to the beginning.
Highest value 1	When the modulated oscillator value and the average modulation value are both positive or both negative and the absolute modulation value is greater than the absolute modulated oscillator value, the modulated oscillator value is set to the modulation value.
Highest value 2	When the absolute modulation value is greater than the absolute modulated oscillator value, the modulated oscillator value is set to the modulation value.
Shape	The waveform of the modulator has to be set to "Use env as osc 1" or "Use env as osc 2" (symmetrical). Only the envelope settings of the modulator are used for wave shaping, so for example not the frequency.
Value	The modulated oscillator value is set to the modulation value, but it can be modified by the envelope and the commands.
Invert 1	When the modulation value is greater than 0, the level will be inverted. In that case, positive values will be negative and negative values will be positive.
Invert 2	When the modulation value is greater than 0, the level will be inverted. In that case, positive values will stay positive and negative values will stay negative, but high values will become low and low values will become high.
Phase (bipolar)	With this modulation you can modulate the phase positive and negative (see Extra/Organ_04).

You can also change the modulation by using the plus and minus buttons (plus = next, minus = previous, ctrl-plus = last, ctrl-minus = first).

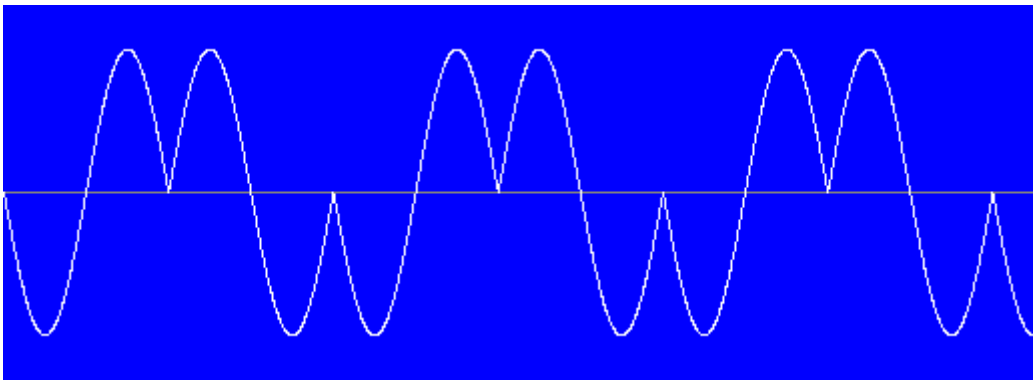


Modulator: Modulation = Highest value 1, Waveform = Square, Frequency = 250 Hz, Level = 50%

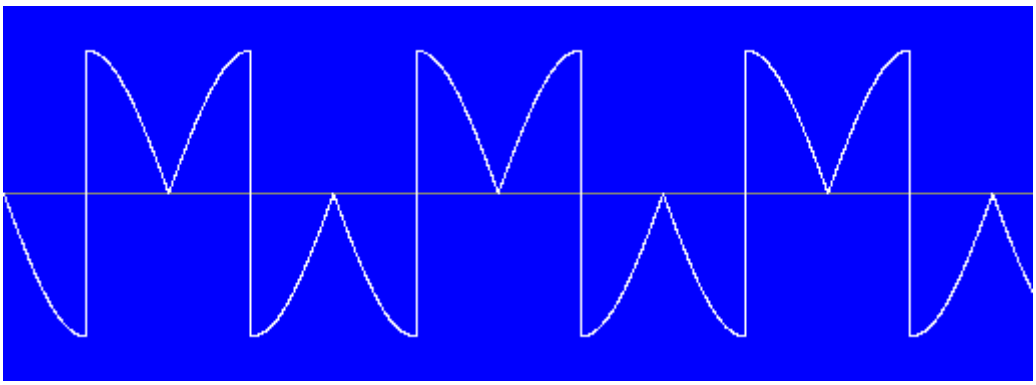
Modulated oscillator: Waveform = Sine, Frequency = 250 Hz, Level = 100%



Modulator: Modulation = Highest value 2, Waveform = Square, Frequency = 500 Hz, Level = 50%
Modulated oscillator: Waveform = Sine, Frequency = 250 Hz, Level = 100%



Modulator: Modulation = Invert 1, Waveform = Sine, Frequency = 50 Hz
Modulated oscillator: Waveform = Sine, Frequency = 100 Hz



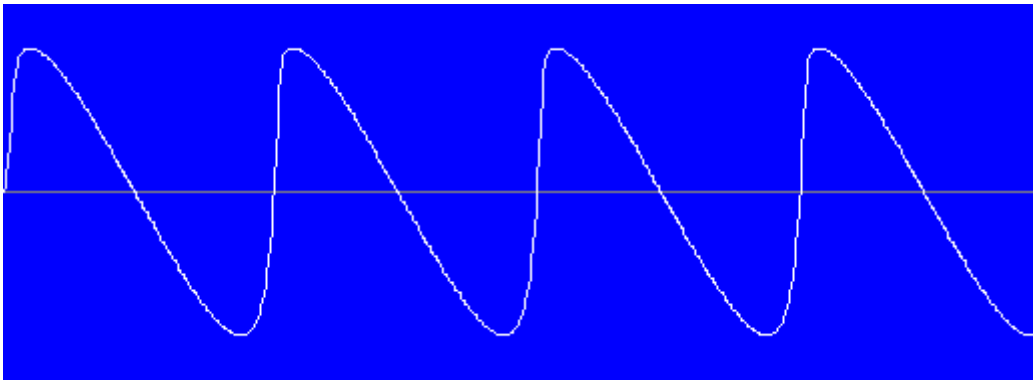
Modulator: Modulation = Invert 1, Waveform = Sine, Frequency = 100 Hz
Modulated oscillator: Waveform = Sine, Frequency = 50 Hz

With the modulation set to Invert 1, you can easily make metallic sounds. Here are some frequency settings that give a nice result:

	1	**2**	**3**	**4**	**5**
F1 (modulator)	1000	1825	333	780	555
F2	4400	1000	805	1400	780

Feedback Level

Use Feedback Level to set the level of the feedback. In some synthesizers phase modulation feedback is used to convert a sine wave to a saw, but in frEDrums you can also to choose the Saw 2 waveform. You can use Feedback for all modulation types, except Frequency. The feedback level can also be negative.



Phase modulating: Feedback Level = 30, Feedback From = 0

Feedback From

If Feedback From is set to 0, the oscillator modulates itself. If the value is greater than 0, the number indicates the oscillator that modulates. The oscillator can be a modulator or a carrier, depending on the selected algorithm.

Level 1

Use this parameter to set the start level of a carrier or the start modulation amount of a modulator. If Level 2 - Level 7 are set to Ignore, the level / amount within the operator will not change. The parameters Level 1, Time Level 2, Level 2, Time Level 3, Level 3, Time Level 4, Level 4, Time Level 5, Level 5, Time Level 6, Level 6, Time Level 7 and Level 7 form an envelope. Keep in mind that there is also a global envelope generator available and that the LFO can also be used as an envelope generator.

Time Level 2

This is the time, as a percentage of the waveform duration, when the level has to be at the level that is set by the Level 2 parameter. The level changes from Level 1 to Level 2.

Level 2

With this parameter you can set the level at the time that is set by the Time Level 2 parameter. Set Level 2 to Ignore, if you don’t want to use the second level point. In that case the third level point becomes the second level point, if it is not also ignored.

Time Level 3

This is the time, as a percentage of the waveform duration, when the level has to be at the level that is set by the Level 3 parameter.

Level 3

With this parameter you can set the level at the time that is set by the Time Level 3 parameter. Set Level 3 to Ignore, if you don't want to use the third level point.

Time Level 4

This is the time, as a percentage of the waveform duration, when the level has to be at the level that is set by the Level 4 parameter.

Level 4

With this parameter you can set the level at the time that is set by the Time Level 4 parameter. Set Level 4 to Ignore, if you don't want to use the fourth level point.

Time Level 5

This is the time, as a percentage of the waveform duration, when the level has to be at the level that is set by the Level 5 parameter.

Level 5

With this parameter you can set the level at the time that is set by the Time Level 5 parameter. Set Level 5 to Ignore, if you don't want to use the fifth level point.

Time Level 6

This is the time, as a percentage of the waveform duration, when the level has to be at the level that is set by the Level 6 parameter.

Level 6

With this parameter you can set the level at the time that is set by the Time Level 6 parameter. Set Level 6 to Ignore, if you don't want to use the sixth level point.

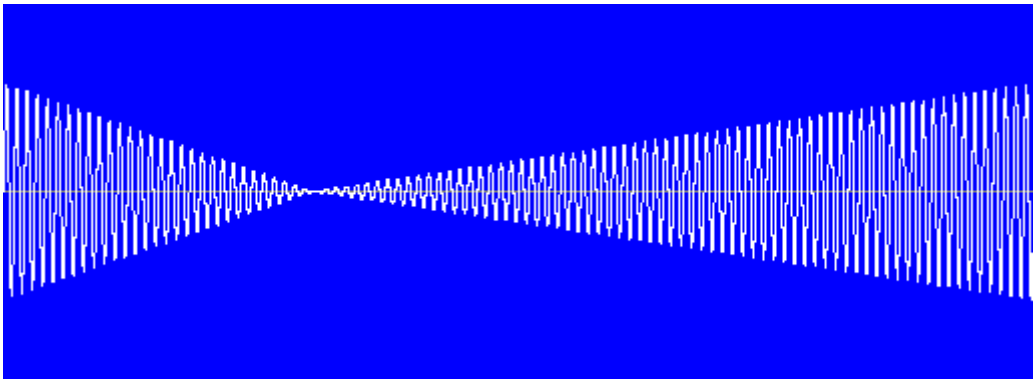
Time Level 7

This is the time, as a percentage of the waveform duration, when the level has to be at the level that is set by the Level 7 parameter.

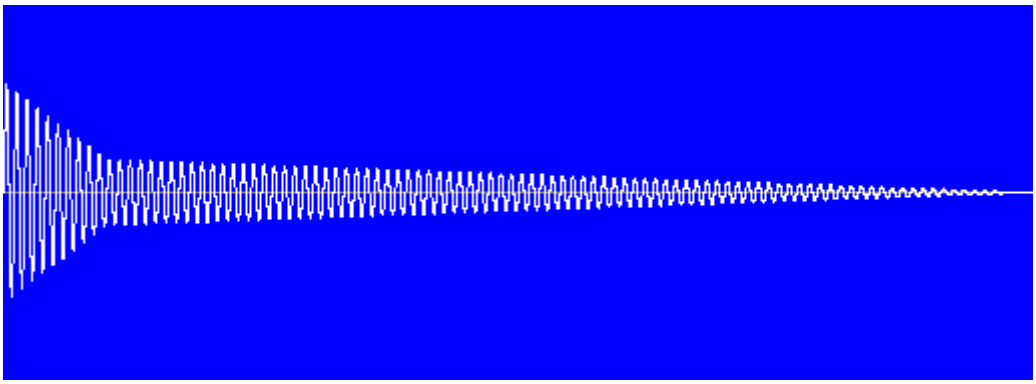
Level 7

With this parameter you can set the level at the time that is set by the Time Level 7 parameter. Set Level7 to Ignore, if you don't want to use the seventh level point.

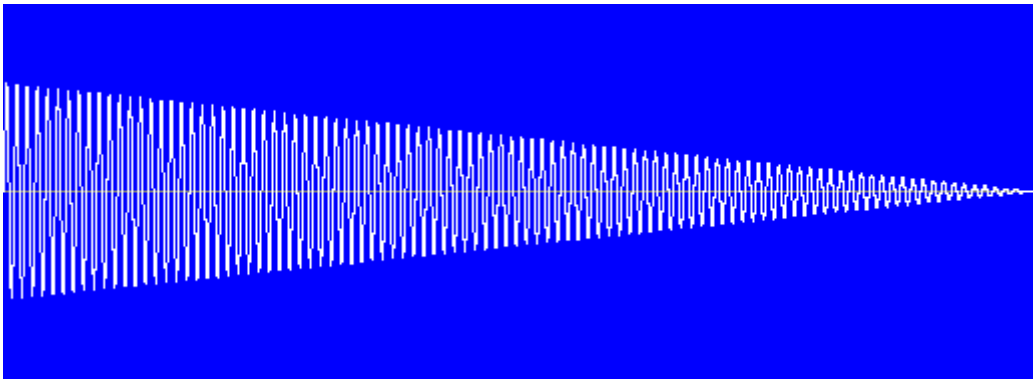
Here are some examples. Not indicated levels are set to Ignore (-).



Level 1 = 100, Time Level 2 = 30, Level 2 = 0, Time Level 5 = 100, Level 5 = 100

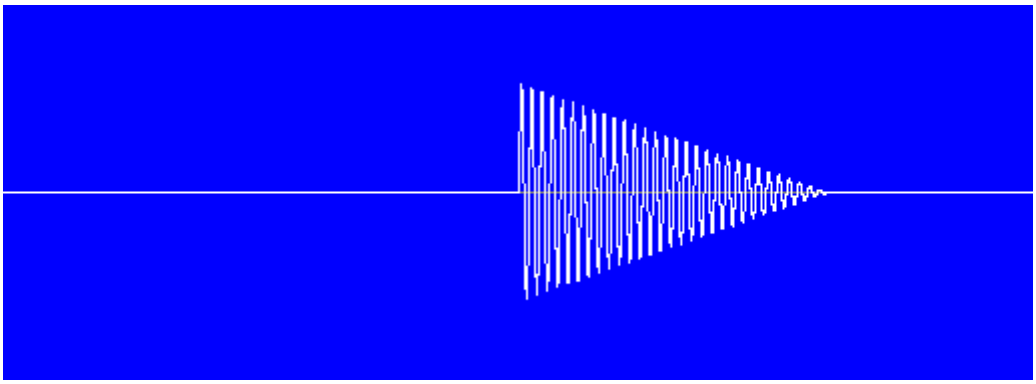


Level 1 = 100, Time Level 2 = 10, Level 2 = 30, Time Level 5 = 100, Level 5 = 0

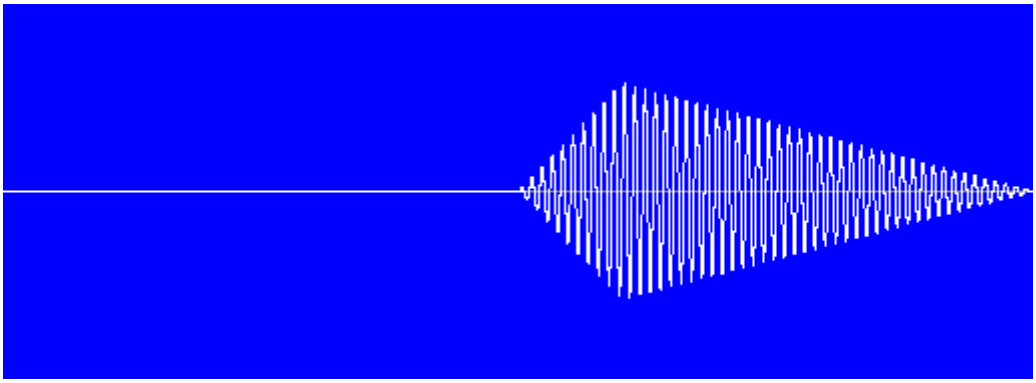


Level 1 = 100, Time Level 5 = 100, Level 5 = 0

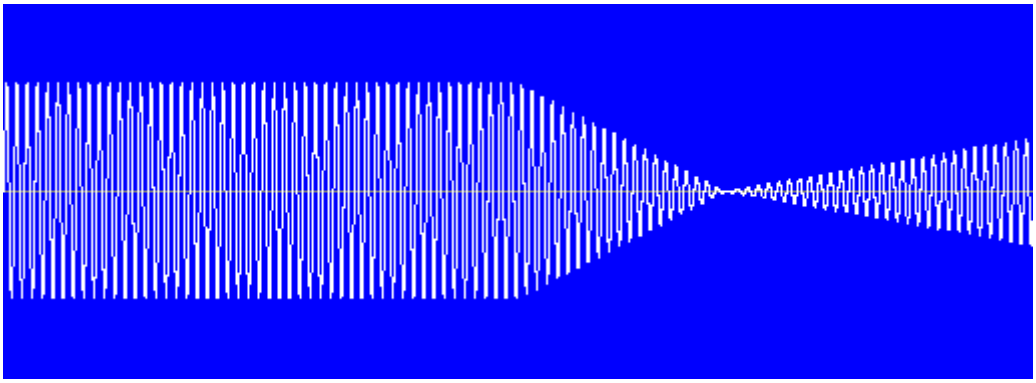
Level 1 = 100, Time Level 2 = 5, Level 2 = 0, Time Level 5 = 100, Level = 0



Level 1 = 0, Time Level 2 = 50, Level 2 = 0, Time Level 3 = 50, Level 3 = 100, Time Level 5 = 80, Level 5 = 0



Level 1 = 0, Time Level 2 = 50, Level 2 = 0, Time Level 3 = 60, Level 3 = 100, Time Level 5 = 100, Level 5 = 0

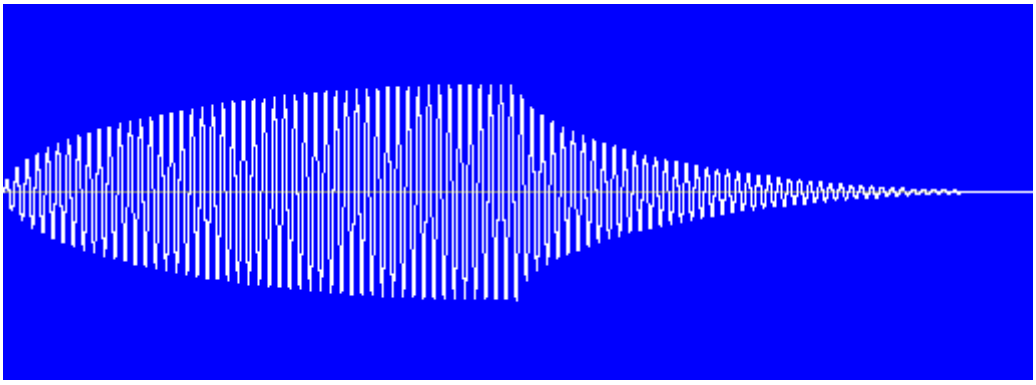


Level 1 = 100, Time Level 2 = 50, Level 2 = 100, Time Level 3 = 70, Level 3 = 0, Time Level 7 = 100, Level 7 = 50

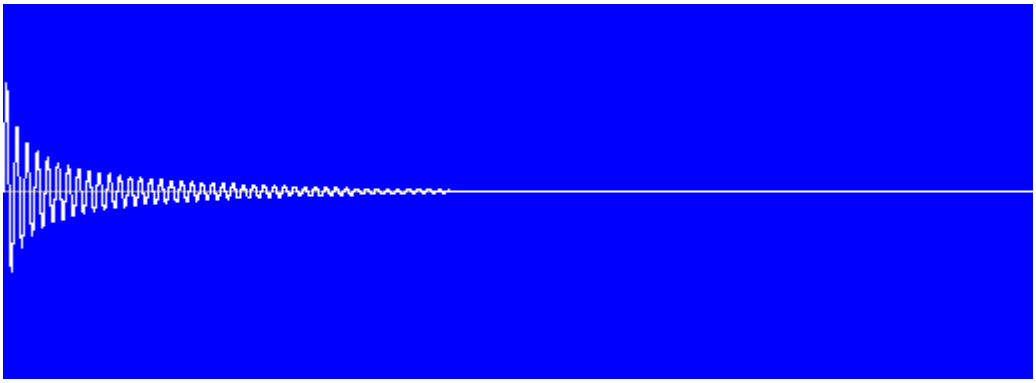
You can change the envelopes also on the Wave combiner Easy EGs tab.

Envelope curve

You can also select a curve for the envelope (See chapter Envelope curves). Double click in a cell to change the envelope curve. You can also change the envelope curve by using the plus and minus buttons (plus = next, minus = previous, ctrl-plus = last, ctrl-minus = first).



Curve 2, Level 1 = 0, Time Level 2 = 50, Level 2 = 100,
Time Level 3 = 100, Level 3 = 0



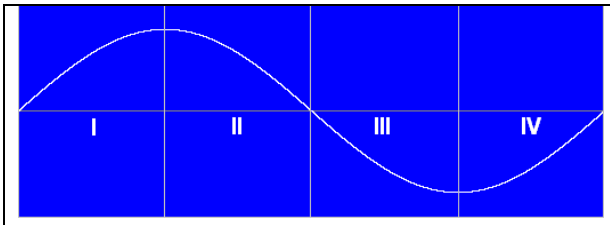
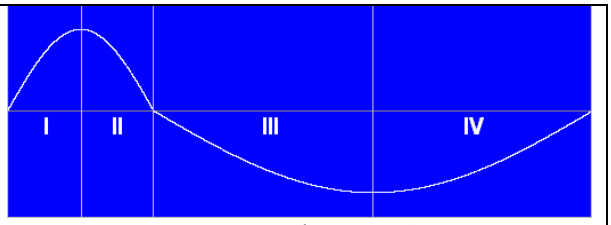
Curve 3, Level 1 = 100, Time Level 2 = 50, Level 2 = 0,

Ignore LFO

If you don’t want the LFO to modulate an oscillator, you can set Ignore LFO for that oscillator by clicking on the cell.

Command 1 and Command 2

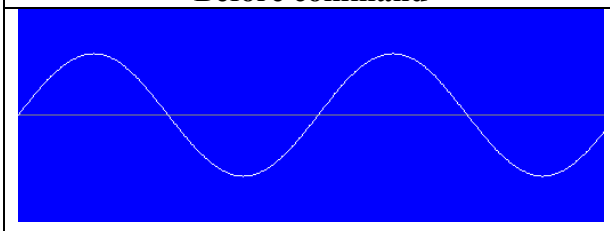
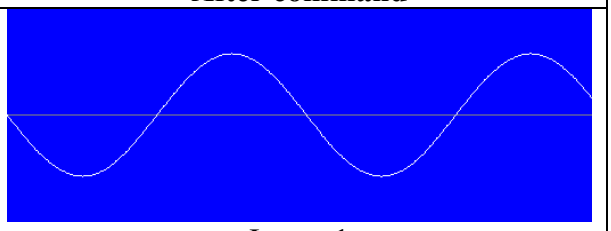
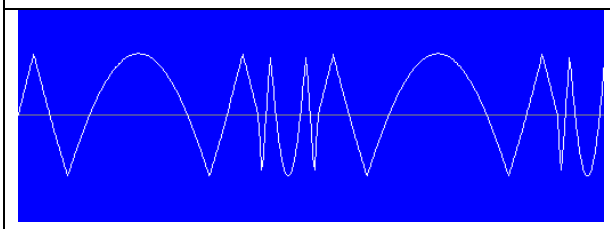
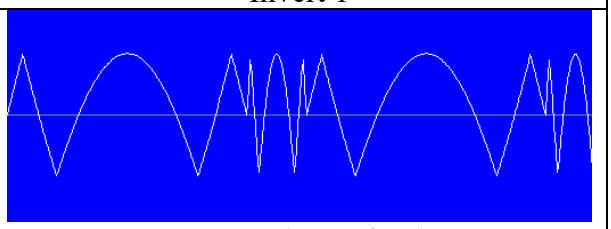
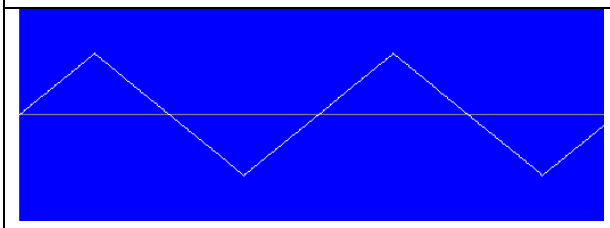
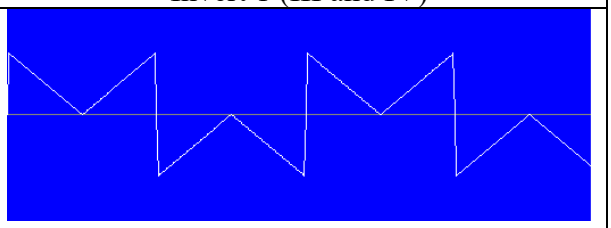
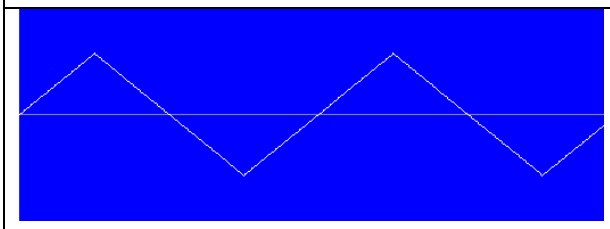
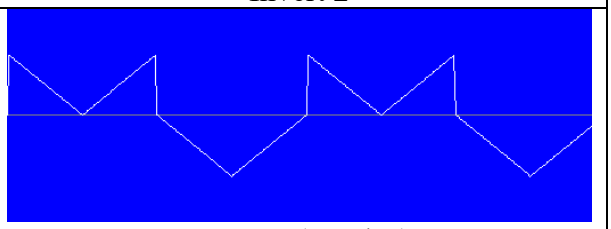
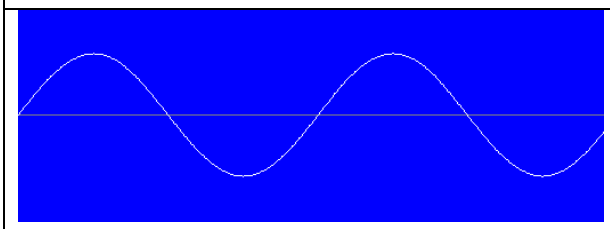
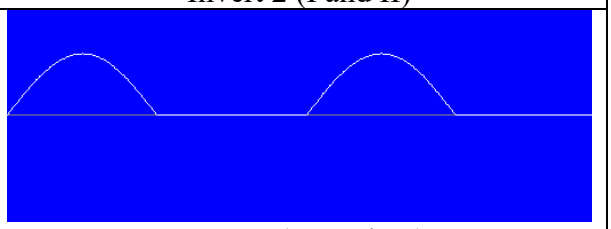
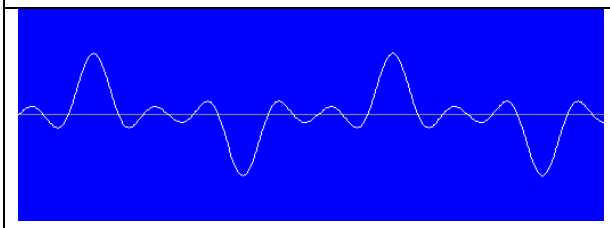
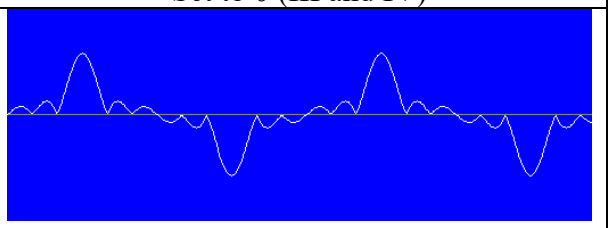
With Command 1 and Command 2, you can make additional changes to the waveform. Command 1 will be executed first. Select None if you don't want to use a command. When the Duty cycle parameter is 50%, I and II is the first half of the waveform and the III and IV is the last half.

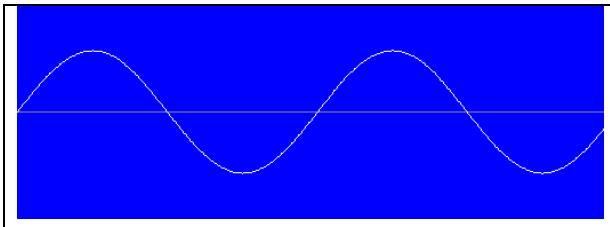
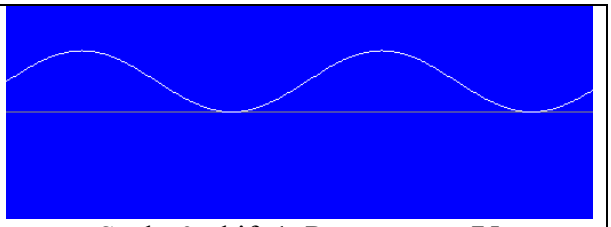
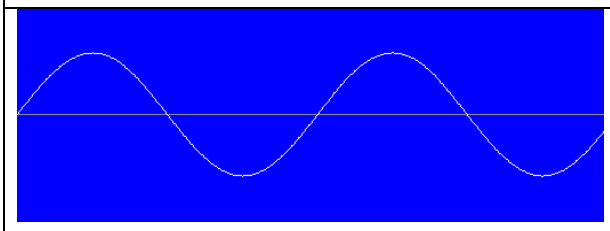
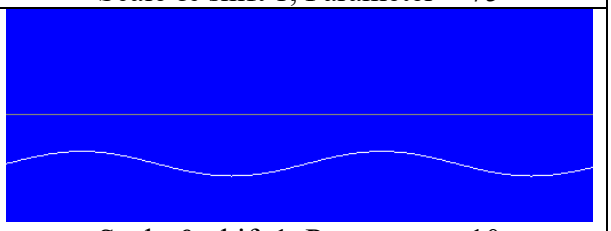
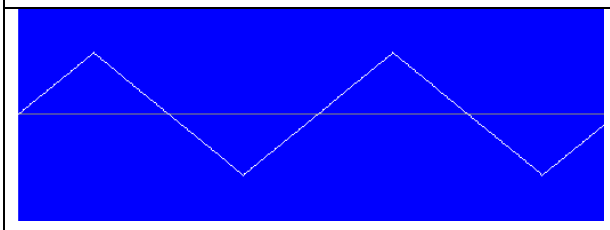
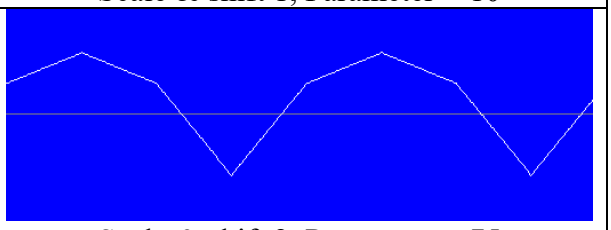
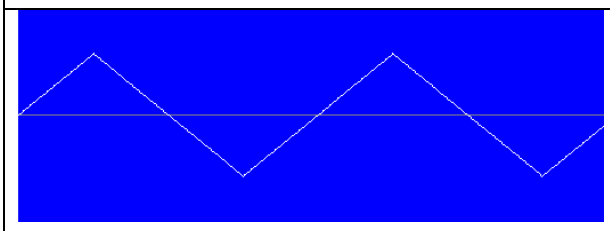
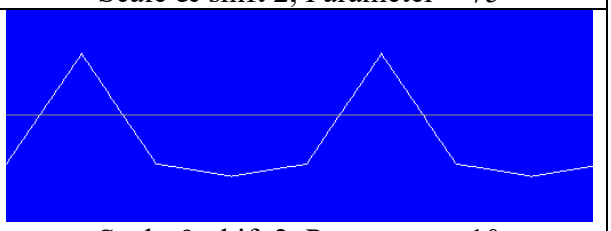
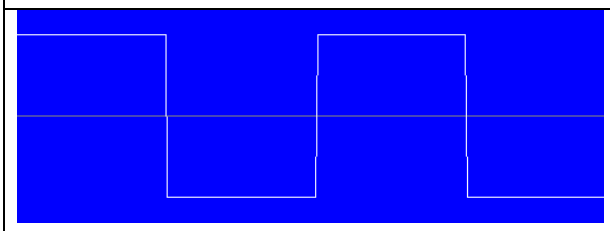
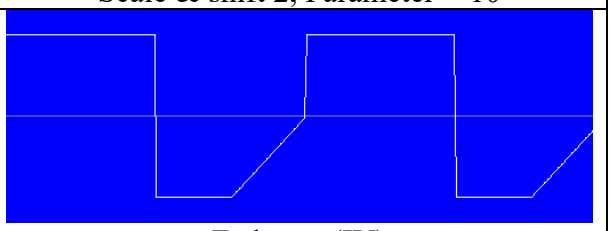
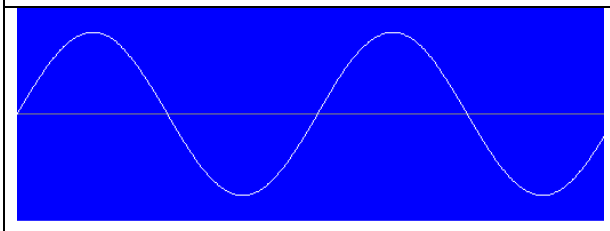
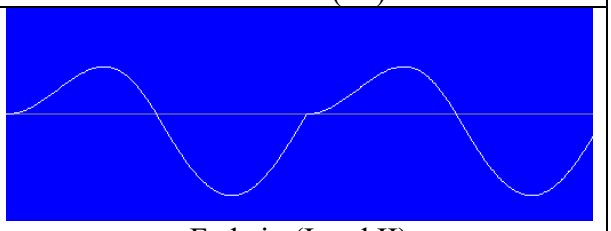
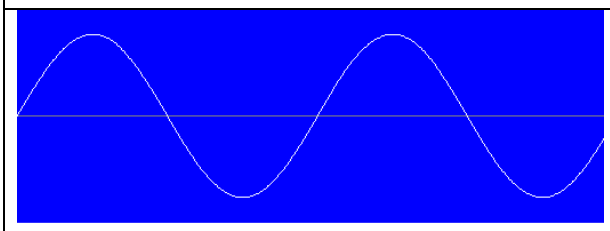
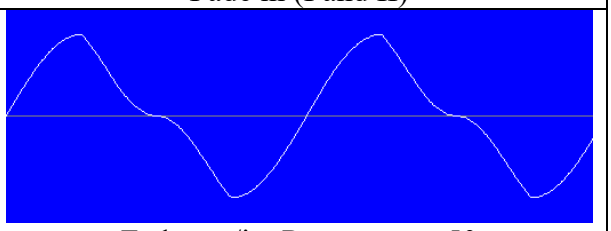
	
Duty cycle = 50%	Duty cycle = 25%

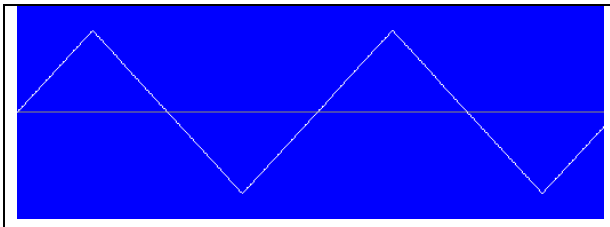
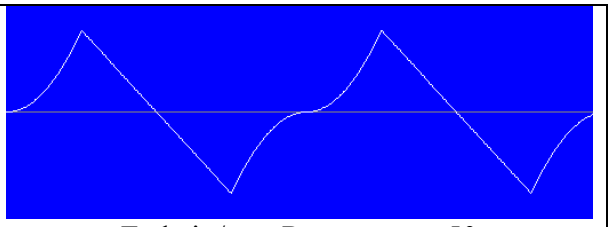
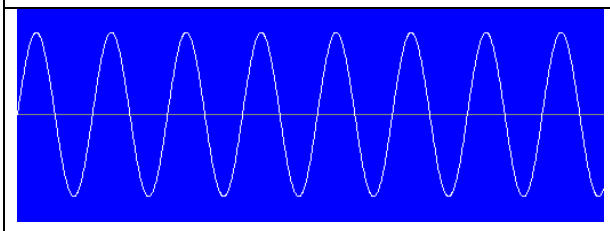
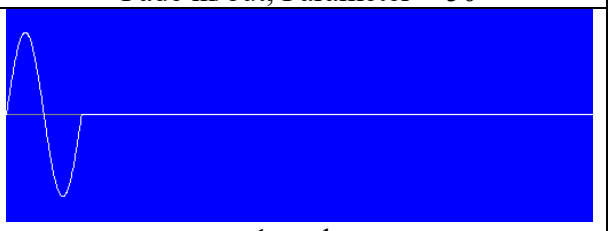
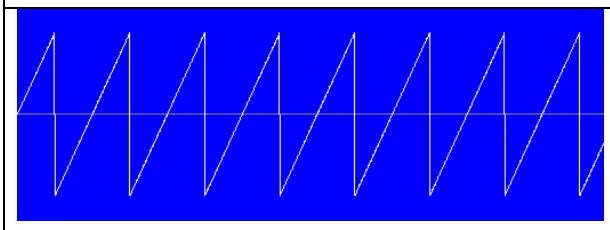
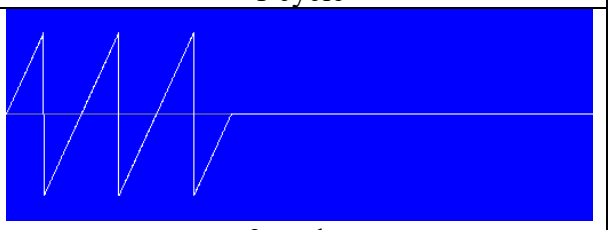
Invert 1	Positive values will be negative and negative values will be positive.
Invert 2	Positive values will stay positive and negative values will stay negative, but high values will become low and low values will become high.
Set to 0	The values will become 0.
Set positive to 0	Positive values will become 0.
Set negative to 0	Negative values will become 0.
Make positive	Negative values will become positive.
Make negative	Positive values will become negative.
Make left positive and right negative	Negative values of the left part will become positive and positive values of the right part will become negative.
Make left negative and right positive	Positive values of the left part will become negative and negative values of the right part will become positive.
Scale & shift 1 (uses parameter)	The whole waveform will be scaled smaller and then shifted. If the value of the parameter is greater than 50, the waveform will be shifted up. If the value of the parameter is less than 50, the waveform will be shifted down. If the parameter has a value of 50, there will be no change.
Scale & shift 2 (uses parameter)	The positive values and the negative values will be scaled differently depending on the parameter. After that, the whole waveform will be shifted. If the parameter has a value of 50, there will be no change.
Fade out	The volume will decrease gradually linearly.
Fade in	The volume will increase gradually linearly.
Fade out/in (uses parameter)	The volume will decrease gradually linearly and then increase gradually linearly. With the parameter you control the time (percentage of the duration) in which this happens. With a value of 100, the volume will start decreasing immediately.
Fade in/out (uses parameter)	The volume will increase gradually linearly at the start and decrease gradually linearly at the end. With the parameter you control the total increasing/decreasing time (percentage of the duration). With a value of 100, decreasing starts immediately after increasing.

1 cycle	Set the values after the first cycle to 0. This is very handy for Karplus-Strong synthesis
2 cycles	Set the values after the first 2 cycles to 0.
3 cycles	Set the values after the first 3 cycles to 0.
Mix with triangle	The current sound will be mixed with a triangle waveform.

See the following examples for a better understanding of the commands.

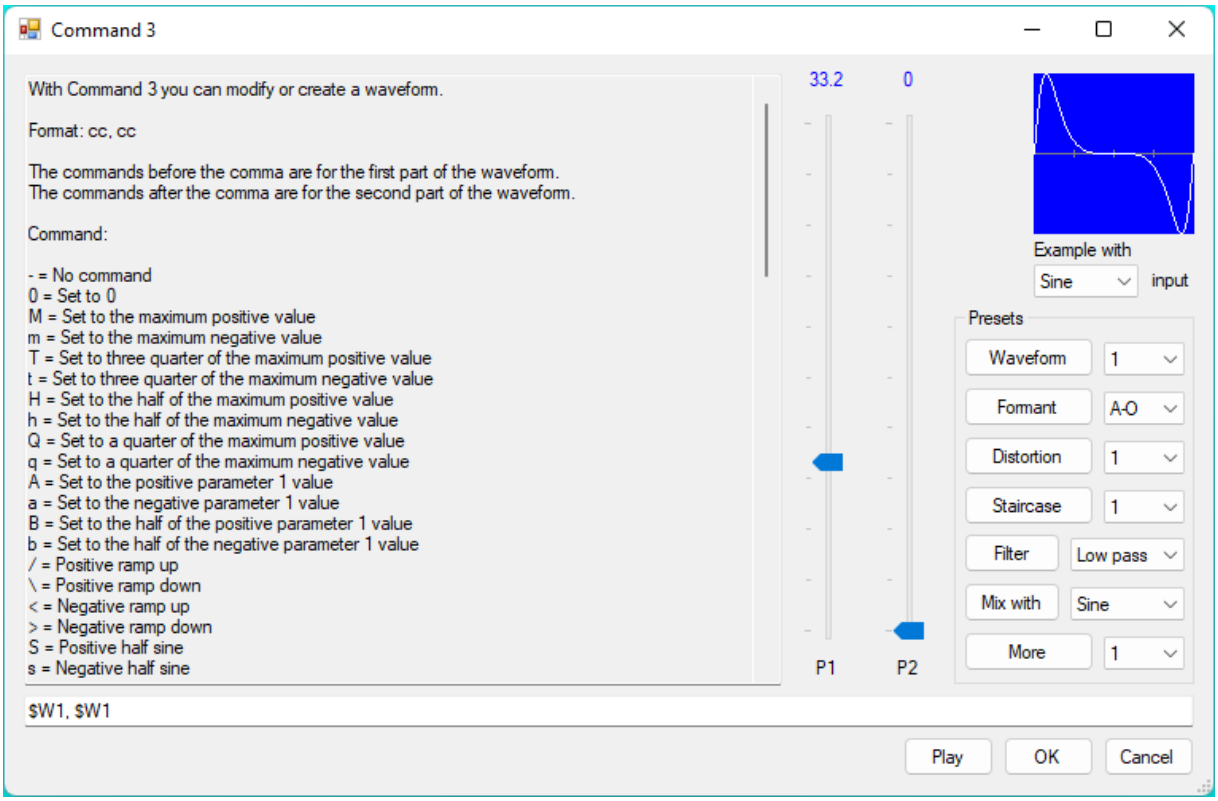
Before command	After command
	 Invert 1
	 Invert 1 (III and IV)
	 Invert 2
	 Invert 2 (I and II)
	 Set to 0 (III and IV)
	 Make pos (I and II), make neg (III and IV)

	
	Scale & shift 1, Parameter = 75
	
	Scale & shift 1, Parameter = 10
	
	Scale & shift 2, Parameter = 75
	
	Scale & shift 2, Parameter = 10
	
	Fade out (IV)
	
	Fade in (I and II)
	
	Fade out/in, Parameter = 50

	 Fade in/out, Parameter = 50
	 1 cycle
	 3 cycles

Command 3

With command 3 you can change or create a waveform. It will be excuted after Command 1 and Command 2. Command 3 is a little more complicated than the Command 1 and Command 2, but you can really do a lot with it. Command 3 can be typed directly in the table. If you double click in the cell, there will appear a window with information about Command 3 and you can edit the command in an easier way (there is more space for the command). There is also an example waveform, so you can easier understand how the command changes or replaces the waveform.



The input waveform is only for the example waveform picture. When you press the Play button (or Ctrl and Shift), the current settings are used together with the command and the two parameters on this form. Try also the handy presets!

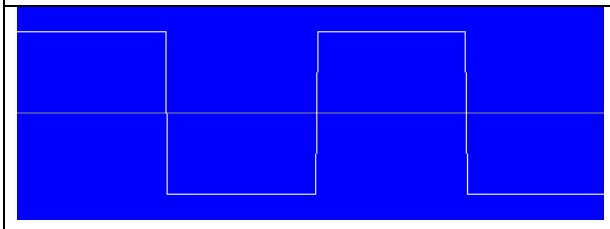
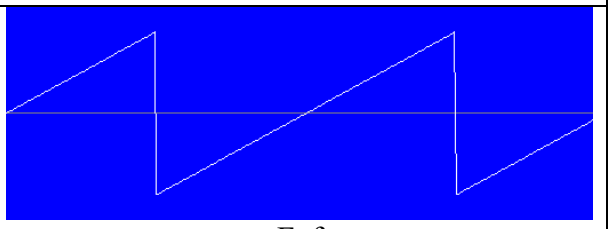
The format of command 3 is: cc, cc

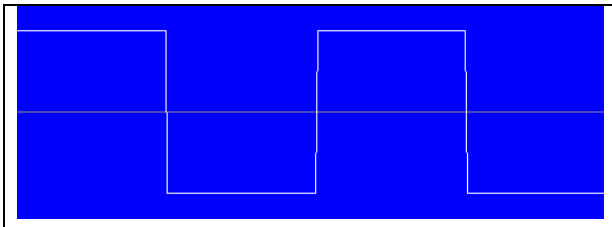
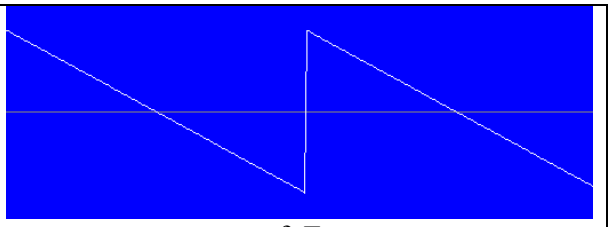
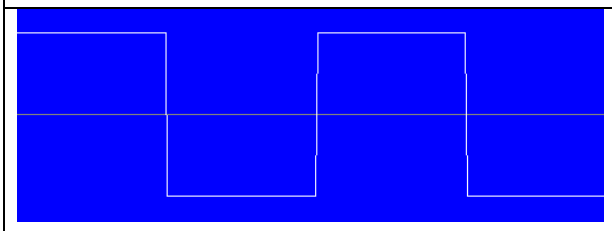
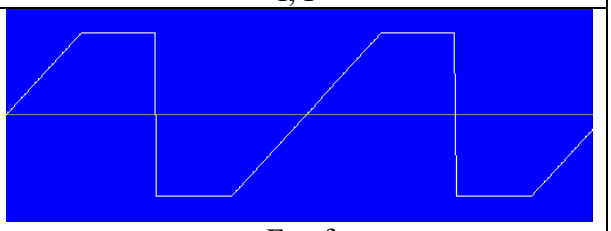
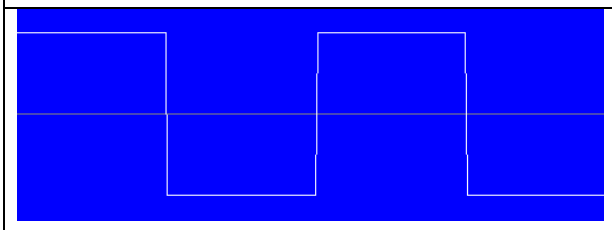
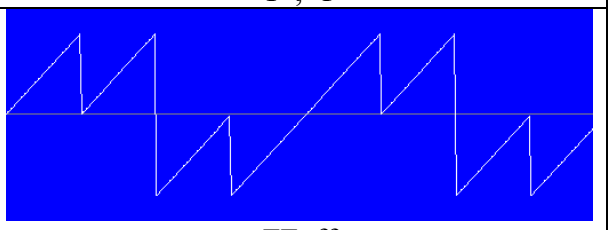
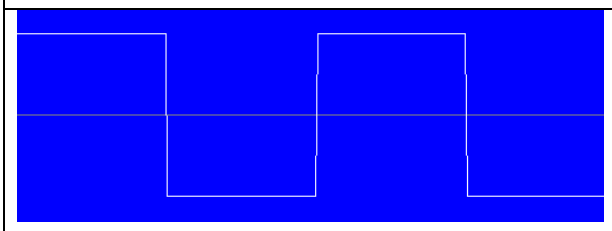
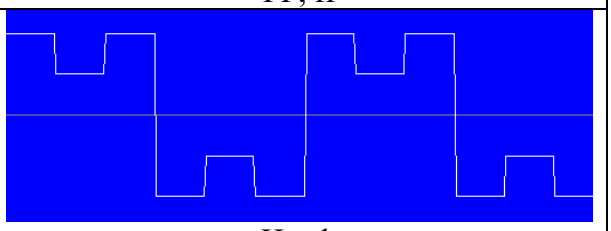
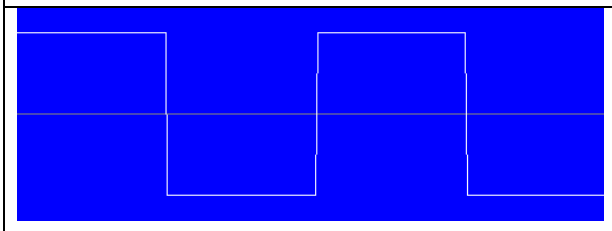
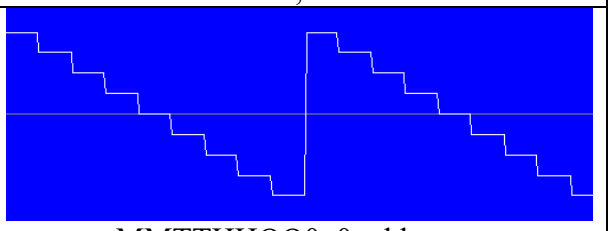
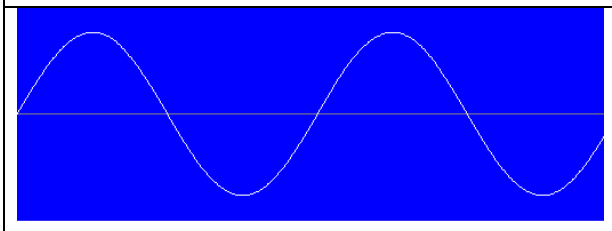
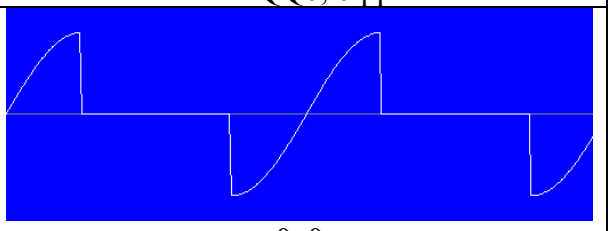
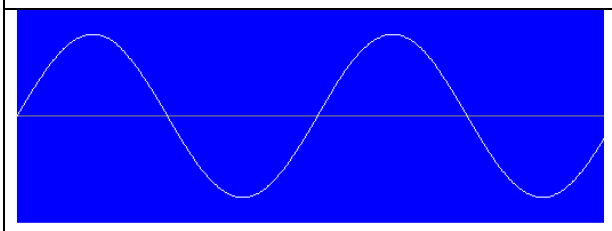
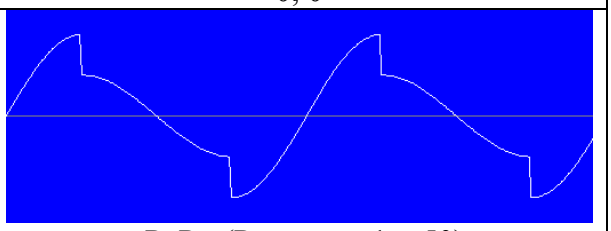
The commands before the comma are for the first part (quadrant 1 and 2) of the waveform and the commands after the comma are for the second part (quadrant 3 and 4) of the waveform. Every character in the format (except comma, space and hyphen) is a command. If there are two commands before the comma, the first command is executed in quadrant 1 and the second command is executed in quadrant 2. If there is only one command before the comma, that command is executed during quadrant 1 and quadrant 2. If there are three commands before the comma, the second command is executed during the last part of quadrant 1 and the first part of quadrant 2. The time for each command is the time of the first part (quadrant 1 and 2) divided by the number of commands. Here is an overview of the commands:

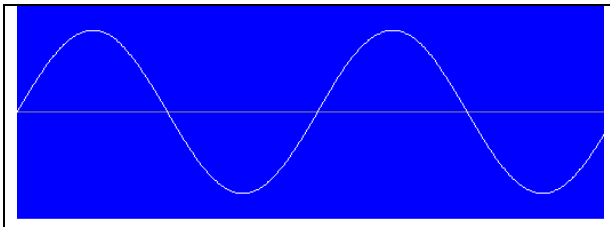
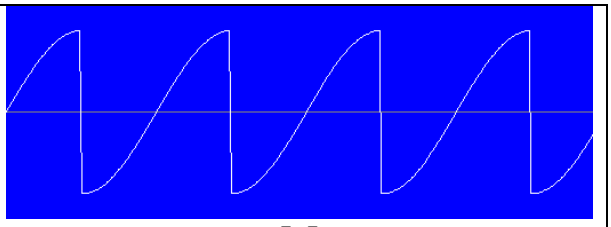
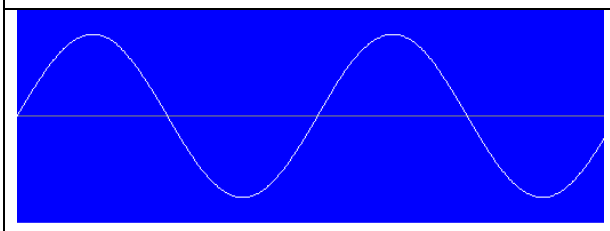
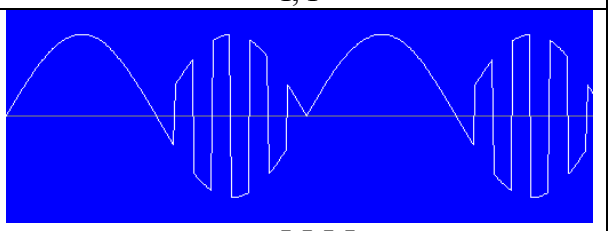
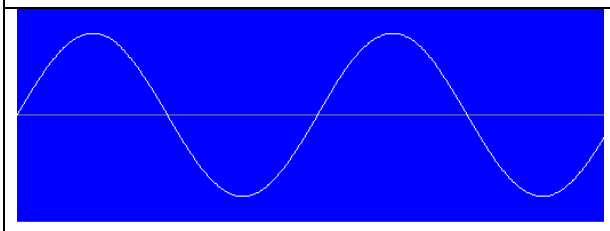
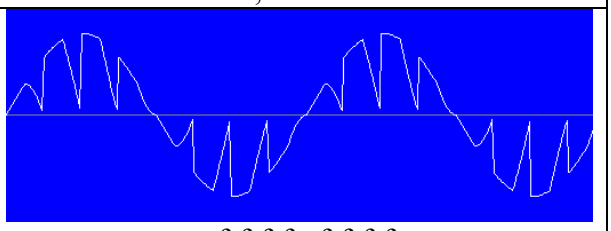
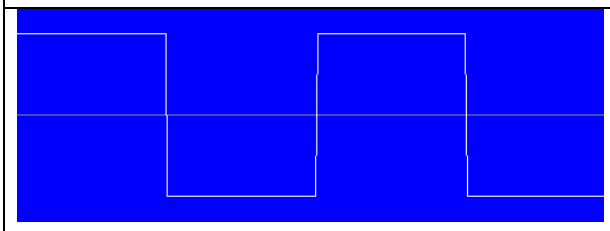
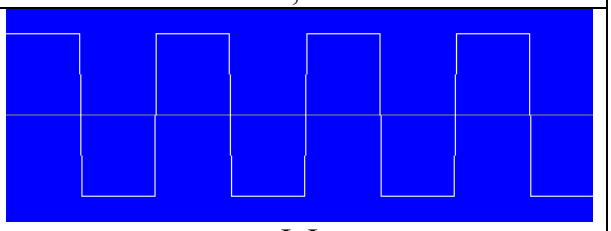
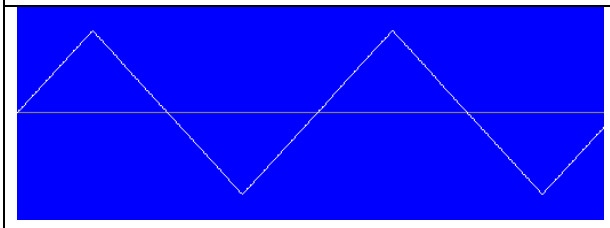
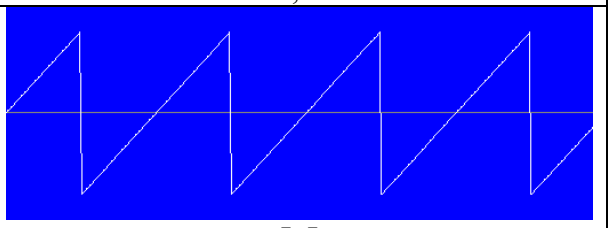
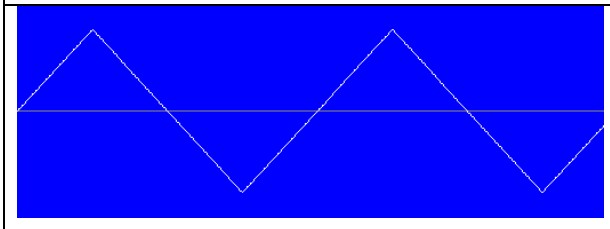
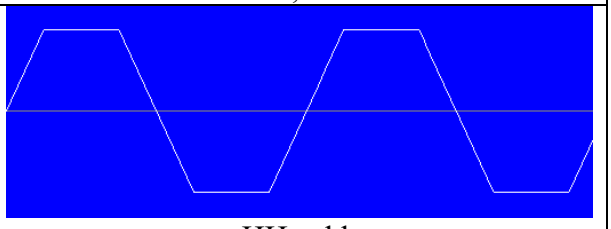
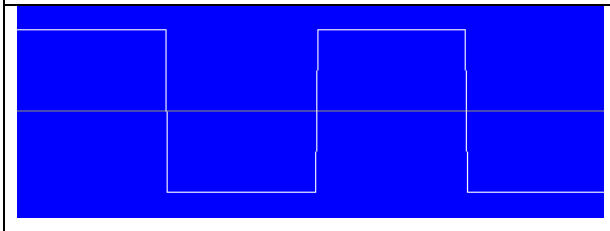
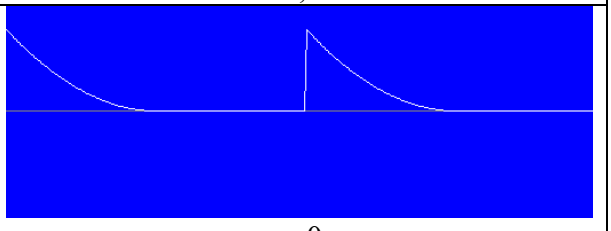
-	No command
0	Set to 0

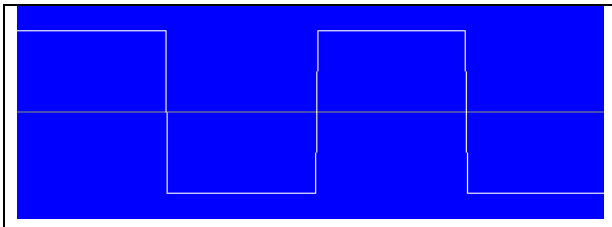
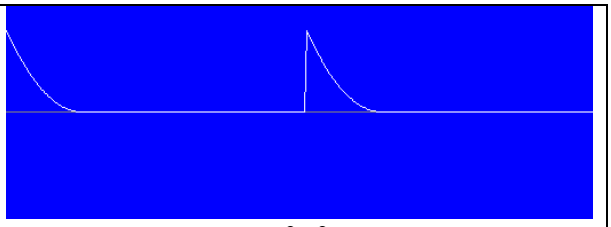
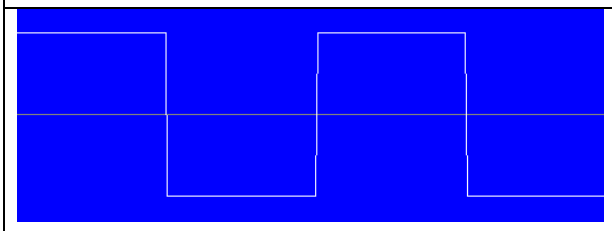
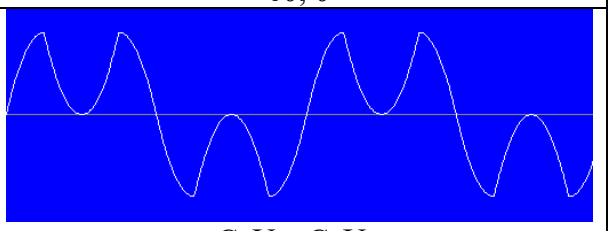
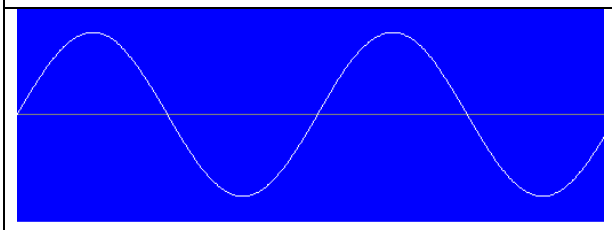
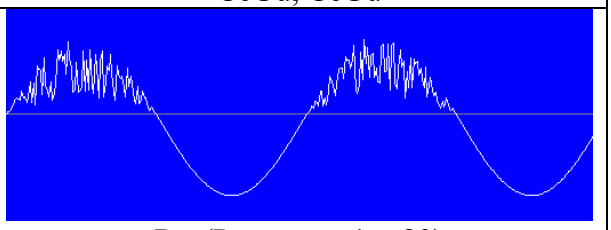
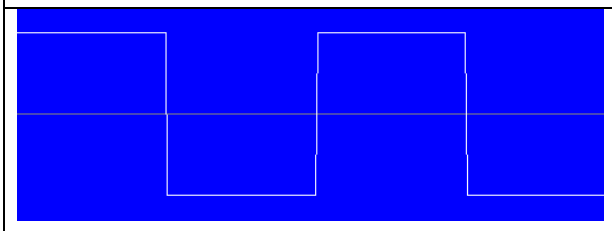
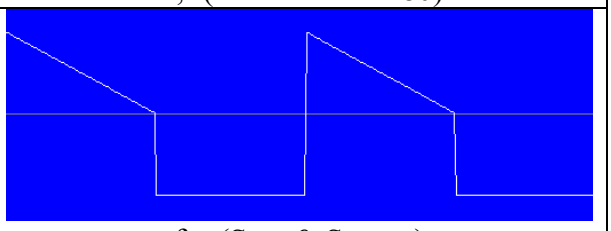
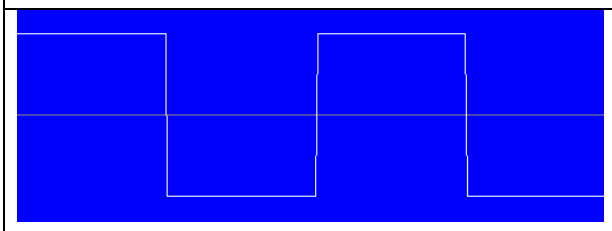
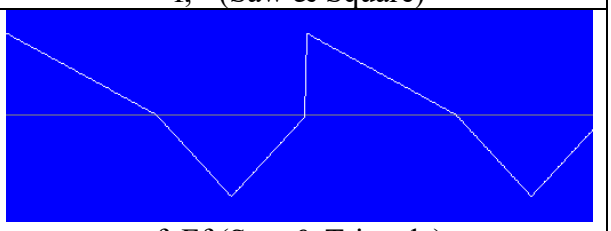
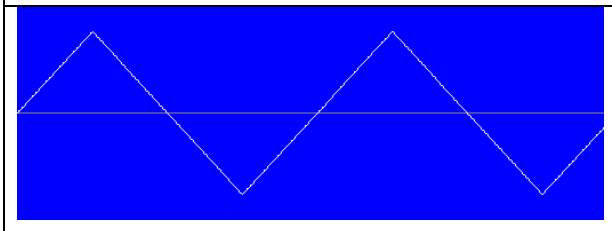
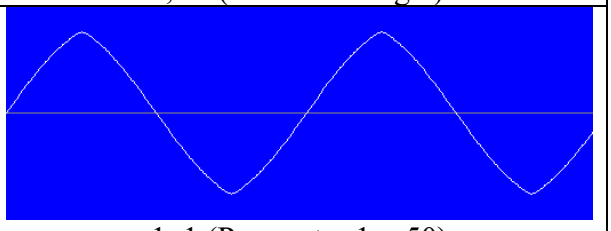
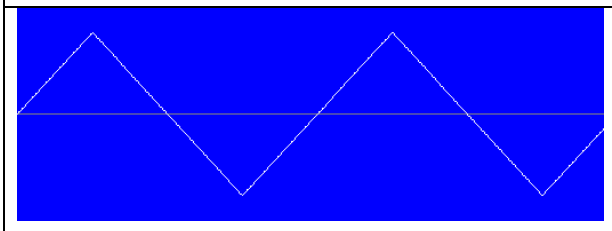
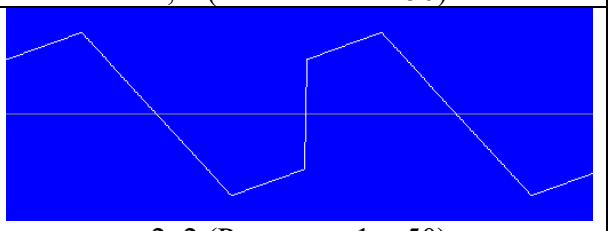
M	Set to the maximum positive value
m	Set to the maximum negative value
T	Set to three quarter of the maximum positive value
t	Set to three quarter of the maximum negative value
H	Set to the half of the maximum positive value
h	Set to the half of the maximum negative value
Q	Set to a quarter of the maximum positive value
q	Set to a quarter of the maximum negative value
A	Set to the positive parameter 1 value
a	Set to the negative parameter 1 value
B	Set to the half of the positive parameter 1 value
b	Set to the half of the negative parameter 1 value
/	Positive ramp up
\	Positive ramp down
<	Negative ramp up
>	Negative ramp down
S	Positive half sine
s	Negative half sine
E	Positive half ellipse
e	Negative half ellipse
I	Invert
S	Scale the values to the percentage of the parameter 1 value
F	Fade in (linear)
f	Fade out (linear)
C	Fade in (curve 1)
c	Fade out (curve 1)
U	Fade in (curve 2)
u	Fade out (curve 2)
R	Decrease randomly the volume (maximum percentage is controlled by parameter 1)
1	Mix with sine (percentage is controlled by parameter 1)
2	Mix with saw (percentage is controlled by parameter 1)
3	Mix with square (percentage is controlled by parameter 1)
4	Mix with triangle (percentage is controlled by parameter 1)
^	Square the value, but keep the original sign
&	Bit mask controlled by parameter 1 (percentage of 255)
D	Distort 1 (parameter 1 controls drive, parameter 2 controls dry/wet)
d	Distort 2 (parameter 1 controls drive, parameter 2 controls dry/wet)
=	Hold the value

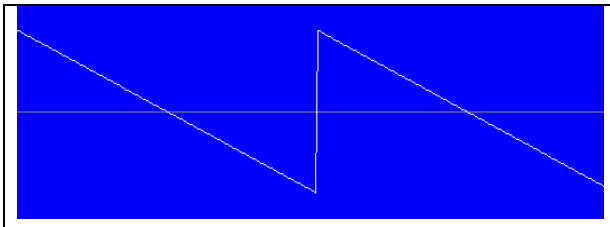
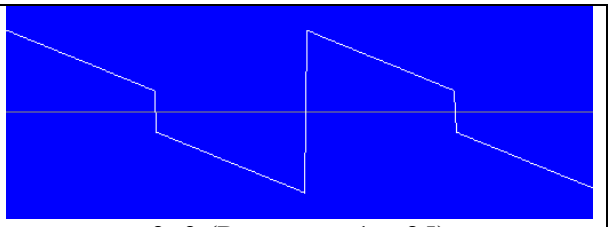
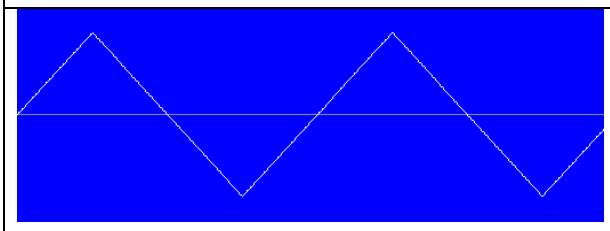
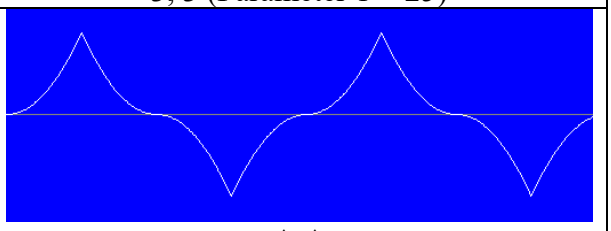
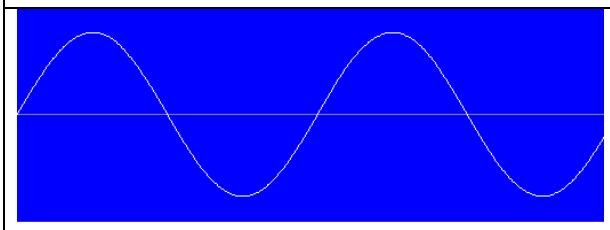
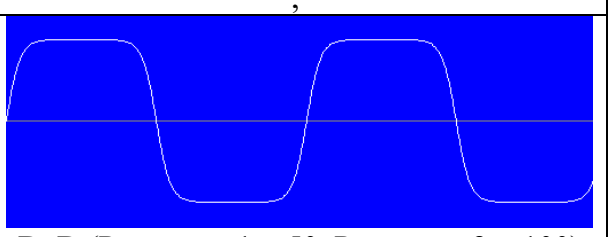
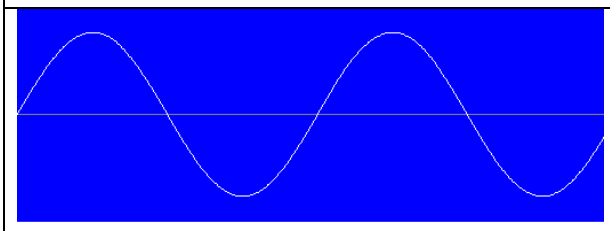
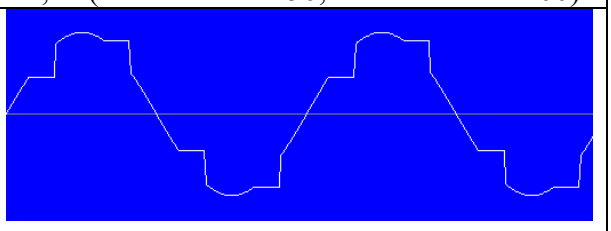
Here are some examples of what you can do with Command 3:

Before command	**After command**
	
	F, f

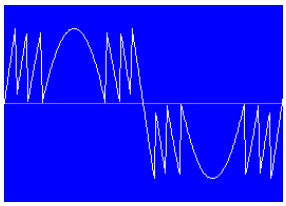
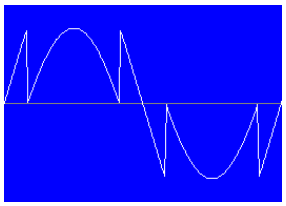
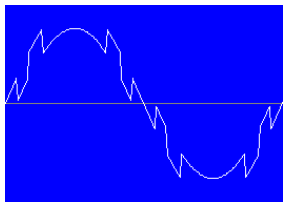
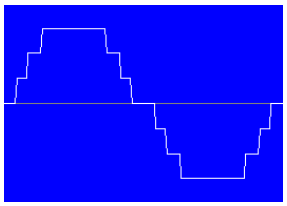
	
	f, F
	
	F-, -f
	
	FF, ff
	
	-H-, -h-
	
	MMTTHHQQ0, 0qqhhttmm
	
	-0, 0-
	
	-P, P- (Parameter 1 = 50)

	
	-I, I-
	
	-, -I-I-I-I
	
	-f-f-f-f, -f-f-f-f
	
	-I, I-
	
	-I, I-
	
	-HH-, -hh-
	
	c, 0

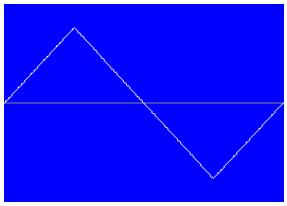
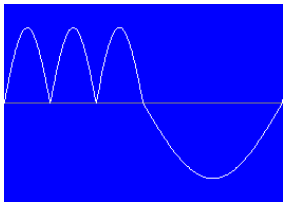
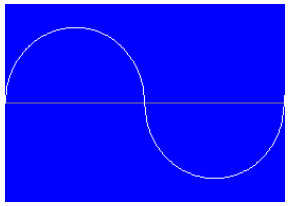
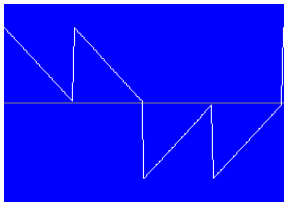
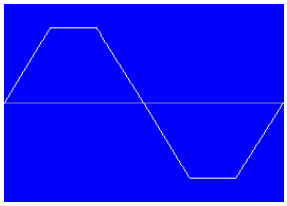
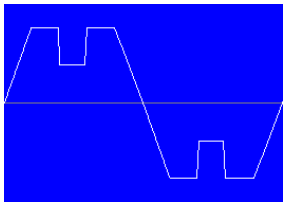
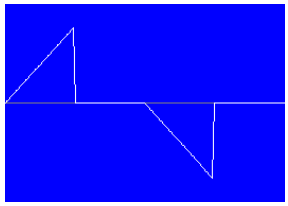
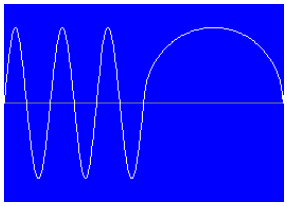
	
	c0, 0
	
	CcUu, CcUu
	
	R,- (Parameter 1 = 80)
	
	f, - (Saw & Square)
	
	f, Ff (Saw & Triangle)
	
	1, 1 (Parameter 1 = 50)
	
	2, 2 (Parameter 1 = 50)

	
	3, 3 (Parameter 1 = 25)
	
	^, ^
	
	D, D (Parameter 1 = 50, Parameter 2 = 100)
	
	-=--=-, -=--=-

Here are some bit mask (&) examples with a sine wave. Try it also with other waveforms!

			
&, & (Parameter 1 = 25)	&, & (Parameter 1 = 50)	&, & (Parameter 1 = 75)	&, & (Parameter 1 = 75.5)

Here are some examples for creating a total waveform. The selected waveform has no influence.

			
/\, <>	SSS, s	E, e	\\, >>
			
/M\, <m>	/MHM\, <mhm>	/0, <0	SsSsSs, E

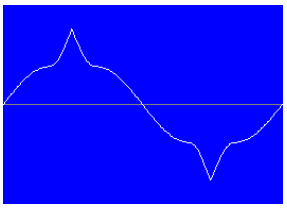
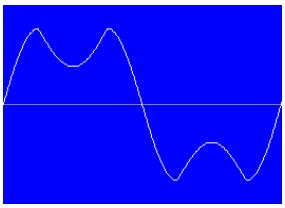
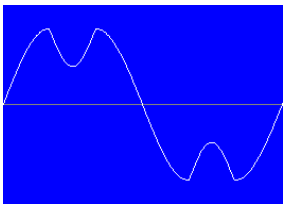
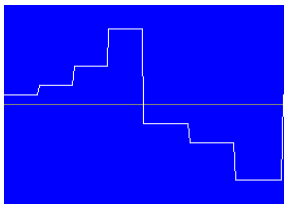
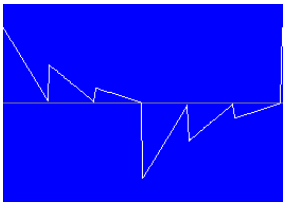
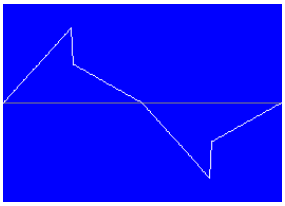
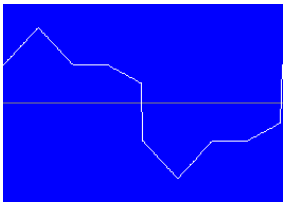
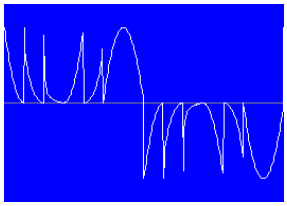
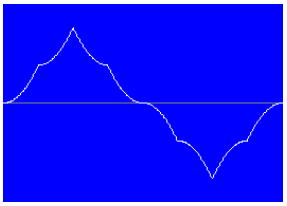
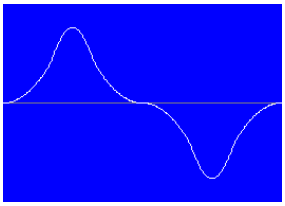
The part before the comma and the part after the comma can be preceded by $, which means that the following characters are two-character commands. In that case you can still use the one-character commands by typing a hyphen (-) for the first character.

--	No command
L1 - L9	Positive level (1 = 10%, 2 = 20% etc.) Use -M for 100% and -0 for 0%
l1 - l9	Negative level (1 = 10%, 2 = 20% etc.) Use -m for 100%
SA	Sinus quadrant 1
SB	Sinus quadrant 2
SC	Sinus quadrant 1 and 2
SD	1 - sinus quadrant 2
SE	1 - sinus quadrant 1
SF	1 - sinus quadrant 2 and 1 - sinus quadrant 1
SG	1 - sinus quadrant 1 and 1 - sinus quadrant 2
SH	SA * 0.5
SI	SB * 0.5
SJ	SC * 0.5
SK	SD * 0.5
SL	SE * 0.5
SM	SF * 0.5
SN	SG * 0.5
SO	SH+ 0.5
SP	SI + 0.5
SQ	SJ + 0.5
SR	SK + 0.5
SS	SL + 0.5
ST	SM + 0.5
SU	SN + 0.5
Sa	Sinus quadrant 3
Sb	Sinus quadrant 4
Sc	Sinus quadrant 3 and 4
Sd	-1 - sinus quadrant 4
Se	-1 - sinus quadrant 3
Sf	-1 - sinus quadrant 4 and -1 - sinus quadrant 3
Sg	-1 - sinus quadrant 3 and -1 - sinus quadrant 4
Sh	Sa * 0.5
Si	Sb * 0.5
Sj	Sc * 0.5
Sk	Sd * 0.5
Sl	Se * 0.5
Sm	Sf * 0.5
Sn	Sg * 0.5
So	Sh- 0.5
Sp	Si - 0.5
Sq	Sj - 0.5
Sr	Sk - 0.5
Ss	Sl - 0.5
St	Sm - 0.5
Su	Sn - 0.5

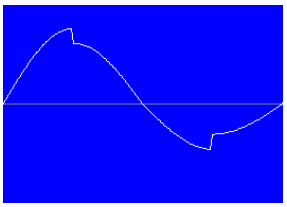
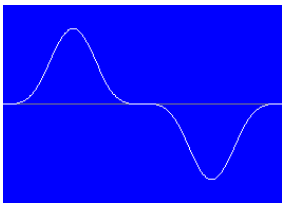
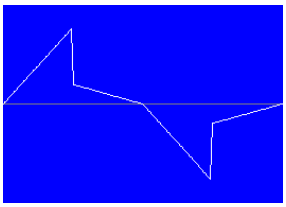
CA	Positive curve 1 down
CB	Positive curve 2 down
CC	Positive curve 3 down
CD	Positive curve 1 up
CE	Positive curve 2 up
CF	1 - positive curve 1 down
CG	1 - positive curve 1 up
CH	CA * 0.5
CI	CB * 0.5
CJ	CC * 0.5
CK	CD * 0.5
CL	CE * 0.5
CM	CF * 0.5
CN	CG * 0.5
CO	CH+ 0.5
CP	CI + 0.5
CQ	CJ + 0.5
CR	CK + 0.5
CS	CL + 0.5
CT	CM + 0.5
CU	CN + 0.5
Ca	Negative curve 1 down
Cb	Negative curve 2 down
Cc	Negative curve 3 down
Cd	Negative curve 1 up
Ce	Negative curve 2 up
Cf	-1 - negative curve 1 down
Cg	-1 - negative curve 1 up
Ch	Ca * 0.5
Ci	Cb * 0.5
Cj	Cc * 0.5
Ck	Cd * 0.5
Cl	Ce * 0.5
Cm	Cf * 0.5
Cn	Cg * 0.5
Co	Ch- 0.5
Cp	Ci - 0.5
Cq	Cj - 0.5
Cr	Ck - 0.5
Cs	Cl - 0.5
Ct	Cm - 0.5
Cu	Cn - 0.5
cA - cF	Curve 1-6 down from maximum positive to maximum negative
cG - cL	Inverse cA - cF (cG = -cA)
cM - cR	Curve 1-6 down from parameter 1 to maximum negative
cS - cX	Curve 1-6 down from parameter 2 to maximum negative
D1 - D0, DP	Positive ramp down (1 = 10%, 2 = 20%, 0 = 100%, P = parameter 1)

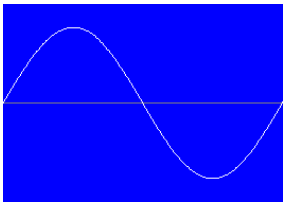
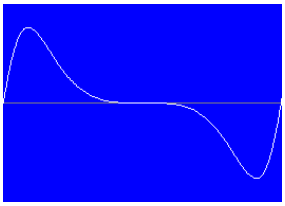
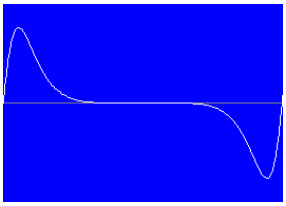
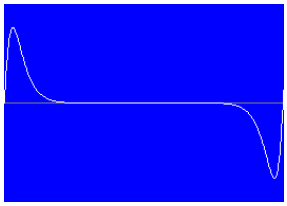
d1 - d0, dP	Negative ramp down (1 = 10%, 2 = 20%, 0 = 100%, P = parameter 1)
U1 - U0, UP	Positive ramp up (1 = 10%, 2 = 20%, 0 = 100%, P = parameter 1)
u1 - u0, uP	Negative ramp up (1 = 10%, 2 = 20%, 0 = 100%, P = parameter 1)
00 - 88	Level to level (first digit is start level, second digit is end level) 7 = 100 % positive 5 = 75% positive 3 = 50% positive 1 = 25% positive 0 = 0 2 = 25% negative 4 = 50% negative 6 = 75% negative 8 = 100% negative
P1 - P9, PP	Scale to percentage (1 = 10%, 2 = 20%, P = parameter 1)
^2 - ^9	Raise to power, but keep the original sign
W1 - WM	Waveform (shape depends on the parameter(s) like a wave table)
M1 - M0, M!	Mix with square wave (parameter 1 controls the ratio for the frequency of the square wave, parameter 2 controls the decay of the square wave within the period of the original waveform, the number after the M controls the mix percentage of the square wave, M! = Only the square wave)
m1 - m0, m!	Same as M1 - M0, M!, but mixed with a sine wave
F1	Formant filter A-O controlled by parameter 1 (0% = A, 100% = O)
F2	Formant filter O-A controlled by parameter 1 (0% = O, 100% = A)
F3	Formant filter A-I controlled by parameter 1 (0% = A, 100% = I)
F4	Formant filter I-A controlled by parameter 1 (0% = I, 100% = A)
F5	Formant filter O-I controlled by parameter 1 (0% = O, 100% = I)
F6	Formant filter I-O controlled by parameter 1 (0% = I, 100% = O)
F7	Formant filter A-U controlled by parameter 1 (0% = A, 100% = U)
F8	Formant filter O-U controlled by parameter 1 (0% = O, 100% = U)
F9	Formant filter I-O-U controlled by parameter 1 (0% = I, 50% = O, 100% = U)
FA	Formant filter O-U-I-E-A controlled by parameter 1 (0% = O, 25% = U, 50% = I, 75% = E, 100% = A)
LP	LP = Low pass filter (parameter 1 controls the cutoff frequency, parameter 2 controls the resonance)
HP	High pass filter (parameter 1 controls the cutoff frequency, parameter 2 controls the resonance)
BP	Band pass filter (parameter 1 controls the cutoff frequency, parameter 2 controls the resonance)
NO	Notch filter (parameter 1 controls the cutoff frequency, parameter 2 controls the resonance)
1P	1 pole low pass filter (parameter 1 controls the cutoff frequency)
4P	4 pole ladder filter (parameter 1 controls the cutoff frequency, parameter 2 controls the resonance)
!0-!9, !A-!Z, !a-!z	Distortion (0 = No distortion, 1 = Curve 1, 2 = Curve 2, A = Curve 10 etc, parameter 1 controls the curve parameter)

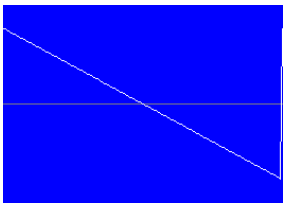
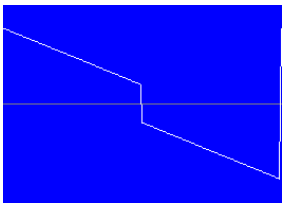
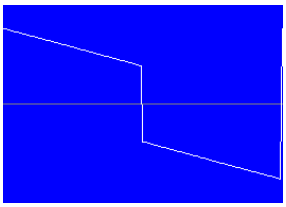
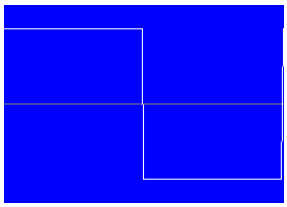
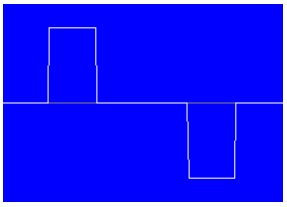
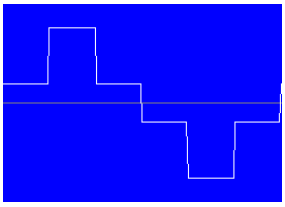
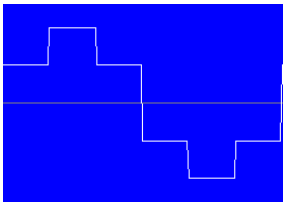
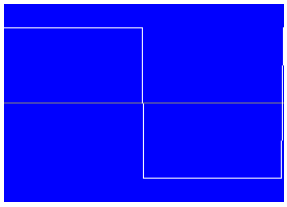
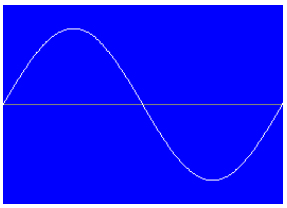
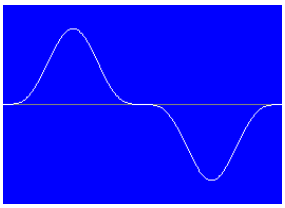
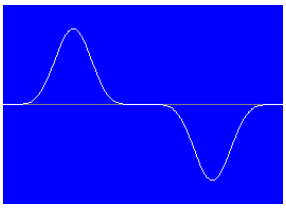
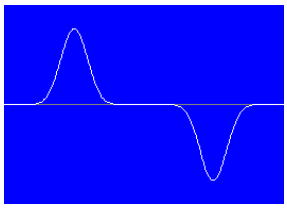
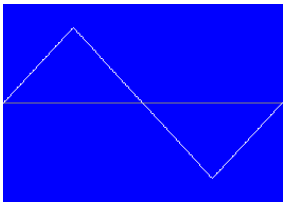
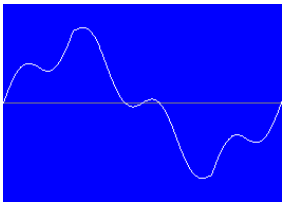
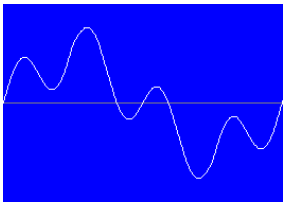
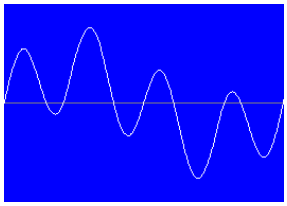
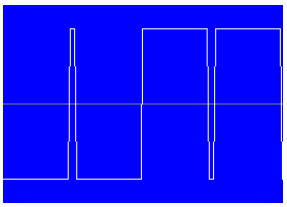
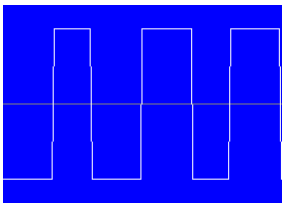
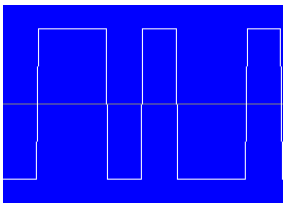
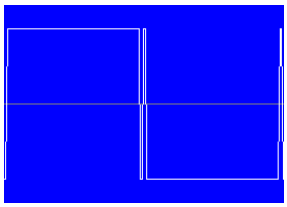
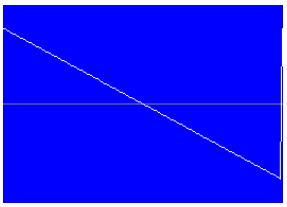
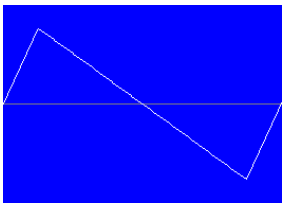
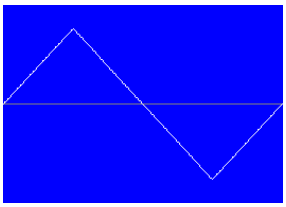
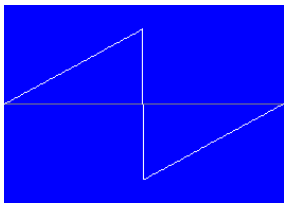
Here are some examples of two-character commands whereby the selected waveform has no influence.

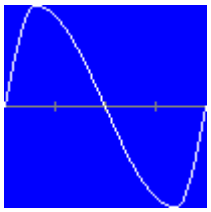
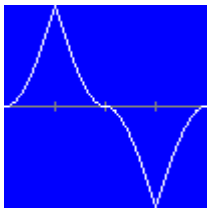
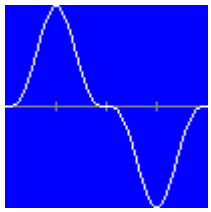
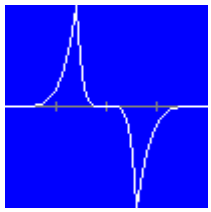
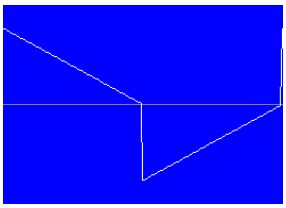
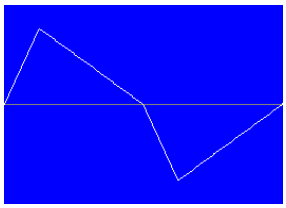
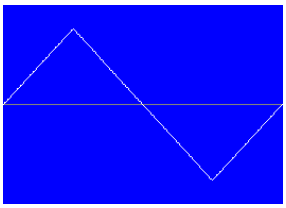
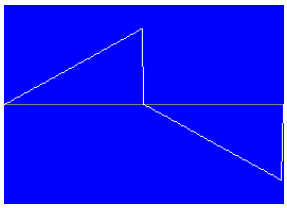
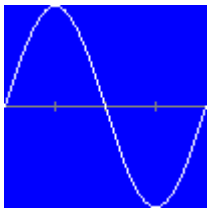
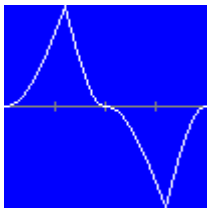
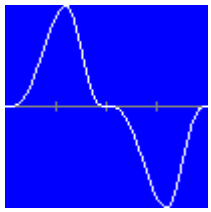
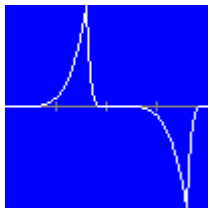
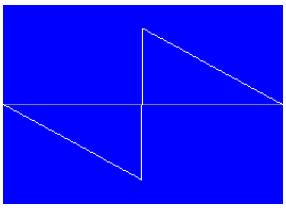
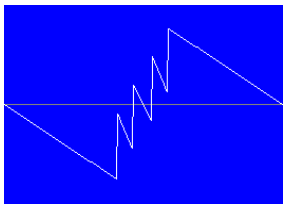
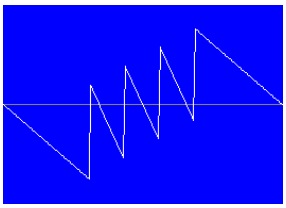
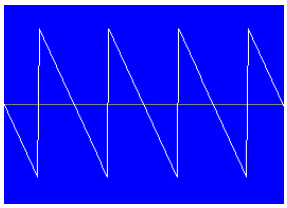
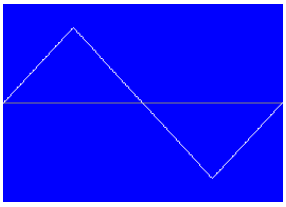
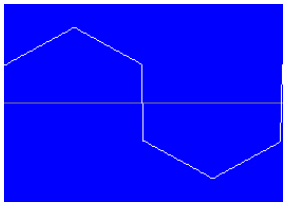
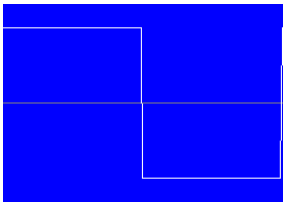
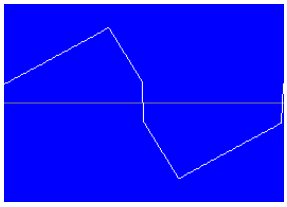
 $SHSTSI, $ShStSi	 $SASSSRSB, $SaSsSrSb	 $SASUSB, $SaSuSb	 $L1L2L4L8,$l2l4l8
 $D0D5D2, $d0d5d2	 $U0D5, $u0d5	 $37733331, $48844442	 $CACBCCCDCECFCG, $CaCbCcCdCeCfCg
 $CKCRCOCH, $CkCrCoCh	 $CKSQCH, $CkSqCh		

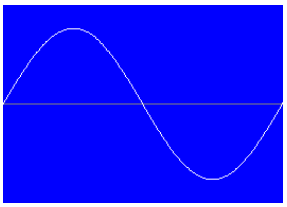
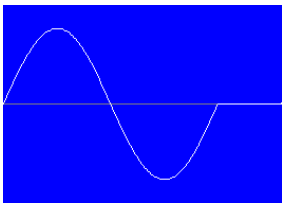
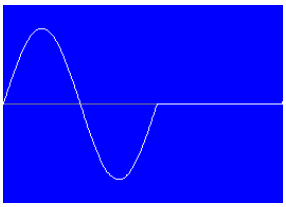
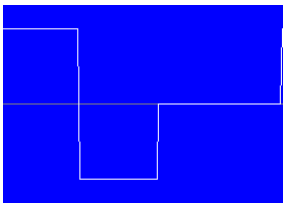
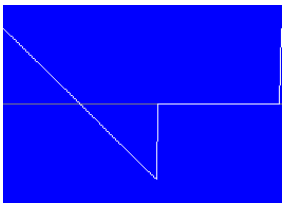
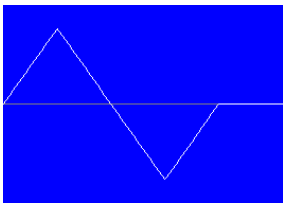
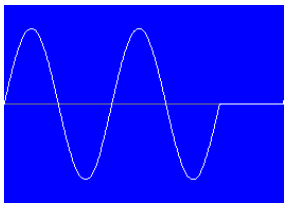
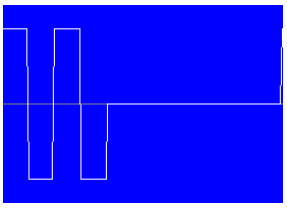
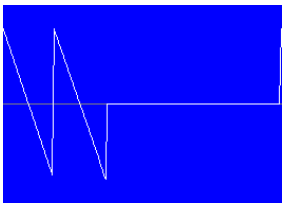
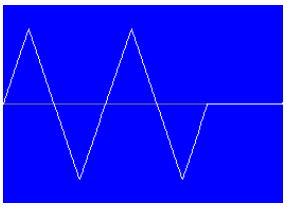
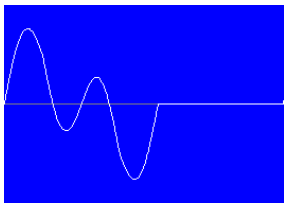
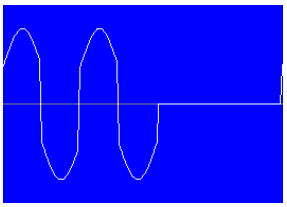
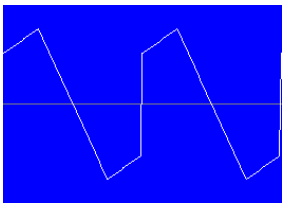
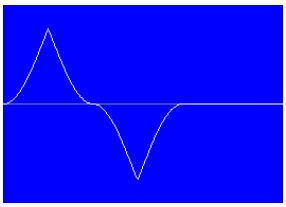
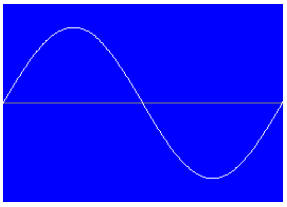
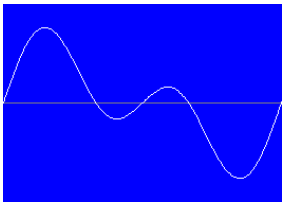
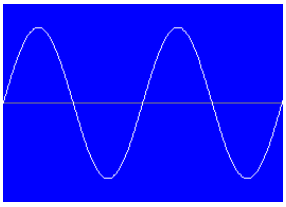
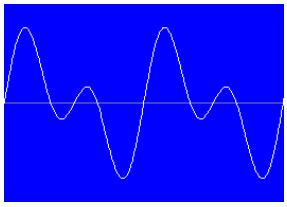
Here are some other examples of two-character commands.

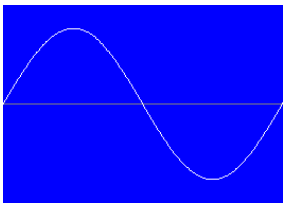
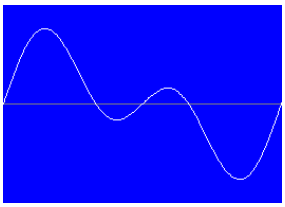
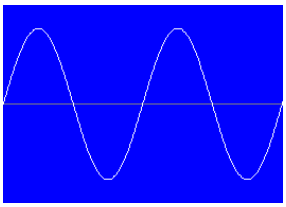
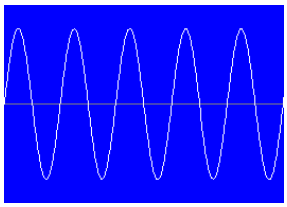
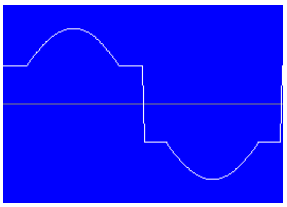
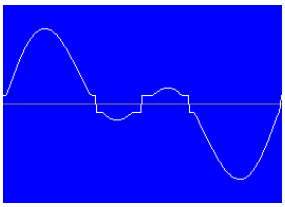
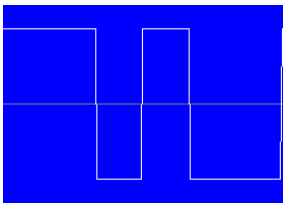
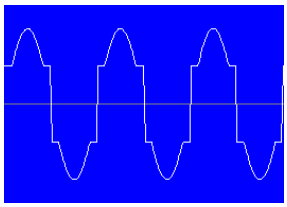
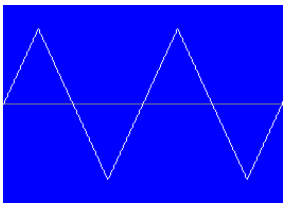
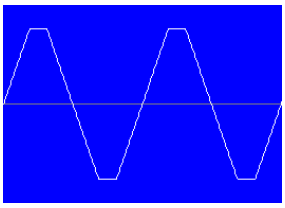
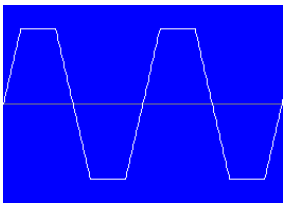
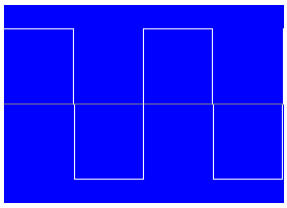
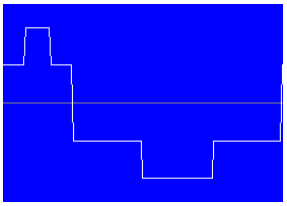
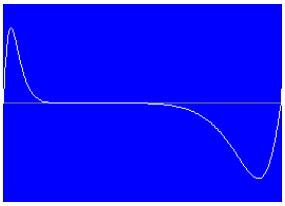
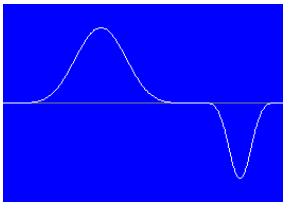
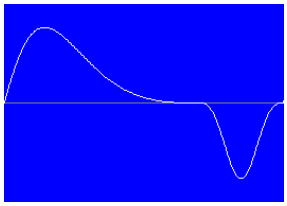
 $--P8, $P6P4 (Sine selected)	 $^4, $^4 (Sine selected)	 $U0DP, $u0dP (Parameter 1 = 25)	

 $W1, $W1 (Parameter 1 = 0)	 $W1, $W1 (Parameter 1 = 25)	 $W1, $W1 (Parameter 1 = 50)	 $W1, $W1 (Parameter 1 = 100)

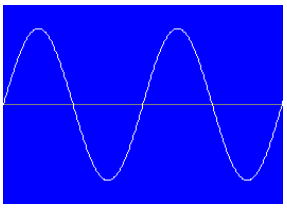
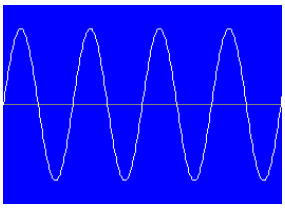
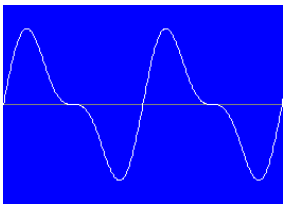
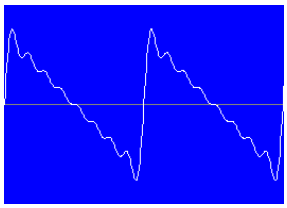
 $W2, $W2 (Parameter 1 = 0)	 $W2, $W2 (Parameter 1 = 25)	 $W2, $W2 (Parameter 1 = 50)	 $W2, $W2 (Parameter 1 = 100)
 $W3, $W3 (Parameter 1 = 0)	 $W3, $W3 (Parameter 1 = 25)	 $W3, $W3 (Parameter 1 = 50)	 $W3, $W3 (Parameter 1 = 100)
 $W4, $W4 (Parameter 1 = 0)	 $W4, $W4 (Parameter 1 = 25)	 $W4, $W4 (Parameter 1 = 50)	 $W4, $W4 (Parameter 1 = 100)
 $W5, $W5 (Parameter 1 = 0)	 $W5, $W5 (Parameter 1 = 25)	 $W5, $W5 (Parameter 1 = 50)	 $W5, $W5 (Parameter 1 = 100)
 $W6, $W6 (Parameter 1 = 0)	 $W6, $W6 (Parameter 1 = 25)	 $W6, $W6 (Parameter 1 = 50)	 $W6, $W6 (Parameter 1 = 100)
 $W7, $W7 (Parameter 1 = 0, Parameter 2 = 0)	 $W7, $W7 (Parameter 1 = 25, Parameter 2 = 0)	 $W7, $W7 (Parameter 1 = 50, Parameter 2 = 0)	 $W7, $W7 (Parameter 1 = 100, Parameter 2 = 0)

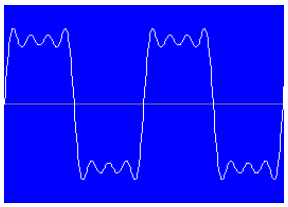
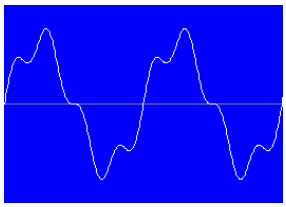
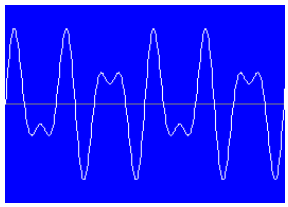
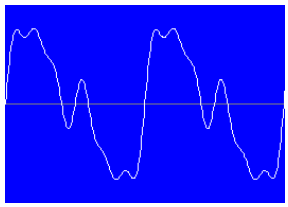
 $W7, $W7 (Parameter 1 = 30, Parameter 2 = 15)	 $W7, $W7 (Parameter 1 = 50, Parameter 2 = 25)	 $W7, $W7 (Parameter 1 = 50, Parameter 2 = 35)	 $W7, $W7 (Parameter 1 = 70, Parameter 2 = 45)
 $W8, $W8 (Parameter 1 = 0, Parameter 2 = 0)	 $W8, $W8 (Parameter 1 = 25, Parameter 2 = 0)	 $W8, $W8 (Parameter 1 = 50, Parameter 2 = 0)	 $W8, $W8 (Parameter 1 = 100, Parameter 2 = 0)
 $W8, $W8 (Parameter 1 = 50, Parameter 2 = 15)	 $W8, $W8 (Parameter 1 = 60, Parameter 2 = 25)	 $W8, $W8 (Parameter 1 = 60, Parameter 2 = 35)	 $W8, $W8 (Parameter 1 = 80, Parameter 2 = 45)
 $W9, $W9 (Parameter 1 = 0)	 $W9, $W9 (Parameter 1 = 25)	 $W9, $W9 (Parameter 1 = 50)	 $W9, $W9 (Parameter 1 = 100)
 $WA, $WA (Parameter 1 = 0, Parameter 2 = 50)	 $WA, $WA (Parameter 1 = 50, Parameter 2 = 50)	 $WA, $WA (Parameter 1 = 100, Parameter 2 = 50)	 $WA, $WA (Parameter 1 = 25, Parameter 2 = 75)

 $WB, $WB (Parameter 1 = 0, Parameter 2 = 0)	 $WB, $WB (Parameter 1 = 25, Parameter 2 = 0)	 $WB, $WB (Parameter 1 = 50, Parameter 2 = 0)	 $WB, $WB (Parameter 1 = 100, Parameter 2 = 0)
 $WB, $WB (Parameter 1 = 50, Parameter 2 = 10)	 $WB, $WB (Parameter 1 = 50, Parameter 2 = 20)	 $WB, $WB (Parameter 1 = 25, Parameter 2 = 30)	 $WB, $WB (Parameter 1 = 25, Parameter 2 = 40)
 $WB, $WB (Parameter 1 = 70, Parameter 2 = 50)	 $WB, $WB (Parameter 1 = 70, Parameter 2 = 60)	 $WB, $WB (Parameter 1 = 30, Parameter 2 = 70)	 $WB, $WB (Parameter 1 = 50, Parameter 2 = 35)
 $WB, $WB (Parameter 1 = 50, Parameter 2 = 45)	 $WB, $WB (Parameter 1 = 0, Parameter 2 = 65)	 $WB, $WB (Parameter 1 = 40, Parameter 2 = 80)	
 $WC, $WC (Parameter 1 = 0, Parameter 2 = 0)	 $WC, $WC (Parameter 1 = 25, Parameter 2 = 0)	 $WC, $WC (Parameter 1 = 50, Parameter 2 = 0)	 $WC, $WC (Parameter 1 = 75, Parameter 2 = 0)

 $WD, $WD (Parameter 1 = 0, Parameter 2 = 0)	 $WD, $WD (Parameter 1 = 12.5, Parameter 2 = 0)	 $WD, $WD (Parameter 1 = 25, Parameter 2 = 0)	 $WD, $WD (Parameter 1 = 100, Parameter 2 = 0)
 $WC, $WC (Parameter 1 = 0, Parameter 2 = 50)	 $WC, $WC (Parameter 1 = 25, Parameter 2 = 10)	 $WC, $WC (Parameter 1 = 25, Parameter 2 = 100)	 $WD, $WD (Parameter 1 = 50, Parameter 2 = 50)
 $WE, $WE (Parameter 1 = 0)	 $WE, $WE (Parameter 1 = 25)	 $WE, $WE (Parameter 1 = 50)	 $WE, $WE (Parameter 1 = 100)
 $W3, $W3 (Duty cycle = 25, Parameter 1 = 50)	 $W1, $W1 (Duty cycle = 25, Parameter 1 = 50)	 $W4, $W4 (Duty cycle = 70, Parameter 1 = 50)	 $W1, $W4 (Duty cycle = 70, Parameter 1 = 20)

It is possible to modulate the command 3 parameters. With the Waveform commands, this looks a lot like wavetables, but there are no samples used. Everything is calculated. The “wavetables” (W7, W8, WA-WD and WH-WK) are two dimensional.

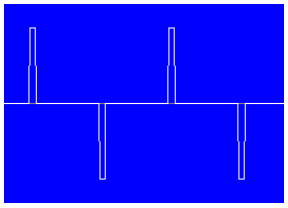
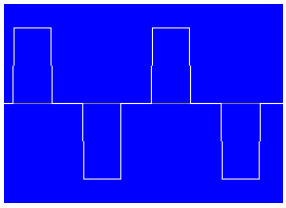
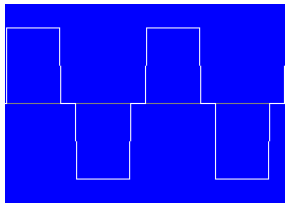
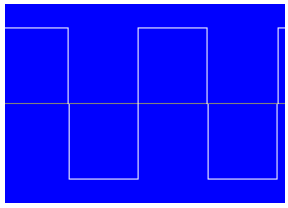
 $WF, $WF (Parameter 1 = 0.1)	 $WF, $WF (Parameter 1 = 0.2)	 $WF, $WF (Parameter 1 = 0.3)	 $WF, $WF (Parameter 1 = 25.5)

			
$WF, $WF (Parameter 1 = 8.5)	$WF, $WF (Parameter 1 = 0.9)	$WF, $WF (Parameter 1 = 2)	$WF, $WF (Parameter 1 = 4.3)

Waveform F is a combination of harmonic partials created by 8 sine oscillators. The frequency of partial 1 is the frequency that is set for the operator. The frequency of partial 2 is 2 times the frequency of partial 1, the frequency of partial 3 is 3 times the frequency of partial 1 etc. The level of partial 2 is 1/2 of the level of partial 1, the level of partial 3 is 1/3 of the level of partial 1 etc. With Parameter 1 you can set which partials you want to include. Simply sum up the partial values that you want to use from the following table.

Partial 1	Partial 2	Partial 3	Partial 4	Partial 5	Partial 6	Partial 7	Partial 8
0.1	0.2	0.4	0.8	1.6	3.2	6.4	12.8

For a saw waveform we need all partials, so 0.1 + 0.2 + 0.4 + 0.8 + 1.6 + 3.2 + 6.4 + 12.8 = 25.5. For a square waveform we need the odd partials, so 0.1 + 0.4 + 1.6 + 6.4 = 8.5.
You can set the parameter to a higher value than 25.5, but only the first 8 bytes (mask) are used, so 25.7 is the same as 0.1 and 25.6 is the same as 0. When the parameter is set to 0, there are no partials used, so the level stays 0. The levels of the waveform are scaled automatically. See also Waveform K.

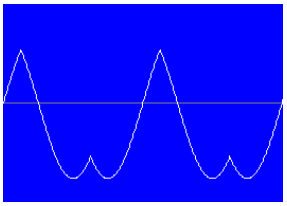
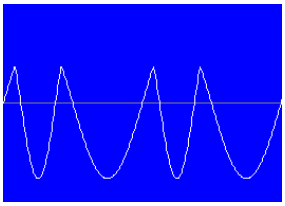
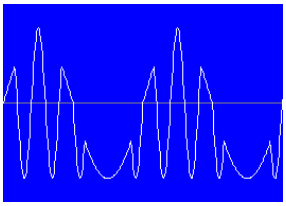
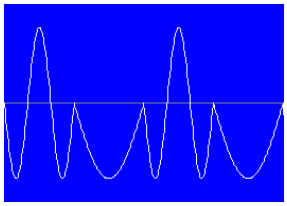
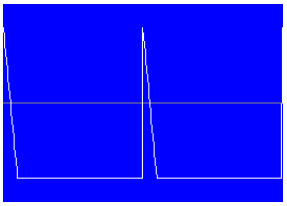
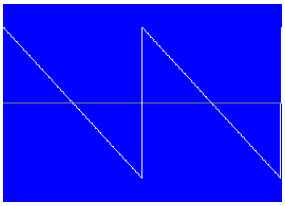
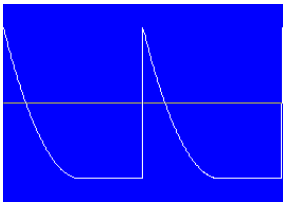
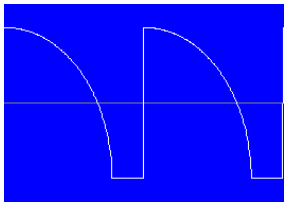
			
$WG, $WG (Parameter 1 = 0)	$WG, $WG (Parameter 1 = 50)	$WG, $WG (Parameter 1 = 75)	$WG, $WG (Parameter 1 = 100)

Waveform H is a variation of Waveform B. The range of parameter 2 is 0-50 (0 = Sine, 10 = Triangle, 20 = Square, 30 = Saw, 40 = sin(x)^2 * sign(x), 50 = 8 lines sine).
Waveform H is used by the Bass drum in the Easy Drum Synthesizer.

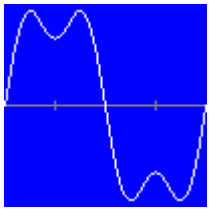
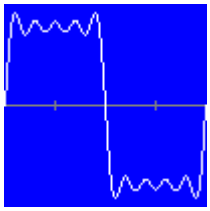
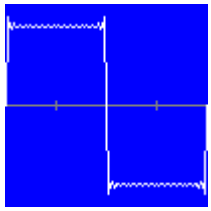
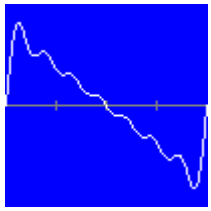
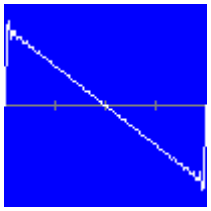
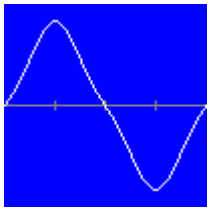
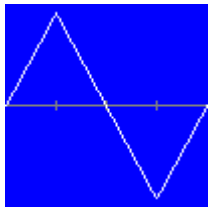
For Waveform I the following formula is used:

Y = MIN(SIN(X), SIN(X * P2 + P1))

X: 0 - 2π
Parameter 1: 0 - 100% → P1: 0 - 2π
Parameter 2: 0 - 100% → P2: 1, 2, 3, 4, 5

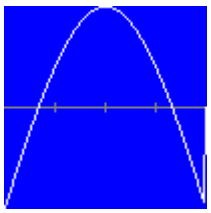
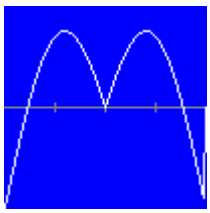
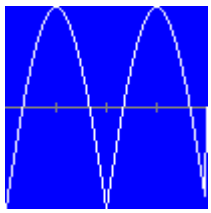
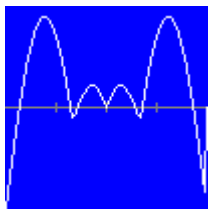
 $WI, $WI (Parameter 1 = 25, Parameter 2 = 0)	 $WI, $WI (Parameter 1 = 25, Parameter 2 = 25)	 $WI, $WI (Parameter 1 = 0, Parameter 2 = 100)	 $WI, $WI (Parameter 1 = 50, Parameter 2 = 50)
 $WJ, $WJ (Parameter 1 = 0, Parameter 2 = 0)	 $WJ, $WJ (Parameter 1 = 0, Parameter 2 = 100)	 $WJ, $WJ (Parameter 1 = 10, Parameter 2 = 50)	 $WJ, $WJ (Parameter 1 = 50, Parameter 2 = 75)

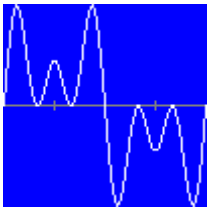
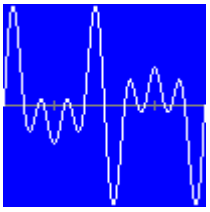
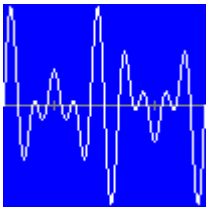
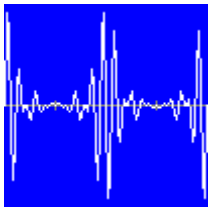
Param 1 controls curve (0 = Linear, 10 = Curve 1, 20 = Curve 2 etc.), Param 2 controls width

 $WK, $WK (Parameter 1 = 0, Parameter 2 = 5)	 $WK, $WK (Parameter 1 = 0, Parameter 2 = 15)	 $WK, $WK (Parameter 1 = 0, Parameter 2 = 100)	 $WK, $WK (Parameter 1 = 40, Parameter 2 = 21)
 $WK, $WK (Parameter 1 = 40, Parameter 2 = 100)	 $WK, $WK (Parameter 1 = 52, Parameter 2 = 4)	 $WK, $WK (Parameter 1 = 52, Parameter 2 = 100)	

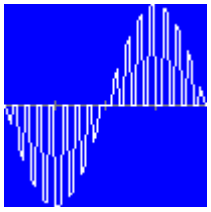
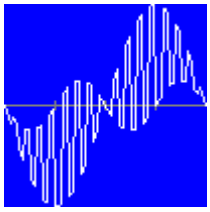
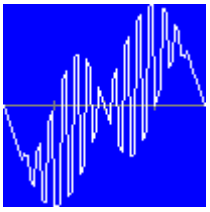
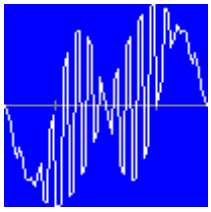
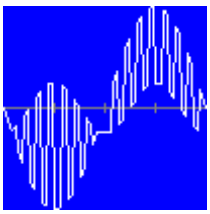
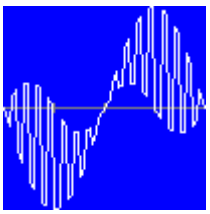
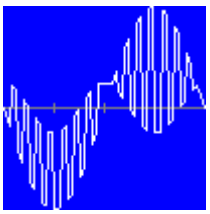
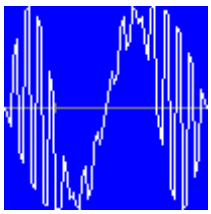
Waveform K is a basic waveform that is made by a combination of up to 32 harmonic partials. Parameter 1 controls the basic waveform and parameter 2 controls the number of partials.

Waveform L uses the User curves 11 - 16 to create the shape of the waveform. This way you can create your own kind of wave table. With Parameter 1 you control the parameter of the User curve. This has of course only effect when you have used a parameter formula for the curve(s). With Parameter 2 you control the wave table position. Use multiples of 10 when you don't want to mix user curves (0 = User curve 11, 10 = User curve 12, 20 = User curve 13, 30 = User curve 14, 40 = User curve 15, 50 = User curve 16). When you set for example Parameter 2 to 5, you will get a mix between User curve 11 and User curve 12. For the following example I have used Preset 3 for the curves, so you can see easily how it works (User curve 11 = 1 mountain, User curve 12 = 2 mountains etc). Of course you can design any curve you like. Preset 3 has no parameter formula, so Parameter 1 has no influence in this example.

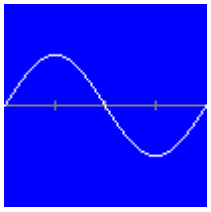
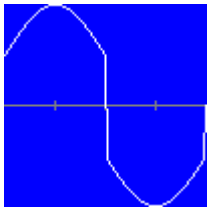
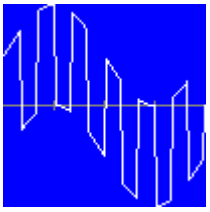
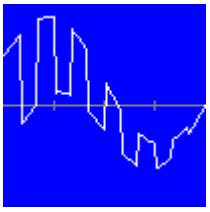
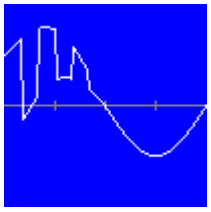
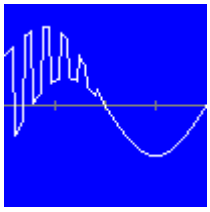
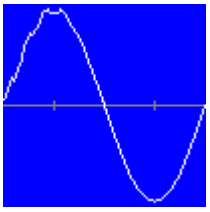
 $WL, $WL (Parameter 2 = 0)	 $WL, $WL (Parameter 2 = 5)	 $WL, $WL (Parameter 2 = 10)	 $WL, $WL (Parameter 2 = 15)

 $WM, $WM (Parameter 1 = 0)	 $WM, $WM (Parameter 1 = 10)	 $WM, $WM (Parameter 1 = 20)	 $WM, $WM (Parameter 1 = 65)

Waveform N (Param 1 = amplitude of second sine, Param 2 = phase of second sine)

 $WN, $WN (Parameter 1 = 0, Parameter 2 = 0)	 $WN, $WN (Parameter 1 = 25, Parameter 2 = 0)	 $WN, $WN (Parameter 1 = 50, Parameter 2 = 0)	 $WN, $WN (Parameter 1 = 75, Parameter 2 = 0)
 $WN, $WN (Parameter 1 = 25, Parameter 2 = 25)	 $WN, $WN (Parameter 1 = 25, Parameter 2 = 50)	 $WN, $WN (Parameter 1 = 25, Parameter 2 = 75)	 $WN, $WN (Parameter 1 = 100, Parameter 2 = 50)

For the following examples the input waveform is a sine wave.

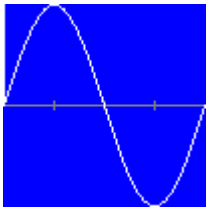
 $M0, $M0 (Parameter 1 = 0, Parameter 2 = 0)	 $M0, $M0 (Parameter 1 = 0, Parameter 2 = 100)	 $M0, $M0 (Parameter 1 = 25, Parameter 2 = 100)	 $M0, $M0 (Parameter 1 = 25, Parameter 2 = 50)
 $M0, $M0 (Parameter 1 = 25, Parameter 2 = 25)	 $M0, $M0 (Parameter 1 = 50, Parameter 2 = 25)	 $M5, $M5 (Parameter 1 = 25, Parameter 2 = 100)	 $M1, $M1 (Parameter 1 = 50, Parameter 2 = 25)

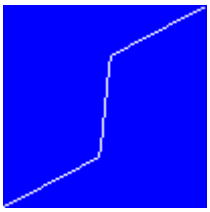
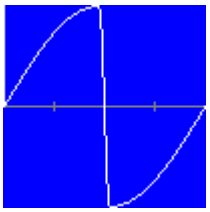
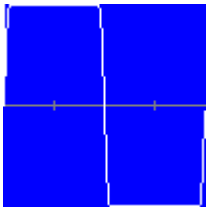
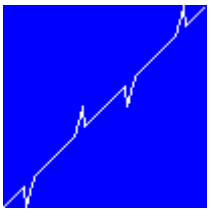
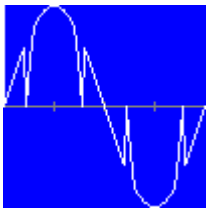
Commands for the whole waveform

CP	Copy like delay or comb filter
PD	Phase Distortion (Parameter 1 = Curve, Parameter 2 = Curve parameter)
RL	Round Level (Parameter 1 = Size)
SF	Set Frequency (Parameter 1 = Position percentage, Parameter 2 = Frequency)

With the CP command you can simulate a comb filter for physical modeling. You can make for example a short noise pulse with one oscillator and modulate the Value of another oscillator that is a carrier. In that oscillator you can use the CP command. The time (number of samples) of the copied part from the beginning is calculated by the frequency. That part is repeatedly copied. It is a good idea to study Guitar_04.eis.

The PD command is inspired by the phase distortion of the Casio CZ synthesizers. There are many phase distortion user curves available in the Curves\Phase_distortion folder. Keep in mind that these are made for a normal sine waveform input. Often you can change them with the curve parameter. With Saw_to_Sine_01.ucv you can morph a saw into a sine. This sounds like a filter sweep without using a filter.
Here are some examples.

User curve	**Result with sine input**
	 No phase distortion

	 Saw
	 Square
	

Mute / Unmute

You can mute an oscillator that you don't need. That is better for the performance than setting the volumes to 0. Click on a cell to mute or unmute an oscillator.

All

If you double click with the left mouse button on a cell in the column All, you can change all parameters in the row to the same value. For Mute / Unmute All or Ignore LFO, click normal with the left mouse button. You can lock oscillators if you don't want their parameters to change. Click on the header column of an oscillator to lock or unlock it. A locked oscillator is indicated by the letter L after the number.

Random

Double click with the left mouse button on a cell in the column Random to change all parameters in that row to a random value. You can lock oscillators if you don't want their parameters to change. Click on the header column of an oscillator to lock or unlock it. A locked oscillator is indicated by the letter L after the number.
When creating complex metallic sounds (cymbals etc.), it is often handy (when you have the base) just to change random some values until it sounds good. After using the Random column, the sound will be played. You will hear the most crazy sounds, but also great sounds.

Frequencies by ratio

It is possible to set the frequencies by ratio. Set the Master frequency, type the ratio values for the 12 frequencies and press the Apply button. If the Master frequency is 250 Hz and Ratio 1 has a value of 1.5, frequency 1 will be 1.5 x 250 = 375 Hz. For the Master frequency you can also enter a musical note (Examples: C4, F#3, Eb4).
If you want (for example) to increase all frequencies, you only have to increase the Master frequency and press the Apply button. If you have not set the frequencies by ratio, you need to press first the Current button. The ratio values will then be calculated.
Press the Sort button to sort the ratio values from low to high.
There are also some presets available for the ratio values. You can use Inharmonic 1, Inharmonic 2 and Inharmonic 3 for metallic sounds.

Levels

For scaling all levels, there must be a level row selected.
You can scale all levels to a value by entering the maximum value and pressing the "Scale to" button.
You can scale all levels by percentage by entering the percentage and pressing the "Scale by %" button. With a value of 200%, all levels will be two times higher. A level cannot be higher than 100. If you scale a level of 51 by 200%, it will become 100.
Use the Copy button to copy all levels. You can for example copy all Start levels to the Fifth levels.

Filter

For one or all carriers you can use a filter. You can choose a high pass, low pass, band pass, notch, high shelf, low shelf, peak, ladder or one pole low pass filter (BQ = Biquad, BW = Butterworth).
In addition to this filter, you can also use Command 3 filters. For every operator (modulator or carrier) you can set a filter. Parameter 1 controls the cutoff frequency and parameter 2 controls the resonance. Depending on the algorithm you can modulate the cutoff frequency and/or the resonance. The filter type can be low pass, high pass, bandpass, notch, ladder or one pole low pass. Within one wave cycle it is even possible to change multiple times the filter type.
Of course there are also the two main filters (with envelopes) that can be routed in series or parallel.

Move columns

You can move a column by selecting a cell and pressing Ctrl-L for moving to the left or Ctrl-R for moving to the right.

Copy columns

You can copy a column by selecting a cell in that column and pressing Ctrl-C. Select a cell in another column and press Ctrl-V to paste the copied data.

Init

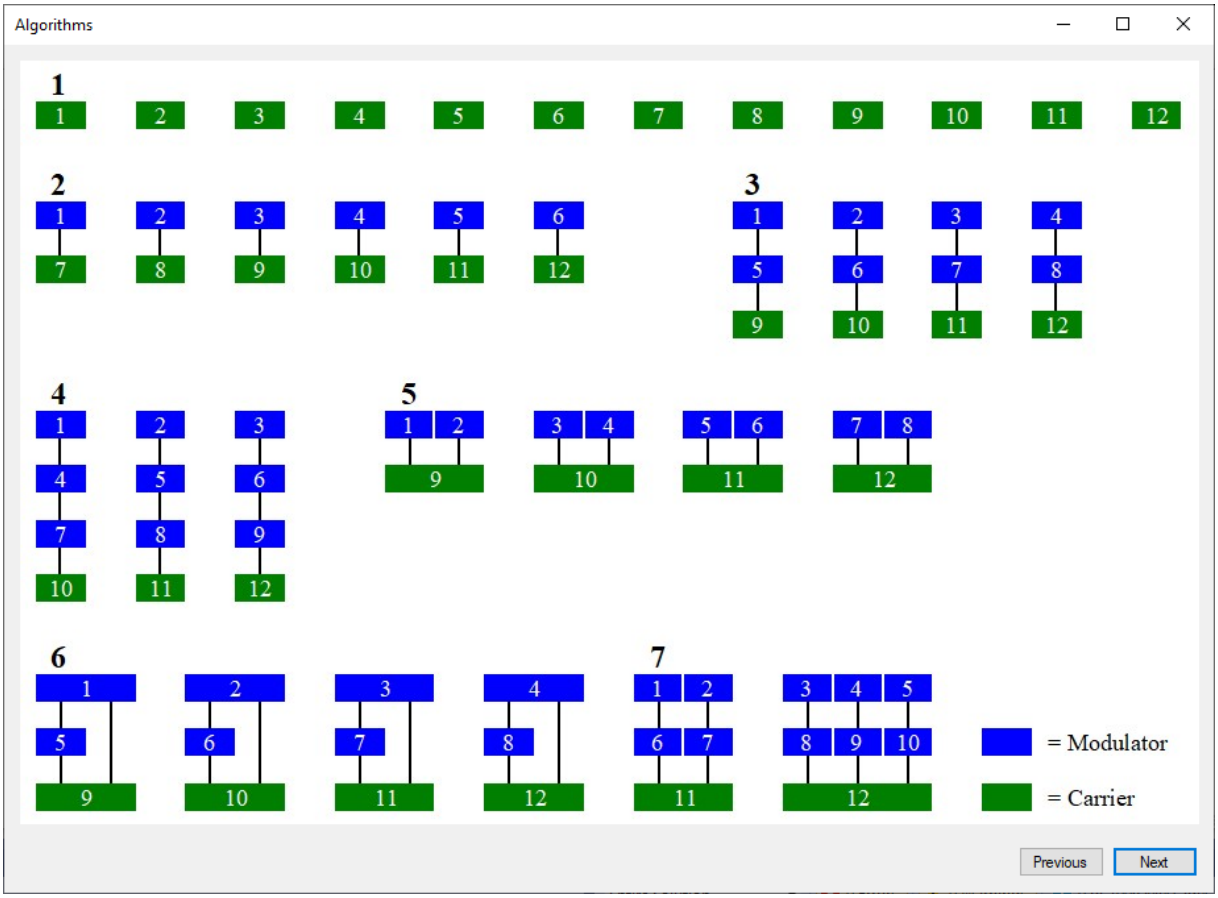
Press the Init button to initialize the whole Wave combiner. You can initialize only one operator (oscillator) by selecting a cell in the column of that operator and pressing Ctrl-I. If you want to use only the envelope (so not the waveform) to modulate, you can initialize the selected operator by pressing Ctrl-E.

Import

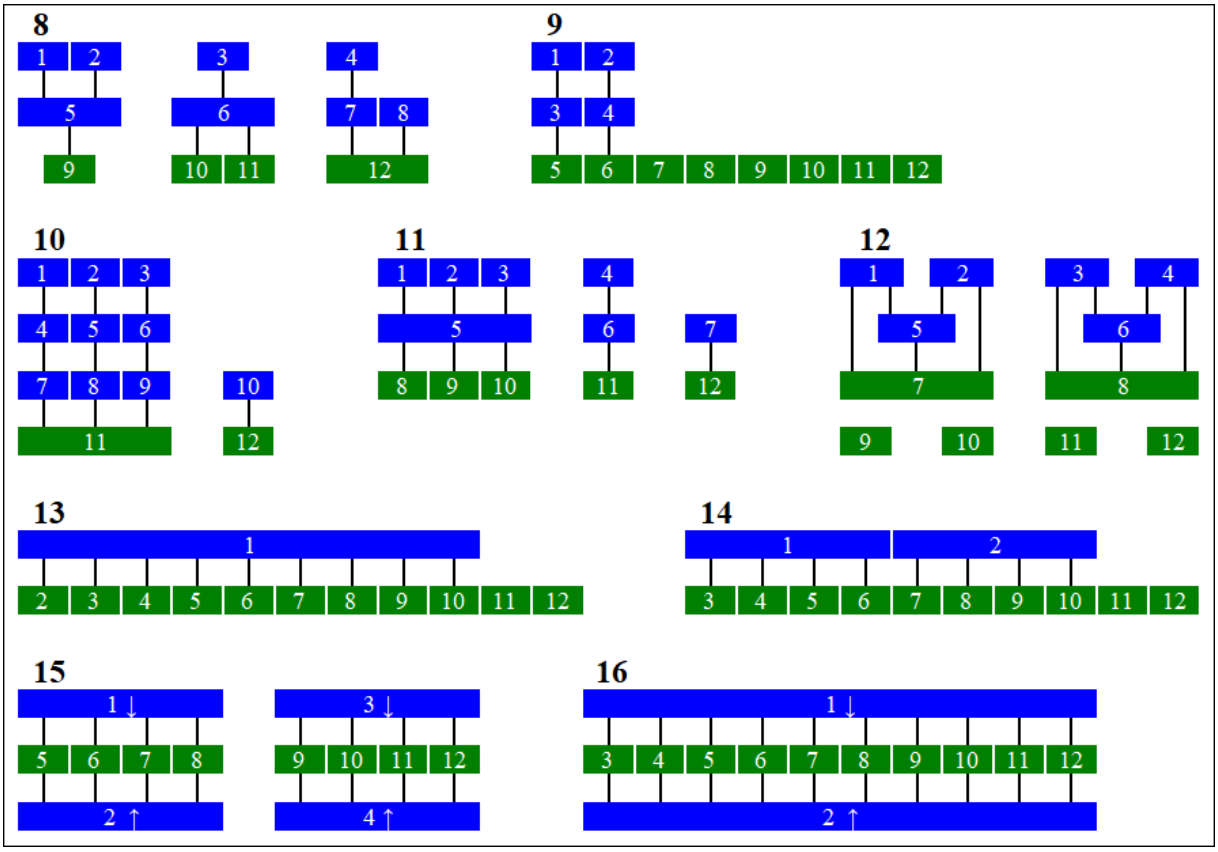
Press the import button to import a frequency spectrum from Audacity. Only the first 12 top frequencies will be imported.

Algorithm

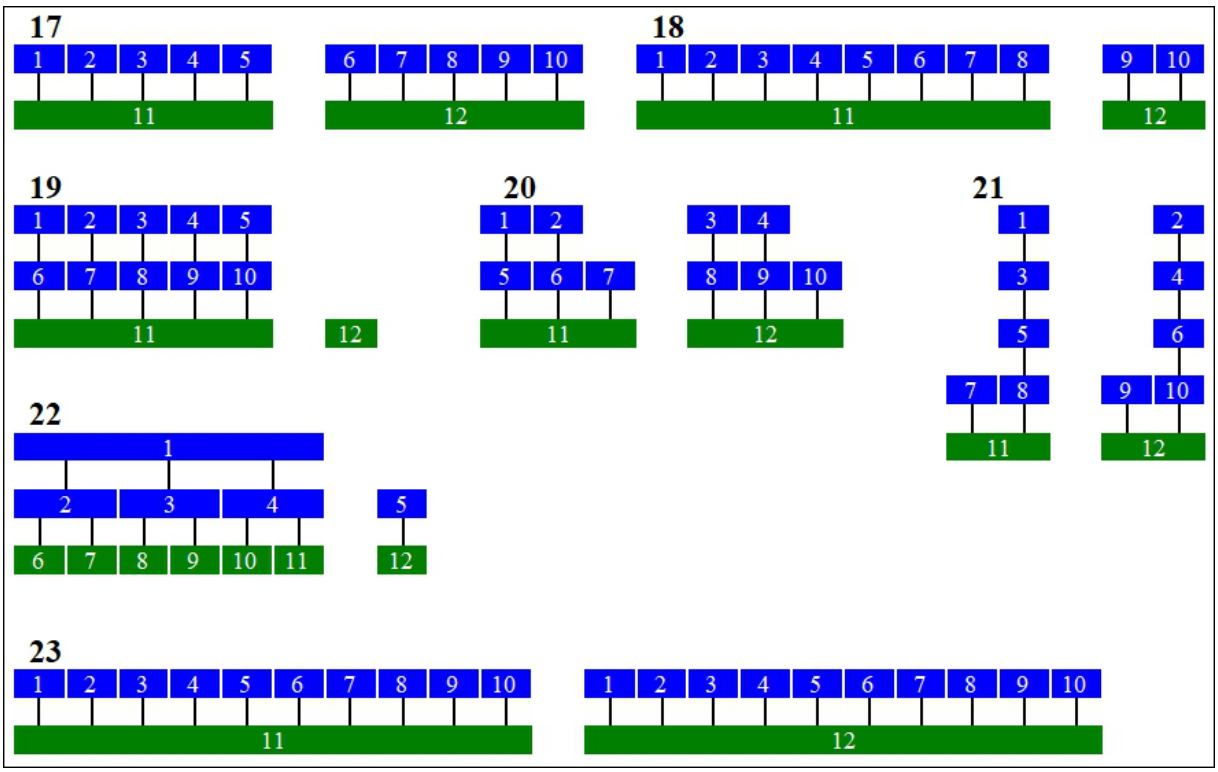
With the Algorithm parameter, you can choose an operator configuration.

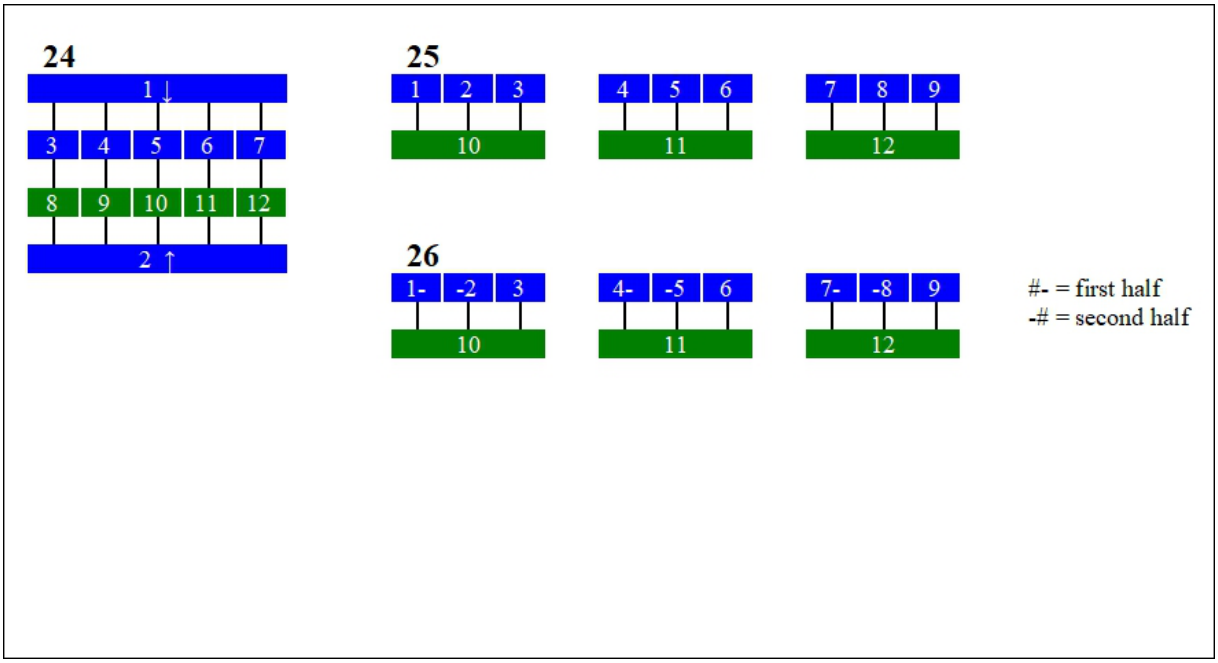


Press the ? button to see this picture in frEDrums. The blue boxes are the modulators and the green boxes are the carriers. These colors are also used in the table of the Wave combiner. A modulator modulates a carrier or a modulator.
Algorithm 1 has only carriers and it works as an additive synthesizer, if the Combine setting (later in this chapter) is set to Mix. In that case, all the outputs from the carriers that are not muted are mixed together.
In Algorithm 2 the operators 1-6 are modulators an the operators 7-12 are carriers. If you don't want the operator 1 to modulate operator 7, you can simply mute operator 1.
It is possible to set the frequency of a modulator low (for example 2 Hz), so that you can use the modulator also as an LFO. You can also use a modulator as an envelope generator. Set Command 3 to "M, M". With the parameters Level 1, Time Level 2, Level 2 etc, you can adjust the envelope. Take a look at the toms of drum kit 6. There it is used for a fast pitch envelope for two oscillators.
Press Next to see more algorithms.



In Algorithm 15, the carriers 5-8 are modulated by modulator 1 and modulator 2. The carriers 9-12 are modulated by modulator 3 and modulator 4.

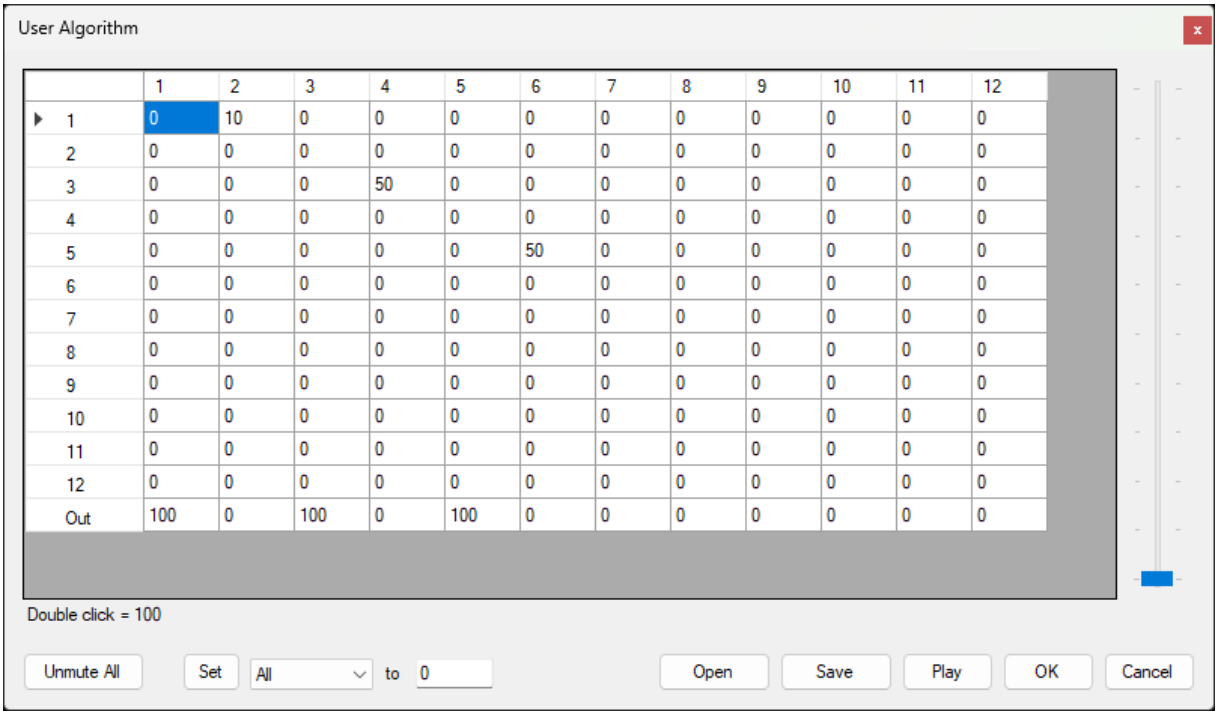




In Algorithm 26, the modulators 1, 4 and 7 are only used in the first half of the duration of the sound. In the second half, it is like they are muted. The modulators 2, 5 and 8 are only used in the second half of the duration of the sound. In the first half, it is like they are muted.

User Algorithm

Press the User button to make your own algorithm.



	1	2	3	4	5	6	7	8	9	10	11	12
1	0	10	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	50	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	50	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
Out	100	0	100	0	100	0	0	0	0	0	0	0

In every cell of the matrix you can set a percentage (-100 - 100), so also negative modulation / feedback is possible. The numbers in the column headers and the row headers indicate the Wave combiner oscillator. Oscillators that have a value not equal to 0 in the Out (output) row

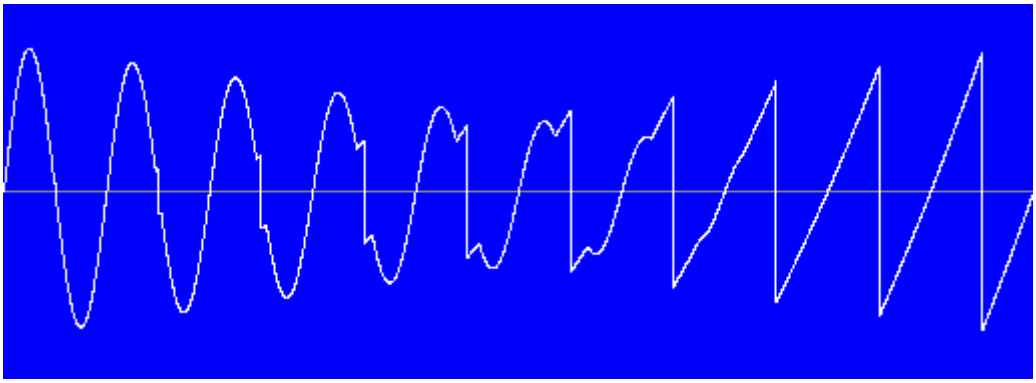
are carriers, but carriers can also modulate. If you want for example to modulate oscillator 1 by oscillator 2, you must set the value in column 2 and row 1 not equal to 0.
To hear the result, you can press the Play button or you can press the Ctrl key and the Shift key simultaneously.
Keep in mind that muted oscillators don't do anything, except of their envelopes that can also be used to modulate the equalizer. Therefore it can be handy to unmute all Wave combiner oscillators by pressing the Unmute All button.
Press the OK button if you want to keep the changes that you made to the user algorithm or press the Cancel button to cancel the changes.
You can also save a user algorithm to a file by pressing the Save button or to load a user algorithm by pressing the Load button. All DX7 and DX9 algorithms are included with frEDrums.
You can easily fill in more cells at the same time by choosing All, Column or Row, type the value and click the Set button. You can also set the value of a cel to 100 by simply double clicking in it.

Combine

With the Combine parameter, you can set how the outputs of the carriers are combined. The default setting is Mix, which simply mix the outputs.
Uneven, AND, OR, Even, Only 1 and Only 2 can for example be used to make metallic sounds. If you select AND, the result level is only positive when all used oscillators have a positive value. With OR, the result level is positive when at least one oscillator has a positive value. With Uneven, the result level is positive when an odd number of oscillators has a positive value. Take a look at the following table (0 = negative, 1 = positive).

Osc 1	Osc 2	Osc 3	Uneven	AND	OR	Even	Only 1	Only 2
0	0	0	0	0	0	0	0	0
0	0	1	1	0	1	0	1	0
0	1	0	1	0	1	0	1	0
0	1	1	0	0	1	1	0	1
1	0	0	1	0	1	0	1	0
1	0	1	0	0	1	1	0	1
1	1	0	0	0	1	1	0	1
1	1	1	1	1	1	0	0	0

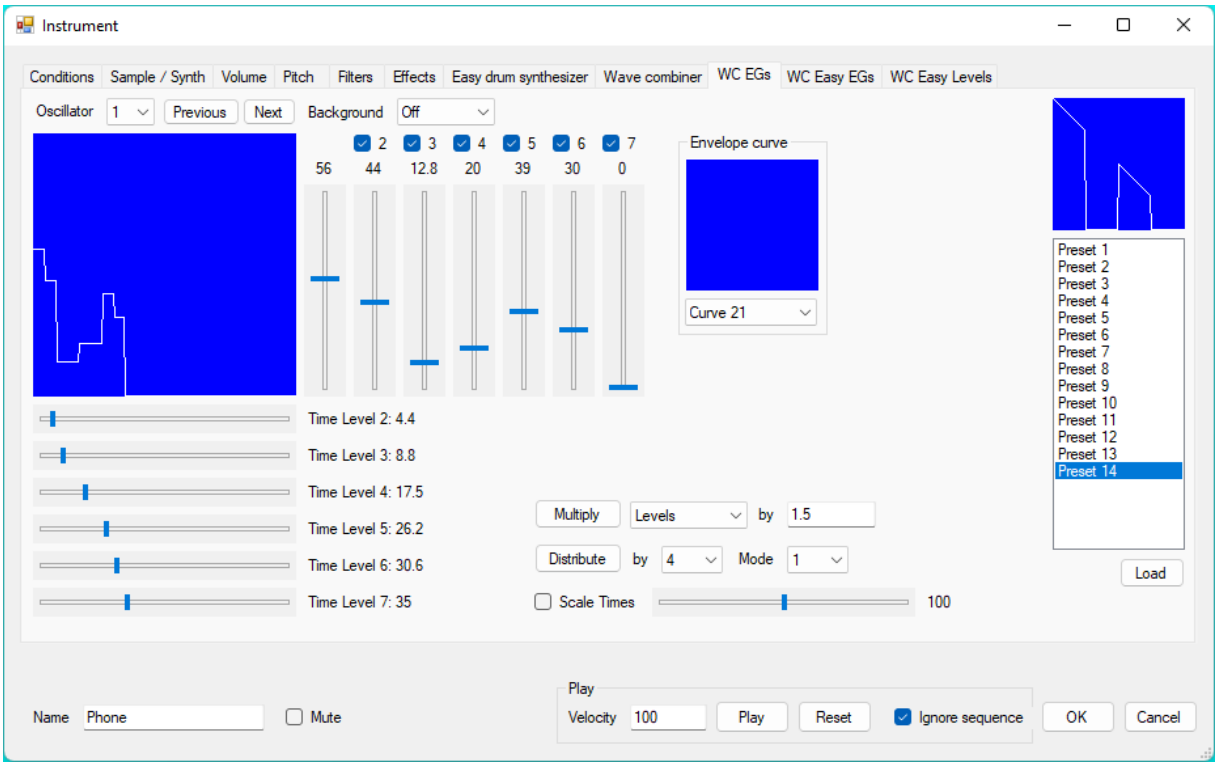
When Combine is set to Highest, the result value is the highest absolute carrier value. Take a look at the following example. The waveform of carrier 1 is a sine and the waveform of carrier 2 is a saw. The frequencies are the same. The volume of carrier 1 is decreasing and the volume of carrier 2 is increasing. Of course you can combine also more than two carriers.



Multi Export

Press the Multi Export button to export the output of every Wave combiner oscillator to a separate wav file. The Waveform of Oscillator 2 has to be set to Wave combiner, the Wave combiner algorithm must be set to 1 and the Level Mix must be set to 100%.

WC EGs



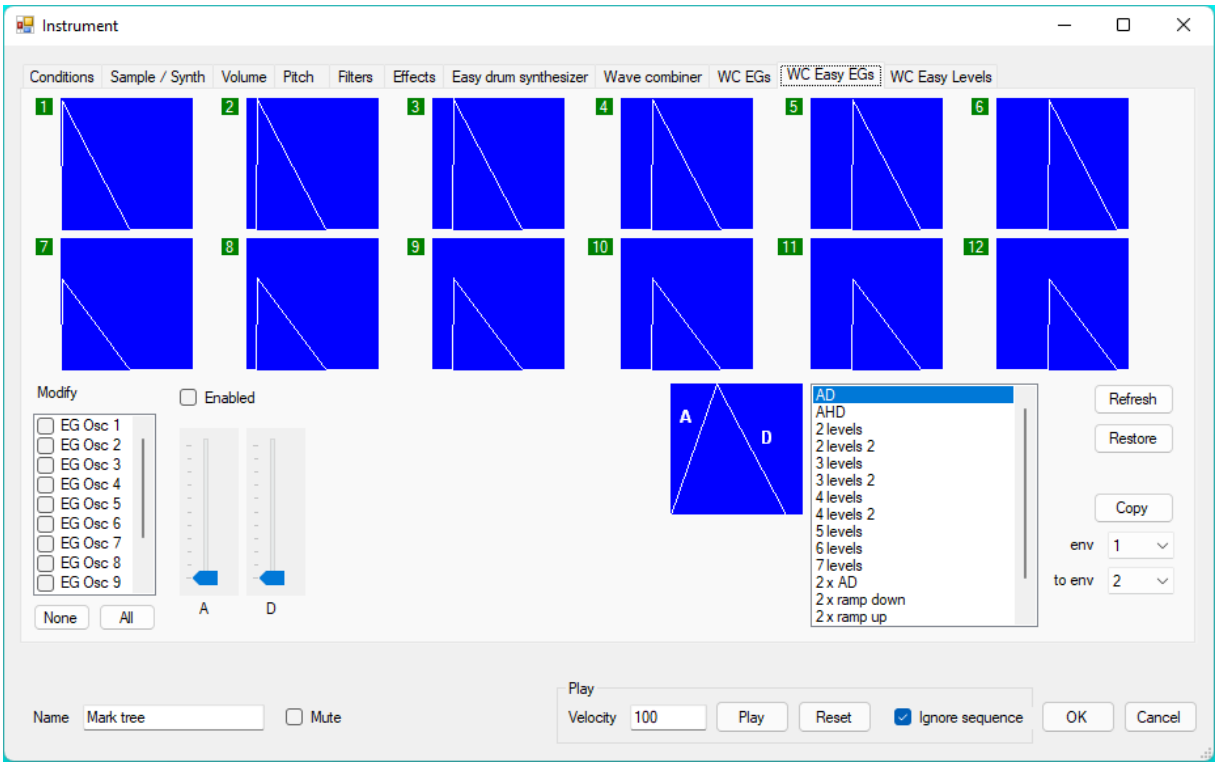
On the WC EGs tab, you can change the envelopes of all the Wave combiner oscillators. First select the oscillator whose envelope you want to change. With the sliders next to the picture, you control the levels and with the sliders below the picture, you control the times. A time is a percentage of the total duration. Therefore the value of a slider can not be less than the value of the slider above that slider. If needed, the values are automatically corrected. Right click on the text after a slider for a menu with handy commands (Copy from previous, Copy from next, Halfway between, Set to 25%, Set to 50% and set to 75%). You can ignore a level by disabling the corresponding checkbox. You can select the curve that is used for the envelope segments (see chapter Envelope curves). You can easily browse through the available curves by clicking on the picture.

Left half of the picture	Right half of the picture
Left mouse button = Previous curve Right mouse button = First curve	Left mouse button = Next curve Right mouse button = Last curve

You can display an envelope from another oscillator on the background (in gray color), which makes it easy to compare.
Often it is handy to start from a preset. Select a preset and press the Load button.
You can multiply the level or time percentages by typing a factor and clicking the Multiply button. A percentage can not be higher than 100%. For example, if Time level 6 is 80% and the multiply factor is 2, the new value will be 100% (not 160%).

It is also possible to automatically divide the times evenly. When mode is set to 1, the left over envelope points will be all at the end. If you like you can disable them. When mode is set to 2, there will be (if possible) two envelope points per time point (except 0). This is for example needed to create a square wave.
Enable Scale Times and move the slider to scale all the envelope times.

WC Easy EGs



On the WC Easy EGs tab, you can easily change the envelopes of all the Wave combiner oscillators. To use the easy sliders below, you must enable the Enabled checkbox. This is to prevent accidental changes.
On the picture you can see the envelopes of a mark tree. For a mark tree there are of course a lot of delays needed.
To change for example the envelope of oscillator 3, select EG Osc 3, select a suitable method for creating an envelope, enable the Enabled checkbox and move the sliders.
When you select a method, the picture on the left of it shows the functions of the sliders. Here is an overview of the used letters that you can see under the sliders.

A	Attack time or Time A
B	Time B
D	Decay time
H	Hold time
L	Level
T	Time
1	Level 1
2	Level 2
3	Level 3
4	Level 4
5	Level 5
6	Level 6
7	Level 7

By selecting more envelopes, you can change more envelopes at the same time. If you want to

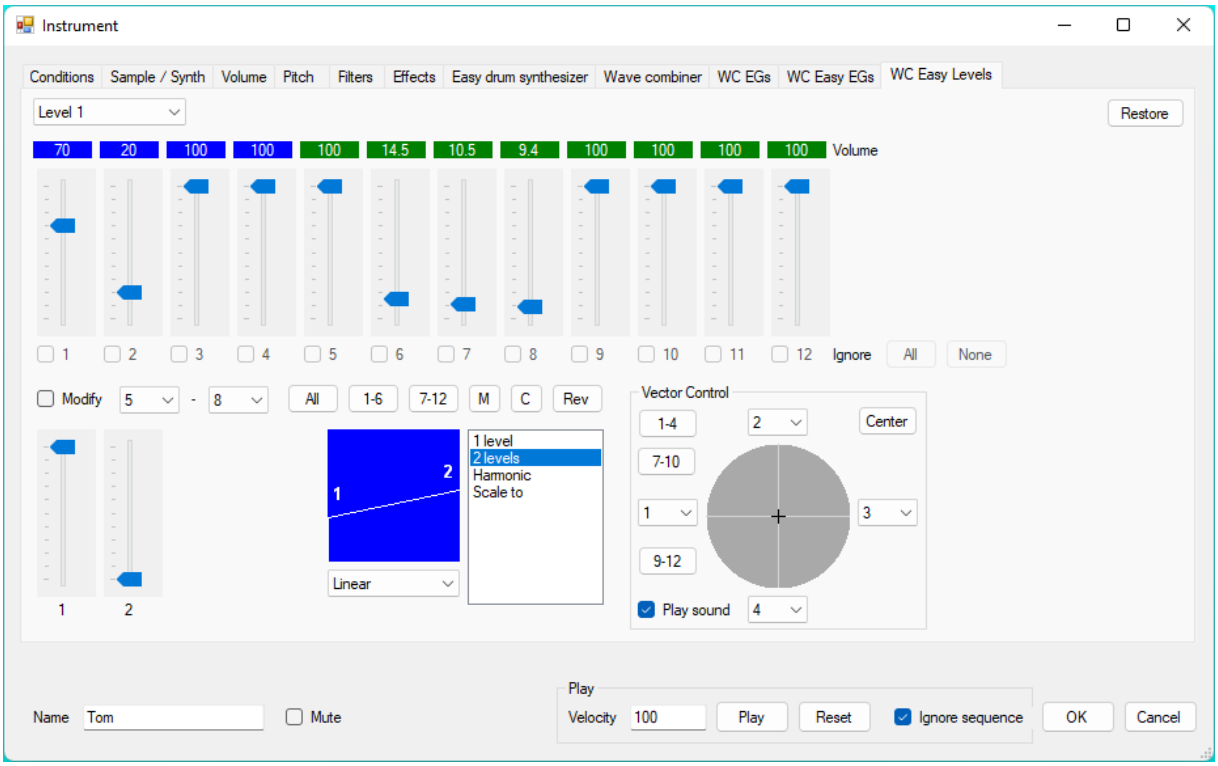
change only one evelope, it is best to check if you see (1 selected) behind Modify.
Take a look at the Volumes section earlier in this chapter to see some examples of different methods to create an envelope. The Curve method is not available in the Wave combiner, but you can create an even better curve by selecting an envelope curve on the Wave combiner tab.

Press the Restore button to restore all the envelope levels to the moment that you entered the Easy Vol Tab.

You can copy an envelope by selecting which envelope you want to copy to which envelope and pressing the Copy button.

You can press the Refresh button to update the envelope pictures, but normally the pictures are updated automatically.

WC Easy Levels

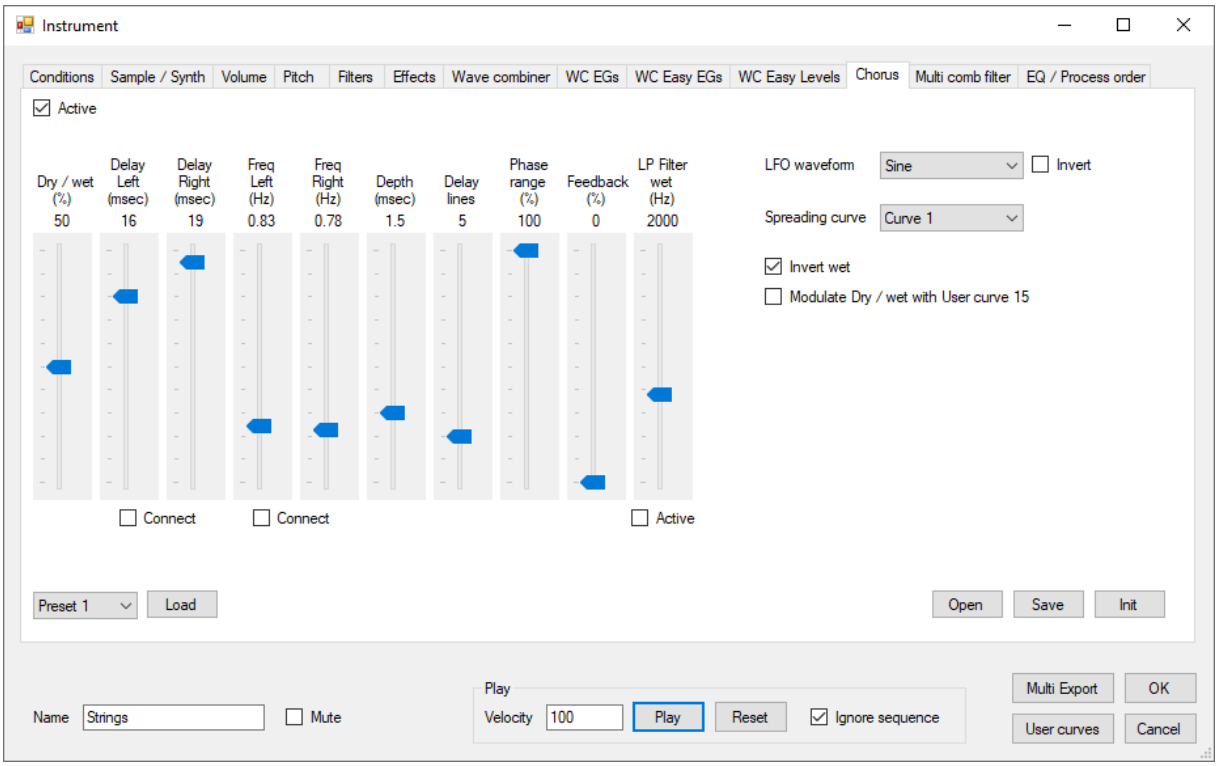


On the WC Easy Levels tab, you can easily change the levels of all the Wave combiner envelope generators. Make sure that you select first the level that you want to change. Instead of using the sliders you can type a value by clicking on that value.
To use the easy sliders below, you must enable the Modify checkbox. This is to prevent accidental changes. Set the range to modify, select the method (1 level, 2 levels etc.) and move the sliders. To set the range, you can also press a preset button (All, 1-6, 7-12, M or C). Press M to select all modulators or press C to select all carriers. You can reverse the volumes of the selected oscillators by pressing the Rev button.
With the Vector Control, you can easily mix four oscillators. Click in the circle to change the levels of the assigned oscillators. On the picture these are the oscillators 1, 2, 3 and 4, but you can change them. You can also press the preset buttons 1-4, 7-10 or 9-12 for assigning very fast four oscillators. You can select an hyphen (-), if you want to change less than four levels. The closer to an oscillator you click, the louder the level of that oscillator will be. If Play sound is enabled, you will also hear the result. This way you can fast and easy arrive to the result you want. If you press the Center button, all the levels will be set to 50%.

Press the Restore button to restore all the envelope levels to the moment that you entered the Easy Vol Tab.

Chorus

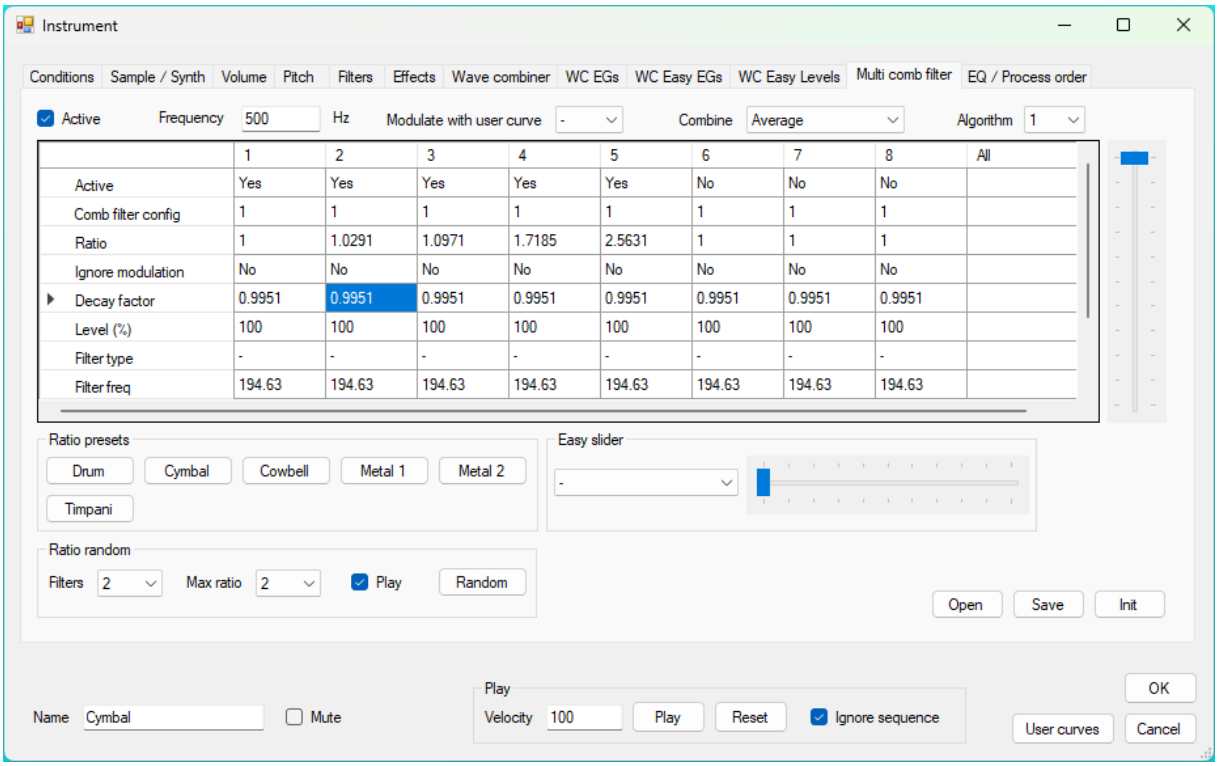
Use the Chorus effect to make a sound richer and fuller.



Active	Enable Active to use the Chorus effect.
Dry / wet	When set to 0%, you will only hear the original sound and when set to 100% you will only hear the added effect.
Delay Left	Pre delay time for the left channel
Delay Right	Pre delay time for the right channel
Freq Left	Modulation frequency for the left channel
Freq Right	Modulation frequency for the right channel
Depth	Modulation depth
Delay lines	Number of voices
Phase range	Range for the start phase of the voices (see also Spreading curve)
Feedback	Percentage of the wet signal that is feeded back
LP Filter wet	Filter frequency for the wet signal (If the Active option under this parameter is enabled, the wet signal is filtered by a low pass filter)
LFO waveform	Waveform of the modulator (When set to a user curve, you can define your own waveform)
Invert	When this option is enabled, the LFO waveform is inverted.
Spreading curve	The Spreading curve determines how the starting phases of the voices are distributed over the Phase range.
Invert wet	Enable this option to invert the wet signal.
Modulate Dry / wet with User curve 15	Enable this option if you want to modulate the Dry / wet parameter with User curve 15 which allows you to create any envelope.

Select a preset and press the Load button to load a preset. Press Init to change all settings to the default value.
Press the Save button to write the chorus settings to a file. Press the Open button to read the chorus settings from a file.

Multi comb filter

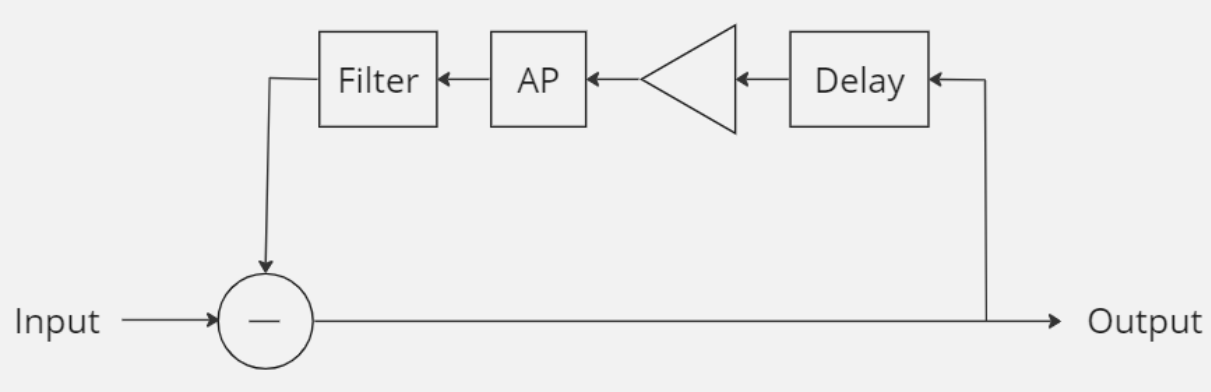


	1	2	3	4	5	6	7	8	All
Active	Yes	Yes	Yes	Yes	Yes	No	No	No	
Comb filter config	1	1	1	1	1	1	1	1	
Ratio	1	1.0291	1.0971	1.7185	2.5631	1	1	1	
Ignore modulation	No	No	No	No	No	No	No	No	
Decay factor	0.9951	0.9951	0.9951	0.9951	0.9951	0.9951	0.9951	0.9951	
Level (%)	100	100	100	100	100	100	100	100	
Filter type	-	-	-	-	-	-	-	-	
Filter freq	194.63	194.63	194.63	194.63	194.63	194.63	194.63	194.63	

The multi comb filter consists of 8 feedback comb filters with optional filters in the feedback loop or before the output depending on the Comb filter config setting. The multi comb filter is in combination with the built-in synthesizer very suitable for Physical modelling synthesis. You can for example easily make realistic sounding cymbals.
If Algorithm is set to 1, every comb filter processes the same input signal. With Combine you can how the outputs will be combined. Average works for most sounds, but you might need Highest, Lowest or Multiply.
If Algorithm is set to 2, comb filter 2 processes the output of comb filter 1, comb filter 4 processes the output of comb filter 3 etc. The outputs from the comb filters with an even number are combined, so algorithm 2 is a combination of series and parallel.
With Frequency you can adjust the fundamental frequency. The frequency of a comb filter is the fundamental frequency multiplied by the ratio. You can switch a comb filter on or off by clicking in a cell of the Active row.

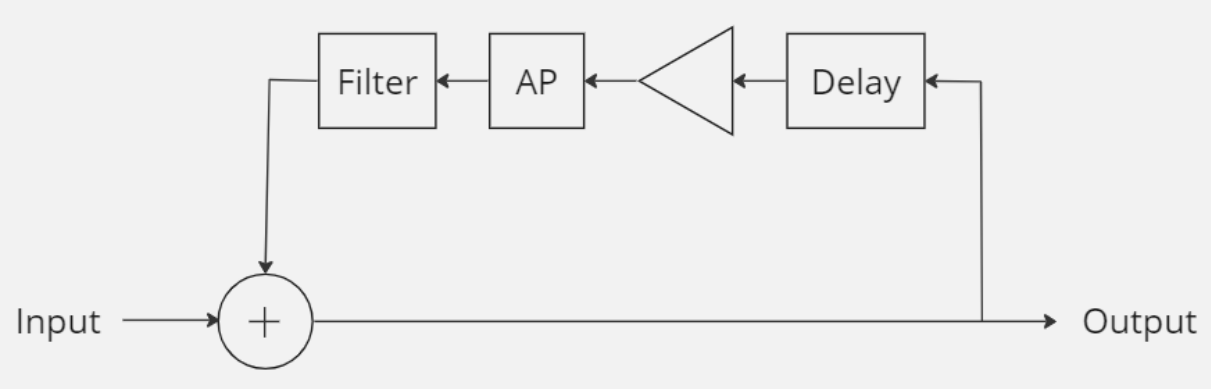
There are 3 different comb filter configurations available.

Comb filter config 1

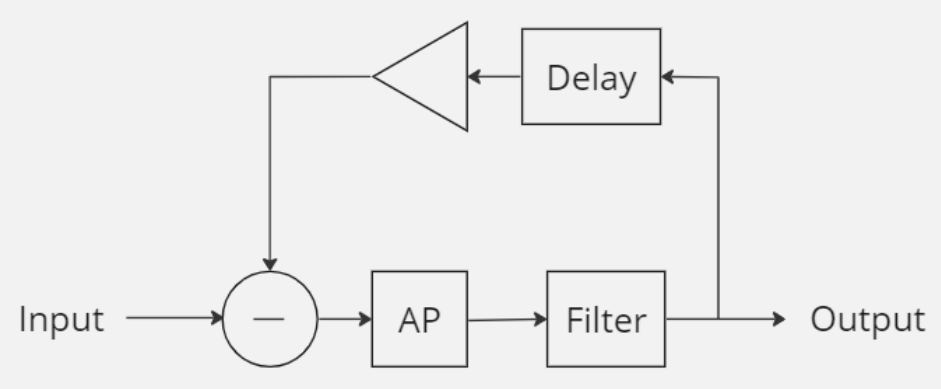


AP = All pass filter

Comb filter config 2



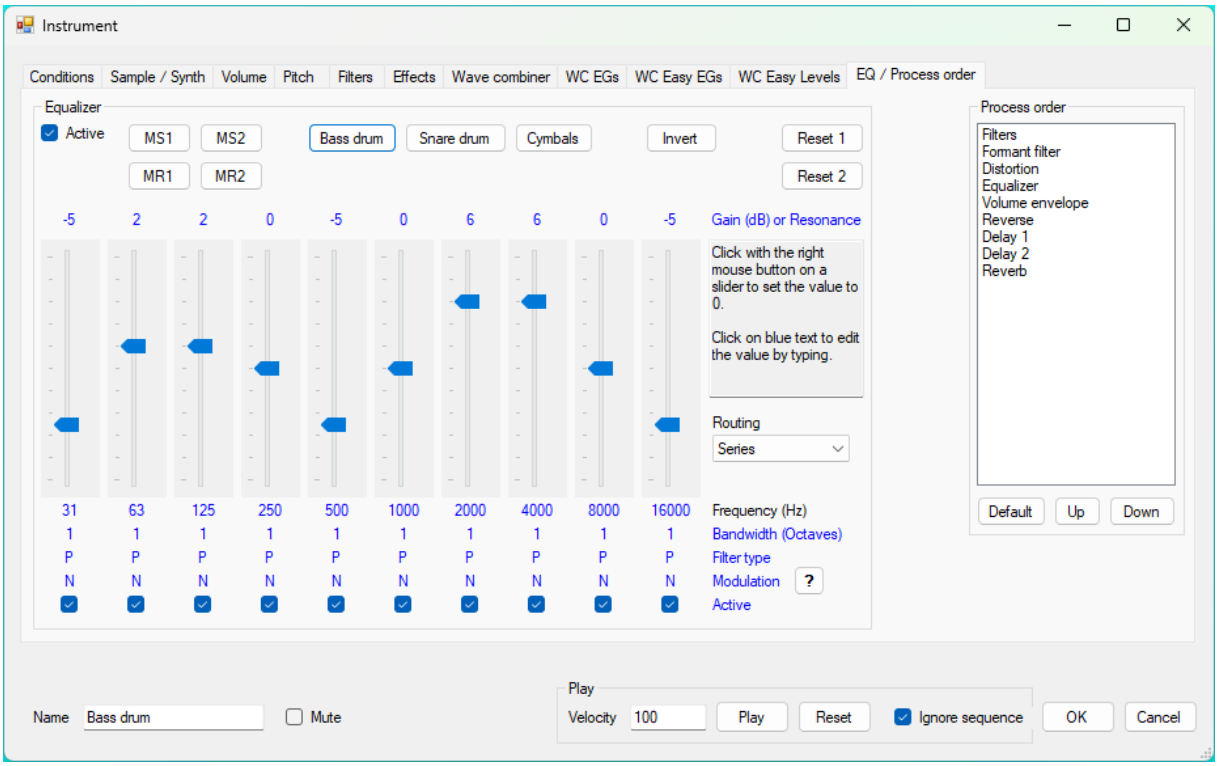
Comb filter config 3



The decay time depends on the frequency, the decay factor and the filters. High frequencies decay fast. If it is too fast, you can set the Easy slider to Decay factor and move the slider. The decay factor will be set higher for the high frequencies when the slider is not totally to the left. The more you move the slider to the right the higher the decay factors will be, but the decay factor of the lowest frequency stays the same. By choosing Level you can easily make the levels softer for the high frequencies.
Use the All column to change all values in the selected row to the same value. For the Ratio, the Decay factor, the Level and the Filter freq, you need to move the slider at the right of the table.

You can use the Ratio presets as a handy starting point. Keep in mind that it will mostly not sound like a cowbell when you press the Cowbell preset, since only the ratio settings will be changed. If you want fast a good cowbell sound, see the Easy Drum synthesizer chapter.
Ratio random can be very handy. Unless you know the ratios for an instrument, it is easier to try what sounds good. Enable Play to hear the result every time when you press the Random button. The Filters and Max ratio settings have a big influence on the Random function. With Filters you set the number of comb filters that you want to use. With Max ratio you set the highest ratio value that can be generated by the Random function.
Mostly when you hit a drum, the frequency is higher at the beginning. You can use “Modulate with user curve” for this. Normally you will need just a simple decay curve, but since a user curve is used, you can also make a very complex curve. If you don’t want a modulation for a comb filter, you can set “Ignore modulation” to Yes for that comb filter.
You can save the Multi comb filter settings by pressing the Save button and you can load previous saved Multi comb filter settings by pressing the Open button. Press the Init button to load the default Multi comb filter settings.

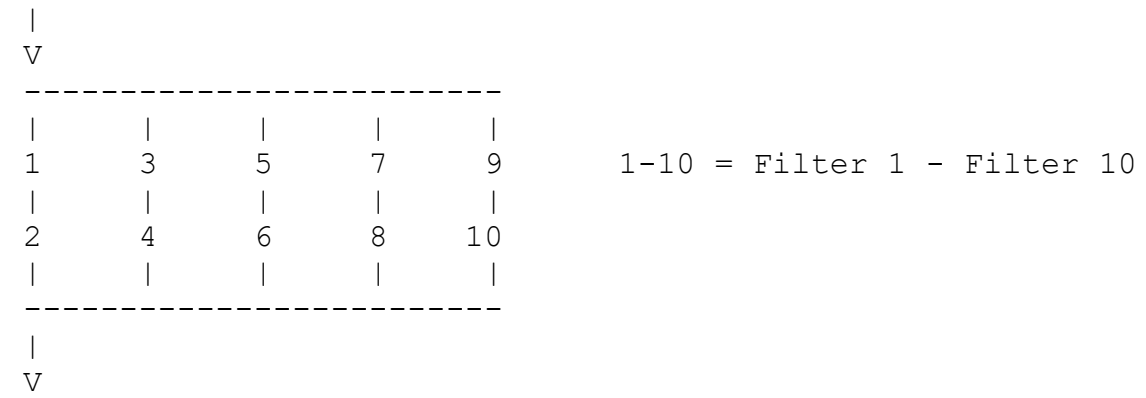
Equalizer



On the EQ / Process order tab you can change the settings of the equalizer. Enable Active to use the equalizer.
With the equalizer you can boost or attenuate a certain frequency band. You can easily set a gain or resonance value to 0 by clicking with the right mouse button on the corresponding slider. A gain value higher than 0 will boost the frequencies and a gain value lower than 0 will attenuate the frequencies. The default frequencies, bandwidths and filter types are suitable for most situations, but if you want you can change the values by clicking on them. If you want to cut a small frequency range, you can set the bandwidth to a small value or change the filter type to Notch. If you want to boost or attenuate more, you can set more filters to the same frequency.
There are some presets available to have a good starting point.
Press Reset 1 or Reset 2 to load default settings. Press Invert to invert the gain values.
The settings can be saved to the temporary memory by clicking on MS1 or MS2 and they can be recalled by pressing MR1 or MR2. This way you can also copy the EQ settings from one instrument to another instrument (even from another file). As long as you don't exit frEDrums, the settings will stay in the memory.
If you click on Gain (dB) or Resonance, you can change all values to 0. If you click on Bandwidth (Octaves), you can change all bandwidths to the same value. Only a peak filter uses the bandwidth setting.
The following filter types are available:

P = Peak, LS = Low shelf, HS = High shelf, N = Notch, LP = Low pass, HP = High pass, BP = Band pass, LA = Ladder

You can browse through the filter types by left clicking on it. Alternatively you can choose a filter type from a menu by right clicking on it. You can change all filter types to Peak by clicking on Filter type.
With the filter types peak, low shelf and high shelf, the slider controls the gain. With other filter types, the slider controls the resonance percentage.
There are different filter routings available. Series/Parallel is a combination of Series and Parallel.



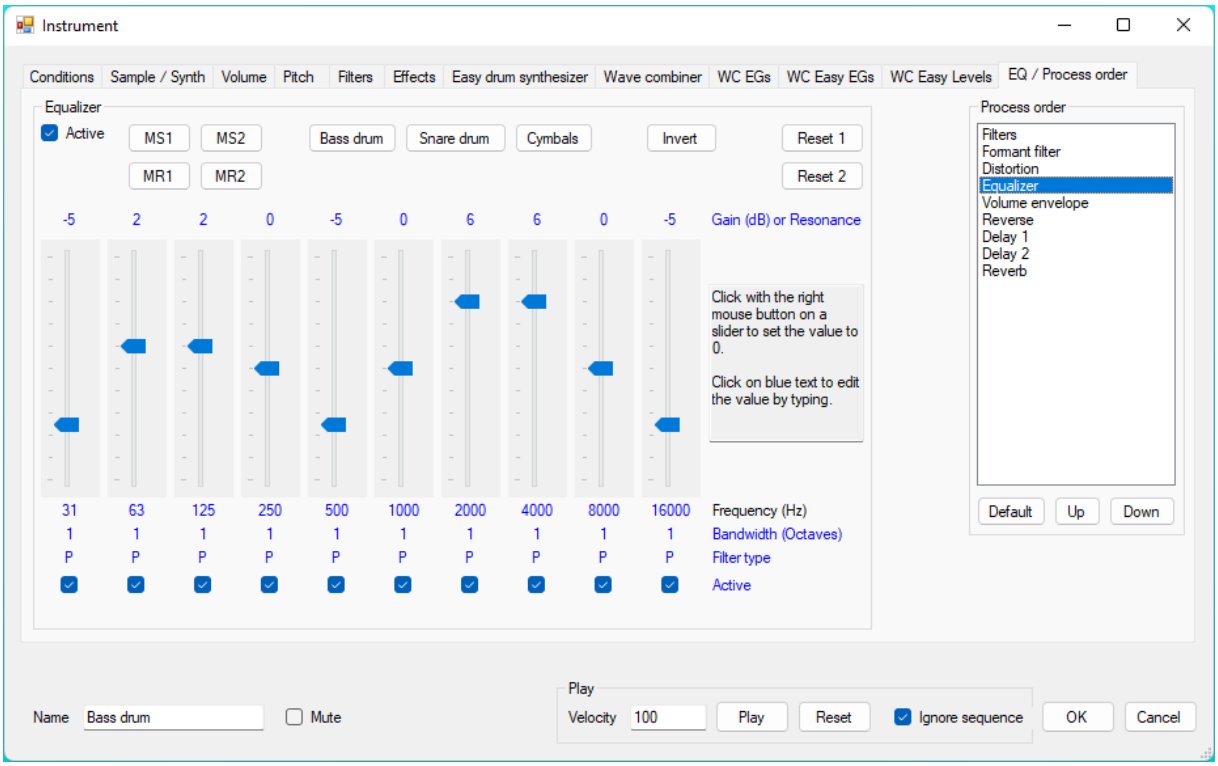
The envelopes of the Wave combiner can be used to modulate the filters. The envelope of operator 1 modulates the first filter, the envelope of operator 2 modulates the second filter etc. It makes no difference if an operator is already used for something else or if it is muted.
The following modulation types are available:

F = Frequency, G/R = Gain or Resonance, B = Bandwidth

You can browse through the modulation types by left clicking on it. Alternatively you can choose a modulation type from a menu by right clicking on it. You can change all modulation types to None by clicking on modulation.

You can enable or disable a filter. When you don’t use a filter it is better to switch it off, so the sound is generated faster. This has no influence on the performance during the playing mode as all sounds are generated before playing.

Process order



On the EQ / Process order tab you can change the order of the processes. The default order is Filters, Formant filter, Distortion, Equalizer, Volume envelope, Reverse, Delay 1, Delay 2, Reverb.
The order of the processes can make a big difference in sound.
The default order is suitable for most sound designs, but if you want another order then you can select a process and move it up or down with the corresponding buttons.
On the Filters tab you can choose the filter routing (in series or parallel).

Name

For stopping the open hi-hat sound, the names of all hi-hat instruments are important.

Sound	Closed hi-hat	Open hi-hat	Pedal hi-hat
Name must contain	Closed hi-hat or Closed_hi-hat	Open hi-hat or Open_hi-hat	Pedal hi-hat or Pedal_hi-hat
Good examples	Closed hi-hat 2 CLOSED HI-HAT Closed_hi-hat_1	25_Open_hi-hat Open Hi-Hat Open HI-HAT	pEdaL hI-hAt Pedal_Hi-Hat_1 3_Pedal_hi-hat_1
Wrong examples	Cl_hi-hat	OH	pedal_hi_hat

Mute

Enable the Mute option, if you don't want to hear an instrument. An M in the Options column indicates that the instrument is muted.

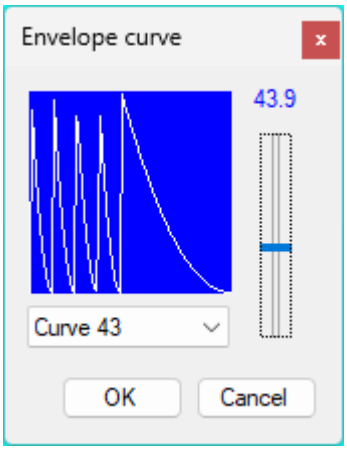
Play

Registered users can hear how the instrument sounds with the current settings by pressing the Play button or by pressing the Ctrl and Shift buttons simultaneously. Since the sound mostly depends on the velocity, you can specify that value.
If Ignore sequence is disabled and the pitch is set to a sequence, every time you press play, you will hear the next step of the sequence. If there is no note at a step, you will hear nothing. Press Reset to reset all pitch sequencers to the start of the song.

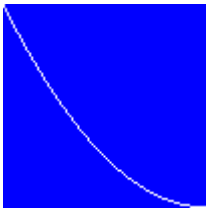
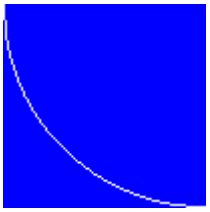
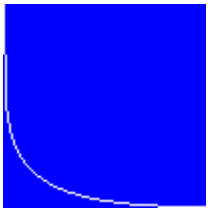
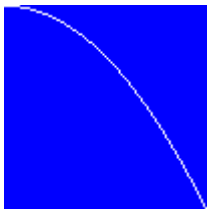
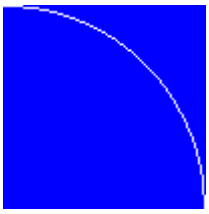
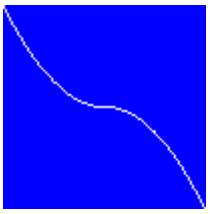
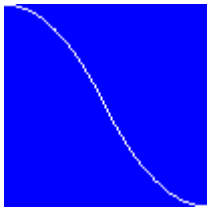
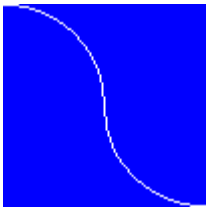
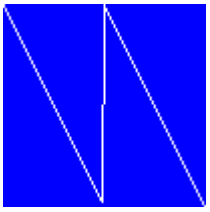
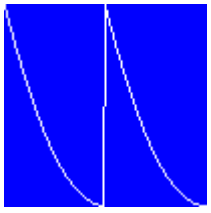
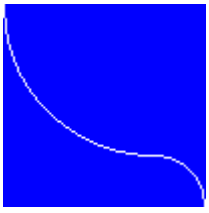
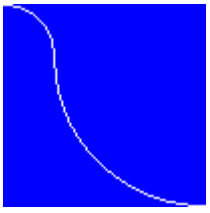
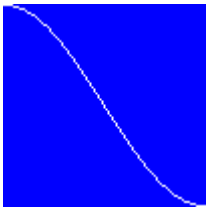
OK / Cancel

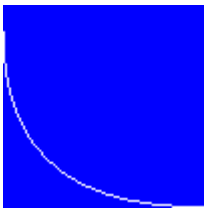
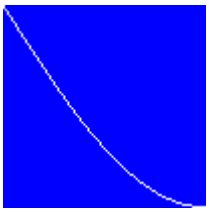
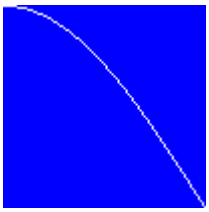
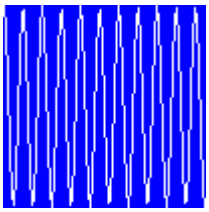
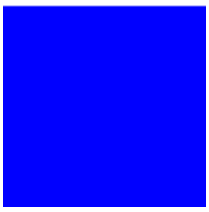
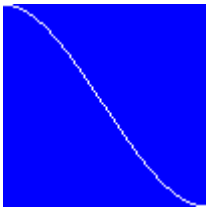
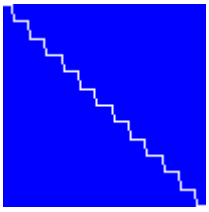
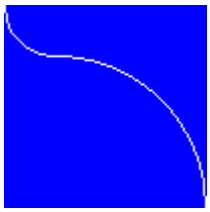
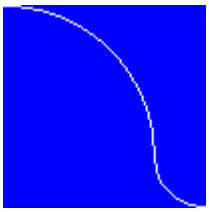
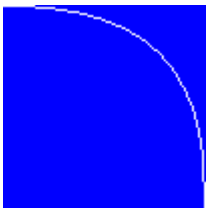
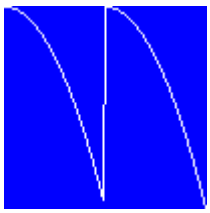
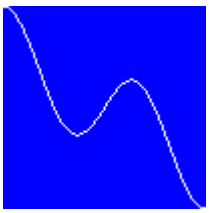
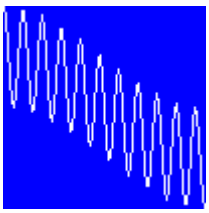
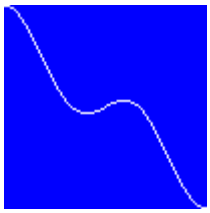
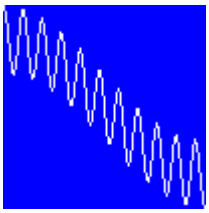
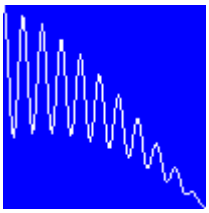
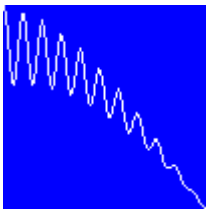
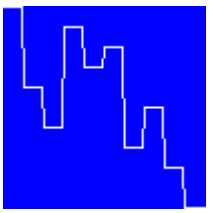
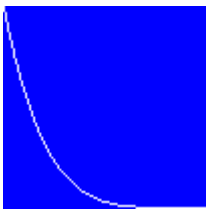
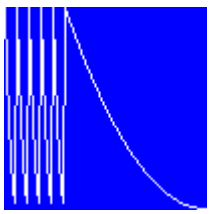
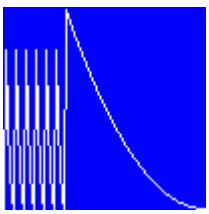
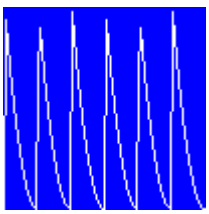
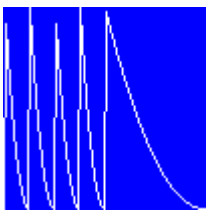
Press the OK button to accept the changes or press the Cancel button to reject the changes. The Cancel button does not reject the changes that are made by using an Apply to all instruments button.

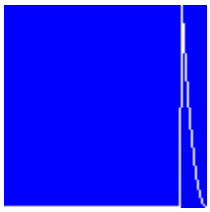
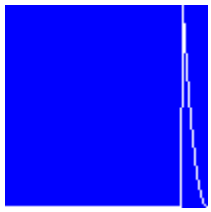
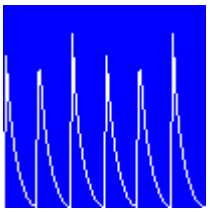
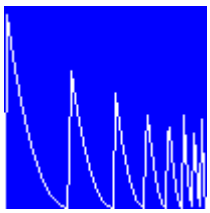
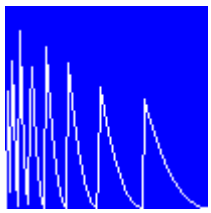
Envelope curves



For the segments of an envelope you can choose a curve. Depending on the curve and the envelope, you can change the shape of the curve with a parameter. Normally all segments of an envelope will have the same curve, but are also choices available with a combination for rising curves and falling curves (see later in this chapter). Per instrument there are also 16 user curves avalable. It is best to use User curve 1 and User curve 2 only for the Distortion effect. With the user curves you can create very complex curves and they can be used to make a complete envelope. You can use as many segments as you like and for each segment you can use a different curve. You can use the same user curve for more envelopes. See the User curves chapter for all the details about creating a user curve.
Here is an overview of the curves can can be used for the envelope segments in frEDrums.

 Linear	 Curve 1	 Curve 2	 Curve 3
 Curve 4	 Curve 5	 Curve 6	 Curve 7
 Curve 8	 Curve 9	 Curve 10	 Curve 11
 Curve 12	 Curve 13	 Curve 14	 Curve 15

 Curve 16	 Curve 17	 Curve 18	 Curve 19 *
 Curve 20	 Curve 21 (hold)	 Curve 22	 Curve 23 *
 Curve 24	 Curve 25	 Curve 26	 Curve 27
 Curve 28	 Curve 29	 Curve 30	 Curve 31 *
 Curve 32	 Curve 33 *	 Curve 34 *	 Curve 35 *
 Curve 36	 Curve 37	 Curve 38 *	 Curve 39 *
 Curve 40 *	 Curve 41 *	 Curve 42 *	 Curve 43 *

 Curve 44 *	 Curve 45 *	 Curve 46 *	 Curve 47 *
 Curve 48 *	 Curve 49 *	 Curve 50 *	User curve 1 - User curve 16

* If you use this curve for the envelope of a wave combiner operator, you can change the curve with the Envelope param setting.

Curve 29 is almost the same as Curve 11, but Curve 29 has small attack times to avoid click sounds.

Curve 40 is very suitable for making a clap sound.

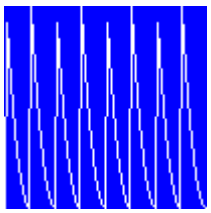
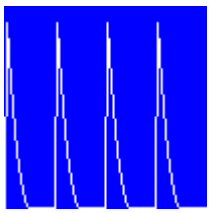
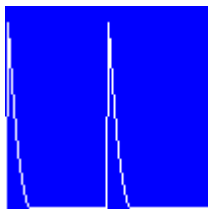
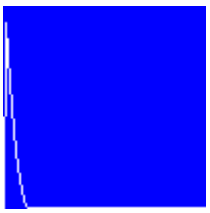
Curve 41 is almost the same as Curve 40, but Curve 41 has small attack times to avoid click sounds.

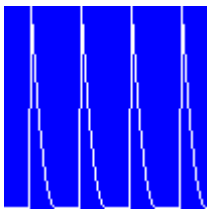
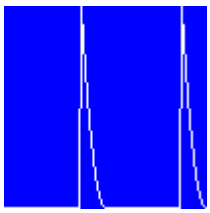
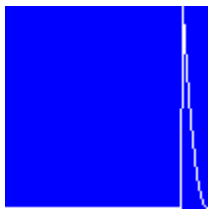
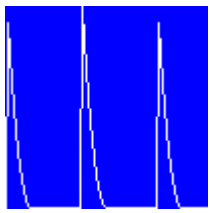
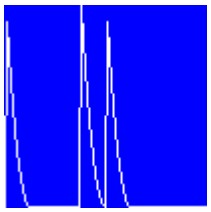
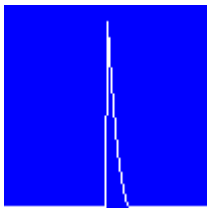
Use Curve 44 to make arpeggios. The curve is divided into 8 parts. With the parameter you can choose major chord and minor chord patterns. Make sure that the envelope is set from the maximum value to the minimum value and that the modulation is set to Frequency (see Arpeggio_02_Dm.eis). It is best to use Curve 44 for the modulator together with Curve 42 or Curve 45 for the carrier. See also Curve 48.

Use Curve 45 to make rhythms. With the parameter you can control the rhythm pattern. In combination with Curve 44 for the modulator, you can control which notes of the arpeggio you want to hear. The curve is divided into 8 parts. You can calculate the parameter value as follows.

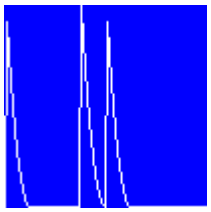
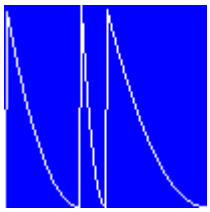
Beat	1	2	3	4	5	6	7	8
Value	1	2	4	8	16	32	64	128

Calculate the sum of the values of the beats that you want to hear, so for beat 1 and beat 5 the sum will be 1 + 16 = 17. Multiply that value by 0.39, so 17 * 0.39 = 6.63. Here are some parameter values for some often used rhythms.

Parameter = 99.45	Parameter = 33.15	Parameter = 6.63	Parameter = 0.39
 Parameter = 66.3	 Parameter = 53.04	 Parameter = 49.92	 Parameter = 28.47
 Parameter = 9.75	 Parameter = 6.24		

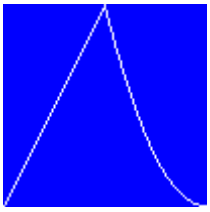
Curve 46 is almost the same as Curve 45, but the decay is calculated differently as you can see in the following example.

 Curve 45 Parameter = 9.75	 Curve 46 Parameter = 9.75

Curve 47 is almost the same as Curve 46, but it is divided into 6 parts. The calculation works as explained for Curve 46, but there are of course only 6 beats. As a little extra, you can add the value of beat 7. In that case curve 2 (instead of curve 1) is used for the decay parts.
The value 15.99 is swing and the value 17.55 is shuffle. Set the value to 24.57 or 49.53 to hear all 6 beats.

Use Curve 48 to make arpeggios. The curve is divided into 6 parts. With the parameter you can choose major chord and minor chord patterns. Make sure that the envelope is set from the maximum value to the minimum value and that the modulation is set to Frequency (see Arpeggio_01_Am.eis). It is best to use Curve 48 for the modulator together with Curve 42 or Curve 47 for the carrier. See also Curve 44.

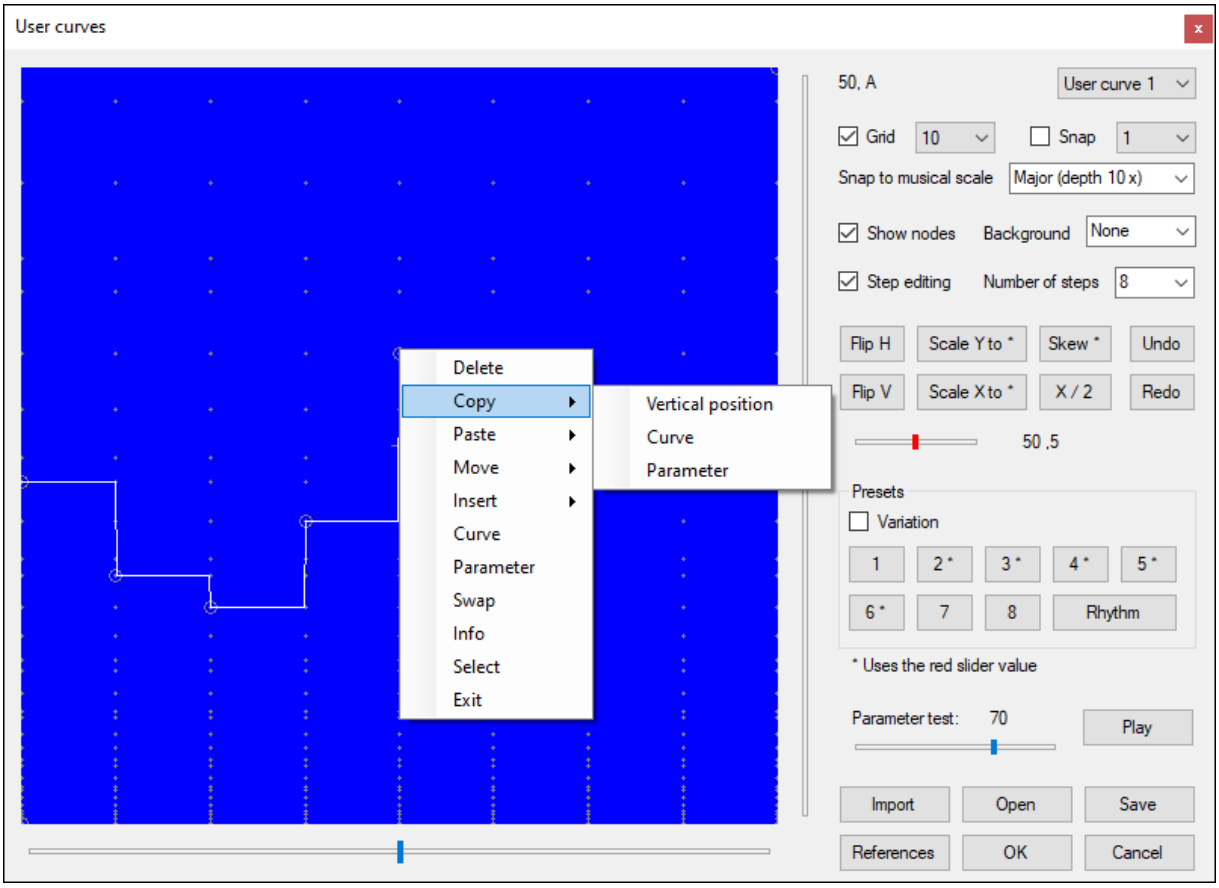
There are also choices available with a combination.
R=L, F=C1 means that for a rising segment a linear curve is used and that for a falling segment Curve 1 is used.



If you set in the Wave combiner the envelope curve to a user curve, the first segment will use the user curve, but the other segments will use Curve 1, since that is more useful.

User curves

You can create your own complex curves. They can be used for most envelopes in frEDrums. In the wave combiner you can use the envelope shape for the shape of the waveform, so in combination with a user curve you can draw a complex waveform.



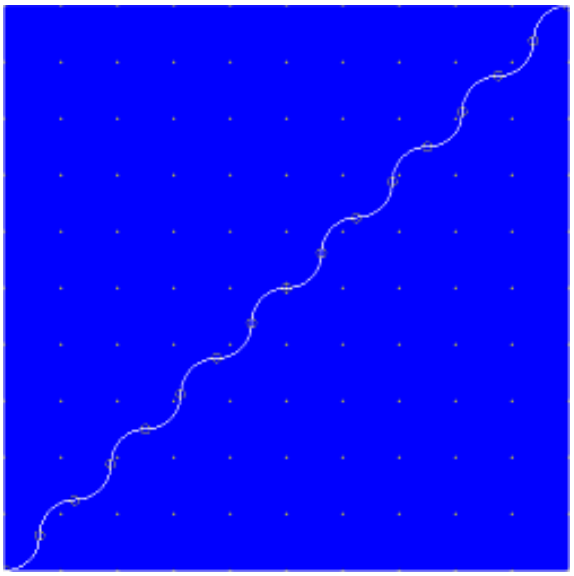
First select on the top right which user curve you want to create or edit. There are 16 user curves available. For the distortion effect, only User curve 1 and User curve 2 can be used, so for something else it is better to use another user curve.
Click with the left mouse button on an empty place in the blue graph to insert a new point. To move an existing point, click with the left mouse button within the gray circle of the point and drag the point to the new position. You cannot move a point before the previous point or after the next point. To make it easier to insert or move a point at the desired position, you can adjust the grid and snap settings. The grid settings control the visible dots on the screen. Even if Grid is disabled, the grid is visible when Step editing is enabled or when a scale is selected for Snap to musical scale. The snap function makes sure that new points are placed on the invisible “magnetic” grid. The grid and snap sizes depend not only on the normal grid and snap settings. When Step editing is enabled, the horizontal sizes are calculated by dividing the total width (100) by the Number of steps. Step editing is very handy for creating rhythms and it is often used in combination with a musical scale. When Step editing is enabled, the new segments will be set to Curve 21 (hold), but if you want, you can change the curve later.
When a musical scale is selected, the vertical sizes are matching with the musical scale. This way you can easily enter musical notes in case you use the curve to modulate the frequency of

another oscillator in the wave combiner. When you move the mouse, instead of the vertical position the musical note is displayed on the top at the right of the blue graph. Of course the carrier oscillator has to be set to the frequency of a C note. When you need a range of more than 1 octave, you can set the scale to Chromatic (depth 10 x) or Major (depth 10 x) in combination with the modulation in the wave combiner set to Frequency (Max depth = 10 x). In that case the range is more than 4 octaves. You can transpose all existing points by clicking with the right mouse button on an empty place in the blue graph and choosing Transpose from the menu. This function depends on the "Snap to musical scale" setting. Only the points that match exactly a musical note will be transposed. Of course you can first (if needed) align all points to the current snap.
You can align all existing points to the current snap by clicking with the right mouse button on an empty place in the blue graph and choosing Align from the menu. Choose Distribute from that same menu to horizontally divide all points evenly.
You can also move a point by clicking with the right mouse button within the gray circle of the point and choose Select from the menu. After that you can move the point with the sliders that are near to the graph. The sliders can be very handy to change only the horizontal or the vertical position. For precise positioning, you can control the sliders with the cursor keys. When a point is selected, you can press the following keys.

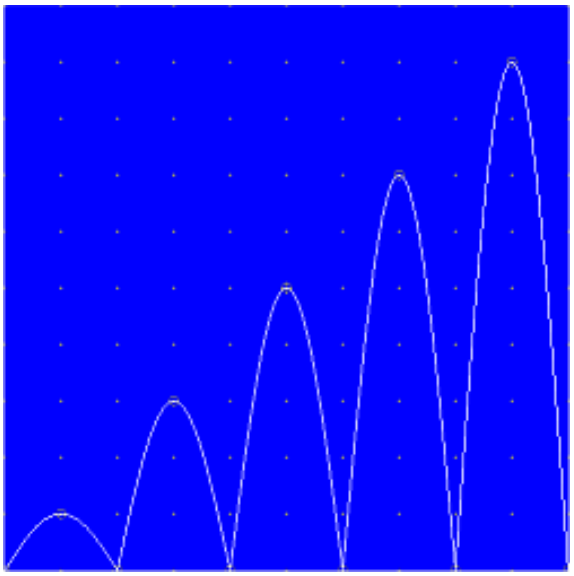
Key	**Action**
c	Change the curve (Linear, Curve 1-6) of the selected point (use Curve from the right click menu for many other curves)
d	Moves the selected point 1 position down
e	Select the last point (end)
l	Moves the selected point 1 position to the left
m	Opens the right button menu
n	Select the next point
p	Select the previous point
r	Moves the selected point 1 position to the right
s	Select the first point (start)
u	Moves the selected point 1 position up
y	Delete the selected point

At the top right you can see the current point and the total number of points (example: 3/5).

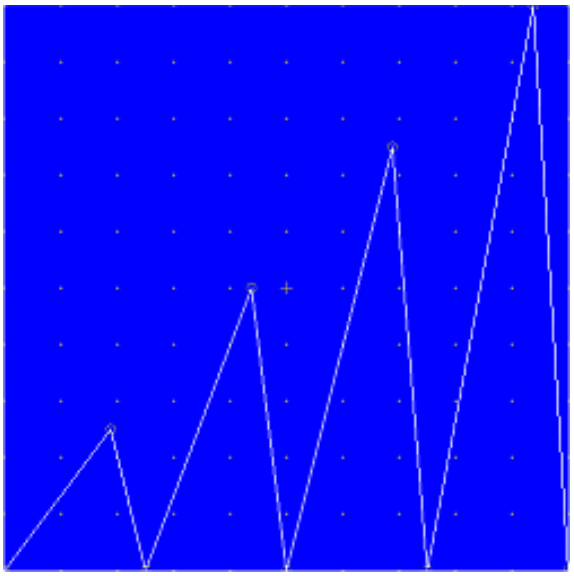
To delete an existing point, click with the right mouse button within the gray circle of the point and choose Delete from the menu.
Press the Play button or press the Shift key and the Ctrl key simultaneously to hear the instrument.
It is a good idea to try the presets to see what is possible. Simply press a preset button and look at the result. All presets (except Preset 9) have a variation. To use the variation of a preset, make sure that Variation is enabled before clicking the preset button. Presets with a * use the red slider value. Set the slider to the desired value before clicking the preset button. After the slider there are two numbers indicated. The first number is the percentage and the second number is the number of waves. The "Scale X to", "Scale Y to" and Skew commands use the percentage and the presets use the number of waves. Here are some examples of the presets.



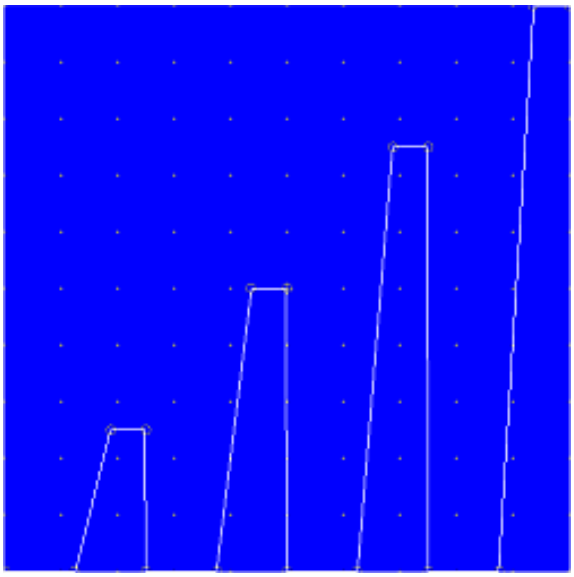
Preset 2, 8 waves



Preset 3 (variation), 5 waves



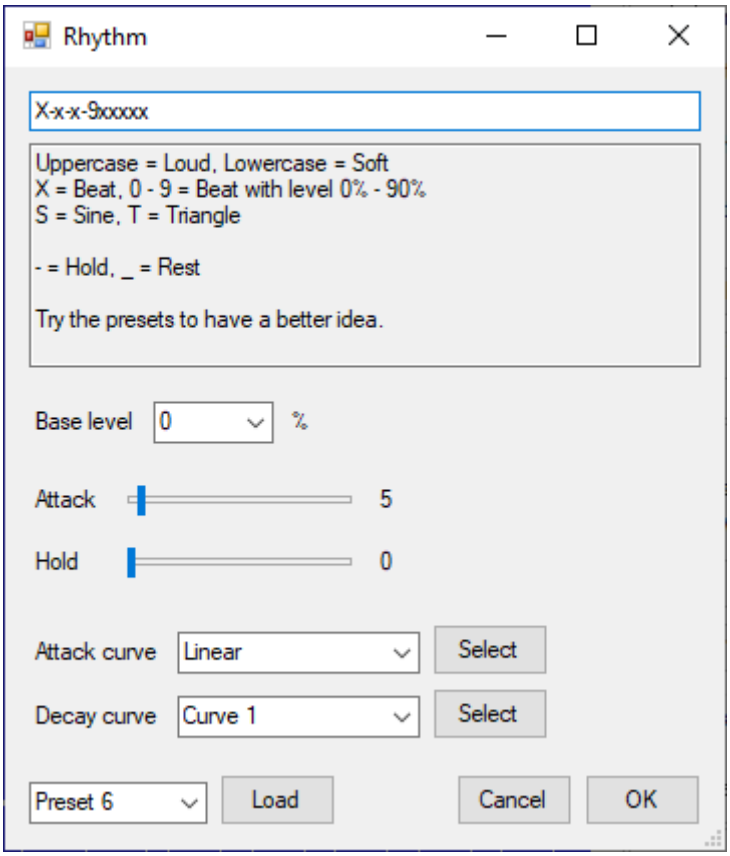
Preset 4 (variation), 4 waves, param = 75



Preset 5 (variation), 4 waves, param = 25

Preset 4 and preset 5 have points that are controlled by the parameter. Move the Parameter test slider after you have pressed the preset button and see what happens! As you can read later in this chapter, it is also possible to control the parameter by the envelope. This way you can make very complex and interesting sounds. There are many more useful curves available as a file. Press the Open button to try them. Most of these curves are controlable by the parameter, so you can use them like little wave tables.

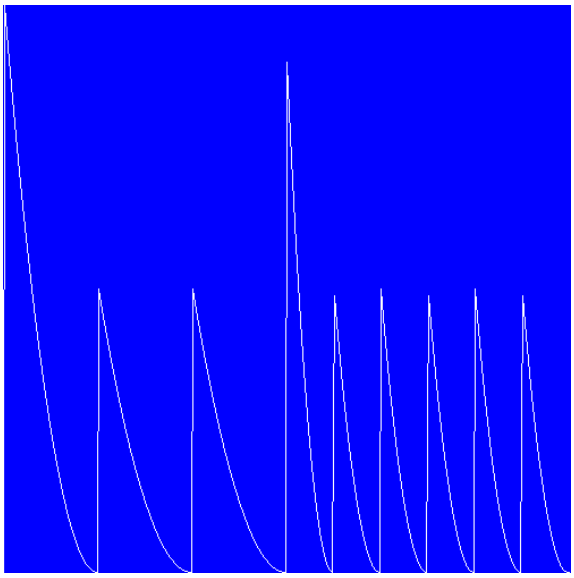
Make sure that you try the preset Rhythm! With this preset you can easily make rhythm patterns.



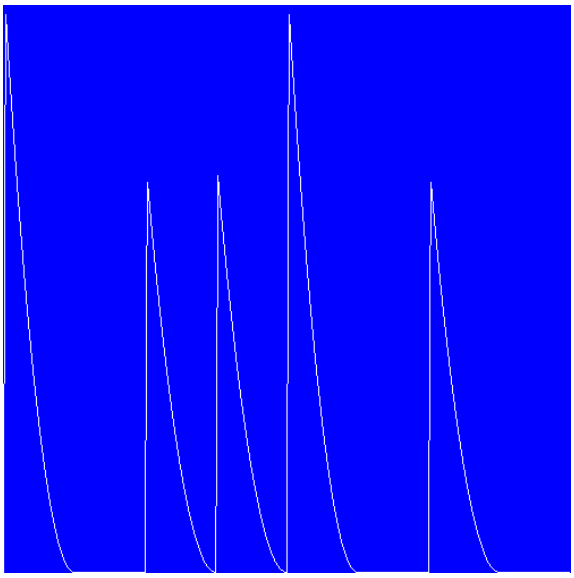
When you hear a clicking sound and you don't want that, you can simply increase the Attack a little. It is possible to have different decay times by using hold (-).
For a shape (Sine or Triangle), the Attack parameter is ignored, but you can change the shape with the Hold parameter.
Set the Base level to 50% if you want a bipolar modulation. A beat level of 0% is in that case maximal negative.

It is a good idea to study the presets. Select a preset, click the Load button, look at the settings and click OK.

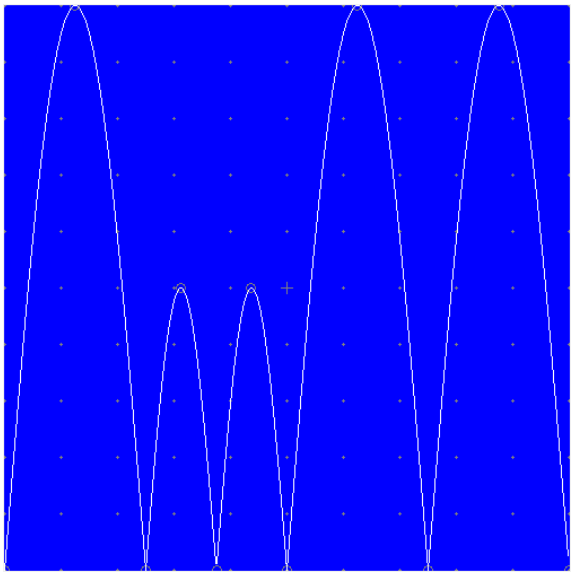
Here are some examples, but there are of course much more possibilities.



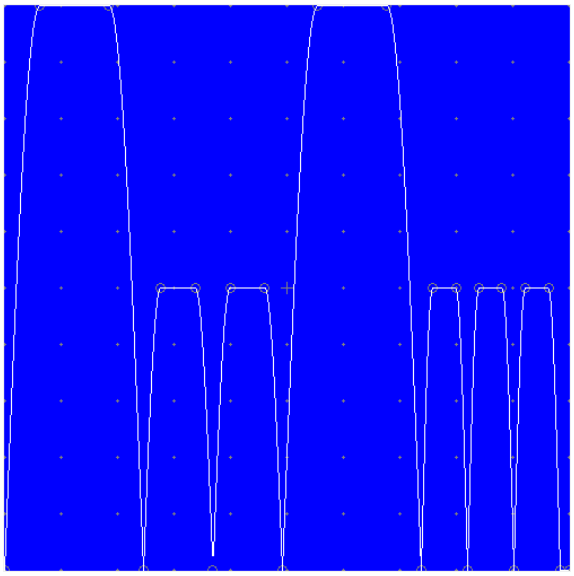
X-x-x-9xxxxx



X_77X_7_



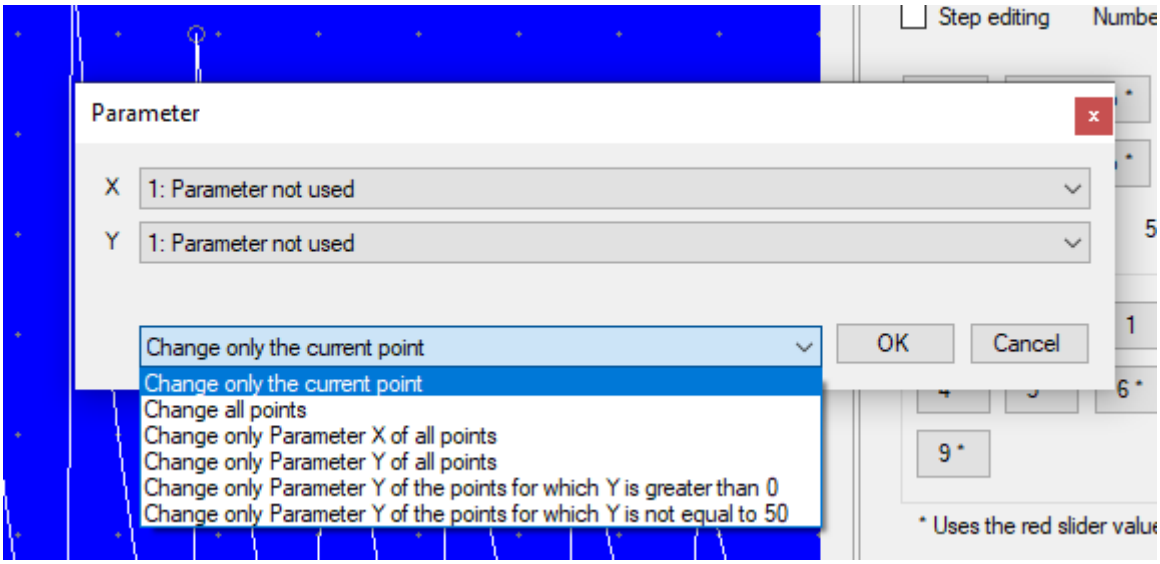
S-ssS-S-



S-----s--s--S-----s-s-s- (Hold = 100)

There are also special rhythm curves available for which you can change the rhythm pattern with a parameter (See chapter Envelope curves).

You can control a point by the parameter by clicking with the right mouse button within the gray circle of the point and choose Parameter from the menu.



How the point moves depends on the selected formulas. By selecting an X formula and an Y formula, the point can move diagonally. You can not type your own formula, since interpreting user formulas would slow down the process too much, but there are a lot of very useful formulas available. You can also apply the parameter settings to more points which can save a lot of work.

	Formula	**Description for when the value of the parameter increases from 0 to 100**
2	X = Xmin + ((Parameter / 100) * (Xmax - Xmin))	The point moves from the minimum possible horizontal position to the maximum possible horizontal position.
3	X = Xmax - ((Parameter / 100) * (Xmax - Xmin))	The point moves from the maximum possible horizontal position to the minimum possible horizontal position.
4	X = Xmin + ((Parameter / 100) * (X - Xmin))	The point moves from the minimum possible horizontal position to its original horizontal position.
5	X = X - ((Parameter / 100) * (X - Xmin))	The point moves from its original horizontal position to the minimum possible horizontal position.
6	X = X + ((Parameter / 100) * (Xmax - X))	The point moves from its original horizontal position to the maximum possible horizontal position.
7	X = Xmax - ((Parameter / 100) * (Xmax - X))	The point moves from the maximum possible horizontal position to its original horizontal position.
8	X = Xmax - (Abs(Parameter - 50) * 0.02 * (Xmax - Xmin))	The point moves from the minimum possible horizontal position to the maximum possible horizontal position and back (triangle shape).
9	X = Xmin + (Abs(Parameter - 50) * 0.02 * (Xmax - Xmin))	The point moves from the maximum possible horizontal position to the minimum possible horizontal position and back (triangle shape).
10	X = Xmin + (Sin(Parameter * 0.01 * PI) * (Xmax - Xmin))	The point moves from the minimum possible horizontal position to the maximum possible horizontal position and back (sine shape).

11	X = Xmax - (Sin(Parameter * 0.01 * PI) * (Xmax - Xmin))	The point moves two times from the maximum possible horizontal position to the minimum possible horizontal position and back (sine shape).
12	X = Xmin + (Abs(Sin(Parameter * 0.02 * PI)) * (Xmax - Xmin))	The point moves from the minimum possible horizontal position to the maximum possible horizontal position and back (sine shape).
13	X = Xmax - (Abs(Sin(Parameter * 0.02 * PI)) * (Xmax - Xmin))	The point moves two times from the maximum possible horizontal position to the minimum possible horizontal position and back (sine shape).
14	X = Xmin + (Max(Parameter - 50, 0) * 0.02 * (Xmax - Xmin))	From 0-50 the point stays at the minimum possible horizontal position. From 50-100 the point moves to the maximum possible horizontal position.
15	X = Xmax - (Max(Parameter - 50, 0) * 0.02 * (Xmax - Xmin))	From 0-50 the point stays at the maximum possible horizontal position. From 50-100 the point moves to the minimum possible horizontal position.
16	X = Xmin + (Min(Parameter, 50) * 0.02 * (Xmax - Xmin))	From 0-50 the point moves from the minimum possible horizontal position to the maximum possible horizontal position. From 50-100 the point stays at the maximum possible horizontal position.
17	X = Xmax - (Min(Parameter, 50) * 0.02 * (Xmax - Xmin))	From 0-50 the point moves from the maximum possible horizontal position to the minimum possible horizontal position. From 50-100 the point stays at the minimum possible horizontal position.
18	X = Xmin + ((Parameter / 200) * (Xmax - Xmin))	The point moves from the minimum possible horizontal position to the middle of the range between the minimum possible horizontal position and the maximum possible horizontal position.
19	X = Xmax - ((Parameter / 200) * (Xmax - Xmin))	The point moves from the maximum possible horizontal position to the middle of the range between the minimum possible horizontal position and the maximum possible horizontal position.
20	X = (XprevCurrent + XnextCurrent) / 2	The point stays in the middle of the range between the current horizontal position of the previous point and the current horizontal position of the next point.
21	X = XprevCurrent	The horizontal position of the point is the same as the current horizontal position of the previous point.
22	X = XnextCurrent	The horizontal position of the point is the same as the current horizontal position of the next point.
23	X = Xmin + (Parameter * 0.009d * (Xmax - Xmin))	The point moves from the minimum possible horizontal position to 90% of the range between the minimum possible horizontal position and the maximum possible horizontal position.
24	X = Xmax - (Parameter * 0.009d * (Xmax - Xmin))	The point moves from the maximum possible horizontal position to 90% of the range between the minimum possible horizontal position and the maximum possible horizontal position.
25	X = Xmin + ((Min(Parameter, 50) / 50) * (X - Xmin))	From 0-50 the point moves from the minimum possible horizontal position to its original horizontal position. From 50-100 the point stays at its original horizontal position.

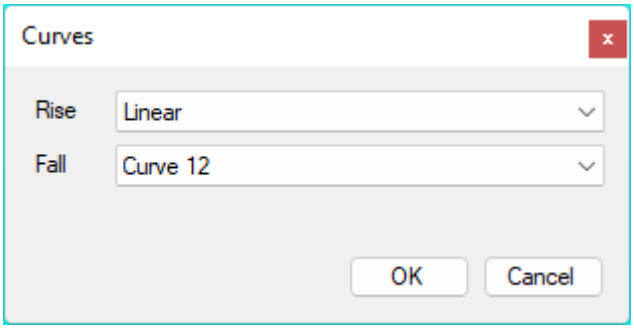
26	X = Xmax - ((Min(Parameter, 50) / 50) * (Xmax - X))	From 0-50 the point moves from the maximum possible horizontal position to its original horizontal position. From 50-100 the point stays at its original horizontal position.
27	X = X - ((Min(Parameter, 50) / 50) * (X - Xmin))	From 0-50 the point moves from its original horizontal position to the minimum possible horizontal position. From 50-100 the point stays at the minimum possible horizontal position.
28	X = X + ((Min(Parameter, 50) / 50) * (Xmax - X))	From 0-50 the point moves from its original horizontal position to the maximum possible horizontal position. From 50-100 the point stays at the maximum possible horizontal position.
29	X = ((XnextCurrent - XprevCurrent) / 3) + XprevCurrent	The point stays 1/3 of the distance between the current horizontal position of the previous point and the current horizontal position of the next point to the right from the current horizontal position of the previous point. Mmm, I think reading the formula is easier :)
30	X = (((XnextCurrent - XprevCurrent) * 2) / 3) + XprevCurrent	The point stays 2/3 of the distance between the current horizontal position of the previous point and the current horizontal position of the next point to the right from the current horizontal position of the previous point.
2	Y = Parameter	The point moves from the bottom to the top.
3	Y = 100 - Parameter	The point moves from the top to the bottom.
4	Y = (Parameter / 100) * Y	The point moves from the bottom to its original vertical position.
5	Y = Y - ((Parameter / 100) * Y)	The point moves from its original vertical position to the bottom.
6	Y = Y + ((Parameter / 100) * (100 - Y))	The point moves from its original vertical position to the top.
7	Y = 100 - ((Parameter / 100) * (100 - Y))	The point moves from the top to its original vertical position.
8	Y = Yprev + ((Parameter / 100) * (Ynext - Yprev))	The point moves from the original vertical position of the previous point to the original vertical position of the next point.
9	Y = Ynext - ((Parameter / 100) * (Ynext - Yprev))	The point moves from the original vertical position of the next point to the original vertical position of the previous point.
10	Y = Yprev + ((Parameter / 100) * (Y - Yprev))	The point moves from the original vertical position of the previous point to its original vertical position.
11	Y = Y - ((Parameter / 100) * (Y - Yprev))	The point moves from its original vertical position to the original vertical position of the previous point.
12	Y = Y + ((Parameter / 100) * (Ynext - Y))	The point moves from its original vertical position to the original vertical position of the next point.
13	Y = Ynext - ((Parameter / 100) * (Ynext - Y))	The point moves from the original vertical position of the next point to its original vertical position.
14	Y = Y - (Abs(Parameter - 50) * 0.02 * Y)	The point moves up and down between the bottom and its original vertical position (triangle shape).
15	Y = Abs(Parameter - 50) * 0.02 * Y	The point moves down and up between the bottom and its original vertical position (triangle shape).
16	Y = Sin(Parameter * 0.01 * PI) * Y	The point moves up and down between the bottom and its original vertical position (sine shape).

17	Y = Y - (Sin(Parameter * 0.01 * PI) * Y)	The point moves down and up between the bottom and its original vertical position (sine shape).
18	Y = Abs(Sin(Parameter * 0.02 * PI)) * Y	The point moves two times up and down between the bottom and its original vertical position (sine shape).
19	Y = Y - (Abs(Sin(Parameter * 0.02 * PI)) * Y)	The point moves two times down and up between the bottom and its original vertical position (sine shape).
20	Y = Yprev + (Sin(Parameter * 0.01 * PI) * (Ynext - Yprev))	The point moves from the original vertical position of the previous point to the original vertical position of the next point and back (sine shape).
21	Y = Ynext - (Sin(Parameter * 0.01 * PI) * (Ynext - Yprev))	The point moves from the original vertical position of the next point to the original vertical position of the previous point and back (sine shape).
22	Y = Yprev + (Max(Parameter - 50, 0) * 0.02 * (Ynext - Yprev))	From 0-50 the point stays at the same original vertical position as the previous point. From 50-100 the point moves to the original vertical position of the next point.
23	Y = Ynext - (Max(Parameter - 50, 0) * 0.02 * (Ynext - Yprev))	From 0-50 the point stays at the same original vertical position as the next point. From 50-100 the point moves to the original vertical position of the previous point.
24	Y = Yprev + (Min(Parameter, 50) * 0.02 * (Ynext - Yprev))	From 0-50 the point moves from the original vertical position of the previous point to the original vertical position of the next point. From 50-100 the point stays at the same original vertical position as the next point.
25	Y = Ynext - (Min(Parameter, 50) * 0.02 * (Ynext - Yprev))	From 0-50 the point moves from the original vertical position of the next point to the original vertical position of the previous point. From 50-100 the point stays at the same original vertical position as the previous point.
26	Y = (Parameter / 2) + 50	The point moves vertically from the middle to the top.
27	Y = 50 - (Parameter / 2)	The point moves vertically from the middle to the bottom.
28	Y = Parameter / 2	The point moves vertically from the bottom to the middle.
29	Y = 100 - (Parameter / 2)	The point moves vertically from the top to the middle.
30	Y = Y + ((Parameter / 100) * (50 - Y))	The point moves vertically from the original vertical position to the middle.
31	Y = Y + (Max(Parameter - 50, 0) * 0.02 * (100 - Y))	From 0-50 the point stays at the original vertical position. From 50-100 the point moves vertically to the top.
32	Y = Y - (Max(Parameter - 50, 0) * 0.02 * Y)	From 0-50 the point stays at the original vertical position. From 50-100 the point moves vertically to the bottom.
33	Y = Y + (Min(Parameter, 50) * 0.02 * (100 - Y))	From 0-50 the point moves vertically to the top. From 50-100 the point stays at the top.
34	Y = Y - (Min(Parameter, 50) * 0.02 * Y)	From 0-50 the point moves vertically to the bottom. From 50-100 the point stays at the bottom.
35	Y = (YprevCurrent + YnextCurrent) / 2	The point stays in the middle of the range between the current vertical position of the previous point and the current vertical position of the next point.

36	Y = YprevCurrent	The vertical position of the point is the same as the current vertical position of the previous point.
37	Y = YnextCurrent	The vertical position of the point is the same as the current vertical position of the next point.
38	Y = ((YnextCurrent - YprevCurrent) / 3) + YprevCurrent	The point stays 1/3 of the distance between the current vertical position of the previous point and the current vertical position of the next point to the right from the current vertical position of the previous point. Mmm, I think reading the formula is easier :)
39	Y = (((YnextCurrent - YprevCurrent) * 2) / 3) + YprevCurrent	The point stays 2/3 of the distance between the current vertical position of the previous point and the current vertical position of the next point to the right from the current vertical position of the previous point.
40	Y = Y + ((Parameter / 200) * (100 - Y))	The point moves from its original vertical position halfway to the top.
41	Y = Y - ((Parameter / 200) * Y)	The point moves from its original vertical position halfway to the bottom.
42	Y = Round(Parameter / 25) * 25	The point moves in steps of 25 from the bottom to the top.
43	Y = Round((100 - Parameter) / 25) * 25	The point moves in steps of 25 from the top to the bottom.
44	Y = Y - ((Y - Yinv) * (Parameter / 100))	The point moves from its original vertical position to its inversed vertical position (compared to the middle).
45	Y = X	The vertical position will be set to the current value of the horizontal position.
46	Y = 100 - X	The vertical position will be set to 100 minus the current value of the horizontal position.
47	Y = Curve1(X)	The point will be on the imaginary Curve 1.
48	Y = Curve2(X)	The point will be on the imaginary Curve 2.
49	Y = (50 * Sin((X / 50) * PI)) + 50	The point will be on an imaginary sine waveform.
50	Y = 100 * Sin((X / 100) * PI)	The point will be on an imaginary half sine waveform.
51	Y = 100 * Abs(Sin((X / 50) * PI))	The point will be on an imaginary absolute sine waveform.
52	Y = Curve39(X)	The point will be on the imaginary Curve 39 which you can change with the parameter.
53	Y = 100 - ((100 - Curve1(X)) * Parameter / 100)	If the parameter is 0, the vertical position will be 100. The greater the value of the parameter, the closer the point will be to the imaginary Curve 1. If the parameter is 100, the point will be on the imaginary Curve 1.
54	Y = Curve(Round(Parameter), X)	The point will be on the imaginary Curve that is defined by the parameter. For example when the parameter is 3, Curve 3 will be used.
55	Y = 100 - Curve(Round(Parameter)	The point will be on the vertical flipped imaginary Curve that is defined by the parameter. For example when the parameter is 1, Curve 1 will be used.

You can remove all assigned formulas by clicking with the right mouse button on an empty place in the blue graph and choosing Remove controls from the menu. If you want you can keep the current positions that are calculated with the formulas.

You can swap a point with the previous point that has the same horizontal position by clicking with the right mouse button within the gray circle of the point and choose Swap from the menu. This can be handy when drawing a square wave or something like that.
You can use Copy and Paste from the menu to copy the vertical position, the curve or the parameter.
Use Move from the menu to move the whole curve vertically to the bottom, the middle or the top. The selected point is used as the point that has to be at the bottom, middle or top. If because of the movement, a point has a value that is out of the range, it will be corrected, so the shape of the curve will change. You can press Undo if you don't like the result.
By default new segments are linear, but you can change that by clicking with the right mouse button within the gray circle of the start point of a segment and choose Curve from the menu.
You can change the curve setting of all points by clicking with the right mouse button on an empty place in the blue graph and choosing Curves from the menu.



Select a curve for the rising segments and a curve for the falling segments. If the X values of a segment are the same, the curve will be set to Linear.
Press Flip H to flip the curve horizontally. Press Flip V to flip the curve vertically.

To scale the curve horizontally, move the red slider to the desired value and press the "Scale X to" button. To scale the curve vertically, move the red slider to the desired value and press the "Scale Y to" button. Press the "X / 2" button if you want to divide all X values (except last) by 2.

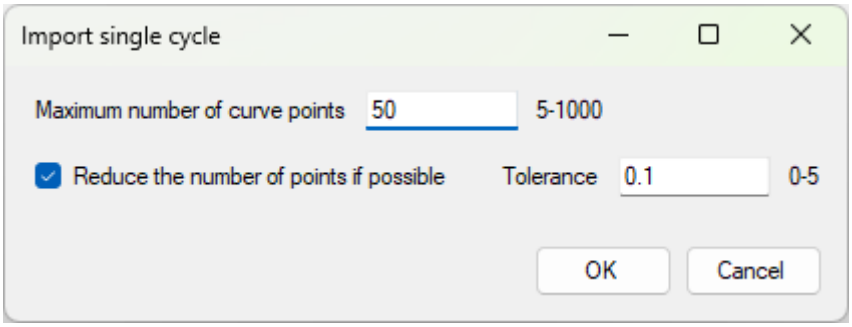
To skew the curve left or right, move the red slider to the desired value (50 = no skew) and press the Skew button.

To see the settings of a point, you can click with the right mouse button within the gray circle of the point and choose List from the menu.

If the result is not what you had expected, you can press the Undo button. You can undo up to 10 actions. By pressing the Redo button you can redo the actions. When you select a different user curve to edit, the undo buffer is cleared.

You can display another user curve on the background. This is handy when curves must have things in common. It is also handy when you want to simplify an imported single cycle waveform.

Press the Import button to import a single cycle waveform. There are many free waveforms available on the internet (see links). You can use a single cycle waveform as an oscillator waveform (see Command 3 $WL, $WL), to modulate, to create a wavetable or as a part of an envelope.



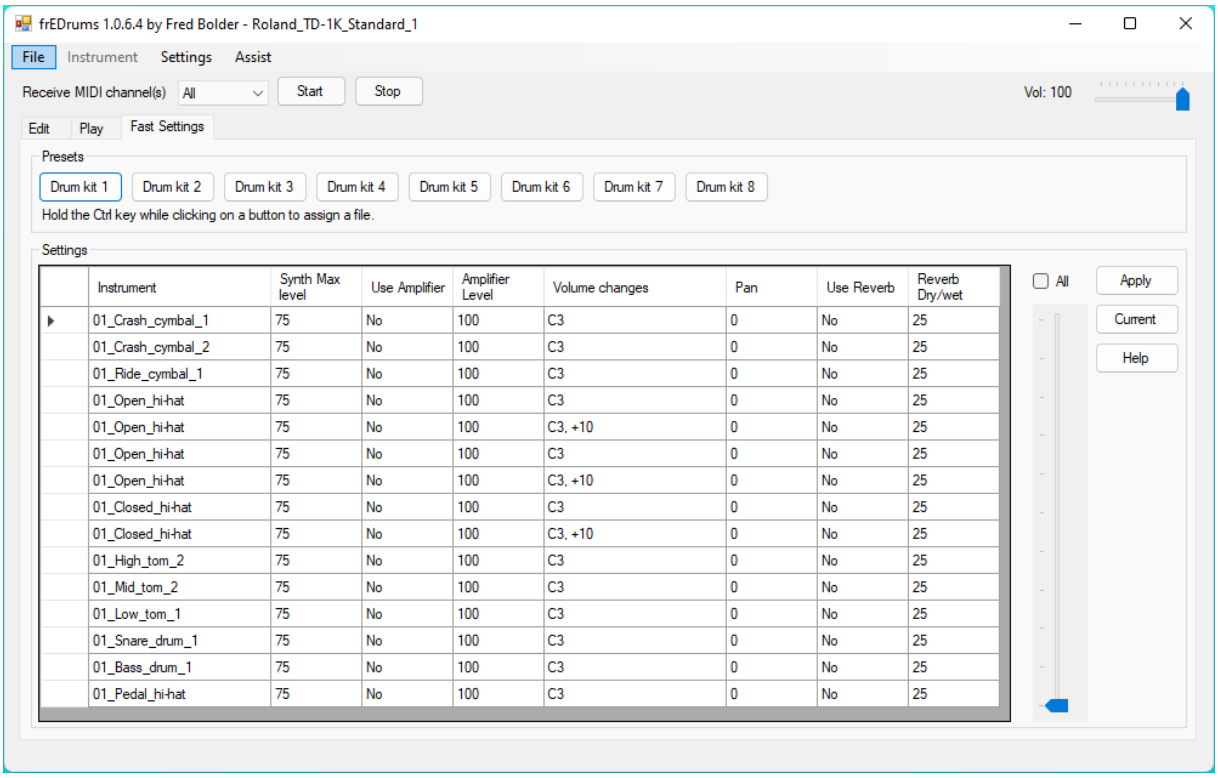
If you want a very precise waveform, you can set the maximum number of curve points to a high value, but often this is not needed and that will make the editing process also slower. You can simplify an imported waveform by deleting points and changing the segment curves. When importing, there are only linear segments created. To avoid a curve with many points, it is good to enable the Reduce option. With a higher tolerance, there can mostly be more reduced. When there are a lot of points and you want to see the curve better, you can disable Show nodes.

Press the References button to see where the user curves are used. You can use the same curve to modulate more things.

Press the Save button to save the current curve to a ucv file. By pressing the Open button you can open an existing curve file. There are a lot included.

Press OK to save the user curves to the current instrument or press cancel to reject the changes.

Fast Settings



Instrument	Synth Max level	Use Amplifier	Amplifier Level	Volume changes	Pan	Use Reverb	Reverb Dry/wet
01_Crash_cymbal_1	75	No	100	C3	0	No	25
01_Crash_cymbal_2	75	No	100	C3	0	No	25
01_Ride_cymbal_1	75	No	100	C3	0	No	25
01_Open_hi-hat	75	No	100	C3	0	No	25
01_Open_hi-hat	75	No	100	C3, +10	0	No	25
01_Open_hi-hat	75	No	100	C3	0	No	25
01_Open_hi-hat	75	No	100	C3, +10	0	No	25
01_Closed_hi-hat	75	No	100	C3	0	No	25
01_Closed_hi-hat	75	No	100	C3, +10	0	No	25
01_High_tom_2	75	No	100	C3	0	No	25
01_Mid_tom_2	75	No	100	C3	0	No	25
01_Low_tom_1	75	No	100	C3	0	No	25
01_Snare_drum_1	75	No	100	C3	0	No	25
01_Bass_drum_1	75	No	100	C3	0	No	25
01_Pedal_hi-hat	75	No	100	C3	0	No	25

Registered users have access to the Fast Settings tab on the main form.

Presets

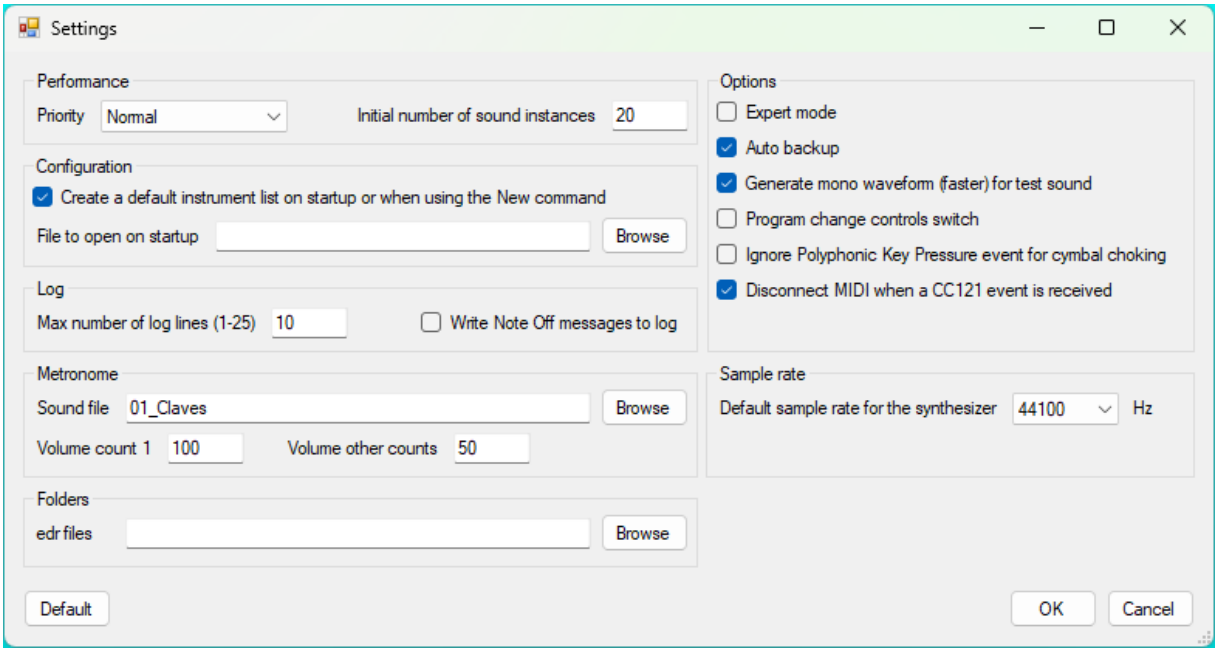
There are 8 customizable presets available. You can assign an edr file to a button by holding the Ctrl key while clicking on the button. When you click on a preset without holding the Ctrl key, the assigned file will be loaded. This way you can easily switch between drum sets.
If there is a MIDI connection, it will be disconnected and after the file is loaded, it will be connected again. This can take some time, because the waveforms have to be generated.

Settings

You can change some important settings of one or more instruments in one place which can save you a lot of time. Click in the cell that you want to edit. You can type the new value or move the slider. By enabling All, you can change a value of more instruments at the same time. A Yes/No value can be toggled by clicking on it.
You can copy a cell to the whole column by right clicking on the cell and chosing “Copy selected cell to whole column”.
Press the Apply button to apply the changes or press Current to load the current settings.

Changing the application settings

Choose Settings from the Settings menu to change the application settings.



Priority

If there is a noticeable delay between the moment the drum is hit and the sound is played (latency), you can try to solve the issue by setting a higher Windows priority to frEDrums. You might also want to change the “Initial number of sound instances” setting.

Initial number of sound instances

This is the number of sound instances per instrument that is created when the playing mode is started. If you play fast, it can happen that there is no sound instance available anymore, because they are all still playing the sound. In that case a sound instance is created, but this takes a little time and depending on your computer you might notice a delay between the moment the drum is hit and the sound is played. You can prevent that by increasing the initial number of sound instances, but you have to keep in mind that every sound instance consumes memory, so don't overdo it.
Once an extra sound instance is created, it will not be removed until you stop the playing mode, so after some time playing there are probably no more sounds instances created, unless you suddenly play faster for a longer time.

Create a default instrument list

If this option is enabled, there is a handy default instrument list created on startup or when using the New command. Disable this option, if you always want to start from scratch.

File to open on startup

Registered users can set an edr file that will be opened when frEDrums starts.

Max number of log lines

Here you can set the maximum number of log lines that you prefer.

Write Note Off messages to log

Depending on the settings, Note Off messages are only used by frEDrums for cymbal choking, but if you want to see them in the log, you can enable this option.

Metronome Sound file

Press the Browse button to select a sound file that is used by the metronome. Alternatively you can type the filename without extension. The sound files are located in the folder in which frEDrums is installed. The filename must be specified without path.

Metronome Volume count 1

Here you can set the metronome volume (0-100) for count 1.

Metronome Volume other counts

Here you can set the metronome volume (0-100) for the other counts.

Edr files

When the default folder field for edr files is empty, the application folder will be used. If the current edr file name is not empty, the folder of it will be used.

Eis files

When the default folder field for eis files is empty, the application folder will be used. If the current eis file name is not empty, the folder of it will be used.

Ignore Polyphonic Key Pressure event for cymbal choking

When a Polyphonic Key Pressure MIDI event is received with the value 127, the sound of the corresponding cymbal (or other instrument) will be stopped. When you want to use this software with a keyboard instead of electronic drums, it is best to check Ignore Polyphonic Key Pressure event for cymbal choking, since keyboards use this event for aftertouch.

Expert mode

If Export mode is enabled, there is more logging.

Program change controls switch

If your drum set sends program change events, you can use this to control the switch (See Editing instruments / Conditions / Switch). This way you don't need a pad for this.

Disconnect MIDI when a CC121 event is received

It is not always clear when the MIDI connection is broken and if that happends you need to stop and then start MIDI. Some drum sets send a CC121 event before switching off. This can be handy to disconnect MIDI.

Generate mono waveform (faster) for test sound

Enable this option for faster generating of the waveform when playing the sound in the editing mode. The difference between mono and stereo is mostly very small.

Auto backup

If this option is enabled, a backup will be made every 3 minutes while the Instrument form is open. The backups will be saved in Documents\frEDrums. An Auto backup file has the name backup#.eis where # is a number. The file backup7.eis is older than backup3.eis.
When you don't move the mouse for one minute, the auto backup will be stopped until you move the mouse again. This prevents backups from being overwritten for no reason.

Sample rate

A higher Sample rate can make a better sound, but it takes more time to generate the sound. Keep it mind that almost all presets are made with a sample rate of 44100 Hz. They can sound different with another sample rate, especially when phase modulation is used. Therefore it is better to set the sample rate of an instrument to 48000 Hz (instead of this global setting) if you need a higher sample rate.

Default settings

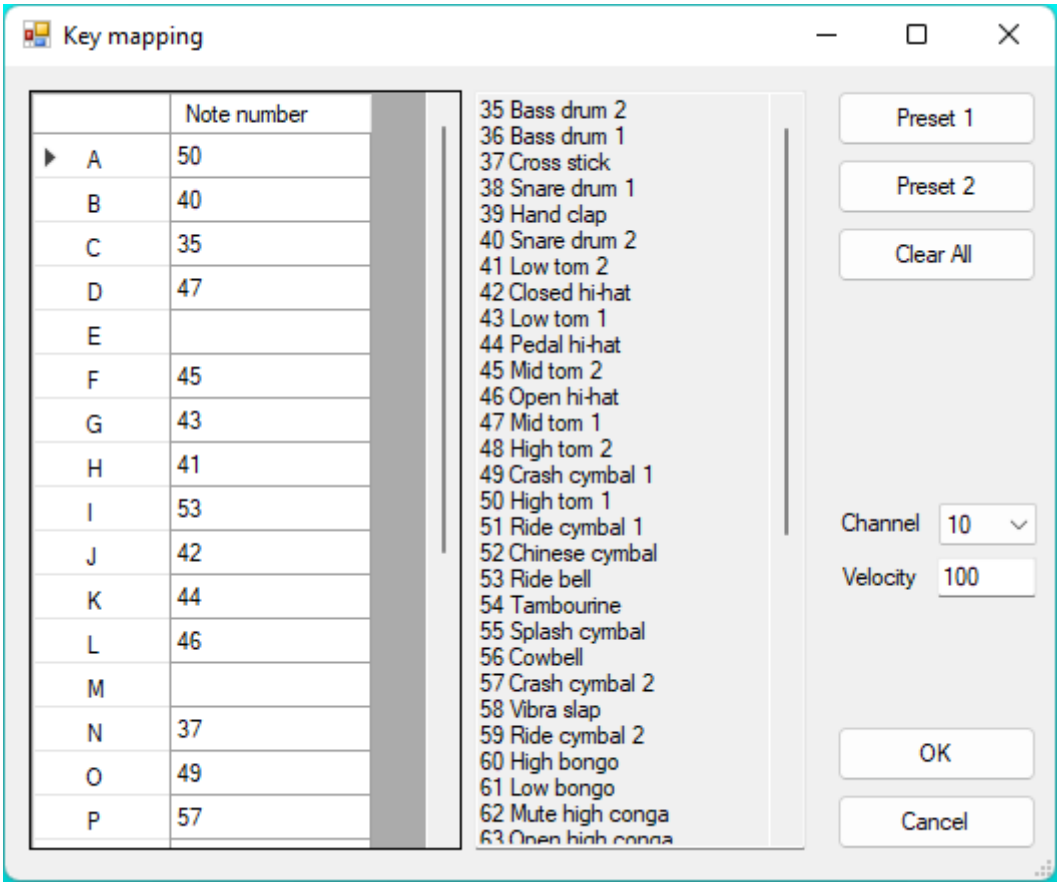
Press the Default button to load the default application settings. The question "Load default settings?" will appear. Press the Yes button to proceed.

OK / Cancel

Press the OK button to accept the changes or press the Cancel button to reject the changes.

Key mapping

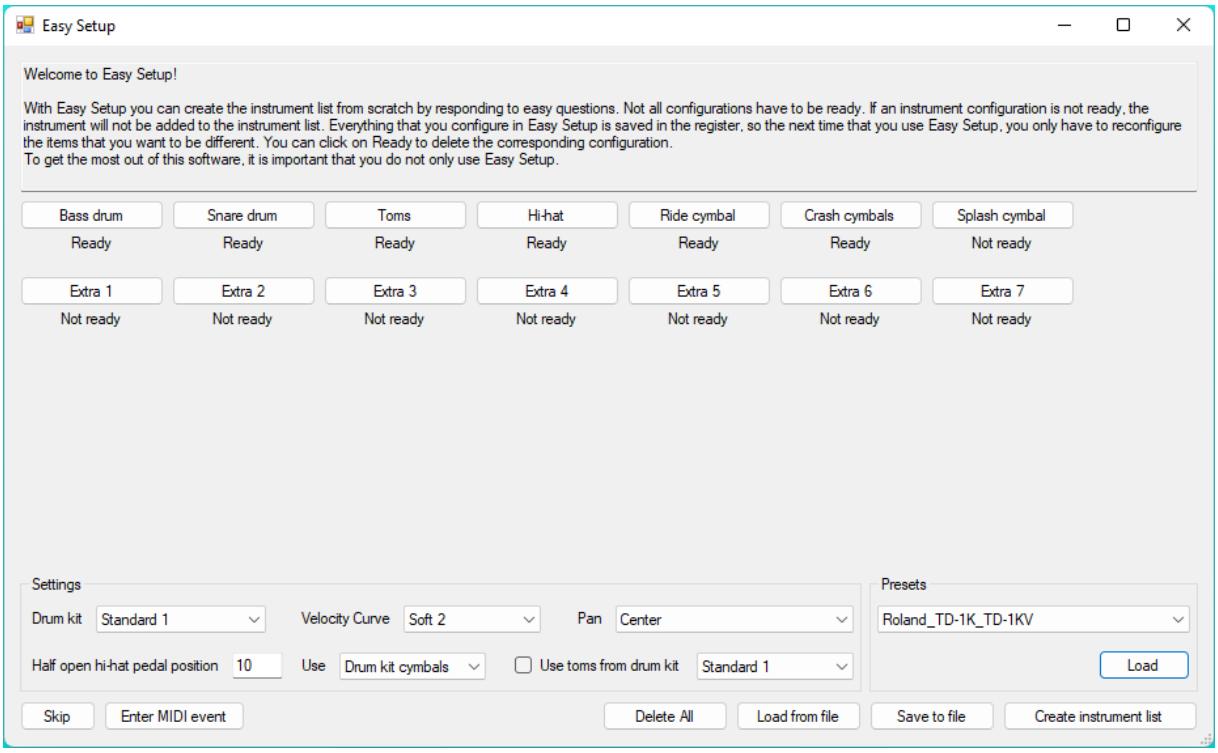
The A-Z keys from the computer keyboard can be used to trigger the instruments when the play mode is active. Press Start to activate the play mode. Pressing a key for which a note number is set creates an internal MIDI event that you can also see in the log.



Choose Key mapping from the Settings menu to change the key mapping settings. Press the Preset 1 button to load the following key mapping.

A	High tom 1	J	Closed hi-hat	S	High tom 2
B	Snare drum 2	K	Pedal hi-hat	T	Splash cymbal
C	Bass drum 2	L	Open hi-hat	U	Ride cymbal 2
D	Mid tom 1	M		V	Snare drum 1
E		N	Cross stick	W	
F	Mid tom 2	O	Crash cymbal 1	X	Bass drum 1
G	Low tom 1	P	Crash cymbal 2	Y	
H	Low tom 2	Q		Z	Ride cymbal 1
I	Ride bell	R	Cowbell		

Easy Setup



To use Easy Setup, press Ctrl-E or choose Easy Setup from the Assist menu.
With Easy Setup you can create the instrument list from scratch by responding to easy questions. Not all configurations have to be ready. If an instrument configuration is not ready, the instrument will not be added to the instrument list. Everything that you configure in Easy Setup is saved in the register, so the next time that you use Easy Setup, you only have to reconfigure the items that you want to be different. You can click on Ready to delete the corresponding configuration. The selected drum kit has no influence on the Extra triggers.
To get the most out of this software, it is important that you do not only use Easy Setup.
When you are asked to press a pedal or hit an instrument, you will hear only a sound if there was already an instrument configurated for that note number. For example, let's assume that you are configuring the ride cymbal with Easy Setup and you have chosen that you want to play a cowbell with it. If before using Easy Setup the ride cymbal was triggering a normal ride cymbal sound, you will hear a ride cymbal when you are asked to play the ride cymbal. After creating the instrument list, you will hear the cowbell.

Here is an example of configuring the bass drum.

Click on the Bass drum button.
Press the main bass drum pedal.
Press the slave bass drum pedal or press the Skip button if you don't have a second bass drum pedal (there are more possibilities).

That was everything needed to configure the bass drum pedal. In the same way you can configure the other instruments. Of course, for the hi-hat there are more easy questions to make the perfect setup for you. For example, you will be asked to hit the bow and the edge of

the hi-hat, because they can have different note numbers. In that case, Easy Setup makes the hi-hat that is triggered by the edge a little louder. If your drum set transmits the hi-hat pedal position as a Foot Controller MIDI event, you will be asked for the position from where you want to start hearing the half open hi-hat sound. There are no half open hi-hat samples included with this software, but Easy Setup creates an extra open hi-hat instrument with a different volume envelope.

Choose a drum kit and a velocity curve and click Create instrument list if you are ready.

If later you want, for example, a different drum kit, you can just open Easy Setup again, change the drum kit and press Create instrument list. As you might have noticed, there are no electronic drum samples included with this software, but you can choose electronic drum sets. All those sounds are generated by the built-in drum synthesizer. Registered users can also make their own sounds with it (see Editing instruments).
If you want to use, for example, a snare drum from another drum set, you can choose a sample file or a preset (see Editing instruments).

If you like, you can also change the panning of the instruments with Easy Setup. If you choose Center, the left volume and the right volume will be the same for all instrument. Keep in mind that in samples there can already be a panning that is different from Center.

Center	You will hear all instruments in the center.
Audience (rh drummer)	You will hear the instruments the way the audience would hear a right handed drummer. For example, you will hear the floor tom a little more on the left.
Audience (lh drummer)	You will hear the instruments the way the audience would hear a left handed drummer. For example, you will hear the floor tom a little more on the right.
Right handed drummer	You will hear the instruments the way a right handed drummer would hear it. For example, you will hear the floor tom more on the right.
Left handed drummer	You will hear the instruments the way a left handed drummer would hear it. For example, you will hear the floor tom more on the left.
Left	You will hear all instruments on the left.
Right	You will hear all instruments on the right.

It is possible to change the Half open hi-hat position, without reconfiguring the hi-hat again.

You can select which cymbal set is used.

Drum kit cymbals	The standard cymbals for the selected drum kit
Cymbal samples	For the electronic drum kits, cymbal samples will be used instead of the cymbal sounds that are made with the drum synthesizer.
Cymbal set 1, 2 or 3	A cymbal set from the presets of the Easy drum synthesizer will be used.

Check the “Use toms from drum kit” option and choose a drum kit, if you want to use the toms from another drum kit.

The buttons Load from file and Save to file are handy when you want to use the same configuration on a different computer.

If you are lucky to have a Roland TD-1K, you can just choose that preset and press the Load button. There is a big chance that it works also good with other Roland drum sets.

You can manually enter a MIDI note number (instead of hitting a drum) by pressing the Enter MIDI event button.

Using Easy Setup with songs

A song is the same as a normal configuration, except that the pitch of some instruments is set to a sequence. When you create an instrument list with Easy Setup, the instruments with a pitch sequence are not deleted. The note numbers of those instruments will be changed. If you have neither configured the hi-hat nor a crash cymbal, the note number will be set to 42. Of course, you can later manually change that number or add more numbers. Only volume curves will be deleted and if you have selected a curve it will be inserted at the first position of the volume changes list. For example the command S45 will not be deleted.

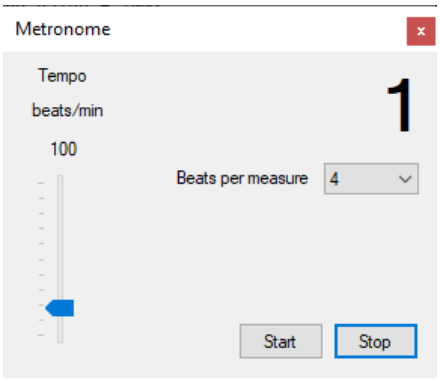
Undoing mistakes

Choose Undo from the Assist menu or press Ctrl-Z to undo the last action. A question like "Undo Delete instrument?" will appear. Press the Yes button to proceed. Choose Redo from the Assist menu or press Ctrl-Y to redo the action.

It is possible to undo and redo up to the last 10 consecutive actions. Saving to a file cannot be undone, but before replacing an existing edr file, a backup is created.

Metronome

Choose Metronome from the Assist menu to use the metronome.



Set the desired tempo and the number of beats per measure and press the Start button to start the metronome. Press Stop to stop the metronome. While the metronome is ticking, you can change the tempo and the number of beats per measure.
Choose Settings from the Settings menu to change the metronome settings.

Example files

With this software there are example files included to show the possibilities. They are located in the folder where you have installed frEDrums (mostly C:\Program Files (x86)\frEDrums). Take also a look in the sub folders Loops and Songs. You can open a file by choosing Open from the File menu or pressing Ctrl-O. Here are some examples. Most of them are made for the Roland TD-1K, but you can easily change them to use with other drum sets.

Roland_TD-1K_Double_bass_drum_pedal_by_using_hi-hat_pedal

This configuration is made for fast Metal music. When you press the hi-hat pedal, you will hear the bass drum. When you hit the hi-hat, you will always hear the closed hi-hat sound.

Roland_TD-1K_Change_snare_drum_with_hi-hat_pedal

This configuration is made for people that want to trigger a snare drum sound and a cross stick sound (not at the same time), but the snare drum has no edge that sends another MIDI note number. By pressing shortly the hi-hat pedal, you can switch from the snare drum to the cross stick sound. When you hit the hi-hat, you will always hear the closed hi-hat sound.

Roland_TD-1K_In_the_air_tonight.edr

This configuration is made to play the song “In the air tonight” by Phil Collins. For the famous fill you need of course a lot of toms. Therefore the hi-hat is configured as the highest tom. The second crash cymbal is configured as the hi-hat, which you can even control by the hi-hat pedal. If you don’t have a second crash cymbal, you can copy the note numbers from the ride cymbal to the closed hihat and the open hi-hat and delete the ride cymbal. This way you can play the ride cymbal for the hi-hat sound.
This configuration is a combination of samples (for the cymbals) and internal synthesizer sounds (for the drums).

Roland_TD-1K_Melodic_1.edr

Hit the ride cymbal and the second crash cymbal for percussion sounds that change in pitch, depending on how hard you hit the cymbals.

Roland_TD-1K_Melodic_2.edr

Hit the toms for two different notes at the same time.

Roland_SPD-6_Bongos.edr

Most sound modules have only samples of the open bongo tones, but there are so many different bongo sounds. With this configuration you can play a real Martillo and more!

This is the configuration of the pads and pedals.

Pad / Pedal	**Sound**
Pad 1	High bongo - Thumb
Pad 2	High bongo - Open
Pad 3	Low bongo - Open
Pad 4	High bongo - Fingers
Pad 5	High bongo - Muted
Pad 6 (hi-hat pedal not pressed)	Low bongo - Muted
Pad 6 (hi-hat pedal pressed)	Low bongo - Fingers
Hi-hat pedal	Low bongo - Thumb
Bass drum pedal	Claves

Here you can see how to play the Martillo pattern on the SPD-6.

Count	1	&	2	&	3	&	4	&
Hand	R	L	R	L	R	L	R	L
Pad	5	4	2	1	5	4	3	1

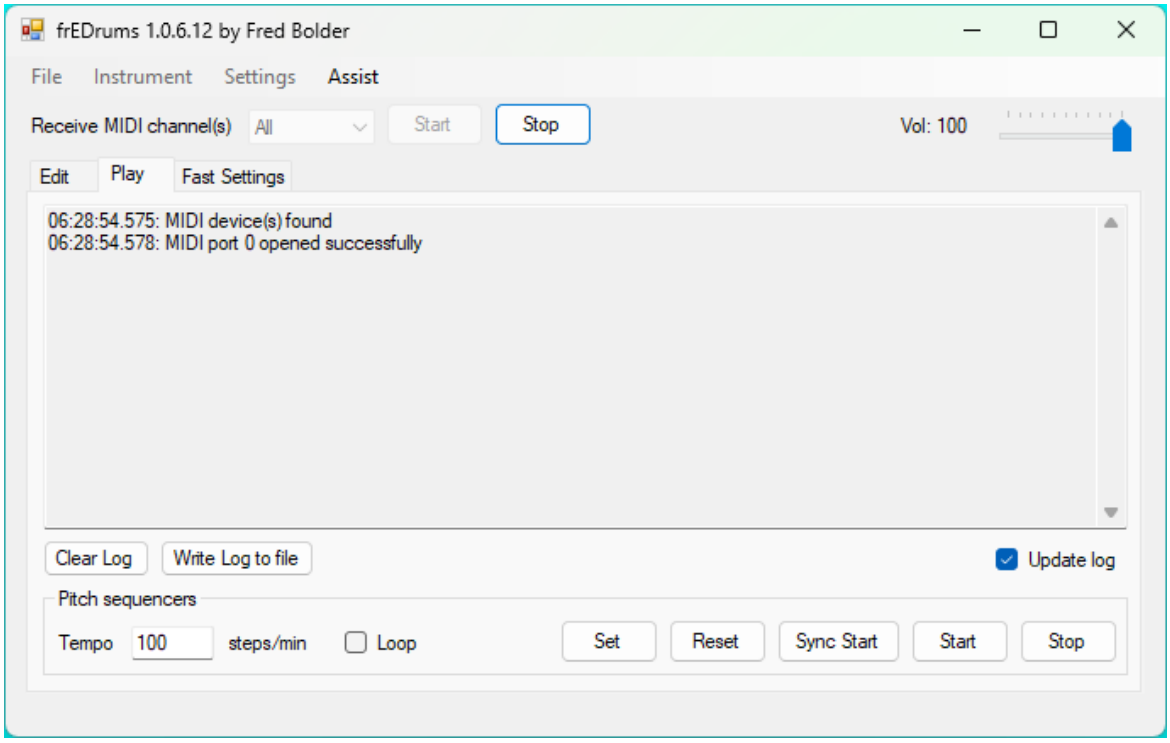
Trouble shooting

When something is not working, it is best to temporary enable the logging by checking Update log.

There is no sound when a drum is played.

- Check the connection between the drum set and the computer.
- Make sure that the computer and the drum set are switched on.
- Check if there is a speaker or headphone connected to the computer.
- Check all Volume settings.
- Make sure that there are instruments in the instrument list.
- In frEDrums enable the logging by checking Update log on the Play tab. Press the Stop button, set Receive MIDI channel(s) to All and press the Start button.

  In the log you should see something like:
  MIDI device(s) found
  MIDI port 0 opened successfully



  If there are more MIDI devices connected to your computer, there appears first a dialog box in which you have to select one or more MIDI devices.

- If a MIDI port is opened, but you still don't hear a sound when you hit a drum, there is perhaps no instrument with the received note number.
  If you hit a drum, there should appear a Note On message in the log.
  10:29:41.271: Note On: Channel=10, Note=38, Velocity=127

In this example you see the note number 38. Make sure that there is an instrument with the MIDI note number that you see in the log (see chapter Editing instruments).

- Check if the instrument is not muted. An M in the Options column indicates that the instrument is muted.

- Check the Velocity trigger, Foot controller and Change volume settings. If you have changed the volume envelope, you can press Preset 1.

The preset instruments are suddenly sounding strange.

- On the Pitch tab set Pitch to 0.
- On the main form choose Settings from the Settings menu and disable “Generate mono waveform (faster) for test sound”.

There is a noticeable delay between the moment the drum is hit and the sound is played.

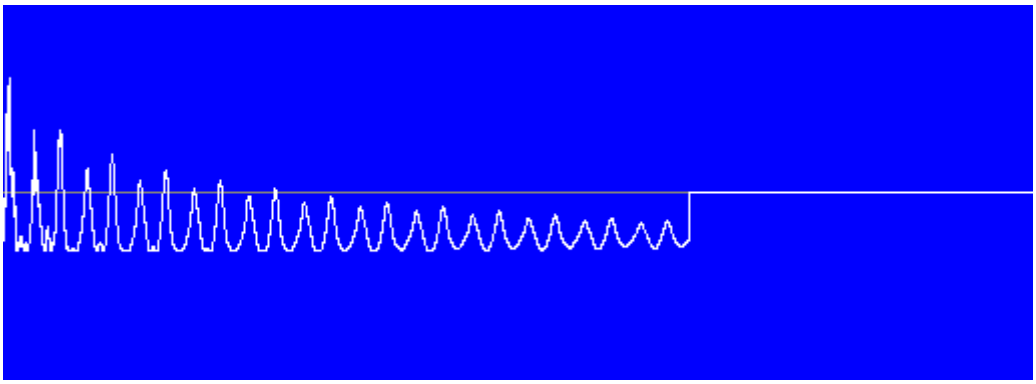
- In frEDrums disable the logging by unchecking Update log.
- Close the programs that you don’t use while playing drums.
- Optimize your computer.
- Set a higher priority to frEDrums (see the chapter Changing the application settings).
- Disconnect from the internet.
- Disable the virus scanner temporarily.
- If you use other samples than the ones that are included with frEDrums, make sure that there is no silence at the beginning.
- In frEDrums delete the instruments that you don’t use.

The open hi-hat sound doesn’t stop when the hi-hat pedal is pressed.

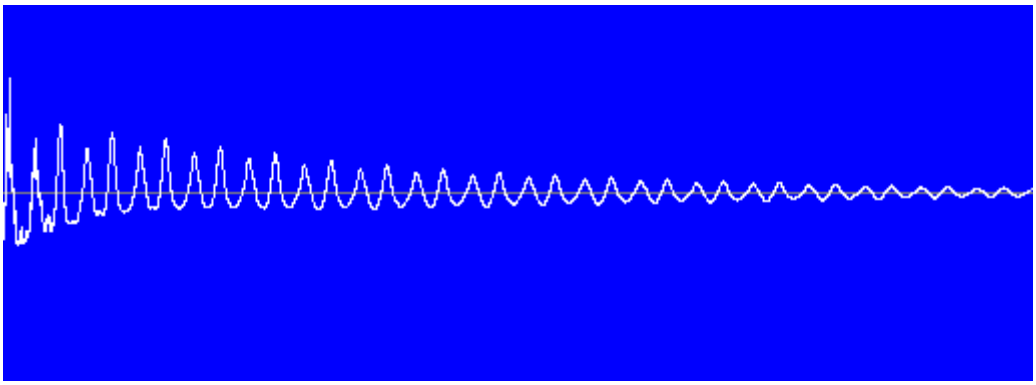
- Check the names of the hi-hat instrument (see chapter Editing instruments).
- Make sure that there is a pedal hi-hat sound in the instrument list and that the settings of it are correct. For example, it may not be muted.

DC detected in output signal

- Check the Distortion effect settings. Enable the DC filter.
- Check the Reverb effect settings. Use EQ after reverb.



Output signal with a DC offset



DC offset problem solved

The frequency is not changing fluently

On the Sample/Synth tab of the Instrument settings, set the Wave generation mode to 2.

Useful links

Keep in mind that after some time the mentioned links might not work anymore.

Free Samples

You can use Audacity to convert the samples if needed.
https://www.audacityteam.org/

TriSamples
https://trisamples.com/

SampleRadar
https://www.musicradar.com/news/tech/free-music-samples-royalty-free-loops-hits-and-multis-to-download

99 Drum Samples
https://99sounds.org/drum-samples/

Sample Focus
https://samplefocus.com/categories/drums

Rhythm Lab
http://www.rhythm-lab.com

Articles

Improving Performance
http://www.alesis.com/kb/article/1620

YouTube channels

65 Drums
http://www.youtube.com/channel/UCUBcHXf3KHCQmilm34aoWzg

Mike Luke
http://www.youtube.com/channel/UCtJJEAwANzFc9pXUF9lWohA

Programming synthesizers

Frequency Modulation Synthesis
http://www.youtube.com/watch?v=h3yrd2YvkUo
http://www.youtube.com/watch?v=5SpTTFNRU54
http://www.adsrsounds.com/fm8-tutorials/theory-behind-fm-synthesis/

Single cycle waveforms
https://www.adventurekid.se/akrt/waveforms/
https://github.com/KristofferKarlAxelEkstrand/AKWF-FREE
https://freesound.org/people/altemark/packs/2339/
https://waveeditonline.com/