

# RAGNARÖK

## *Custom-built Performance/Lead Synthesizer*

Version 1.2

© 2014-2019 by Björn Arlt @ Full Bucket Music

<http://www.fullbucket.de/music>

Hans Peter Willems, CrimsonWarlock aka TechnoGremlin



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## Introduction

### RAGNARÖK... what it is, and what it isn't

RAGNARÖK is a software reincarnation for Microsoft Windows (VST) and Apple macOS (VST/AU) of an existing, custom-built (and therefore one of a kind) hardware analog synthesizer.

RAGNARÖK is NOT the next big thing in digital synthesis, nor is it a faithfully modeled equivalent of a real hardware analog synthesizer. The RAGNARÖK-synthesizer is basically a standard architecture VA-synthesizer, consisting of an oscillator section running into a dynamically controlled filter that is followed by an envelope-controlled amplifier or output section. It has some additional sound-shaping options by means of an overdrive on the filter output and an additional 7-band static filter (also known as a Graphic EQ).

Where RAGNARÖK shines is in its combination of 3 stacked and (slightly) detuned oscillators with a divide-down array that replicates these 3 oscillators over four octaves. This means it can do 3 (slightly) detuned oscillators AND 4 octave-tuned oscillators AT THE SAME TIME, the equivalent of 12 oscillators on one voice. The oscillators offer square and pulse waves simultaneously, so even those can be mixed up. In addition to this there is yet another array of square wave oscillators available that are tuned to an interval (default set at a fifth).

Although the original RAGNARÖK was purely monophonic, modern software technology has made it possible to have a polyphonic version now. This adds tremendously to the usefulness of the instrument.

### History

The hardware version of RAGNARÖK was built in the early eighties (by Hans Peter), and solely aimed at using on stage. Hence the 'performance/lead' designation on the plugin instrument. In those days, Moog-sounds were still in high demand, and the more oscillators you could stack for a solo-sound, the better it was. A DIY synthesizer kit, called the Chorosynth, played into this idea by delivering the combined stacked and octaved oscillators into a pretty cheap package. However, to keep the price low, there was only an amplitude envelope and no filters whatsoever. It also had no real keyboard but used a stylus on an etched circuit board. The first incarnation of the RAGNARÖK synth was merely the Chorosynth with a bolt-on real keyboard.

After about two years use on stage, the first version was rebuilt into a new case, and augmented with several modules from the Elektor Formant Modular synthesizer. It got a very complete multi-pole filter section, real envelope-generators and several other goodies that were available as DIY-kits. Although the Formant Modular was, well... modular, in the RAGNARÖK synthesizer everything was hard-wired for stage use.

After several years the synthesizer was decommissioned and replaced with a Teisco 110F (another beautiful instrument). The hardware RAGNARÖK is still in Hans Peter's possession, but (sadly) no longer in working order.

## Collaboration

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When Hans Peter (known as CrimsonWarlock on the KVR-forum) asked on the KVR-forum for a developer who would be interested to bring this eighties rarity back to life, secretly he was hoping that Björn (Full Bucket) would take up the challenge. As a user of VST-instruments, Hans Peter really liked the stuff Björn was doing, but additionally it seemed that the RAGNARÖK synthesizer was really fitting into the line of stuff Björn had made so far. To cut a long story short; Björn indeed saw this project as a nice opportunity and the resulting collaboration delivered what you are now looking at.

- DSP-coding by Björn Arlt (Full Bucket Music).
- Synthesizer concept, GUI-design and User-manual by Hans Peter Willems (CrimsonWarlock aka TechnoGremlin).
- Additional functional concepts by Björn Arlt.
- Patch-programming (default bank) by Hans Peter & Björn.



*The original RAGNARÖK synthesizer – Image courtesy of Hans Peter Willems.*

## What's New With Version 1.2?

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Apart from being available now for both Windows and macOS, RAGNARÖK has got the standard Full Bucket Start-up bank feature etc. and some minor fixes & updates.

## Oscillator Section



The oscillators are actually found in the 'Voice Selection panels' (see next chapter). However, this section has some 'global' setting for the oscillators.

### Source Mix

Besides the big stack of oscillators/waves in this synthesizer, there is additional white noise available as a sound source. This caters to percussion sounds, nature sounds (water, wind, thunder), and can add some character to oscillator-based sounds when mixed in subtly.

The 'Source Mix' knob will deliver only oscillator signal when set fully counter clockwise, and only the noise signal when set fully clockwise. In between you can mix both signals to the desired mix-ratio.

### Pitch Modulation

This part of the oscillator section has the setting for modulating the oscillator pitch with an LFO (low frequency oscillator). Because the RAGNARÖK synth is aimed at performance play and much less (or totally not, depending on your view) at experimental sounds and/or sound-effects, the LFO has only one waveform: sine-wave. This is the traditional waveform used for vibrato.

**LFO:** This sets the amount of LFO signal, which is basically the 'depth' of the vibrato-effect, also known as the modulation depth. Oscillator modulation depth can be set from zero (no modulation) to +/- 12 semitones (one full octave up and down).

## LFO Section



### Speed

This sets the frequency of the LFO. The speed can be set between 0.001 Hz and 100 Hz.

### Ramp

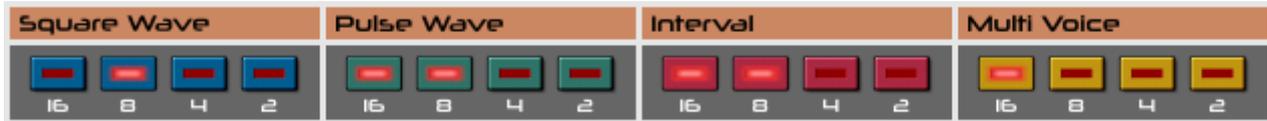
This is a delay time that makes the LFO-signal fade in after a short delay. This makes it possible to create mod-wheel like vibrato and wah-wah effects without actually using a mod-wheel.

*NOTE 1: As a side-note; the original RAGNARÖK did not have a mod-wheel and this functionality was used as a substitute for that.*

*NOTE 2: The LFO signal is also available in the Filter-section for Filter Cutoff modulation. Both 'Speed' and 'Ramp' are affecting the Filter modulation when used there.*

*NOTE 3: When using the mod-wheel options (see Settings-section) the modulation will take the ramp into account, so no modulation is heard when using the mod-wheel before any set ramp-time.*

## Voice Selection Panels



The voice selection panels is where the original architecture of the hardware (and the underlying Chorosynth) is most visible, and specific for the sound character of RAGNARÖK. There are separate sections for the waveforms (square and pulse), interval tones and multi-voice option.

### Square Wave & Pulse Wave

There are four octaves available for both square waves and pulse waves. You can mix both octaves and waves at will. Stacking the same octave for both square and pulse gives a different timbre than either one of those apart.

### Interval

The interval octave buttons add an additional (square) voice for the selected octave, that is by default set to an interval of a 'fifth'. You can change the interval in the 'settings' section with the 'int' knob. The interval can also be set to (close to) the base tuning, for additional chorus/phaser like effects.

### Multi Voice

This is the most important section of the voices: it handles RAGNARÖK's 3-voice spread/detune option for all the square and pulse voices. By switching on an octave in this section, it will set both the square and pulse for that octave (if in use) to 3 oscillators that are slightly detuned for a big chorus effect. The amount of detuning can be set in the settings section with the 'spr.' knob. This setting is patch dependent.

## Filter Envelope & Volume Envelope Sections



The filter envelope generator and volume envelope generator are identical and hard-wired to their respective destinations. The envelope generators are of the traditional ADSR-type, meaning Attack, Decay, Sustain and Release. They can be switched from ADSR to AD mode for percussive sounds.

### Attack

Sets the attack-time of the envelope. This is basically the time it takes for the sound to go to full volume and/or filter cutoff, from the start of a note.

### Decay

The decay is the time it takes to 'fall back' to a lower level (of sustain), directly after the 'attack' part reaches it's maximum level. Decay is used for example for percussive and brass-like sounds, or anything that needs some sort of 'peak' in the sound or volume.

NOTE: This setting is obviously only 'doing something' if 'sustain' is set to less than 100% (full right). If sustain is set to full, there is no level to 'decay to'.

### Sustain

The sustain level is the level where the envelope will 'hold', after the two previous stages, when a note is held for a longer time. You can set the sustain from 0% (meaning 'no sustain' but sometimes useful) to 100% meaning the note is sustained at it's maximum level of volume and/or timbre.

### Release

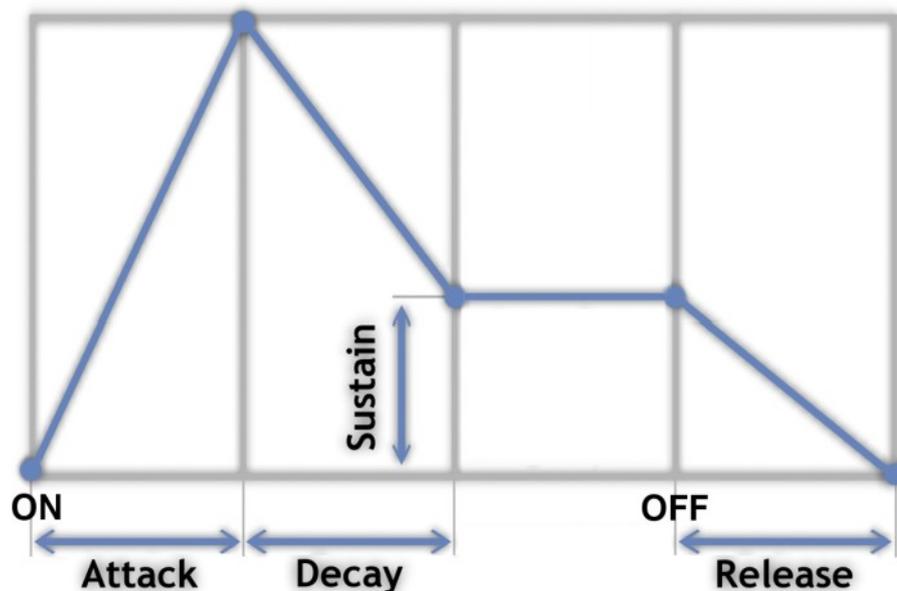
The release time is the time it takes the envelope to 'fall back' to zero, after the release of the note. It is used when we want a sound to (slowly) fade away when the keys are released, instead of abruptly being 'switched off' after the note ending.

## ADSR/AD switch

This switch sets the envelope to either ADSR mode (default) or AD mode.

**ADSR-mode:** The envelope behaves basically as described above. When combined with a zero sustain level you can have a different release based on how long you hold a note. Holding a note will give you the decay time, releasing the note before the decay time is done will go to the release time.

**AD-mode:** This switches off the sustain level and gives you only the decay time. When combined with a sustain level higher than zero, this switch let you move quickly (performance) between a percussive or a sustained version of the sound.



*The typical ADSR-envelope curve.*

## Dynamic Filter Sections



The dynamic filter is a traditional multi-pole VCF architecture with several modulation options and variable key-tracking. In addition the filter has an overdrive-stage on the output, before going in to the 7-band static filter.

### dB/oct. Switch

You can set the filter between 1 and 4 poles, meaning you can choose 6, 12, 18 or 24 dB slope for the filter cutoff. The 24 dB filter sound was made famous mainly by the Moog synthesizers, while 18 and 12 dB are more sounding like (old) Korg and Roland synthesizers. Basically more poles gives a 'rounder' sound while less poles gives a more aggressive and electronic sound.

*NOTE: Mouse-action of this knob is horizontal, because the rotation spans only the (somewhat) horizontal top part of the rotation scale. Additionally, you can click on the 'scale-part' for any option and the knob will jump to that setting.*

### HP/LP switch

You can choose between a high-pass filter and a low-pass filter (default). Both filter types cater for completely different sounds, especially in combination with the envelope generator.

### Cutoff

The cutoff frequency determines the 'brightness' (or lack thereof) of the sound. In combination with modulation by the envelope and/or the LFO, all kinds of very characteristic sounds can be made. The cutoff together with the envelope modulation basically define the fundamental character of a patch/sound.

### Reso

Resonance (Reso) determines how much the frequency at the cutoff point is hyped. High resonance settings gives very aggressive and electronic sounding effects.

*NOTE: The filter is capable of self-oscillation.*

## Key Track

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This knob determines how much the cutoff frequency is 'tracking' with the keyboard. When using 'key track', the filter will adjust the cutoff frequency when playing higher or lower notes. This is mainly used for lead sounds, but can also be very effective when playing polyphonic with high notes and accompanying low notes that you want to sound 'lower'.

## Modulation

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**LFO:** This knob sets the amount of LFO-modulation for the cutoff frequency. You can use this for wah-wah effects and more subtle spectral movement in a sound.

**Envelope:** This knob sets the amount of envelope modulation for the cutoff frequency. This knob has two directions: you can set the envelope signal as normal or as inverted. When the envelope is inverted, all envelope slopes move in opposite direction (attack goes down, decay goes up, etc.).

## Output Sections



### Overdrive

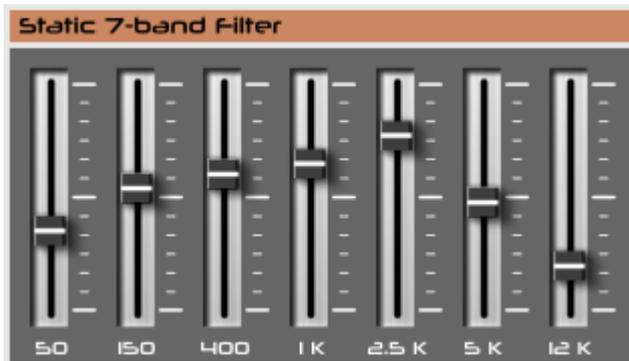
RAGNARÖK has a nice overdrive stage at the end of the filter, to add some grit and dirt if needed. This gives traditional overdrive/distortion like sounds, but can also be used to get even more aggressive, ring-modulator like sounds when combined with the interval setting for the voice selection.

*NOTE: There is only one overdrive that is shared by all voices. This is similar to having an overdrive-effect on the output of the synthesizer. The hardware-version of RAGNARÖK was actually used in combination with an overdrive stomp-box.*

### Volume

This is just a final output level that sets the amount of signal that is coming out of the synthesizer. With all the voice stacking, filter options and distortion, a sound can get pretty loud and you might want/need to dial it down to prevent the input channel of your DAW from clipping.

## Static 7-band Filter Section



The static 7-band filter is basically a tuned 7-band EQ. Frequency bands are tuned for sound shaping as opposed to basic equalization duties, although it can obviously be used that way as well.

The filter works and behaves as a 'normal' graphic EQ. The frequency response is flat when the sliders are at the mid-position. Above the mid-position frequencies are boosted, while below the mid-position they are dampened.

*NOTE<sup>1</sup>: Although there are no modulation options for the 7-band filter within RAGNARÖK, all parameters of the synthesizer are externally automate-able.*

*NOTE<sup>2</sup>: There is only one 7-band filter that is shared by all the voices.*

## Performance Section

The performance section holds all the settings for keyboard performance (portamento, legato and envelope re-trigger) and external trigger/repeat options.

### Portamento

**Speed:** This knob sets the time it takes to 'glide' from one note to another, when portamento is active (depending on the legato switch, see below).

**Legato:** With this switched on, you only have portamento when playing 'legato', meaning 'holding the previous note while playing the new note'. This is most obvious when playing monophonic or with '1 voice' set.

*NOTE: RAGNARÖK has polyphonic portamento. However, this is pretty hard to achieve with more than 4 voices, so legato should better be switched off in that case.*



### Envelope

Mode switch: This sets the 'trigger behavior' of the synthesizer, meaning how the envelopes are being triggered.

- **Normal** means that a note plays when a key is played (or sequenced).
- **Repeat** sets the key-trigger in repeat from the LFO. The speed of the repeating notes is set with the LFO-speed knob. The length of the repeated notes is set with the 'len.' knob in the settings section.
- **Host** sets the repeat locked to the host tempo. Same as 'repeat', the length of the repeated notes is set with the 'len.' knob in the settings section. Also, the host sync can be set to several time signatures with the ... option in the settings popup-menu (button besides the 'len.' knob in the settings section).

*NOTE: The repeat and host sync options only sync the tempo of the repeated notes but NOT the exact timing of the notes: this makes for the possibility of creating arpeggiator-like patterns in a performance, based on the timing of the notes played (or sequenced). Try this with any (slow) repeat or host sync and playing notes with different timings (use polyphony) to hear the effect and experiment with the possibilities.*

*NOTE: The mouse-behavior of this knob is similar to the Filter dB/oct. Switch.*

**Retrig switch (re-trigger):** This switch determines if the envelopes are re-triggered when a new note is played in legato mode. Re-trigger 'on' means that any noted played will re-trigger the envelopes, off means that the envelopes will only re-trigger when all previous notes are released.

*NOTE: Retrig also works in polyphonic mode, but might be hard to use with more than 4 voices.*

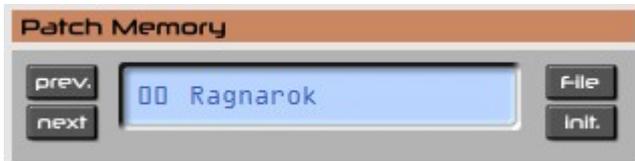
## Voices Sections



The voices section sets the amount of available voices for the synthesizer. Using less voices means using less CPU for the synthesizer. Setting this to '1' voice means the synthesizer behaves as a monophonic synthesizer, which activates all the portamento, legato and re-trigger options in the performance section.

Voices amount can be set to several presets: 1 (monophonic), 2, 4, 8, 16, 32 and 64.

## Patch Memory



The patch management section makes it easy to manage and organize patches inside a (loaded) patch bank. Especially when doing sound-design or tweaks, having patch management inside RAGNARÖK makes it simple to name, rename and organize patches.

### Prev./Next buttons

Especially for auditioning patch banks, these buttons make it easy to quickly step through the available sounds in a (loaded) patch bank. Previous and Next are self-explanatory.

### File button

**Copy Program:** This option copies the current patch to an internal clipboard, so you can paste it into another location in the bank. Handy for rearranging and if you want to start a new patch based on an existing patch, without overwriting the existing patch.

**Paste Program:** This option is only active if the 'copy' function was used and the internal clipboard holds a copied patch. Using this option will write the copied patch into the currently selected slot.

*NOTE: you get a confirmation warning, asking if you are sure to overwrite the currently selected patch.*

**Load Program:** If your DAW does not support patch management, you can use this option to load an individual patch in FXP-format.

**Save Program:** This option let you save the currently loaded patch as an individual FXP-file. Make sure to name the patch first; the FXP-filename is NOT the same as the patch name (although you would probably name them similar).

**Load Bank:** This option will load a full RAGNARÖK patch-bank in FXB-format. This will replace the default patch-bank in the currently loaded instance only.

**Save Bank:** This option will save the complete patch-bank from RAGNARÖK into a standard FXB-file.

**Init Program:** This option will reset all controls to the default 'INIT' setting. The INIT-setting is meant to help when creating new sounds from scratch, and gives a 'clean slate' to start from.

**Reload Configuration:** RAGNARÖK comes with a INI-file that makes it possible to have a default mapping for MIDI-controllers (also see the manual section: INI-file). This menu-option will reload the INI-file in case you made changes to it and want to use/test it right away.

Save Configuration: Save the RAGNARÖK's INI-file (see section: INI-file)

**Select Startup Bank:** Select the bank file that should always be loaded when the RAGNARÖK is started.

**Load Startup Bank:** Load the Startup bank file; can also be used to check what the current Startup bank is.

**Unselect Startup Bank:** Unselect the current Startup bank

**Check Online for Update:** When connected to the Internet, this function will check if a newer version of the RAGNARÖK is available at fullbucket.de.

**Visit fullbucket.de:** Open fullbucket.de in your standard browser.

## Init. Button

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This button initializes the current patch/position in the bank, so you can start a new sound from scratch. All synthesizer settings are set to a default position and the actual patch is renamed to 'INIT'.

## Renaming patches

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You can simply rename a patch by clicking in the name-display. ESC-key while editing reverts to the name that was there, ENTER-key writes the changed name into the patch-bank.

*NOTE: Writing the patch name into the bank does not mean 'storing on disk'. You need to save the patch/bank to store any changes (name and/or parameters) for later retrieval.*

## Settings



The settings section contains several options for performance, host-sync and basic settings for the synthesizer like pitchbend-range and base-tuning. There are also setting that influence the spread/detune and interval options in the voice-selection panels.

### Tun.

**Tuning:** This is the basic tuning of the instrument. Default tuning is A-440Hz. Tuning is stored for each patch, so you need to (re)tune each patch that you want to use with that tuning.

### Len.

**Trigger length:** The knob sets the trigger length (duty-cycle) of the repeat function in the performance section. This is equal to the time a key is pressed if you would repeat a note on a keyboard.

### Int.

**Interval:** This knob sets the note-interval for the 'Interval' voices in the voice selection panel. Default interval is a 'fifth'. You can tune the interval back to center tuning (and both above or under that) for additional chorus-like effects in addition to the 'Spread' option (see below).

### Spr.

**Spread/Detune:** This is where the RAGNARÖK magic happens: the knob sets the spread/detune of the three oscillators (for each octave) that you can switch on in the 'multi-voice' section of the voice selection panels. Detune goes from 'exact tune' to 1 semitone detune where the three voices are detuned at equal distances between -/+ 1 semitone.

## Settings-button [ ... ]

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The settings-button opens a popup-menu with several options. These options are also patch-dependant.

**Sync-to-Host Rate:** This sets the timing 'interval' in relation to the host-sync trigger (if used). There are many options including triplets. **Pitch Bend Range:** This sets the maximum range of the pitchbend wheel, in semitones. Available options are 2 (one whole note), 3, 5, 7 and 12 (one full octave).

**Mod Wheel → Filter:** This sets the 'amount' of how much the mod-wheel influences the filter-cutoff frequency. The mod-wheel adds or subtracts from the value set by the filter-cutoff knob and the other modulation signals (envelope and LFO). There are four slopes available: 25%, 50%, 75% and 100%.

**Mod Wheel → LFO to Osc:** This switches the mod-wheel to control the LFO-to-Oscillator behavior. This works in a specific way:

- If the 'pitch modulation' amount is zero, the mod-wheel has no effect.
- If there is a certain amount of 'pitch modulation' set, the mod-wheel modulates between zero and the set amount.
- If there is a 'ramp-time' set, the mod-wheel again will modulate between zero and the set amount of 'pitch-modulation'. However, the mod-wheel takes the ramp-time into account, meaning there is zero mod-wheel influence at the start of the ramp-time, going up to the full pitch-modulation amount at the end of the ramp-time.

**Mod Wheel → LFO to Filter:** This switches the mod-wheel to control the LFO-to-Filter behavior. This works in a specific way:

- If the 'LFO modulation' (in the filter-section) amount is zero, the mod-wheel has no effect.
- If there is a certain amount of 'LFO modulation' set, the mod-wheel modulates between zero and the set amount.
- If there is a 'ramp-time' set, the mod-wheel again will modulate between zero and the set amount of 'LFO-modulation'. However, the mod-wheel takes the ramp-time into account, meaning there is zero mod-wheel influence at the start of the ramp-time, going up to the full LFO-modulation amount at the end of the ramp-time.

## Skinning support

RAGNARÖK has rudimentary skinning support; You can easily replace the background graphic (the default graphic is bundled in the download) and any of the graphics for the controls, without the need to actually 'hack' the plugin DLL-file.

*NOTE: This functionality was implemented because several users wanted to alter the color-scheme of the GUI. But using specific tools to replace the graphics in the DLL isn't as easy and straightforward, and might damage the DLL and prevent it from working.*

**IMPORTANT:** *as of now (release 1.1.0) it is no longer allowed to alter the DLL in any way, simply because it is no longer needed. The prohibition of changing the DLL (from now on) is meant to prevent from several hacked versions going around in any way or form (which was prohibited anyway).*

### How does it work

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You simply put the edited graphics in any folder of your choosing, so you know the path to where they are stored. Now by adding the specific path for any GUI graphics, to the INI-file (see next section), Ragnarök will load this graphic and overrule the default one with it.

**Important:** The replacing graphics need to have the same size and control placement to work correctly. Also knob/slider graphics need to have the exact same size and number of frames to work correctly. It is not possible to alter the placement of controls, as that is handled by code in the plugin.

The specific syntax for putting graphic paths in the INI-file can be found in the section below.

## INI-File

RAGNARÖK is able to read some settings from a configuration file (`ragnarok.ini`) located in the same directory as the RAGNARÖK VST DLL (`ragnarok.dll` or `ragnarok64.dll`) or Mac VST/AU (`Ragnarok.component` or `Ragnarok.vst`) itself. After you have edited this INI file in a text editor, you have to reload it using the *Reload Configuration* command from the *File* menu (see section *Patch Memory*).

*NOTE: If you don't want automatic MIDI-CC mapping, for example when you want to use the parameter learn function in your DAW, simply remove or comment-out all the mappings in the INI-file.*

## MIDI Control Change Messages

All parameters of RAGNARÖK can be controlled by MIDI controllers, or more precise: Each MIDI controller (except *Modulation Wheel* and *Sustain Pedal*) can control one of RAGNARÖK's parameters. The mapping is defined in the `ragnarok.ini` for example like this:

```
[MIDI Control]
# General Purpose controllers
CC7  = 4  # Volume
CC74 = 28 # Filter Cutoff
...
```

The syntax is straight forward:

```
CC<controller number> = <parameter ID>
```

Given the above example, controller 7 directly controls the overall *Volume* parameter, controller 74 the *Filter Cutoff* etc. As you can see, comments are introduced by the Pound sign (`#`); they are here just for description purposes and completely optional.

The *parameter ID* of one of RAGNARÖK's parameters is given in the section *Parameter List* below. Note that the *controller number* can run from 0 to 119, with the exception of 1 (*Modulation Wheel*) and 64 (*Sustain Pedal*); the latter two are simply ignored.

## Skinning path settings

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You can add paths that point to specific graphics in any location that you have them, as long as the complete path is given in the INI-file.

Bitmaps that you don't want to replace can be set to default (see example below), or left out of the INI-file completely.

The INI-section should look like this:

```
[Editor]
Bitmap_Back = D:\alternate_skins\myown\1.png
Bitmap_Slider = D:\alternate_skins\myown\100.png
Bitmap_Knob1 = default
Bitmap_Knob2 = default
Bitmap_Switch1 = D:\alternate_skins\myown\300.png
Bitmap_Switch2 = D:\alternate_skins\myown\301.png
Bitmap_Switch3 = default
Bitmap_Switch4 = default
Bitmap_Button1 = default
Bitmap_Button2 = default
Bitmap_Button3 = default
Bitmap_Button4 = default
Bitmap_Digits = default
```

## Parameter List

ID	Parameter	ID	Parameter
0	Polyphony	30	Filter Envelope amount
1	Portamento	31	Filter LFO amount
2	Legato (Portamento)	32	Filter Key track
3	Pitch Bend Range	33	LFO Rate
4	Volume	34	LFO Ramp time (delay)
5	Master Tune	35	Envelope Trigger mode
6	Spread/detune	36	Envelope Trigger length
7	Interval Tune	37	Envelope Re-trigger on/off
8	Vibrato amount (LFO → Pitch)	38	Filter Envelope mode (AD/ADSR)
9	Square 16 on/off	39	Filter Envelope attack (time)
10	Square 8 on/off	40	Filter Envelope decay (time)
11	Square 4 on/off	41	Filter Envelope sustain (level)
12	Square 2 on/off	42	Filter Envelope release (time)
13	Pulse 16 on/off	43	Amp Envelope mode (AD/ADSR)
14	Pulse 8 on/off	44	Amp Envelope attack (time)
15	Pulse 4 on/off	45	Amp Envelope decay (time)
16	Pulse 2 on/off	46	Amp Envelope sustain (level)
17	Interval 16 on/off	47	Amp Envelope release (time)
18	Interval 8 on/off	48	Overdrive
19	Interval 4 on/off	49	EQ1 Gain
20	Interval 2 on/off	50	EQ2 Gain
21	Multivoice 16 on/off	51	EQ3 Gain
22	Multivoice 8 on/off	52	EQ4 Gain
23	Multivoice 4 on/off	53	EQ5 Gain
24	Multivoice 2 on/off	54	EQ6 Gain
25	Osc/Noise mix	55	EQ7 Gain
26	Filter Mode	56	Sync-to-host Rate
27	Filter Poles	57	Mod-wheel to Pitch modulation (Osc)
28	Filter Cutoff	58	Mod-wheel to Filter LFO modulation
29	Filter Resonance	59	Mod-wheel to Filter cutoff

## Bitmap Reference List

<b>Bitmap Reference</b>	<b>Actual Graphic / Control</b>
Bitmap_Back	Background graphic for the entire GUI
Bitmap_Slider	EQ-sliders
Bitmap_Knob1	Big knob (e.g. "Cutoff")
Bitmap_Knob2	Small "Settings" knob
Bitmap_Switch1	On/off switch (e.g. "Portamento Legato")
Bitmap_Switch2	Toggle switch (e.g. "ADSR/AD Mode")
Bitmap_Switch3	Three-state switch ("Envelope Retrigger Mode")
Bitmap_Switch4	Four-state switch ("Filter Poles")
Bitmap_Button1	Blue Octave switch
Bitmap_Button2	Green Octave switch
Bitmap_Button3	Pink Octave switch
Bitmap_Button4	Yellow Octave switch
Bitmap_Digits	Digits font shown for "Polyphony"

## Frequently Asked Questions

### ***How do I install the RAGNARÖK (Windows 32 bit version)?***

Just copy the files `ragnarok.dll` and `ragnarok.ini` from the ZIP archive you have downloaded to your system's or favorite DAW's VST plug-in folder. Your DAW should automatically register the RAGNARÖK VST plug-in the next time you start it.

### ***How do I install the RAGNARÖK (Windows 64 bit version)?***

Just copy the file `ragnarok64.dll` and `ragnarok.ini` from the ZIP archive you have downloaded to your system's or favorite DAW's VST plug-in folder. Your DAW should automatically register the RAGNARÖK VST plug-in the next time you start it.

Note: You may have to remove any existing (32 bit) `ragnarok.dll` from your VST plug-in folder or else your DAW may screw the versions up...

### ***How do I install the RAGNARÖK (Mac VST/AU universal 32/64 bit)?***

Locate the downloaded PKG package file `ragnarok_1_2_4_mac.pkg` in Finder (!) and do a right- or control-click on it. In the context menu, click on "Open". You will be asked if you really want to install the package because it comes from an "unidentified developer" (me 😊). Click "OK" and follow the installation instructions.

### ***What is the plug-in ID of the RAGNARÖK?***

The ID is `h p b o .`

### ***Why is there no saw and no triangle/sine available?***

The main component of the hardware RAGNARÖK was a DIY-kit called Chorosynth. This was specifically aimed at doing large lead-sounds with three slightly detuned oscillators. The original designers of that synth coupled the fact that triangle/sine waves were not (at that time) obvious choices for synth-leads, to the technical choice to use divide-down circuits (which were cheap to implement) and not implement wave-shaping (which was pretty costly in hardware back then, and still is) to recreate sine/triangle waves. This technical implication also regarded saw-waves by the way. As we decided that the 'new' RAGNARÖK should be close to its hardware precedent, it also has only square and pulse waves.

### ***Why does RAGNARÖK not use keyboard velocity and/or aftertouch?***

We have thought about implementing at least velocity, but finally decided against it because it would have taken the software too far away from the original hardware specification.

***The RAGNARÖK logo takes up a lot of space...?***

This has been discussed (on the KVR-forum) at least briefly: The RAGNARÖK GUI is not really that big (there are much bigger GUIs around), and the controls are already nicely spaced. The GUI is certainly not crowded. So taking it off to make space for something else didn't make much sense. The choices made for the GUI (and the logo) are very much based on the original hardware: knobs and switches are oriented very close to the original hardware faceplate, and adding the patch-management section simply created the place for the logo.