u-he

ACE

any cable everywhere

user guide

for version 1.4.1

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HECKMANN AUDIO GMBH   -   BERLIN

Introduction

Installation

Go to the ACE webpage at www.u-he.com, download the appropriate installer for your system, and unzip the compressed file. Open the "ACE" folder and start the installer application. The only demo restriction is a mild crackling sound at irregular intervals after about two minutes of use. This disappears after you enter a valid serial number.

For more information, including our terms of use, please refer to the ReadMe file that comes with the installer. By default, ACE uses the following directories:

Win

presets (local)	*C:\Users*YOU*\Documents\u-he\ACE.data\Presets\ACE*
presets (user)	*C:\Users*YOU*\Documents\u-he\ACE.data\UserPresets\ACE*
preferences	*C:\Users*YOU*\Documents\u-he\ACE.data\Support\ (*.txt files)*
alternative skins	*C:\Users*YOU*\Documents\u-he\ACE.data\Support\Themes*
microtuning	*C:\Users*YOU*\Documents\u-he\ACE.data\Tunefiles*

Mac

presets (local)	*Macintosh HD/Library/Audio/Presets/u-he/ACE/*
presets (user)	**YOU*/Library/Audio/Presets/u-he/ACE/*
preferences	**YOU*/Library/Application Support/u-he/com.u-he.ACE...* (*.* files)
alternative skins	*Macintosh HD/Library/Application Support/u-he/Themes/*
microtuning	*Macintosh HD/Library/Application Support/u-he/Tunefiles/*

online resources

For downloads, news articles and support, go to the u-he website
For lively discussions about u-he products, go to the u-he forum
For friendship and informal news updates, go to the u-he facebook page
For countless presets (commercial and free), go to the u-he preset library
For video tutorials and more, go to the u-he youtube channel

u-he team 2020

in no particular order…

Urs Heckmann (boss, concepts, original GUI); Thomas Binek (QA, bug-hunting, presets); Sebastian Greger (GUI design, 3D stuff); Rob Clifton-Harvey (IT admin, backend development); Viktor Weimer (support, presets, the voice); Howard Scarr (user guides, presets, necessary grump); Jan Storm (framework, more code); Sascha Eversmeier (code, bad puns); William Rodewald (student life-support code); Frank Hoffmann (more framework, new browser); Alexandre Bique (all things Linux); Henna Gramentz (office supervision); Jayney Klimek (office management); Alf Klimek (tagging & repairs, studio); Melina Garbisch (studio attendant); Oddvar Manlig (everything else!)

Special thanks to Brian Rzycki for maintaining the original preset library

ACE Concept and Features

modular ultrasound

Most digital synths handle audio signals and modulation signals separately. Audio is usually evaluated at a rate between 44100 and 96000 Hertz, while modulation signals update at 1000 Hz or slower (often called the "control rate" of the synthesizer).

ACE is different in this respect. While the oscillators have more than 500 times over-sampling, all signals (including modulation) run at least twice as fast as the host application's sample rate... and this is just the lowest of ACE's quality settings.

ACE does not differentiate between audio signals and modulation/control signals. You can plug any signal output into any signal inputs and expect it to work just like vintage modular hardware. So any modulation can function beyond the limits of human hearing. For instance, the LFOs (low frequency oscillators) can be sent above 20 kHz and still modulate e.g. the pulse width of another oscillator. This gives you a sonic freedom previously reserved for expensive analogue hardware. Both LFOs can be used as audio oscillators e.g. for FM (frequency modulation) sounds. Conversely, the VCOs (voltage controlled oscillators) can be used as alternative LFOs. Note: Any DC (direct current) is removed from VCO outputs, so when used as LFOs their shapes may not be precisely as you might expect.

analogue modeling

Wherever necessary, the non-linear characteristics of analogue circuitry has been programmed directly into the code. For instance, the filter algorithm is built around a very precise mathematical model of a hardware analogue filter – as are the basic components of the oscillators and envelope generators.

Only the LFOs, mixer, ramp generator and control-signal conversions are not analogue models. You will soon hear why: unlike its analogue ancestors, ACE is not susceptible to instabilities, and all the oscillators can be synchronized to song tempo. In ACE, even perfect host-synchronized beating between two oscillators is possible.

Non-linear distortion in the self-oscillating filters, extremely fast envelopes and modulation channels (as well as other unique details such as "Glide2" and "Tap Map") open up a myriad of sound-sculpting techniques unavailable in other software synths.

If you really want to compare ACE to a classic modular synth (or three), think of it as a pimped-up ARP 2600 using modules from a Roland SH-7 with (almost) the patching flexibility of an EMS VCS3 / Synthi A – but polyphonic. Just like the ARP 2600, ACE is pre-patched so that it will work out-of-the-box, but these default connections can be overridden by plugging in patch cables.

Many of the modules were designed to carry out a number of seemingly unrelated tasks. For instance the ramp generator can be used as an LFO, the multiplexes as ring or amplitude modulators, LFO1 as a waveshaper, or the filters as slew limiters…

User Interface

You should feel very comfortable with ACE – it was designed to pack a lot of functionality into a compact but clear user interface:

Default Signal Flow

Like e.g. the ARP 2600 but unlike most other real modular systems, you don't need to plug any cables in before you can get a humble squeak out of ACE. That's because the modules are already connected in the typical configuration of a fixed architecture synth by default. Of course the real fun begins when you dip into your infinite supply of cables and start overriding those defaults, connecting modules together any way you like...

ACE signal flow when no patch cables are connected
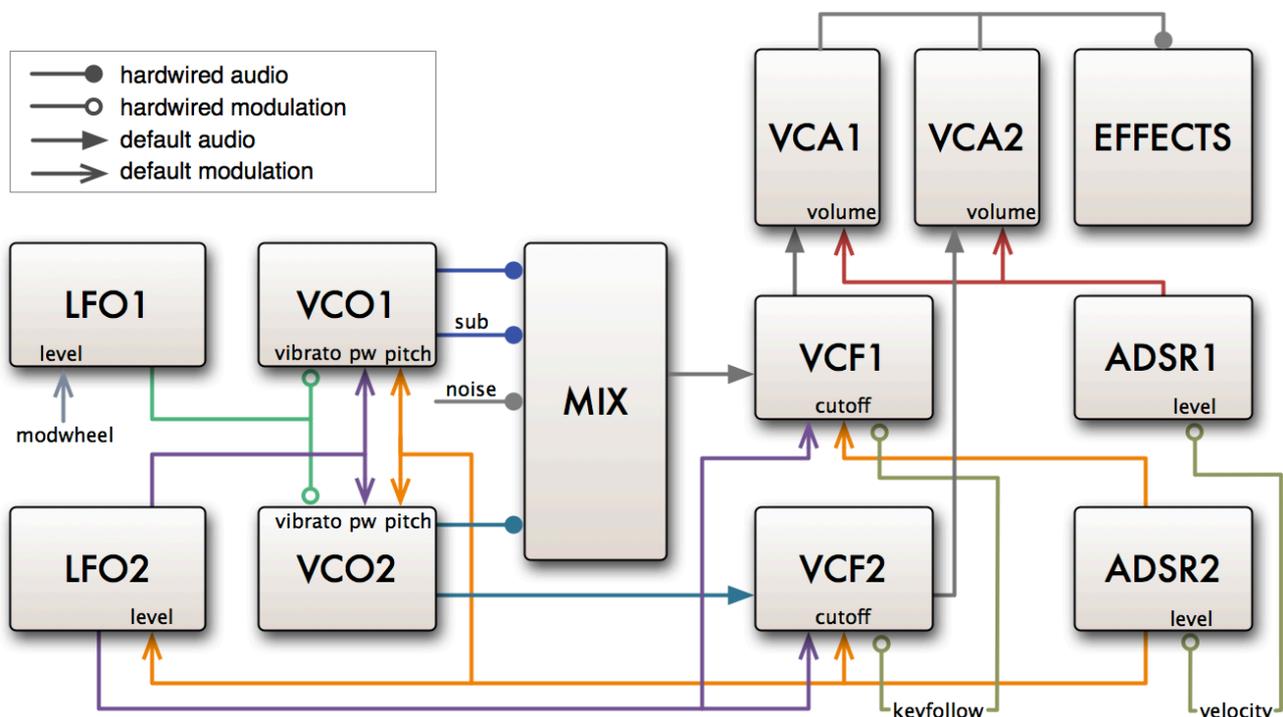
VCO1 and sub-oscillator, VCO2 and white noise are MIXed and routed to VCF1, which is in turn routed to VCA1 (to right of the oscilloscope, unlabeled). VCO2 is also sent through VCF2 to VCA2.

LFO1 is hardwired as the source of vibrato for both VCOs. The output level of LFO1 and therefore vibrato depth is controlled by the modulation wheel (MIDI CC#1). LFO2 (violet) modulates both VCO pulse widths and both VCF cutoffs.

ADSR1 (red) is used as the envelope generator for both VCAs. ADSR2 (orange) modulates both VCO frequencies, both VCF cutoffs and the output level of LFO2.

Control Bar

The strip along the top is home to several indicators and controls:

synth / tweak / patch

Select the the synthesis page, the so-called Tweak page or the patch (preset) browser.

MIDI

A MIDI activity indicator. This flashes whenever ACE is receiving MIDI data.

save

Right-click on the *Save* button to check the format in which patches will be saved. The default is u-he's cross-platform *.h2p* format. To save patches in the host-specific native format, select *native* before saving. We recommend using the standard *.h2p* so you can exchange patches directly between the various computer worlds. The *.h2p extended* format is the same but also allows per-line comments.

Important: If you have set the Save Presets To preference from the default user folder to *selected folder*, make sure that the folder where you want to store your preset is already selected before saving – if not, click on it first.

Click on the [**save**] button, give your preset a name and enter any other details. Preset description, playing tips etc. – anything you would like to appear in the PRESET INFO panel of the browser. Finally, confirm by clicking on the apply button.

Whenever you need to create a new folder or refresh the list (e.g. if folders or patches have been added from Explorer / Finder), right-click in the left pane of the browser. Simply clicking on a folder should also refresh the list.

Tip: If there's a preset called **default** in the local root, it will be loaded instead of the regular demo sound. Try this: Right-click on the data display and select 'init'. Save the patch under the name 'default' and start a fresh instance of ACE.

data display

The central display shows the name of the selected patch or the value of any parameter as it is being edited. Click on the triangles either side of the display to step through patches. Click on the name in the the display to open a drop-down list of all patches in the current directory.

undo / redo

To the right of the data display is a pair of *undo* and *redo* buttons.The number of steps in the undo buffer is limited, but you can even undo a change of preset to recall edits made to the previous one!

multicore

Switching this on causes ACE to distribute voices across available CPU cores, which will usually allow more voices to be played without overloading the CPU. This mode appears to work well on relatively recent processors such as the Intel i5 and i7, but please note that performance can even be reduced if your CPU is older. Note: Some hosts already offer multicore support, and this can lead to poorer performance for ACE. In such cases, please switch one of them off (either ACE's or the host's multicore option).

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GUI Elements

knobs

ACE has two types of knob: *unipolar* and *bipolar*. Unipolar knobs only allow positive values, usually within a range of 0.00 to 100.00. Bipolar knobs also allow negative values, usually within a range of -100.00 to +100.00 with zero in the central position.

coarse control: Click+hold with the lefthand mouse button, then drag up or down.

fine control: for steps of 0.01, hold down either SHIFT key before moving the knob.

mouse wheel: If your mouse has a scroll wheel, you can hover over a knob and roll the wheel for coarse adjustment. Fine control via SHIFT.

If your mouse wheel is rastered (you can feel it clicking slightly as you roll the wheel), right-click on any knob and select MouseWheel is rastered from the context menu. Each little click will then increment or decrement with a more 'sensible' step!

default reset: Double-clicking a knob reverts to a sensible default value, usually 0.00.

Note: All the above also applies to the envelope faders.

switches
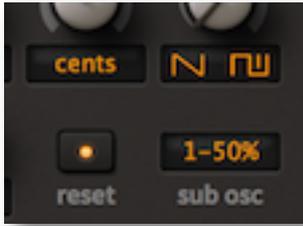
All orange text elements and icons are switches. Many of them also serve as labels for the associated knobs.

Values can be incremented via left-click, a right-click opens the list, and mouse wheel movement scrolls through all values.

parameter locking

To guarantee that the value of a parameter **doesn't change when you switch presets**, use the Lock function. Right-click on a control and select 'Lock' from the context menu. Please remember this: You are still free to adjust the value of a locked parameter at any time!

sockets and cables

In most hardware modular synthesizers, standard jack sockets and leads are used to connect modules together. ACE's virtual cables always connect outputs with inputs:

the **OUTPUT** sockets have darker rims

the **INPUT** sockets have lighter rims

To create a connection in ACE, drag and drop between the sockets. Outputs will happily accommodate several patch cables, while inputs will only accept one. Most of the modulation inputs have controls for setting the modulation amount. For instance below LFO1's *Phase* knob is an input socket and control for *phase modulation*.

daisychains: Although you normally can't connect two inputs together, try dragging a cable from an unused input socket to one that is already in use – it works, the source signal is passed on to all inputs in the chain. The main advantage of daisychain patching is that it can appear clearer.

to change inputs, drag+drop from the current input to another input.

to change opacity and style, right click on any input socket (even an unused one) and select the two properties: Opacity = *solid*, *see-thru*, *x-ray* or *ghosted* and Style = *thick*, *slim*, *line*, *hair* or *natural*. Default options can be set in the preferences panel.

to change outputs, right-click on the output and drag it to a different output. A straight line will appear. Several cables connected to one output can only be moved together.

to remove cables, double-click (or drag away) the input end.

to change colour, click on the input end. Take care not to double-click, as this would remove the cable. Colours are initially selected more or less at random so that overlapping cables can be differentiated easily.

oscilloscope

The oscilloscope displays a mono sum of the output, pre-effects. It is used for e.g. fine adjustments to waveforms, for checking the effects of audio-rate modulation or filtering on the waveform, for viewing envelope shapes etc.. Or simply for its entertainment value!

Oscilloscopes have proved very useful while creating sounds. Especially if the synth has audio-rate modulation – like classic modular systems... and ACE.

ACE's oscilloscope is synchronized to MIDI notes as well as to zero-crossings (negative to positive transitions). The display is updated whenever a longer scan is completed.

As synchronization is automatic, the oscilloscope only requires two controls: **Freq** adjusts the horizontal resolution while **Scale** adjusts the vertical resolution.

Right-clicking in the window lets you switch the drawing mode: **glow**, **fire** and **wind** add different fade-out effects at the cost of extra CPU. These modes are also a bit slower than **eco** or **fast**. Tip: If you need to keep CPU-usage down, use eco (economical) mode. The setting is temporary. To specify a default 'scope effect, see Preferences.

GUI size

Right-click anywhere in the background. The size options are measured in percentages and pixels (width x height), and increment in 10% steps from 70% to 200%.

This setting is temporary – to specify a default GUI size, see Preferences.

Multichannel MIDI

ACE now supports a growing class of expressive 'performance' instruments (e.g. Haken Continuum, Eigenharp, Roli Seaboard, Linnstrument) that can send each note on a separate MIDI channel. For ACE to respond correctly your host must be able to route multiple MIDI channels to a single instance of a plug-in. Each voice should then react individually to performance controls (pitchbend, pressure, mod wheel, Control A and Control B).

The voice modes *poly*, *mono* and *legato* become practically identical while multichannel MIDI is received. In each case, ACE behaves like several mono synths set to the same sound. The value of *voices* in the General Settings panel still applies as the voices can be 'stolen' across multiple channels. The *duo* voice mode is not channel aware – the MIDI channels are simply merged. 'Single trigger' type modulation sources react to the channel used by the first played voice.

Patch Browser

Overview

ACE presets are sometimes called **patches**, a term borrowed by the modular synth community from the telephone world where calls used to be connected via jack cords.

You can load any preset in the current folder by clicking on the data display, or step through them by clicking on the arrow symbols either side of the data display.

Of course ACE also includes a browser. Clicking on the [patch] button at the top left will open this set of panels:

Folders appear on the left, patches in the centre and information about the currently active one appear on the right. If you can't see any, click on *Local*. If there is no PRESET INFO panel, click on the [≡] button (top right) and select *Show Preset Info*.

The Local root directory contains a representative selection of presets copied from the sub-folders. After loading a preset by clicking on its name you can step through all others using your computer's cursor keys.

### That's all you need to know for now!

If you want to dig deeper, however, read the rest of this chapter. ACE's browser has many more features including drag&drop functions and a powerful search engine.

Default preset

When ACE starts it checks whether the Local root contains a preset called *default*, which is then loaded instead of the demo sound. Note that *default* will not appear in the browser.

Directory Panel

On the left of the patch browser is the DIRECTORY panel:
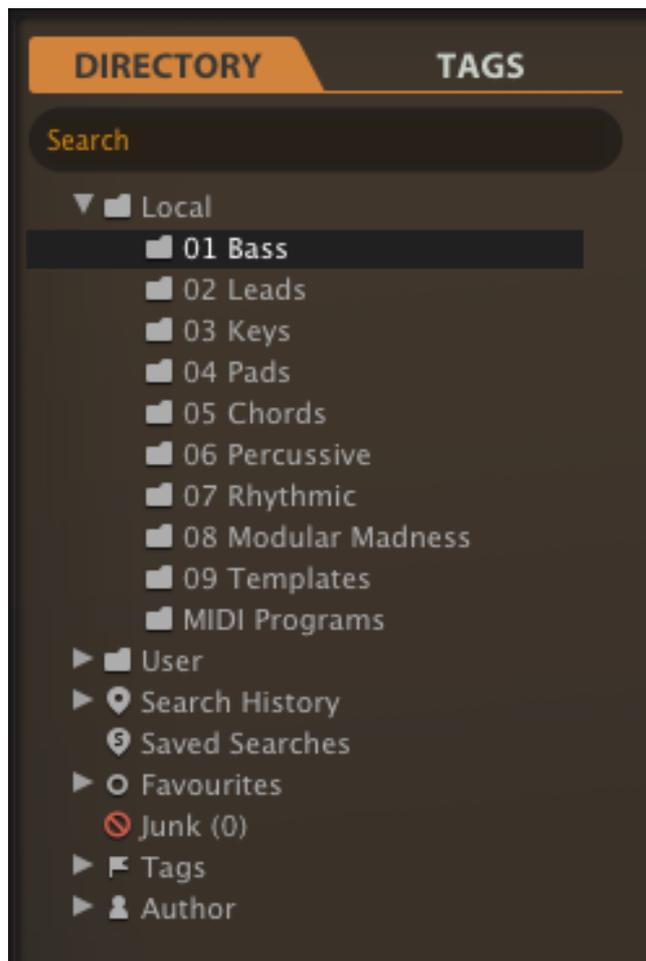
Local

ACE's factory presets are sorted into folders 01 through 09. We recommend that you do not add or remove presets here, but save all your creations and any third party sound-sets in the 'User' folder (see below). See the preference Save Presets To.

MIDI Programs

As well as the categorized factory presets, *Local* also contains a special folder called 'MIDI Programs', which is initially empty. When the first instance of ACE starts, all presets in that folder will be loaded into memory. These presets (up to 128) are selected directly via MIDI Program Change messages. As they are accessed in alphabetical order, it's probably best to put a number at the beginning of the name e.g. '000 rest-of-name' to '127 rest-of-name'. But that's not all…

'MIDI Programs' can contain up to 127 sub-folders, each holding up to 128 presets. The sub-folders are switched via MIDI Bank Select messages (CC#0). Send Bank Select first, then Program Change. 'MIDI Programs' is bank 0, sub-folders are addressed in alphabetical order, starting with bank 1.

Important: 'MIDI Programs' presets cannot be added, removed or renamed on the fly – any changes to that directory will only take affect after you have restarted the host.

User Folder

The best address for your own creations as well as soundsets from other sources. You can either select 'User' immediately before saving the preset, or set a global preference which ensures that it will always be saved here – see the [Save Presets To](#) preference.

Tip: It's worth finding out where the 'User' folder actually resides on your computer. Right-click on 'User' and select *reveal in Finder* (Mac) or *open in Explorer* (Win).

Smart Folders

These folders do not contain files, but display the results of querying a database. The content is dynamic i.e. it will change whenever the underlying data changes.

Search History

Click on this folder to display the results of past searches (maximum 10). Whenever you need to make the results of a search more permanent, right-click and select save Search... The entry will be moved to the Saved Searches folder – see below. To remove all searches from the list, right-click on the Search History folder and select clear.

Saved Searches

This folder contains searches that have been saved via right click from Search History. To remove individual saved searches, right-click on the search and select delete.

Tip: Entries dragged from Saved Searches and dropped onto real folders within Local or User will create a folder containing copies of all found presets!

Favourites

8 smart folders, one for each Favourite colour. See Presets context menu on the next page. Presets dropped onto one of the Favourites folders will be marked as such.

Junk

A smart folder pointing to all junked presets. See Presets context menu on the next page. Presets dropped onto this folder will disappear from the rest of the browser unless made visible (see *show junk* in the Presets context menu).

Tags

Smart folders for each Category/Subcategory, Features and Character tag. Presets dropped onto these folders will adopt the corresponding tag. Presets dropped onto the *Untagged* folder will have all Category, Features and Character tags removed.
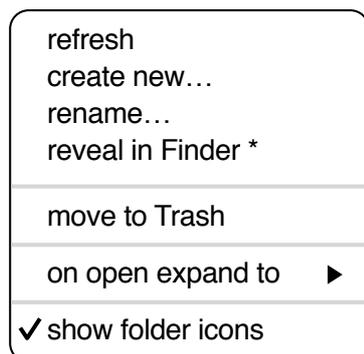
Author

Smart folders for each Author. Tip: Instead of signing each of your creations, you could sign just one of them, select them all and drag onto Author/*YOU*/. This process cannot be undone, so to avoid setting wrong authorship please use this feature with caution!

See also the section [Drag & Drop functions](#) a few pages down…

Directory context menu

Right-clicking on any folder within *Local* or *User* will open this menu:

> refresh
> create new…
> rename…
> reveal in Finder *
>
> move to Trash
>
> on open expand to   ▶
>
> ✔ show folder icons

refresh: Update the browser contents, which is necessary for Windows users after altering any files in Explorer.

create new: Insert an empty subdirectory.

rename: Edit the folder name.

reveal in Finder / open in Explorer: Opens a system window for the clicked folder. After adding, removing or renaming presets or folders outside of ACE's own browser, Windows users should always *refresh* (see above).

on open expand to: Specifies how deeply the browser will open subdirectories whenever the GUI is reopened or the *refresh* function is called.

show folder icons: Lets you hide all icons in the directory (except the *Junk* symbol).

Presets Panel

The central, unlabelled area of the browser is where you click to load presets...

Presets context menu

Right-click to open a menu containing functions that can be applied to individual presets.

> ● mark as favourite
> ● mark as favourite
> ● mark as favourite
> ● mark as favourite
> ● mark as favourite
> ● mark as favourite
> ● mark as favourite
> ● mark as favourite
>
> 🚫 mark as junk
>
> ✔ show junk
>
> select all
> deselect
>
> rename…
> copy to User folder
> reveal in Finder *
> convert to h2p
>
> move to Trash

mark as favourite: Choose one of eight 'favourite' marks. The selected entry will be replaced with unmark as favourite.

mark as junk: Instead of deleting any unloved presets, you can mark them as 'junk' so that they disappear from the browser…

show junk: Activate this option to display junked files (see above) instead, but mark them with a STOP symbol.

select all, deselect: See Multiple Selection below.

rename: You can change the names of presets using this function. Note that only the most recently selected preset can be renamed i.e. you can't rename multiple files at once.

copy to User Folder / duplicate: The function here depends on the status of the *Save Presets To* preference as well as on the location of the source preset(s) i.e. whether they are in *Local* or *User*. Selected presets are copied with a number appended to the name, which is incremented so that presets cannot be overwritten by mistake.

reveal in Finder / open in Explorer: Opens a system window for the selected preset. After manipulating any files in Explorer, Windows users should always *refresh* the directory.

convert to native / h2p / h2p extended: Converts the selected preset(s) into the format previously selected via right-click on the [SAVE] button.

move to Trash / Recycle Bin: Moves the selected preset(s) to the system trash.

Restore

While in the browser you can audition as many presets as you like in any folders without losing the one that was previously loaded: Clicking the [Restore] button will always get you back to where you started.

Scan / ready

In the top right of the presets panel is a dark rectangle normally labelled 'ready'. Upon *refresh* this turns into a progress indicator showing how much of the preset database has been refreshed. The process should only take a few seconds.

Multiple selection

A block of adjacent presets can be selected via shift+click, and individual presets can be added to the selection via cmd-click (Mac) / alt+click (Win). Presets can be moved to a different folder via drag & drop (see below). To deselect, either click on an unselected preset or choose deselect from the context menu.

Drag & Drop functions

To manage your preset library more comfortably you can drag presets and folders between ACE's browser and your desktop (or elswhere). Examples: To install new sound-sets, drag them from your desktop directly into the User folder. Dragging a search result folder onto the desktop will create a new folder containing the presets from that search.

Import / export favourites: You can import/export a single favourite 'colour', or all at once. Shift-click and drag the favourites smart folder(s) out of the browser to create a *Favourite (n).uhe-fav* favourites file. To import, drag this file into the favourites area. Note: Importing favourite status from another computer will only work correctly if the names and locations of those presets are identical on both computers.

Mac: Most Finder operations should automatically update the browser. This might not update instantly when using multiple instances of different formats, or multiple hosts at the same time, but all it usually takes is a click on the GUI or in the directory tree, which sets the focus to the plug-in instance.

Win: A manual *refresh* is often required. We plan to improve this in future versions.

Preset Tagging

"Tags" are elements of metadata, information that you can add to presets so that they can be found according to certain attributes.

IMPORTANT: Clicking on [SAVE] isn't required, as tags are updated automatically. The advantage is that presets don't have to be saved each time you edit tags. The main drawback is that you should only edit tags after saving your preset. If you edit tags while creating a new version of something, you would also be changing the tags in the original!

The Tagging Window

Right-click on the [SAVE] button and select *Tag this preset*:

CATEGORY			FEATURES			CHARACTER	
Bass	Acoustic		Mono	Percussive		Bright	**Dark**
Pads	Analogue		Poly	Soft Attack		Constant	Moving
Leads	Digital		Duo	Slow Release		**Clean**	Dirty
Keys	**Dist+LoFi**		Chord	Glide		Soft	Aggressive
FX	E-Bass		**BPM**			Phat	Thin
Drums	FX Bass		Modulated			Natural	Synthetic
Seq	Plucks		OscSync				
Other	**Sub**		RingMod				
	Sync		CrossMod				
	Synth						
	Vocal						

CATEGORY describes a preset by analogy to instrument types or classic synth genres. Each one has its own set of subcategories. FEATURES are technical classifications, and CHARACTER tags are pairs of opposites from which you can choose only one.

Tagging via PRESET INFO

In the PRESET INFO panel, right-click on CATEGORY, FEATURES or CHARACTER and select / unselect tags 7. Note: This method only works for individual presets. If you right-click on an existing tag, the first option in the menu becomes *remove tag*...

The function *create Search from Tags* searches for presets with ALL the same tags.

Tagging via Tags smart folder

You can tag presets by drag & drop onto one of the Tags smart folders. To remove all tags, drag the presets onto the Tags/Untagged/ smart folder.

Search by Tags

Click on the TAGS tab to open this view. The buttons here let you set up search criteria according to existing tags with just a few mouseclicks:

TAGS

Search

CATEGORIES ∨

Bass | Pads | Leads | Keys | FX | Drums | Seq | Other

FEATURES ∨

Mono | Poly | Duo | Chord | BPM | Modulated
OscSync | RingMod | CrossMod | Percussive
Soft Attack | Slow Release | Glide

CHARACTER ∨

Bright | Dark | Constant | Moving | Clean | Dirty
Soft | Aggressive | Phat | Thin | Natural | Synthetic

FAVOURITES ∨

● 1 | ● 2 | ● 3 | ● 4 | ● 5 | ● 6 | ● 7 | ● 8

There are four sets of buttons. The first three correspond to the tags in the tagging window (see the previous page), and the bottom row lets you find any presets tagged as Favourites. Clicking on the [^] icon to the right of each heading hides the options for that set of tags.

Categories and Subcategories

Each Category has its own set of subcategories. Not selecting any subcategory here means "show me presets tagged with any subcategory". Click on [Leads]...

You can select multiple categories without specifying any subcategory if you hold cmd (Mac) or alt (Windows) while clicking on the category. Try that with the [Keys] button.

Selecting the subcategory with the same name as the category means "show me presets tagged without a subcategory". You will not find any in the factory presets.

Completed category+subcategory tags appear below the subcategories as buttons with 'off' switches [X] so you can add other main categories by simply clicking on them.

Features, Character and Favourites

Unlike multiple Category tags, which expand the search, selecting these types restrict the search. Let's find all thin sounding presets with a slow release:

Click on the TAGS tab. If any Categories are highlighted, click on them. Then select FEATURES = [Slow Release] and CHARACTER = [Thin].

Summary / Recap

In the DIRECTORY panel, specify a search path via double-click. In the TAGS panel, select category tags. Add others if required to extend the search, but remember to hold down **cmd** (Mac) or **alt** (Windows) if you want to retain category tags that don't specify a subcategory. Select Features, Character and/or Favourites tags to refine the search. Exit any search path by clicking on the [X] to the right. You'll soon get the hang of it!
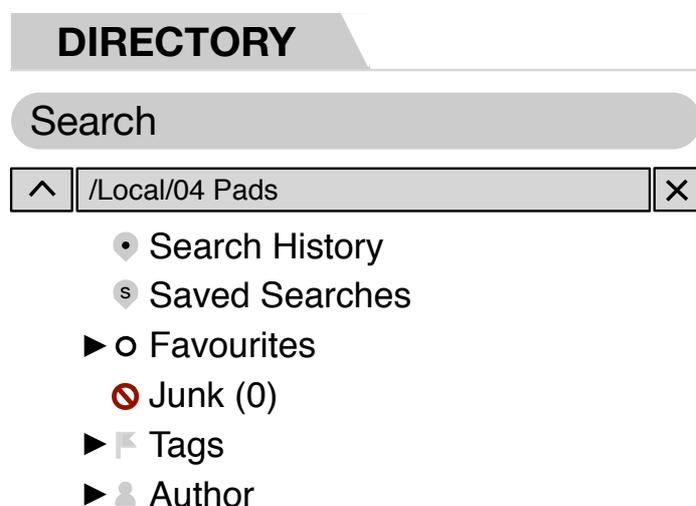
Search by Text

The Search field lets you find presets according to a string of characters i.e. text. Here's an easy example: If you remember that the preset you're looking for has the word "clock" in its name or description, enter "clock" into the Search field and hit Return.

The search normally looks into the preset name, author, DESCRIPTION and USAGE (see the PRESET INFO panel). Searches are not case-sensitive, and quotes are not required unless you need to include spaces.

To restrict the search to a particular path, for instance Local/04 Pads, double click on a folder. This path will appear beneath the Search field instead of the preset folders, and you will only see smart folders (unless the specified path contains sub-folders).

See the image below. The [^] button to the left moves the Search path up one level, in this case to /Local. The [X] button to the right sets the search path to the default Local plus User (i.e. all ACE presets), and the preset folders become visible again.

DIRECTORY

Search

| ∧ | /Local/04 Pads | ✕ |

- Search History
- Saved Searches
- ▶ ○ Favourites
- 🚫 Junk (0)
- ▶ ⚐ Tags
- ▶ 👤 Author

Try a text search: Enter three or four letters then hit Return. For instance, star will find all files containing the text string star (e.g. mustard or starters). Entering "star wars" (with the quotes) would find e.g. Battlestar Warship, if such existed in the presets.

Syntax

Scope

You can limit the scope of the search to just the preset name or specific parts of PRE-SET INFO by using name (preset name), author, desc (description) or use (usage) followed by a colon. For instance, author:the finds all presets by sound designers whose author names contain 'the'. Similarly, desc:space will find all presets with the word space in the description.

Logic

IMPORTANT: The following logical operators can only be used between text elements.

AND requires that presets contain both words. It can be written explicitly if you prefer, but is not necessary. For example, star AND wars (or simply star wars) will find presets that contain both star and wars.

OR means that presets can contain just one of the words or both. For example, star OR wars will find presets that contain star as well as presets that contain wars.

NOT excludes presets containing the word. To find all presets that contain star but don't contain wars, enter star NOT wars.

Including Tags

Note: In the current version of the browser, tags must appear after any text items.

Regular tags can also be entered into the search field if preceded with a '#'. For example, name:"hs " #bass:* will find all presets with "hs " in the name that are tagged as Bass with any or no subcategory. The colon separates Category and Subcategory, and the star (*) means "any subcategory, even none". Between multiple tags of the same type is an implicit OR, while between different types is an implicit AND.

Modules

VCO common parameters

The two VCOs are ACE's main sound-generation modules, with a frequency range of 0 Hz to 20 kHz. All oscillators (VCOs and LFOs) include the same set of frequency parameters: Three knobs with associated switches that also serve as labels:

frequency

The frequency control has a range of 0.00 to 24.00. The frequency modes are:

semi ....maximum 24 semitones above the current pitch.
partial.......the first 24 overtones – octaves are at 1.00, 3.00, 7.00, 15.00
subhrm.....the first 24 subharmonics – look up "Trautonium" on the web
hertz.........0Hz to 24Hz. 0.00Hz is no signal because DC components are removed
sync ....sync to song tempo, divider – 1.0 is a whole note, 4.0 a quarter note etc.

modifier

The modifier control range is -50.00 to +50.00 (bipolar). The modifier modes are:

cents ....detunes the oscillator by +/- 100 cents i.e. 1 semitone
5 Hz ....detunes the oscillator by +/- 5 Hertz
beats........detune in sync with song tempo. +4.00 = one extra cycle per quarter note
mtply ....frequency is multiplied (from 0 to 50) or divided (from 1/1 at -1.00 to 1/50th)

FM amount

The amount of frequency modulation from the FM input. Available FM ranges are:

cents ....+/- 100 cent i.e. 1 semitone
5 semi ......+/- 5 semitones
50 semi ....+/- 50 semitones

reset

The oscillators in analogue synths run *continuously*, they never stop. In digital synths, oscillators are not computed until a note is played. This means they either start at a random phase (most similar to analogue) or at the same phase every time (for consistent attack). The VCOs in ACE have a switch offering both options:

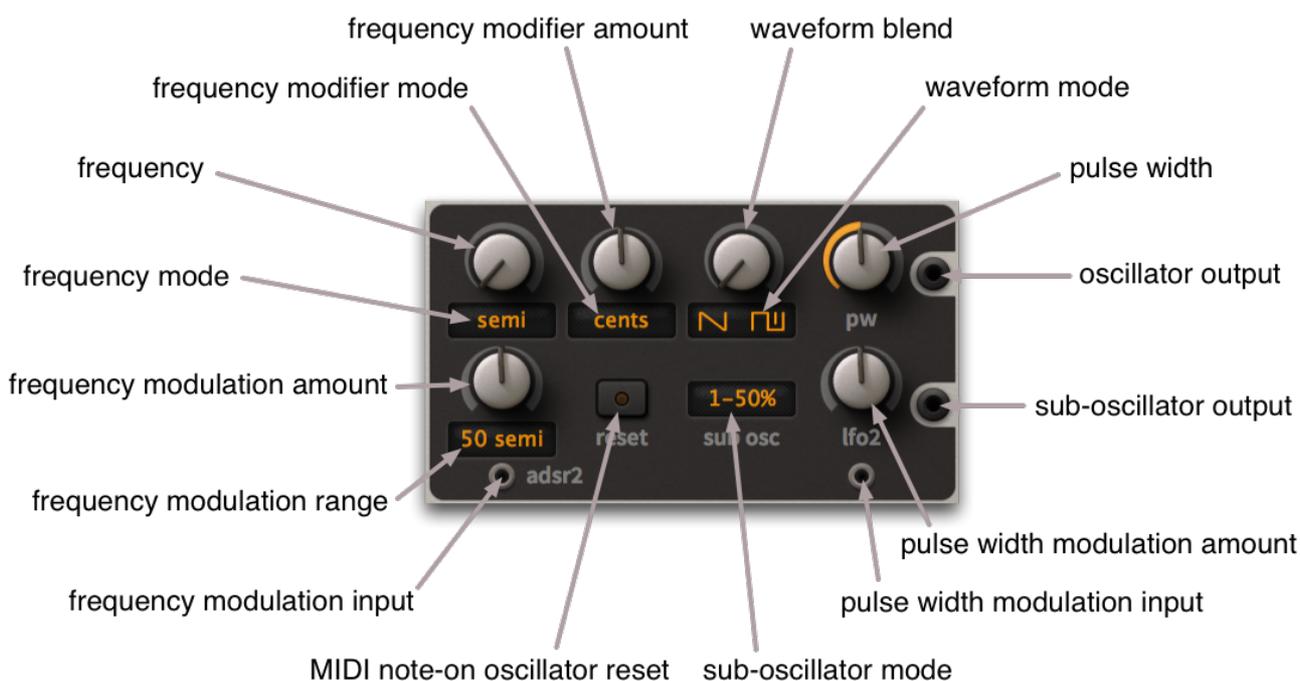*off ....*random phase
*on ....*fixed phase

waveform blend

Crossfades between the sawtooth and pulse waves (or peak and triangle in VCO1).

pulse width (pw)

The width of the pulse wave is variable from 0% to 100%. Any signal can be used for pulse width modulation (PWM), even an audio oscillator. The default source is LFO2.

VCO1

frequency modifier amount   waveform blend

frequency modifier mode   waveform mode

frequency   pulse width

frequency mode   oscillator output

frequency modulation amount   sub-oscillator output

frequency modulation range   pulse width modulation amount

frequency modulation input   pulse width modulation input

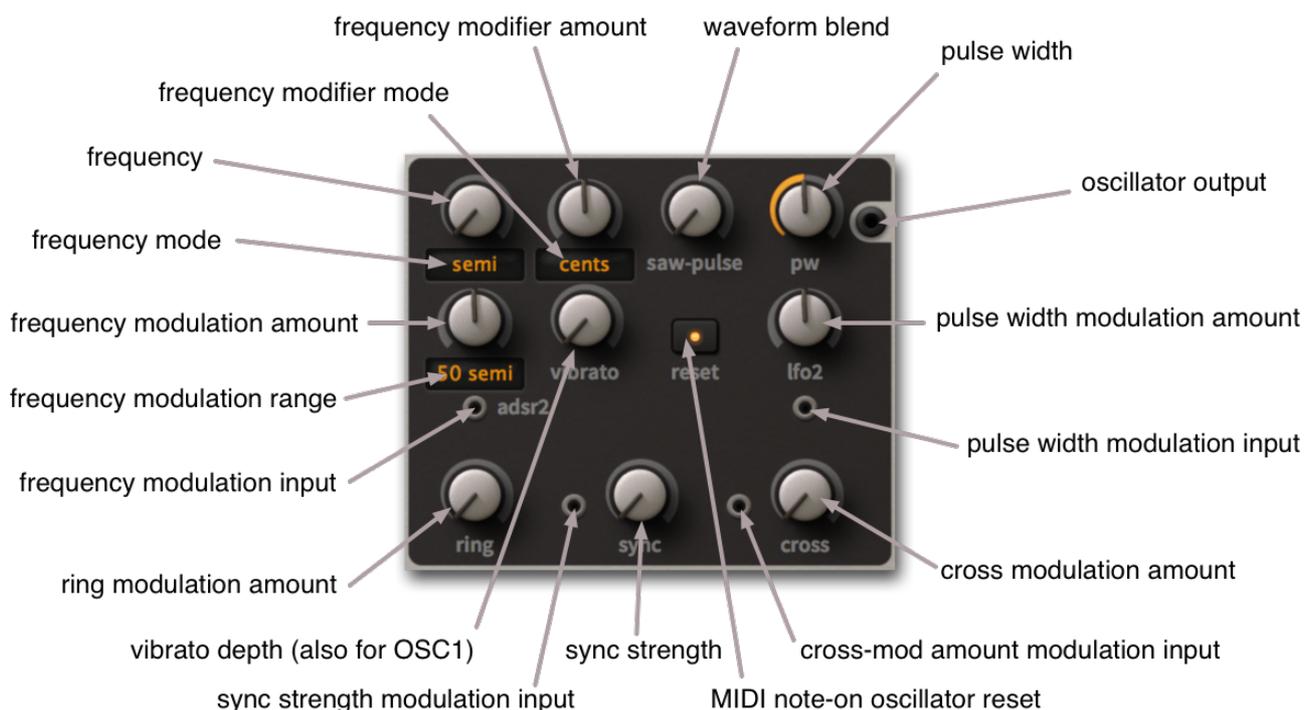MIDI note-on oscillator reset   sub-oscillator mode

waveform mode

As mentioned above, both VCOs can blend between sawtooth and pulse waves. VCO1 also lets you switch to the mellower *peak / triangle* (click on the waveform icon).

sub-oscillator

VCO1 includes a sub-oscillator with its own separate output socket. Click on the **sub-osc** switch to select a 50% pulse wave (perfect square) pitched 1 or 2 octaves below the main oscillator, or a 75% pulse wave 2 octaves below.

VCO2

frequency modifier amount   waveform blend

frequency modifier mode   pulse width

frequency

frequency mode   oscillator output

frequency modulation amount

frequency modulation range   pulse width modulation amount

frequency modulation input   pulse width modulation input

ring modulation amount   cross modulation amount

vibrato depth (also for OSC1)   sync strength   cross-mod amount modulation input

sync strength modulation input   MIDI note-on oscillator reset

vibrato

Frequency modulation for both VCOs from LFO1, hardwired. Although it also affects VCO1, placing this knob in the VCO2 panel was a necessary compromise.

ring

Ring modulation. Cross-fades between pure VCO2 and ring modulation between VCO1 and VCO2. Depending on the waveform and interval between the two oscillators, ring modulation can create metallic sounds, nasal sounds… or even rhythms if VCO1 is set to e.g. *sync* mode.

sync

The phase of VCO2 is not only reset when it completes its normal cycle, but also whenever VCO1 completes a cycle (turn *sync* up to maximum for the standard 'hard sync'). The pitch of VCO2 is normally set higher than VCO1, and VCO2 is often modulated by an envelope or LFO to sweep the effect. Hard sync can deliver sounds that are very rich in harmonics without losing the fundamental pitch (of VCO1).

Set lower values for a special kind of 'soft sync': Again, the phase of VCO2 is reset by VCO1 – but not to 0°! The phase of VCO2 moves by a proportion of its current value (e.g. 50%), which lets you create pure-interval overtones. Experiment with the sync knob and the interval between the two oscillators – you should quickly discover some very interesting overtones and quasi-chaotic effects.
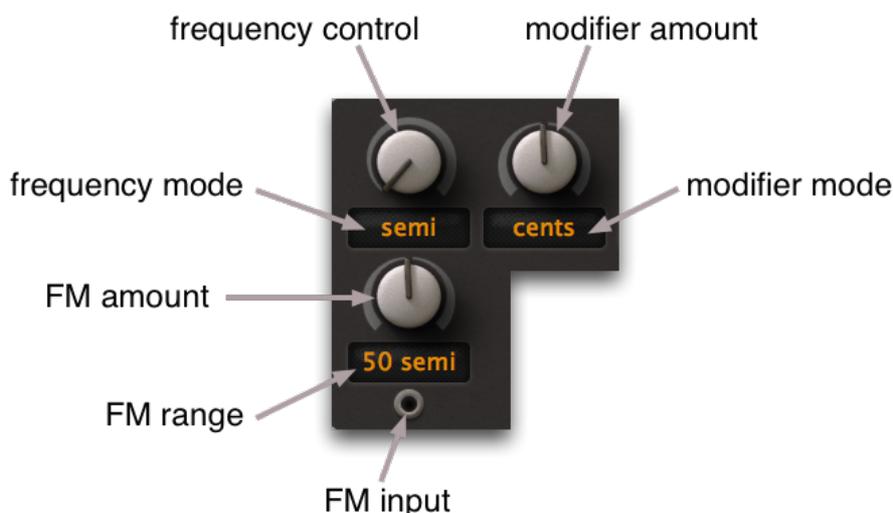
Connecting a cable to the sync modulation socket effectively replaces a +5V default modulator. Tip: Try patching velocity or an envelope into the sync input.

cross

Short for "cross modulation". In ACE this means analogue FM (frequency modulation), with VCO1 modulating VCO2. Connecting a cable to the cross modulation socket effectively replaces a +5V default modulator.

LFO common parameters

The label **LFO** only describes the default function of these modules, as they are actually full range (0Hz–20kHz) i.e. from static to inaudibly high! All oscillators have the same set of frequency parameters – three knobs with associated switches that also serve as labels:

frequency

The frequency control has a range of 0.00 to 24.00. The frequency modes are:

semi...........maximum 24 semitones above the current pitch.
partial........the first 24 overtones – octaves are at 1.00, 3.00, 7.00, 15.00
subhrm......the first 24 subharmonics – look up "Trautonium" on the web
hertz..........0Hz to 24Hz. 0.00Hz is no signal because DC components are removed
sync...........sync to song tempo, divider – 1.0 is a whole note, 4.0 a quarter note etc.

modifier

The modifier control range is -50.00 to +50.00 (bipolar). The modifier modes are:

cents..........detunes the oscillator by +/- 100 cents i.e. 1 semitone
5 Hz...........detunes the oscillator by +/- 5 Hertz
beats.........detune in sync with song tempo. +4.00 = one extra cycle per quarter note
mtply..........frequency is multiplied (from 0 to 50) or divided (from 1/1 at -1.00 to 1/50th)

FM amount

The amount of frequency modulation from the FM input. Available FM ranges are:

cents ....+/- 100 cent i.e. 1 semitone
5 semi ......+/- 5 semitones
50 semi ....+/- 50 semitones

LFO1

LFO1 normally generates a pure sine wave. The LFO1 specialities are vibrato, phase modulation i.e. classic FM, sample & hold... and even waveshaping.

phase

The **phase** knob adjusts the phase position i.e. where in its cycle the waveform will start whenever the LFO is *reset* (see below). LFO1 has a **phase modulation** input – connecting another oscillator here gives you classic FM sounds (all so-called "FM" synths were actually using phase modulation, and should have been called "PM" synths). Of course the phase modulation source can be LFO1 itself, which skews the sine wave towards something very similar to a sawtooth.

Note: The phase knob has a very different role in sample & hold mode (see below).

level

LFO1 output level. Both LFOs have amplitude modulation inputs, and the default source for LFO1 is the modulation wheel (*m-wheel*) for e.g. quick "vibrato via mod wheel".

reset

This switch determines whether the LFO phase is reset by MIDI note-on events. Note: If the frequency mode is *sync*, LFOs are also reset in sync with the host program.

free......not reset, runs continuously ("monophonic")
gate .....per-voice reset whenever a note is played ("polyphonic")

sample & hold

If anything is connected to the *s&h* input, LFO1 switches into **sample & hold mode**, and samples the input at its own "clock speed". For vintage random effects, connect noise here.

In s&h mode the *phase* knob becomes a lag processor, smoothing out jumps between successive values. At very high LFO1 rates, the phase parameter acts like the cutoff control of a lowpass filter (but in the opposite direction). If you find LFO1 strangely silent in s&h mode, set its *phase* closer to zero.

some LFO1 tricks

random modulation: Connect white noise ("white") to the s&h input and use LFO1 to modulate e.g. VCO frequency or VCF cutoff.

sample rate reduction effects: Start with the default patch and drag a cable from LFO1 output directly to one of the VCAs. Connect an audio signal (e.g. a VCO) to LFO1's s&h input. Set the frequency mode to *semi* and the modifier to *mtply*. Set LFO1 phase to around zero or you won't hear anything. Now try different multiplication factors (modifier values) between 1.50 and around 30. LFO1 adopts the pitch of the sampled oscillator and delivers a "rougher" version of same. To see the steps in the waveform, turn the oscilloscope frequency way down.

waveshaping: Although the VCFs can deliver plenty of distortion, especially when connected in series, you can also use LFO1 as an extra waveshaper – try this: Start with the default patch and drag a cable from LFO1 output directly to one of the VCAs. Set *semi* and *mtply* modes, and a multiplication factor of 0.00. Switch the *reset* to *gate* (LFO1 doesn't oscillate now) and set the phase to 0.00 (LFO1 always resets to 0° now).

Then patch the signal you want to process (e.g. VCO1) into LFO1's phase modulation input. Turn up the amount – there's your *sine waveshaper*! Change the phase to make the effect asymmetrical. By the way, the sampled signal doesn't have to be a VCO – you can use this method to alter the shape of any signal: try waveshaping an envelope.

LFO2

Instead of phase modulation and s&h, LFO2 offers a much wider variety of waveforms than LFO1... which makes LFO2 easy to use as a third audio oscillator.
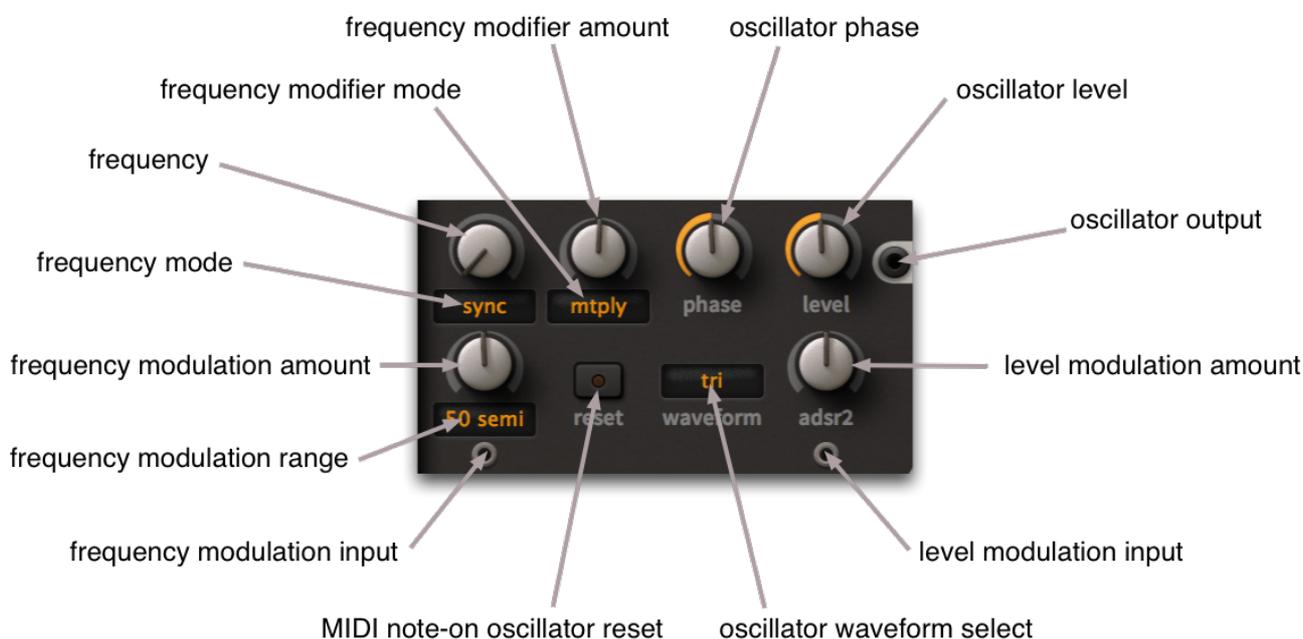
phase

The phase knob adjusts the phase position i.e. where in its cycle the waveform will start whenever the LFO is *reset* (see below).

level

LFO2 output level. Both LFOs have level/amplitude modulation (AM) inputs and associated amount controls, and the default source for LFO2 is ADSR2.

reset

This switch determines whether the LFO phase is reset by MIDI note-on events. Note: If the frequency mode is *sync*, LFOs are also reset in sync with the host program.

free ....not reset, runs continuously (monophonic)
gate ....per-voice reset whenever a note is played (polyphonic)

waveform

The first four LFO2 waveforms are standards, but the last in the list is very special:

sine............sine wave, pure
*tri* ....triangle wave, pure
saw ....sawtooth wave, bright
square.......square wave, hollow
tap map ....the mapping generator interpreted as a waveform. Note that setting the LFO2 waveform to *tap map* doesn't prevent the mapping generator from being used in its other role as a modulation source at the same time.

MIX

In the middle of the window is a mixer that serves as the default link between the main sound generators and the sound processing in ACE. The MIX module also includes amplitude modulation inputs. Note that its output is sent to VCF1 by default.
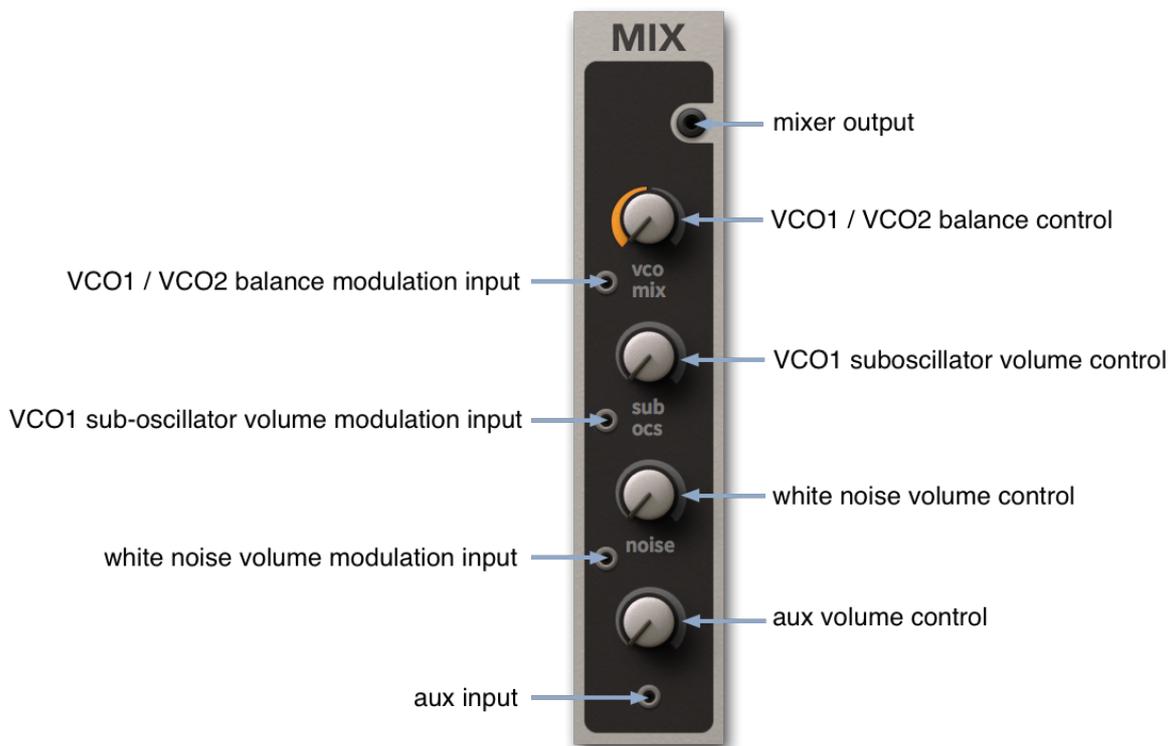
vco mix

The upper knob controls the relative levels between VCO1 and VCO2. The central position (0.00) is a 50-50 mix of both VCOs.

Of course the balance modulation input will also accept audio rate signals: remember *any cable everywhere!* Tip: For bipolar modulation sources (LFO, VCO) set the mix knob to the centre, for unipolar sources (e.g. mod wheel, ramp) set it to maximum.

sub osc

VCO1's sub-oscillator.

noise

White noise. Tip: A small amount of white noise mixed into a pad patch can give the filters and chorus more frequencies to work with, making the sound fuller.

aux

The unlabelled knob is the level control for the auxiliary input at the bottom of the mixer. Connect anything you like here: pink noise, a pitched LFO – or even VCF1 for instant *filter feedback*.

VCF

ACE's two filters are almost (but not quite) identical. The screenshot here shows VCF2, with its cutoff mode selector and bipolar cutoff knob...
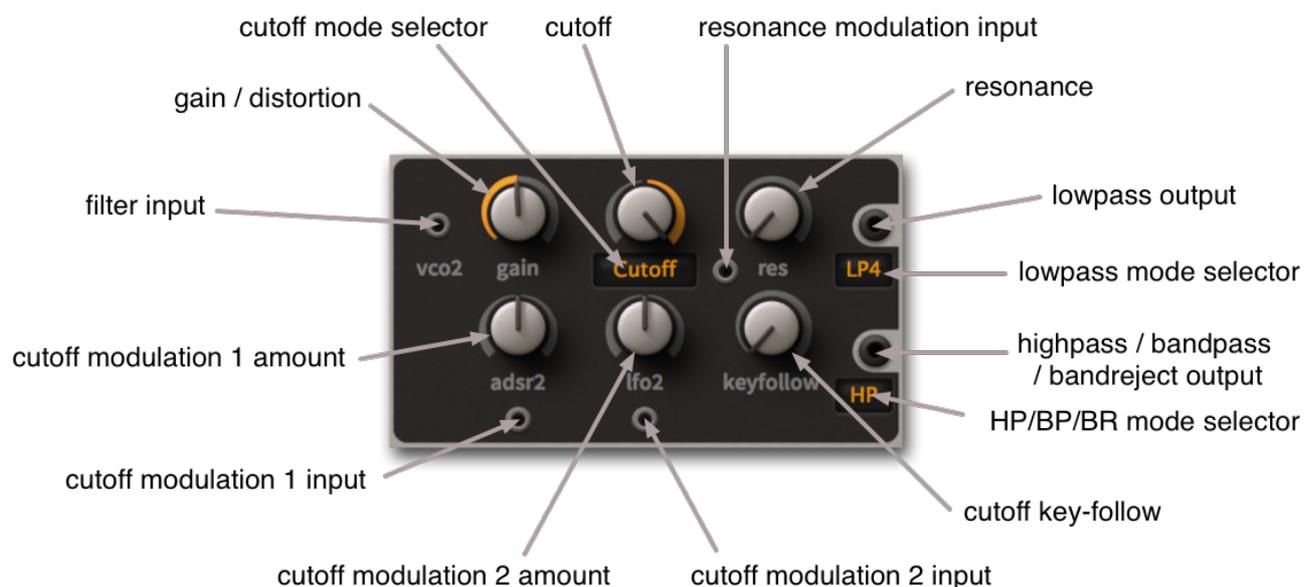
The filters in ACE have several properties normally associated with analogue hardware only. For instance, they can easily be overdriven without sounding harsh. Unlike classic hardware filters, strong overdrive in ACE won't necessarily kill the resonance. Just turn it up – there's plenty of headroom there.

Especially around the self-oscillation threshold, where the resonance appears to struggle with the oscillators for control over pitch, there are surprising opportunities for organic/chaotic sound design. Depending on the input signal and its gain, it can even sound as if the input is actually *modulating* cutoff. Experimentation is the name of the game here!

The underlying cascade filter architecture gives you different filter types in parallel, just like hardware multimode filters. In ACE however, *all* types are capable of resonance and even self-oscillation.

Tip: if a single filter still sounds too tame for your evil purposes, you could try patching the filters in series i.e. one after the other, and increasing the gain of the second filter. This is a great way to make very bold, biting sounds similar to hardware filter units.

gain

VCF input level (negative values) and overdrive (positive values).

Tip: for typical screaming distortion (TB303 etc.), use another VCF in series. Set it to LP1 mode, with maximum cutoff and very high gain.

cutoff

VCF1: Cutoff frequency is measured in semitones from 0.00 to 150.00 (12 octaves) and the modulation range is +/-150 semitones. Note: the input / knob at the bottom left of the VCF panel also modulates cutoff, *not* gain.

VCF2: Instead of a simple positive-only cutoff, VCF2 has 3 modes and bipolar control:

cutoff ....like VCF1, but bipolar

offset ....VCF2 cutoff follows VCF1 – *including any modulation* – but shifted negative or positive. This means that VCF2 cutoff can be modulated directly by up to *four* sources: two within the VCF2 panel and two adopted from VCF1.

spread.......like offset, but also affects VCF1 cutoff *in the opposite direction*.

keyfollow

Keyfollow causes cutoff to follow the MIDI note. If keyfollow is set to maximum, cutoff follows MIDI notes 100%, like the VCOs.

resonance

The **res** range is 0.00 to 100.00. Although self-oscillation can start around 50.00, the actual amount of resonance depends on the level of the input signal (see **gain** above), so a generous range was necessary here. Resonance can be modulated by connecting a signal to the socket to the left of the *res* label (effectively replacing a +5V default).

outputs

Each filter has two parallel outputs. The upper one offers four grades of lowpass...

LP1<..........6dB/octave   (1-pole lowpass)
LP2 ....12dB/octave (2-pole lowpass)
LP3 ....18dB/octave (3-pole lowpass)
LP4 ....24dB/octave (4-pole lowpass)

...and the lower one has three other types:
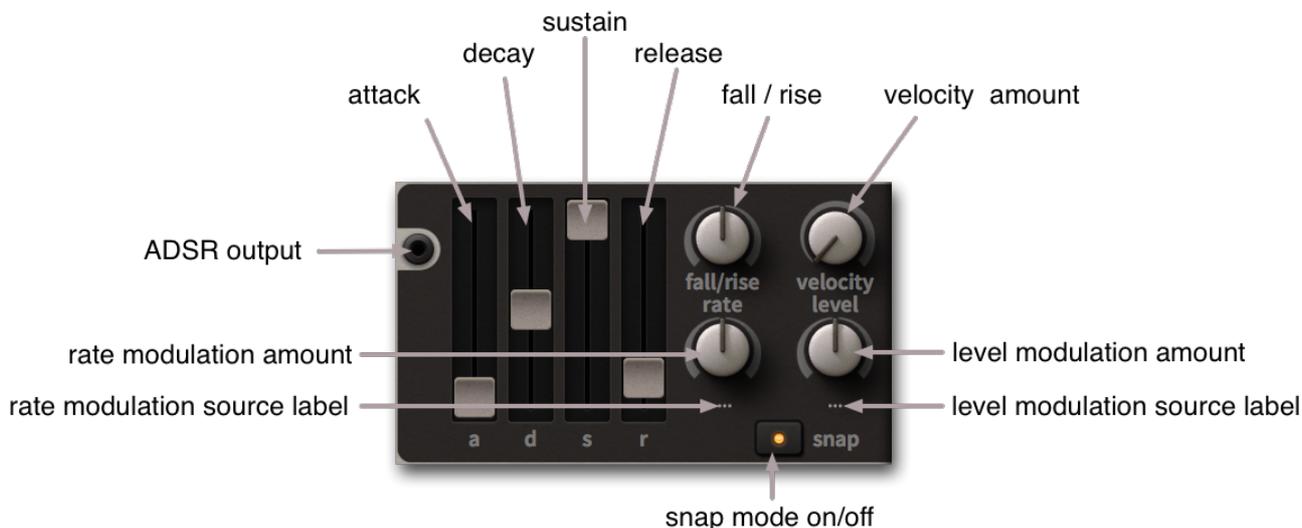
HP ....high pass
BP ....band pass
BR..............band reject (notch)

ADSR

What would a synthesizer be without envelopes to control the ebb and flow of levels? ACE has two identical envelope generators:

a, d, s, r

Like the vast majority of synthesizers, the main envelope parameters are **A**ttack time, **D**ecay time, **S**ustain level and **R**elease time. But ACE also has a few extras...

fall/rise

Firstly, the bipolar **fall/rise** knob causes the normally flat sustain to fall or rise at a defined rate. There's a parameter in the Tweak page called <u>fall/rise range</u> that limits how far towards zero / maximum the sustain level will fall / rise.

rate modulation (...)

The lower lefthand knob is user-definable (hence the '...' default label). This parameter lets you modulate the envelope rates (attack, decay and release). Right-click on the knob to select a modulation source. For instance, selecting KeyFollow and setting a negative value here will make higher notes shorter, simulating the characteristics of plucked or struck instruments.

velocity amount (vel)

Envelope levels can be scaled via MIDI velocity (vel), as well as via a source selected by right-clicking on the lower righthand knob ("..." means none yet i.e. undefined).

level modulation (...)

The lower righthand knob is user-definable (hence the '...' default label). Lets you modulate the overall ADSR level. Right-click on the knob to select a modulation source.

snap

This switch makes the decay and release more extreme, more "snappy" if the envelope stages are relatively short.

Ramp Generator

If you find that two envelopes and two LFOs aren't quite enough for a complex patch, you could take a look at the ramp generator – it can fill either of these roles quite well. The ramp is not a simple decay, it is a linear attack-hold-decay (AHD) envelope with an off time – so its closest relative is the *trapezoid* of classic EMS synthesizers *Synthi A* and *VCS3*.

up...............attack time
hold...........time at maximum
down.........release time
rest............time before repeat

Unlike standard envelopes, the ramp generator will stay at maximum for the period set by *hold*. If *rest* is set to maximum, the ramp is a one-shot envelope i.e it does not repeat. Note: the Tweak page includes a parameter called ramp clock that sets the ramp segments to either seconds or one of two different sync values.

Multiplex
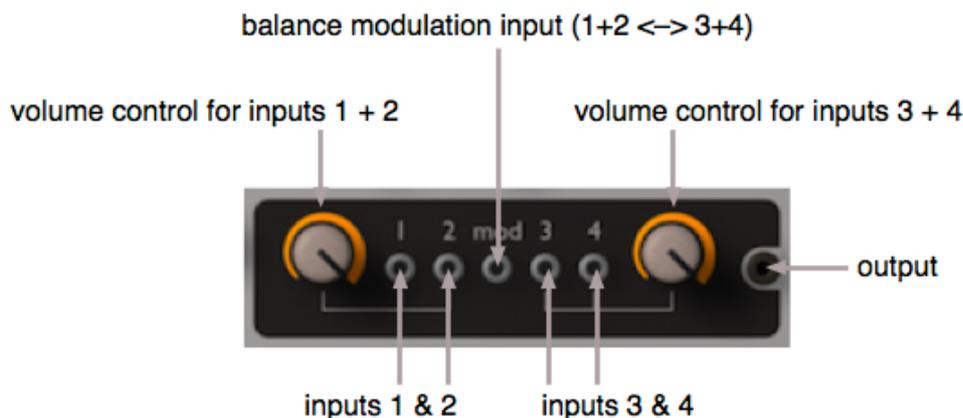
The *multiples* you will find in most analogue modular systems are simple mix/split devices, often just four sockets bridged together. As most modular synthesizers have a very limited number of inputs and outputs per module, multiples are important – without them it would be impossible to modulate more than one parameter at a time from e.g. an envelope generator, or plug more than one or two audio sources into a filter.

The humble multiple underwent a serious redesign for ACE (and Bazille), finally emerging as something much more useful than a multiple: a **multiplex**.

simple mixing

In this example, four signals are connected to each of the inputs. The lefthand knob is around 50% while the righthand knob is at maximum – the sum of the signals in inputs 1 and 2 is lower than the sum of the signals in inputs 3 and 4. You can mix up to 4 signals, arranged in pairs with a common level control for each pair.

ring modulation (RM)

In this example, the signal connected to input 1 is ring modulated (i.e. multiplied) with the signal in the **mod** (modulation) input. If another cable was connected to input 2, the sum of both inputs would be ring modulated with the mod signal.

Whenever a cable is connected to the **mod** input, the lefthand knob crossfades from the "dry" sum of inputs 1 and 2 to the ring modulated signal. In the above image, the left-hand knob is at maximum, meaning that the output (yellow cable) is the ring modulated signal only. The value of the righthand knob is irrelevant here, as inputs 3 and 4 are not in use.

Because ring modulation is actually multiplication, the multiples can be used to scale control signals from another source. For instance, if you connect an LFO to input 1 and velocity to the mod socket, you will get **LFO level** x **velocity value** from the output – the harder you play a note, the more LFO signal will appear at the multiplex's output.

amplitude modulation (AM)

Another classic effect is amplitude modulation (AM). This is like ring modulation except that, as well as the side bands, the output also contains the modulated original signal.

While RM could be written as $y = a \times mod$, AM is normally $y = a \times (1 + mod)$. However, AM in ACE's multiplex is defined as $y = a \times (1 - mod)$. There's a very good reason for this departure from the norm, as you will see shortly...

Amplitude modulation is achieved by using inputs 3 and/or 4 in conjunction with the mod input. Similar to ring modulation, the righthand knob crossfades from only the original(s) to only the amplitude modulated signal.

Again (like in ring modulation), the level of a signal can be controlled via another, but in this case control is inverted – the "minus" symbol in $y = a \times (1 - mod)$. If we took the previous example but used input 3 instead, the harder you played a note, the less LFO signal would appear at the output.

balance processing

The RM and AM features can be used at the same time. In this example, the mod signal (green) controls the mix between inputs 1 and 3. If an envelope was connected to the mod input, the envelope would crossfade smoothly between inputs 1 and 3. Please note that some signals are bipolar (e.g. oscillators) while others are not (e.g. envelopes). If you use a bipolar signal to crossfade between two other signals, you may get unexpected results due to the natures of the algorithms. In such cases, you might have to e.g. bridge inputs 1 and 2 to double the level and set the lefthand knob to 50.00.

signal inversion

To invert a signal, connect it to the *mod* input of a multiplex, then +5v to input 3 or 4.

VCA

At the end of the synthesis chain there is always an amplifier unit, otherwise you wouldn't hear anything! In analogue synthesizers this is usually called a VCA (Voltage Controlled Amplifier). VCAs often have their own dedicated envelopes to control transient volumes. As stereo is the de facto standard for software synthesizers, ACE has two amplifiers with associated pan controls.

The default inputs to the VCAs are filters 1 and 2 so that whenever you open a fresh instance of ACE, all you have to do to get a wide sound is to pan the two amplifiers apart and detune one (or both) of the oscillators. Such a feature would be unthinkable in older analogue synths but, despite its simplicity, this tweak can have a dramatic effect.

The knobs in the VCA section are self-explanatory: volume and pan position. Above the input socket is a switch for selecting which envelope will be used – ADSR1, ADSR2 or Gate. The latter is an instantaneous on/off, and is useful if you want to free up an extra envelope (e.g. for classic sync sounds with separate oscillator and filter sweeps).

Why does ACE only let you use envelopes to control the final volume? In the "real" modular systems, you could use any signal (or none) to modulate VCAs, and even leave the system droning or bubbling away for hours without you having to play a note. Most of these old synthesizers were monophonic – all the early polyphonic synths had envelope-controlled VCAs at the end of the signal chain. ACE tries to span both worlds, but you **do** have to play a MIDI note somehow... not too much to ask, really!

Signal Sources

Along the bottom of the panel is a row of signal sources:

white............white noise output (brighter, great for percussion sounds)

pink ....pink noise output (good for classic wind and wave effects)

+5V ....a constant "voltage" which can be used e.g. to create DC (direct current) offsets or to modulate parameters beyond their normal ranges

gate ....+1 while a note is being played, otherwise 0

velocity ....MIDI note velocity output

m-wheel ......modulation wheel (CC#01) output

p-wheel ....pitch bender output

ctrl-a ....breath control (CC#02) output by default, but assignable in Preferences

ctrl-b ....expression pedal (CC#11) output by default, but assignable in Preferences

pressure......aftertouch output: both polyphonic and channel pressure are recognized

keyf-1 ....note number. Unlike the dedicated filter 'keyfollow', keyf-1 pivots around E3 (MIDI note 64) so that lower notes can deliver negative values.

keyf-2 ....same as keyf-1 but includes the glide2 offset (see below)

random........a random value per note

alternate......toggles between +1 and -1, per note

stack............the stack index – for creating any kind of offsets between stacked voices (note: for pitch offsets, use the dedicated stacked voice tuning controls)

mapper........the mapping generator output

General Settings

The top left panel contains parameters that are not specific to individual modules:

output

The knob at the top right of the panel is ACE's **master volume** control.

Polyphony and Quality

mode

Determines the polyphony and how MIDI notes are interpreted.

poly ....polyphonic
mono ....monophonic, retrigger
legato.......monophonic, no retrigger
duo ....duophonic

voices

Only relevant for *poly* mode, this parameter sets the maximum number of notes that can be played before voice-stealing occurs.

few ....4 voices
medium....8 voices
many........16 voices

quality

draft, standard, good, accurate

The quality switch is mostly for controlling CPU load, an important consideration in ACE. Tip: start with *good* and compare the sound with other quality settings. Depending on modulation rates, filter distortion and/or whether the sound of high notes is important, *standard* or *draft* can be used without compromising the result.

stack

The number of voices played in unison. Up to 8 voices can be stacked for a very powerful unison effect like a few classic polyphonic synths e.g the Oberheim OBXa. However, ACE can still be played polyphonically. This is not a "supersaw", it is true unison i.e. the entire voice is multiplied.

Of course this feature eats a lot of CPU power, but we think it is worth it. For instance, multiple filter distortion on one note is more lively than a single filter could possibly be.

Using the stacked voice tuning knobs in the Tweak page, the 8 voices can be detuned within a range of +/- 24 semitones.

Pitch Settings

pb up / down

Separate pitchbend ranges, 0 to +/- 24 semitones, 36 (3 octaves) or 48 (4 octaves).

drift

If *on*, voices are slightly detuned against each other for a fuller, more lively sound.

transpose / tune

Transpose adjusts the overall pitch over a +/- 2 octave range.
Tune also adjusts the overall pitch over a +/- 100 cent range (+/- one semitone).

glide controls

Glide or 'portamento' is a smooth pitch transition between consecutive notes. In ACE it also affects the 'Key Follow' modulator.

glide ....controls either the *time* or the *rate*, depending on the state of the *glide mode* switch (see below)

glide2 ....offset relative to the glide value, applied to LFO2, VCO2 and VCF2 only. Careful use of this parameter can really bring static sounds to life!

range ....In classic polysynths, polyphonic portamento was seldom used except for special effects. In ACE, the range parameter can shift the initial position (where the glide starts) closer to the target note. This means that the glide can start "already half way there" for a more subtle effect.

Tip: for natural intonation effects, set the range to very low values.

glide mode ....*time:* the glide will take exactly the same time, however close together or far apart the notes are. *rate:* the glide is proportionally slower for notes thet are further apart.

Effects

The upper-right panel controls ACE's three post-VCA effects: Chorus, Delay and Tone…

Chorus

Traditionally, chorus is a simple very fast delay periodically shortened and lengthened by a dedicated LFO. The pitch of the delayed signal rises and falls like the *Doppler Effect* you hear when a fast car (or the classic example: an ambulance) passes by.

Mixing the delayed signal with the original dry signal results in a warm comb-filter effect similar to slightly detuned oscillators. As the delays are under 50 milliseconds, they blend well with the dry signal i.e. they aren't perceived as individual echoes.

Chorus can be made richer by using more than one delay line with different modulation depths and LFO phases. Most of today's chorus units are stereo, using two delay lines fully panned apart. The one in ACE has four different models – 3 varieties of chorus (4 or 8 voices) plus a classic phaser:

mode

Chorus 1 is a 4-voice chorus with triangle LFO. Triangle modulation keeps the detuning effect fairly constant and therefore more subtle than Chorus 2....

Chorus 2 is also 4-voice, but has a sine LFO for more dramatic movement.

Chorus 3 is an 8-voice chorus for lush ensemble effects – of course without the high noise floor typical of the original hardware units.

Phaser is a classic phaser with a more subtle comb-filter effect than the chorus models. The phaser includes a variable feedback instead of the mix parameter. Higher feedback values result in a very dramatic resonant or metallic (due to atonal phase shifting) effect. Tip: Set the depth to minimum for strong tonal coloration but no movement.

One special feature of ACE's chorus is that the low bass content of the signal bypasses the effect, which helps preserve the body of the sound – adding chorus in other synthesizers usually means losing a lot of "oomph".

rate

Speed of the effect's own modulation LFOs

mix

In all *chorus* modes, this knob controls the amount of delayed signal (0 to 50%), in *phaser* mode it controls the amount of resonance

center

Nominal delay time before modulation, affects the overall **tone** of the effect

depth

LFO modulation depth

Delay

Delay is another traditional effect often used in for synthetic sounds. Unlike chorus, the delay times are long enough for repeats to be perceived as individual echoes.

The first delay units used magnetic tape while the next (solid state) generation was made of *bucket brigades* – a large number of capacitors each provided a short delay, which were arranged in series to produce a single long delay. Both techniques had major drawbacks, the most serious of which were noise and lack of synchronization capability. However, these units do have their own special charm, which is why digital emulations of tape and bucket brigade delays are still available, as hardware or plugin effects.

In the '80s, when the price of memory dropped considerably, digital delays quickly displaced analogue – they were cheaper to manufacture, they were more precise and the sound quality was deemed better. However, most people in the 1980s were convinced that the early digital synths sounded much better than analogue... how times change!

ACE's delay is a simple low-noise digital type with two taps and synchronized timing...

times

Click on the button to select delay times/patterns:

off, *8th + 8th, 8th groove, 8th dotted,*

4th + 4th, 4th groove, 4th dotted, slap

mix

Dry/wet mix for the delay.

spread

The **spread** knob controls stereo width: at 100 the taps are panned 100% to the left and right channels, at 0.00 both taps are in the centre (mono), and at -100 the left and right taps are swapped.

feedback

The amount of delayed signal fed back into the delay input, which ultimately affects the number of echoes. As the delay is synchronized to the host application's clock, it's easy to set up precise rhythmic effects, and feedback can accentuate this.

damp

Reduces the high frequency content of successive echoes, emulating real spaces: high frequencies are more readily absorbed (by carpets, trees etc.) than low frequencies.

Tone controls

ACE doesn't have a classic EQ, but the pair of tone controls offer enough high and low boost for most purposes. In an attempt to achieve a bigger sound (often to make up for deficiencies in other areas), many digital synthesizers include a kind of "loudness contour". In contrast, ACE's basic sound is principally the same as analogue synthesizers: its filters do not deliver irritating treble or lifeless bass...

bass

As some analogue filters (notably classic Moog models) are famous for bass sounds, ACE lets you boost sub-bass frequencies by several decibels.

treble

Modern mixes often demand ultra-crisp highs from synthesizers. Analogue synths don't deliver these frequencies, but VA (virtual analogue) synths, with their purely digital filters, can. The treble control in ACE compensates for any possible losses due to the analogue-modeled oscillators and lowpass filters. ACE can sound as crisp as you like.

Effects On/Off

In the top righthand corner of the effects panel is a button that switches all effects on or off **globally**, so you can temporarily browse through the raw patches without any effects. Just remember to switch it back on afterwards!

Tweak Page

The **Tweak Page** is where you will find the thoroughly digital **mapping generator** plus anything else that doesn't fit on the main *synth* panel or is of secondary importance...

Mapping Generator

Mapping generators are alien to analogue synthesizers, and the mapping generator is the only "digital" type module implemented in ACE. Paradoxically, it is great for adding some of the important characteristics of analogue synthesizers – per-note tuning irregularities, non-linear modulation curves etc..

The mapping generator is a list of 128 editable values that can be used for various modulation purposes. For instance you can assign a separate value to every MIDI note (0 to 127) so that each one sounds consistently different, you can emulate a classic *round-robin* architecture or pan stacked voices apart etc..

The mapping generator actually has two outputs: Firstly, the socket at the bottom of the *synth* page labelled **mapper**. Secondly, the LFO2 output when in [tap map](#) mode.

map modes

Typical uses for ACE's mapping generator: quasi-random, sequencer, modulation-shaper

map smooth and **map quantized** – both these modes take a selectable source (including wheels and envelopes) to scan through the map. For instance, to transform a simple envelope into a complex one with hills and valleys, or make abrupt timbral changes via velocity etc.. In *map smooth* mode, the values are interpolated for softer transitions. In *map quantize* mode the values are not interpolated, so this is usually the better choice for e.g. sequencer-type effects or sharp transitions.

Note: A **mapping source** is only used in the *map smooth* and *map quantize* modes. It is ignored in *increment* and *key* modes...

increment – successive notes step through the map (play a few keys and watch the highlighted bar move from left to right). The default map is a list of 128 quasi-random values, but even a two-value map can be useful.

Example: To pan stacked voices apart, connect the mapping generator to VCA pan modulation, set *stack* to 2 and the number of mapping generator steps to 2, set the map values to maximum and minimum and the mode to *increment*.

key – selects a position within the map according to which notes are being played. If the map contains 128 values, these correspond directly to MIDI notes 0 to 127. If the numbers of steps is less than 128, the list is repeated. For instance, setting 12 steps will let you tune each note (C, C#...) in all octaves at the same time.

Drawing and Selection

To edit the map, simply draw in the window. For straight lines, hold down **ctrl** (Win) or **alt** (Mac) while drawing. To make a selection, hold down the **SHIFT** key: the functions (see below) are restricted to the selection. To deselect, either click in the background i.e. away from the selection, or choose 'deselect' from the *selection* sub-menu.

Context menu

Right-clicking on the Mapping Generator's edit window gives you access to various map editing tools. This newly expanded version is provisional – selecting tools will be much easier in future. For the time being, remember the following: holding down the **SHIFT** key lets you select a subset of the values in the window, and the **ALT** (Win) or **CMD** (Mac) key lets you apply the functions. Experiment with all these functions:

copy / paste – copies the current map to the clipboard, or replaces the current map with a previously copied one

shapes – ready-made *ramp, triangle, sine, cosine, root, quadric.* The *spectralize* function (see below) interprets the map as a harmonic series and replaces it with the actual waveform

alt-draw or **cmd-draw** – sets the drawing mode to *erase* (zero), *scale* (multiply), *shift* (2D move) or *warp* (2D bend).

selection – *deselect, invert, shift left, shift right, every 2nd, every 3rd,* or *every 4th.* If nothing is selected, only the 'every' options will appear in the submenu.

reverse – flips the current window or selection horizontally

invert – flips the current window or selection vertically

randomize – a random variation based on current values

soften – removes abrupt transitions

normalize – scales all values in the current window or selection so that the lowest and highest are at the bottom and top.

straighten – draws a straight line between the first and last values in the current window or selection

reset – sets all values in the current window or selection to zero

quantize 4, 6, 8, 12, 16, 24 – quantizes all values to the specified number of levels. Tip: the 12 and 24 settings are useful for setting up little sequences: connect the mapper output to a pitch input, set the amount to 12 or 24 semitones then use the *ramp generator* (with minimum *rest*) as mapping source. Simpler still: use LFO2 with the *tap map* waveform!

2 to 12, 16, 24, 32, 48, 64, 96 or 128 – sets the number of visible steps in the mapping generator. Note that the original data is retained when the number of steps is reduced.

copy
shapes ▶
cmd-draw ▶
selection ▶
reverse
invert
randomize
soften
normalize
make unipolar
straighten
reset
Quantise 4
Quantise 6
Quantise 8
Quantise 12
Quantise 16
Quantise 24
2
3
4
5
6
7
8
9
10
11
12
16
24
32
48
64
96
128
Lock

Spectralize

Especially useful for LFO2 *tap map* mode, the spectralize function in the shapes submenu interprets the map data as the levels of individual partials in the harmonic series. With random phases set per partial, these are transformed into the corresponding waveform and the number of values automatically set to maximum (128).

Stacked Voice Tuning

This block of knobs is used for tuning the individual voices within a [stack](). The total range for each voice is +/- 24 semitones, so as well as setting up mild detuning you can even create massive one-finger chords. For fine tuning, hold down the SHIFT key on your computer keyboard.

Important: Stacking voices will significantly increase the CPU-hit per played note.

Circuit Bending

slop

Attributed to Dave Smith of *Sequential Circuits* and *DSI,* this has recently become the term of choice for tuning instabilities. The Slop parameter in ACE adds slow random detuning.

crosstalk

Once considered an even less desirable feature of analogue synths than tuning instability, even crosstalk has its own special charm in this digital age. Quoting from Wikipedia:

Crosstalk is any phenomenon by which a signal transmitted on one circuit or channel of a transmission system creates an undesired effect in another circuit or channel.

osc cap failure

Finally, let's make sure the capacitors in your emulated analogue synth sound like they will need replacing very soon. No joke, that's what this parameter emulates... try it!

filter reset

none...............quasi 'free-running', transients may have a little analogue randomness

full..................reduces randomness by flushing the filter at the beginning of each note – presets with self-oscillating filters will fade in more slowly

full+click ......the same as full, but with an extra strong transient at the start of each note – use this mode for filter 'self-oscillation'.

Envelope Tweaks

fall/rise range

These two knobs affect the level after fall/rise for each of the two ADSRs. Normally this would be either maximum (positive fall/rise) or zero (negative fall/rise). The range knob sets a percentage of the difference (from the sustain level) instead of always 100%.

singing envs

Switching **singing envs** on causes the envelope of a new voice to start at the current level of the stolen voice's envelope instead of at zero, emulating the typical behaviour of classic analogue envelopes more closely.

ramp clock

This switch sets the maximum of the ramp generator stages to either absolute time or host-synchronized values: **0-20 sec** is absolute time with maximum 20 seconds per stage, while **1/1** and **4/4** are synchronized to song tempo. Note: The ramp generator scaling is absolutely linear, so setting e.g. an attack time of 25 will divide the maximum by four (i.e. it will be 5 seconds, 1/16 or 1/4 long)

Microtuning

ACE supports standard .TUN microtuning tables. Hundreds (or even thousands?) of tuning tables are available online, most of them free. Put any .tun files into the following folder:

Win	*C:\Users*YOU*\Documents\u-he\ACE.data\Tunefiles*
Mac	*Macintosh HD/Library/Application Support/u-he/Tunefiles/*

The location will differ if you selected non-standard paths during installation.

Configuration

New in version 1.3.1 – click on the cogwheel icon at the top right to open the global configuration pages where you can connect ACE parameters to MIDI continuous controllers as well as specify several global preferences.

A vertical row of buttons appears instead of the cogwheel:
Close [X], MIDI Learn [L], MIDI Table [≡] or Preferences [tools].

Tip: Right-click within the row of buttons to set the current page as default.

MIDI Control

MIDI Learn

ACE can be remote-controlled / automated via MIDI messages from a hardware controller unit or from your host sequencer. Click on the configuration button and select the 'L' icon…


The MIDI Learn window is an overlay with all MIDI-learnable elements appearing as selectable outlines. Controls that are already assigned appear filled (like a few of the controls in this image), and the currently active control is highlighted.

Try it: Click on the Filter 1 cutoff knob and send ACE some MIDI CC (continuous controller) data i.e. move a knob or slider on your MIDI controller. The connection is made instantly, and applies to all instances of ACE.

Note that the SYNTH and TWEAKS buttons remain active while the MIDI Learn page is open, so you don't have to exit the configuration pages to access all parameters.

MIDI Table

Click on the configuration button and select the '≡' MIDI icon button to open an editable list of all current MIDI CC assignments…
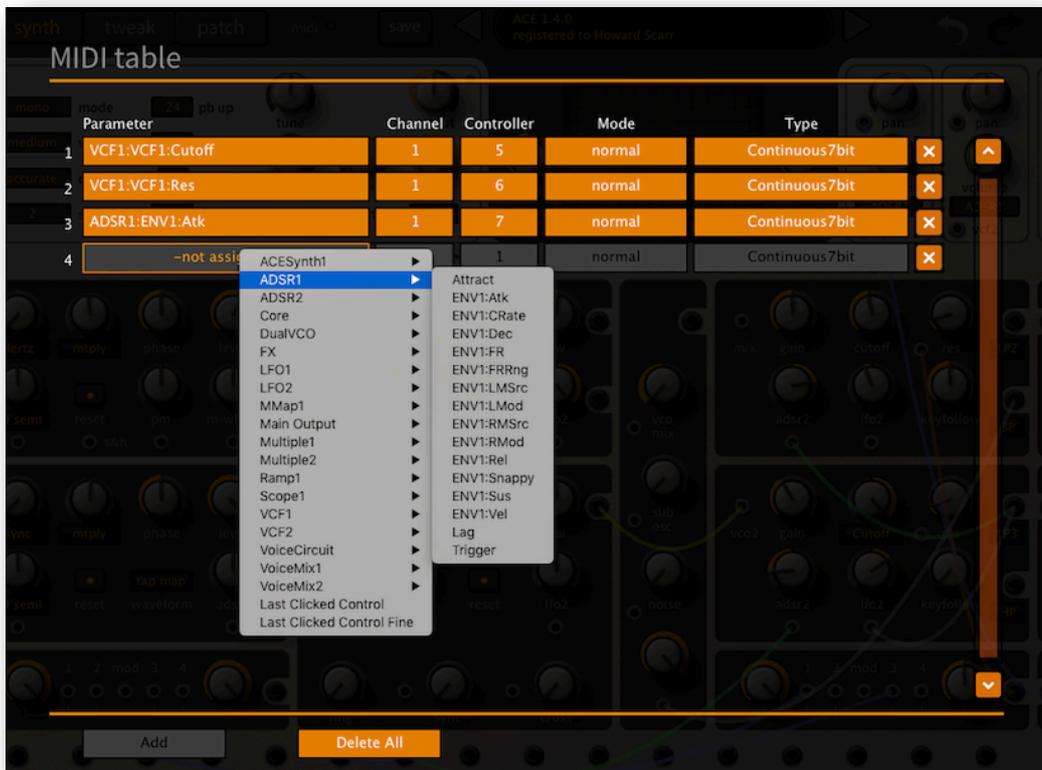
Parameter

The first field displays/selects one of ACE's many parameters, sorted into sub-menus. Click on the 'Add' button at the bottom and experiment with this option. Delete any un-wanted assignments by clicking on the small [x] to the right of each line.

Here's an experimental feature... At the very bottom of the Parameter menu are two extra options. Select *Last Clicked Control*, enter a Controller number and exit the configuration pages. The most recently clicked knob or switch will now respond to that CC! The *Last Clicked Control Fine* option is similar, but with a significantly reduced range.

Channel / Controller

The next two fields are for MIDI channel and CC number. ACE is channel-sensitive, so you can map up to 16 channels for… let's say "lots" of control assignments.

Mode

Specifies the range and/or resolution of values.

normal ....full range, continuous
integer ....full range, whole numbers only
fine ....0.01 steps between the two integers closest to the current value

Type

Specifies the type of hardware (by far the most common is Continuous 7-bit).

Encoder 127 ....unipolar encoder ("relative")
Encoder 64 ....bipolar encoder ("relative")
Continuous 7-bit ....7-bit MIDI CC (normal resolution, common)
Continuous 14-bit ......14-bit MIDI CC (high resolution, rare)
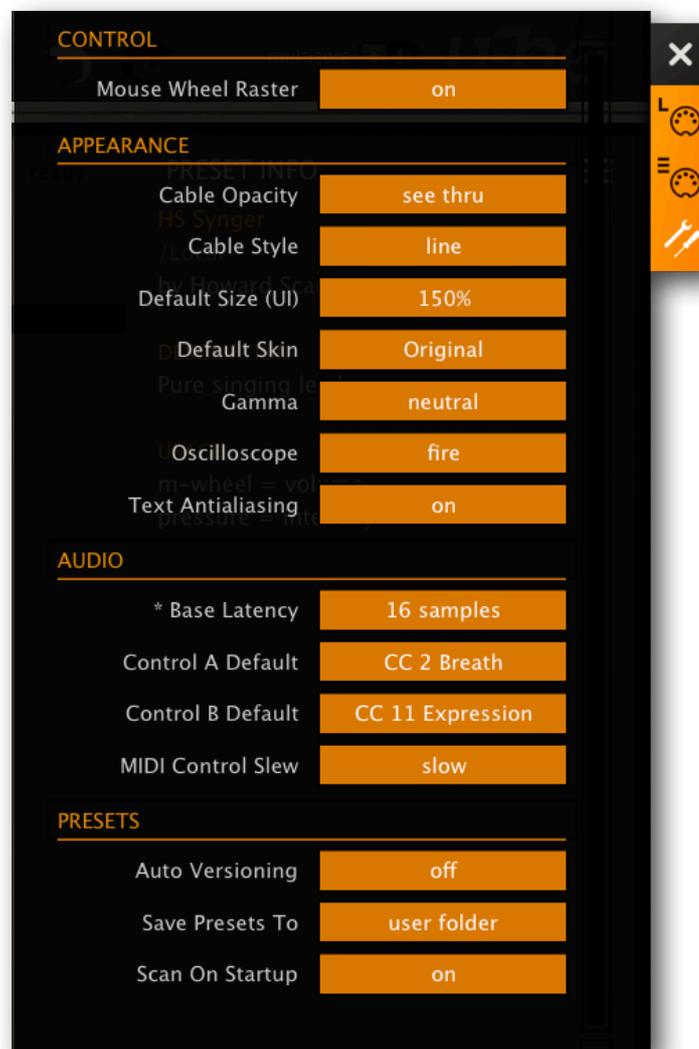
Delete

To remove individual assignments, click on the [x] to the right of each line. To remove all assignments, click on the *Delete All* button at the bottom.

Preferences

Click on the 'tools' icon to open the global **preferences** window:

CONTROL	
Mouse Wheel Raster	on

APPEARANCE	
Cable Opacity	see thru
Cable Style	line
Default Size (UI)	150%
Default Skin	Original
Gamma	neutral
Oscilloscope	fire
Text Antialiasing	on

AUDIO	
* Base Latency	16 samples
Control A Default	CC 2 Breath
Control B Default	CC 11 Expression
MIDI Control Slew	slow

PRESETS	
Auto Versioning	off
Save Presets To	user folder
Scan On Startup	on

CONTROL

Mouse Wheel Raster

If your mouse wheel is rastered (you can feel it clicking slightly as you roll the wheel), set to '*on*'. Each click should now increment / decrement by a more sensible step.

APPEARANCE

Cable Opacity

4 options *(solid* to *ghosted)*.

Cable Style

5 options (*thick* to *natural)*.

Default Size (UI)

The window size for each new instance of ACE. Note that you can temporarily change the size without entering the *Preferences* page – right-click in the background.

Default Skin

This option will only appear if ACE finds at least one alternative skin when it loads. Change this to set the global default.

Gamma

Brightness control.

Oscilloscope

How the oscilloscope wave is drawn, 5 options (*eco* uses the least CPU).

Text Antialiasing

Smoothing of all text elements. In rare cases, switching this off improves readability.

AUDIO

Base Latency

If you are certain that your audio system – hardware as well as software – uses buffers that are a multiple of 16 samples in size (please refer to the respective documentation), you can disable ACE's base latency. Otherwise leave it set to the default '16 samples' to prevent crackles. Note that a new Base Latency setting will only take effect when the host allows e.g. on playback or after switching the sample rate. Reloading ACE will always work.

MORE ABOUT BUFFERS

Internally, ACE processes audio in chunks of n x 16 samples. This 'block processing' method significantly reduces the CPU load and memory usage of all our plug-ins.

If the number of samples to be processed is say 41, ACE processes the first 32 and keeps the remaining 9 in a small buffer (16 samples is enough). Those 9 samples are then processed at the start of the next call… and so on.

The extra buffer is only necessary if the host or audio driver processes 'unusual' buffer sizes. In the many host applications that process buffers of e.g. 64, 128, 256 or 512 samples (all multiples of 16), try switching it off so that ACE can process latency-free.

Control A/B Default

The list of modulation sources in previous ACE versions included the fixed MIDI controls Breath (CC#02) and Xpress (CC#11). While retaining backwards compatibility, we replaced these with the user-definable **Control A** and **Control B** sources.

MIDI Control Slew

This option lets you change performance control smoothing (pitch bend, modulation wheel, breath, expression and aftertouch). The default setting is 'fast'.

PRESETS

Auto Versioning

If switched on, an index is appended to the preset name and automatically incremented each time you save it. For instance, saving 'Space' three times in a row would give you three files: 'Space', 'Space 2' and 'Space 3'

Save Presets To

The default *user folder* option causes all saved presets to land in the User folder (or a selected subdirectory). If you prefer to have complete control, change this to *selected folder* – but always remember to select a folder before saving your patch.

Scan On Startup

Whether the preset library should be scanned and the database recreated when the first instance of ACE is started, e.g. when you reopen a project.