

# USER MANUAL

# CS-80 V

**ARTURIA**<sup>®</sup>  
YOUR EXPERIENCE • YOUR SOUND

---

## Direction

---

Frédéric Brun

Kevin Molcard

---

## Development

---

Stefano D'Angelo

Samuel Limier

Baptiste Aubry

Germain Marzin

Corentin Comte

Mathieu Nocenti

Baptiste Le Goff

Pierre Pfister

Pierre-Lin Laneyrie

Benjamin Renard

Valentin Lepetit

---

## Design

---

Glen Darcey

Sebastien Rochard

Yannick Bonnefoy

Greg Vezon

Morgan Perrier,

---

## Sound Design

---

Jean-Baptiste Arthus

Jean-Michel Blanchet

---

## Manual

---

Jason Valax

---

## Special Thanks

---

Alejandro Cajica

Sergio Martinez

Denis Efendic

Shaba Martinez,

Ruary Galbraith

Miguel Moreno

Dennis Hurwitz

Daniel Saban

Clif Johnston

Carlos Tejeda,

Koshdukai

Scot Todd-Coate

Joop van der Linden

© ARTURIA S.A. – 1999-2016 – All rights reserved.

11 Chemin de la Dhuy

38240 Meylan

FRANCE

<http://www.arturia.com>

# Table of Contents

1	INTRODUCTION .....	6
1.1	The birth of the Yamaha™ CS-80.....	6
1.2	Why a virtual CS-80? .....	8
1.3	Arturia's secret ingredient: TAE® .....	9
1.3.1	Aliasing-free oscillators .....	9
1.3.2	A better reproduction of analog oscillator waveforms.....	10
1.3.3	Direct Filter Circuit Modeling .....	12
2	ACTIVATION AND FIRST START .....	14
2.1	Register and Activate.....	14
2.2	Initial setup .....	14
2.2.1	Audio and MIDI settings: Windows.....	14
2.2.2	Audio and MIDI settings: Mac OS X .....	17
2.2.3	Using CS-80 V in plug-in mode .....	17
3	USER INTERFACE .....	18
3.1	The virtual keyboard .....	18
3.2	Toolbar.....	18
3.2.1	Save Preset .....	18
3.2.2	Save Preset As.....	19
3.2.3	Import preset .....	19
3.2.4	Export preset.....	20
3.2.5	Resize window options .....	20
3.2.6	Audio settings .....	21
3.2.7	Preset browser overview .....	21
3.2.8	MIDI Learn assignment .....	21
3.2.8.1	Assigning / unassigning controls.....	22
3.2.8.2	Min / Max value sliders.....	23
3.2.8.3	Relative control option.....	23
3.2.8.4	Reserved MIDI CC numbers .....	23
3.2.9	MIDI controller configuration.....	24
3.2.10	The lower toolbar.....	24
3.2.10.1	Current control value .....	24
3.2.10.2	Midi Channel Setting.....	25
3.2.10.3	Panic button and CPU meter .....	25
3.2.10.4	Polyphony multiplier .....	25
3.3	The Preset Browser.....	26
3.3.1	Searching presets .....	26
3.3.2	Using tags as a filter.....	26
3.3.3	The Preset Info section.....	28
3.3.4	Preset selection: other methods.....	28
3.3.4.1	Selecting a preset by its Type .....	29
3.3.5	Playlists .....	30

3.3.5.1	Add a playlist.....	30
3.3.5.2	Add a preset.....	30
3.3.5.3	Re-order the presets .....	31
3.3.5.4	Remove a preset .....	31
3.3.5.5	Delete a playlist.....	31
3.4	Overview of the CS-80 V sections .....	32
3.4.1	Overview of the Single mode (CS-80).....	33
3.4.2	Overview of the Multi Mode .....	34
3.4.3	Overview of the effects section.....	35
3.4.4	Overview of the modulation matrix.....	35
3.5	Single mode in details .....	36
3.5.1	Two lines of synthesis.....	36
3.5.2	The modulation matrix.....	40
3.5.3	The sub-oscillator .....	41
3.5.4	The keyboard modulations .....	42
3.5.5	The ring modulator .....	43
3.5.6	chorus/tremolo .....	43
3.5.7	Stereo delay .....	44
3.5.8	The pedals .....	44
3.5.9	The arpeggiator.....	45
3.5.10	The original preset buttons .....	46
3.5.11	The ribbon.....	46
3.5.12	General settings.....	46
3.6	The Multi mode .....	47
4	THE BASICS OF SUBTRACTIVE SYNTHESIS .....	50
4.1	The three main elements .....	50
4.1.1	The oscillator (VCO) .....	50
4.1.2	The filter or VCF.....	54
4.1.3	The amplifier or VCA.....	57
4.2	Other modules .....	57
4.2.1	The keyboard.....	57
4.2.2	The envelope generator .....	58
4.2.3	The low frequency oscillator .....	59
5	A FEW ELEMENTS OF SOUND DESIGN .....	61
5.1	Subtractive sound synthesis.....	61
5.1.1	A basic sound.....	61
5.1.2	The modulation matrix.....	62
5.1.3	Use of real time controllers .....	64
5.1.3.1	Velocity and aftertouch .....	64
5.1.3.2	The ring modulator.....	64
5.2	Multi Mode.....	65
5.2.1	Four different sounds on the keyboard.....	66
5.2.2	A composite sonority in unison mode.....	66

5.2.3	<i>Introduction of the arpeggiator in a Multi preset</i> .....	67
5.3	<i>Other sides of the CS-80V</i> .....	69
5.3.1	<i>A step sequencer</i> .....	69
5.3.2	<i>Stereo sound without the effects</i> .....	70
6	<b>END USER LICENSE AGREEMENT</b> .....	71

# 1 INTRODUCTION

Arturia would like to thank you for purchasing our synthesizer model: the CS-80 V. We are confident it will prove to be an extremely valuable addition to your music production studio. If you've purchased our products before, you know we pride ourselves in faithfully recreating the sound and feel of the original instruments, down to the smallest detail. CS-80 V is no exception to this rule.

And if this is the first of our products you have owned, you are in for a treat! The synthesizer upon which this model is based was the absolute pinnacle of analog synthesizer technology at the time, light-years ahead of the competition.

---

## 1.1 The birth of the Yamaha™ CS-80

Yamaha™ was created at the end of the 19<sup>th</sup> century, in Hamamatsu, Japan.

The first electronic instrument, the Electone D-1 electronic organ, was designed and built in 1959. But the history of the CS-80 began when, in 1974, the GX-1 was released.



*The GX-1*

The GX-1 was an analog polyphonic synthesizer that was built in order to test the market. It costed \$60,000 and was premiered in the US in 1973 at the NAMM convention. Keith Emerson, John Paul Jones of Led Zeppelin, Jurgen Fritz of Triumvirat and Stevie Wonder all bought one. Stevie Wonder called it “the Dream Machine”.

One of the strong features of the GX-1 is the superposition of the two full-sized velocity-sensitive keyboards. The CS-80V, with the Multi mode, allows the creation of the same type of sounds that the GX-1 offered.

In 1976, Yamaha™ introduced the CS-80, which has the same circuits as the GX-1. The price tag (\$6,900) put it out of the reach of most musicians, and the weight (83 kg with stand) made it sometimes hard to use on stage.

But the qualities of this synthesizer, considered Japan's first great synthesizer, made it immediately famous in the Music Industry.



The CS-80

The CS-80 was made popular in the late 70's and early 80's by a number of pop groups, including Electric Light Orchestra, Toto, Paul McCartney and Wings. Other artists and bands like Vangelis, Bon Jovi, Jean-Michel Jarre, Geoffrey Down, Stevie Wonder and some others managed to turn the CS-80 into a real myth.

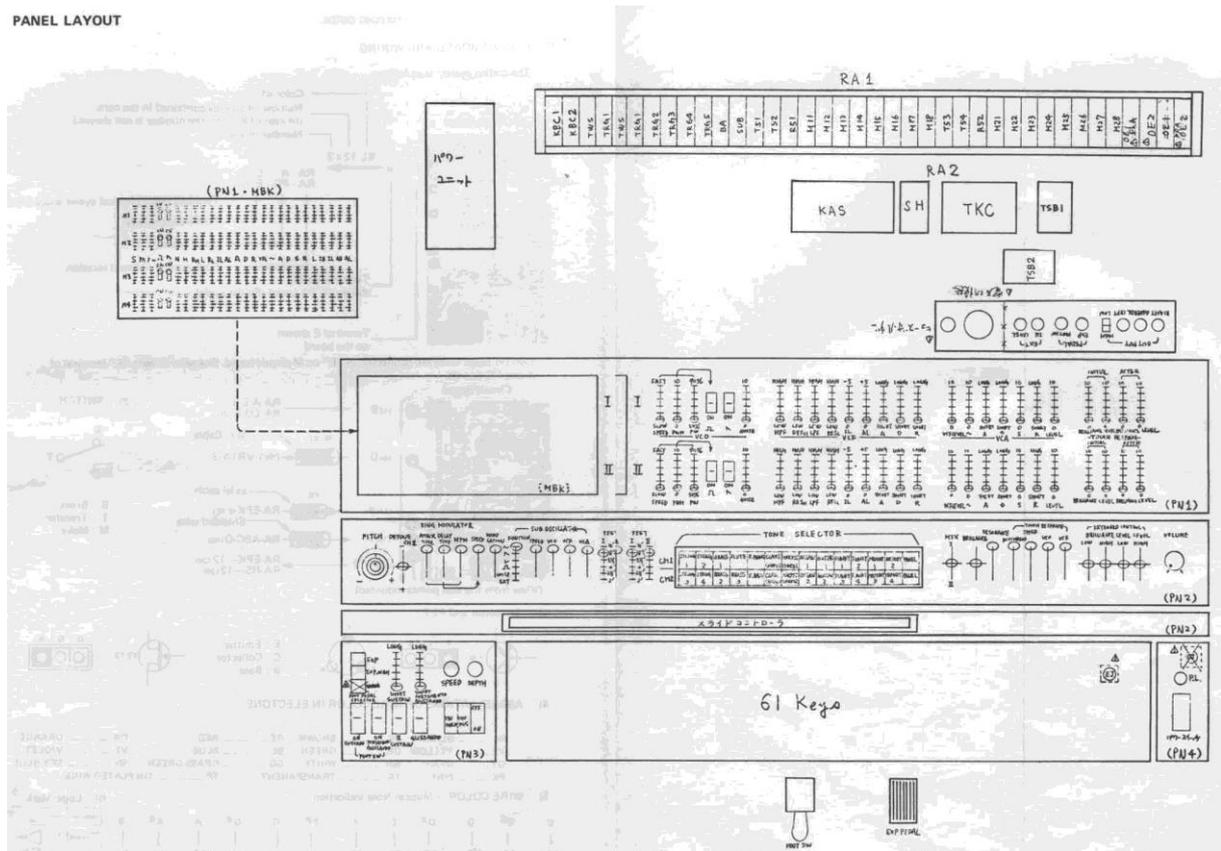
Let us quote Matt Friedmann from *the Vintage Synth Explorer* website:

*"No synth sounds greater. The best examples for its extremely fat sound are 'Blade Runner', 'Mask', or 'Bounty' by Vangelis as well as 'Dune' by Toto. (...)*

*With two analog oscillators per voice, the CS-80 has the potential for some really phat sounds. A great VCF filter with independent hi pass and low-pass resonant filters, a powerful ring modulator and plenty of modulation controls further enhance the CS-80's sonic potential. There are 22 preset sounds (6 user) selected from bright and ugly colored buttons above the keyboard. The keyboard is weighted and has a full 61 keys with performance controllers for vibrato, pitch, brightness and volume. Surprisingly there's also a ribbon controller for the pitch-bending. There is no MIDI or CV/Gate."*

The first edition of the service manual has a lot of hand-drawn pages, including the main panel layout.

PANEL LAYOUT



The CS-80 Service Manual

In conclusion, let's also quote another huge reference in the field: Peter Forrest (in *The A-Z of Analogue Synthesizers*, Susurreal, First published 31/10/96):

*"When it comes to trying to decide which of the top-flight synths is the best ever, it's not easy. From almost any practical viewpoint, and in terms of versatility of sound, there are a lot of instruments which wipe the floor with the CS-80. But if you are looking at richness of sound coupled with performance power, and sheer overkill, maybe nothing can touch it."*

The CS-80V provides all the features of the original CS-80. But it offers also a unique Multi mode and a modulation matrix to create entirely new sounds. It also comes with a wide selection of presets.

We hope you will enjoy it as much as musicians enjoyed playing the original.

## 1.2 Why a virtual CS-80?

Only 3,000 CS-80 synthesizers were manufactured. Weighing in at more than 80 kg, it takes at least two people to move it. And even though few have had the occasion to own one, it remains a favorite among musicians and amateurs alike. Some famous artists have gone as far as buying several, to have a permanent stock of spare parts.

Why such a success? With two independent lines of synthesis, the CS-80 offers an original structure, at the same time simple and rich. The ergonomics of the machine offered an approach that inspired musicians: moving a knob, modifying a wheel can be enough to radically transform a sound.

But this synthesizer, reproduced identically, despite its particular structure would bring little innovation to today's musical landscape.

Arturia has thus brought new life to the myth, remaining faithful to the sound and the functionality, but also taking it several steps further. As you will see, these new additions bring a new lease of life to the CS-80V.

The possibility to affect a different sound to each of the polyphonic voices, an independent keyboard management, positioning in stereo space and particular tuning allow the amplification of the unique presence and the sonorities of this polyphonic synthesizer. New combinations have emerged, and the Multimode will open enormous perspectives for those who take the time to discover its characteristics.

To this we have added a modulation matrix, which widens the possibilities of creative combinations.

A new version which respects the past while bringing the possibilities of the present and future, this was our vision for this CS-80V.

### **1.3 Arturia's secret ingredient: TAE®**

TAE® (True Analog Emulation) is Arturia's outstanding technology dedicated to the digital reproduction of the analog circuits used in vintage synthesizers.

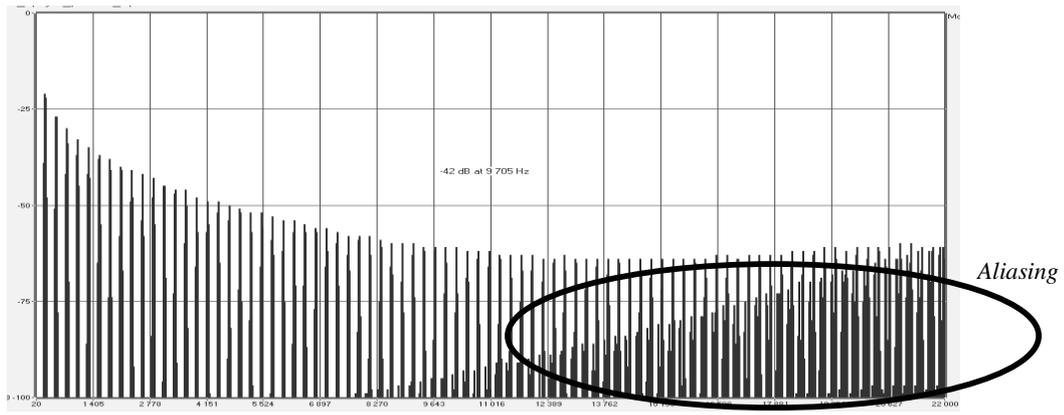
TAE®'s software algorithms result in spot-on emulation of analog hardware. This is why CS-80 V offers an unparalleled quality of sound, as do all of Arturia's virtual synthesizers.

TAE® combines three major advances in the domain of synthesis:

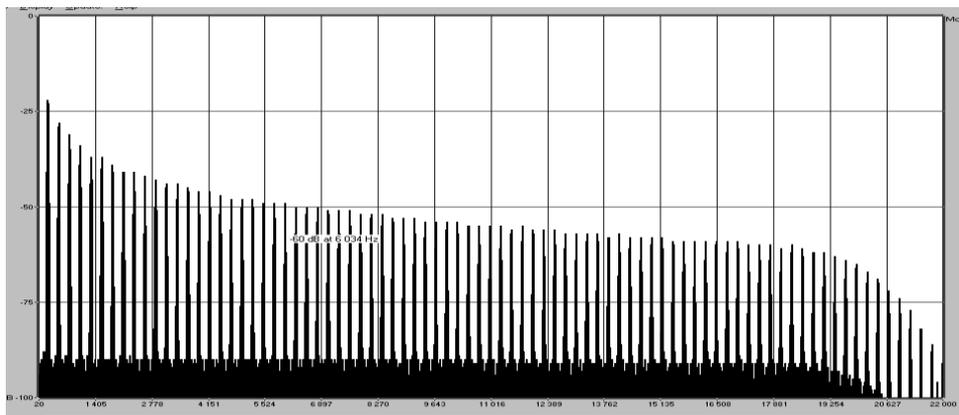
#### **1.3.1 Aliasing-free oscillators**

Standard digital synthesizers produce aliasing in high frequencies, especially when using Pulse Width Modulation (PWM) or Frequency Modulation (FM).

TAE® enables the generation of oscillators which are completely free of aliasing in all contexts (PWM, FM...), and at no extra CPU cost.



*Linear frequency spectrum of a current well-known software synthesizer*

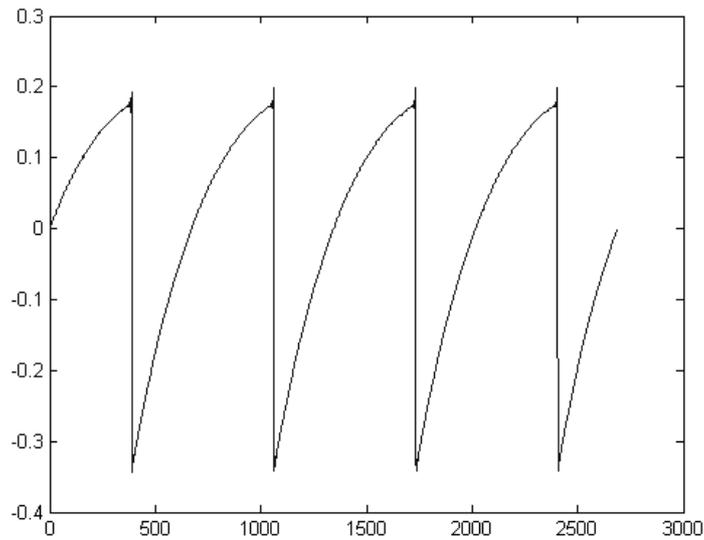


*Linear frequency spectrum of an oscillator modeled with TAE®*

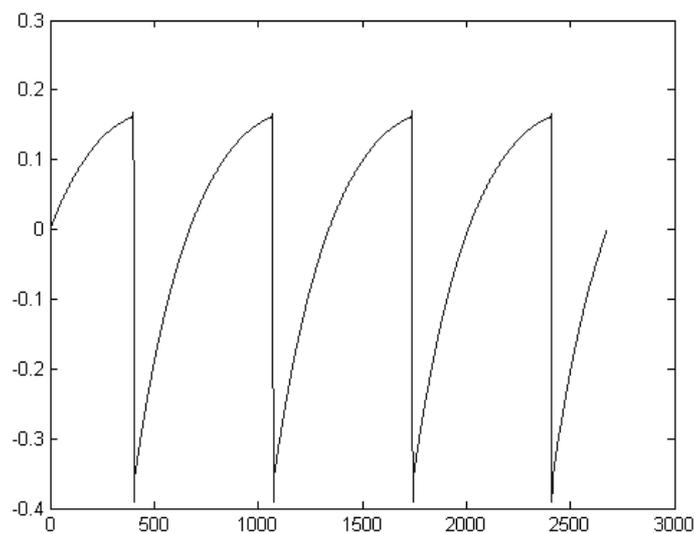
### **1.3.2 A better reproduction of analog oscillator waveforms**

The waveforms produced by the oscillators in analog synthesizers are affected by the presence of a capacitor in the circuits. The discharge of a capacitor results in a slight 'bend' in the original waveform (most notably for sawtooth, triangular and square waveforms). TAE® reproduces the result of this capacitor discharge in software.

Below is the analysis of a waveform from one of the five original instruments Arturia's software emulates, followed by one made by TAE®. They are both equally deformed by the low-pass and high-pass filtering.



*Temporal representation of the “sawtooth” waveform of a hardware synthesizer*



*Temporal representation of a “sawtooth” waveform reproduced by TAE®*

What's more, the hardware analog oscillators were unstable. In fact, their waveforms vary slightly from one period to another. If we add to this the fact that the starting point for each period (in Trigger mode) can vary with the temperature and other environmental conditions, we see why vintage synthesizers have such a typical sound.

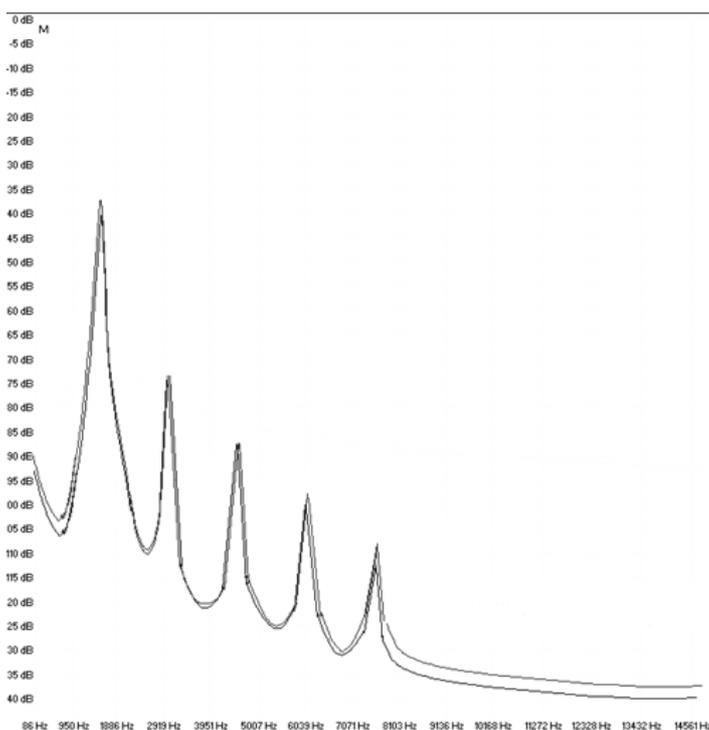
TAE® reproduces the instability of oscillators, resulting in a fatter and “bigger” sound.

### 1.3.3 Direct Filter Circuit Modeling

Due to advances in computer processing power, TAE® can now employ direct filter modeling techniques to achieve unprecedented accuracy in the emulation of a hardware synthesizer's filter. By modeling the operation of the individual hardware components of the filter circuit, the warm nuances synonymous with analog sounds are recreated.

The following graph shows a single example of direct circuit modeling in action. The peaks represent the generation of harmonics at multiples of the resonant frequency when a particular filter is in self oscillation mode. These harmonics are characteristic of hardware synthesizer filters and are due to the non-linear behavior inherent to their analog circuitry. Anomalies such as these add to the richness and warmth of the sound produced by the filter.

But you'll notice there are two lines on the graph: Those are the superimposed frequency domain plots for both one of Arturia's virtual instruments and the hardware filter being emulated. They are practically indistinguishable, both on the graph and to the human ear. The direct recreation of this analog circuitry causes the same characteristics of the sound to be present, thus giving the user a truly analog sound.



*Comparison of harmonics generated by the filter circuits in self-oscillation of TAE® and a hardware synthesizer*

So here's the bottom line: when you bring together a bunch of music lovers who also have a deep understanding of the characteristics of electronic circuits, you wind up with Arturia. And Arturia now offers you our most impressive software model yet, the CS-80 V.

We take great satisfaction in knowing this great synthesizer will help you explore previously unknown musical territory.

## 2 ACTIVATION AND FIRST START

### 2.1 Register and Activate

CS-80 V works on computers equipped with Windows 7 or later and Mac OS X 10.8 or later. You can use the stand-alone version or use CS-80 V as an Audio Units, AAX, VST2 or VST3 instrument.



Once CS-80 V has been installed, the next step is to register the software.

The registration process will require you to enter the serial number and the unlock code you received with the product.

In order to proceed, go to this web page and follow the instructions:

<http://www.arturia.com/register>

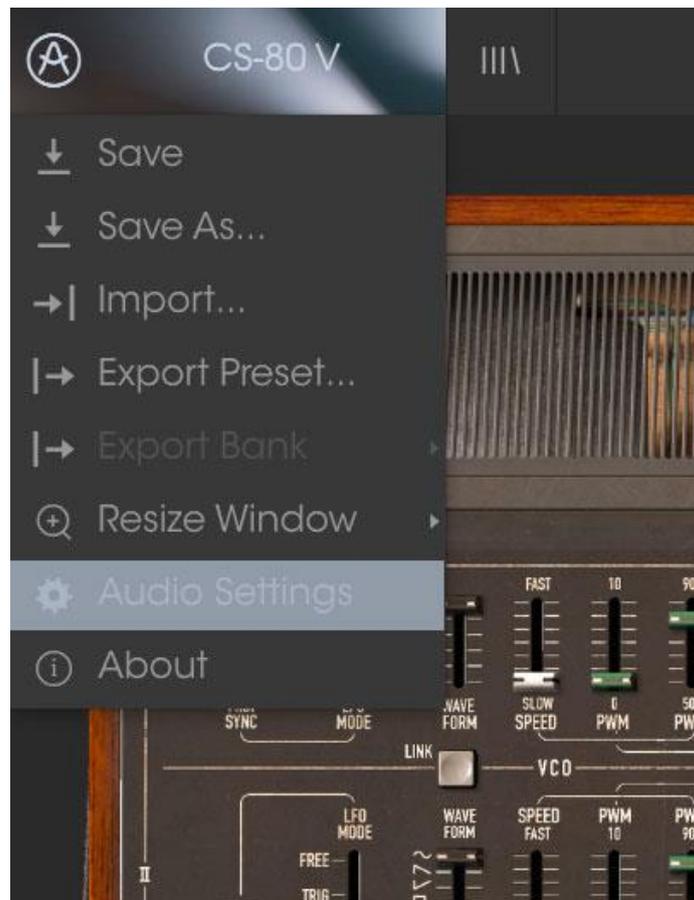
Note: If you don't have an Arturia account yet, you will need to create one. The process is quick, but it does require that you can access your email address during the registration process.

Once you have acquired an Arturia account you will be able to register the product.

### 2.2 Initial setup

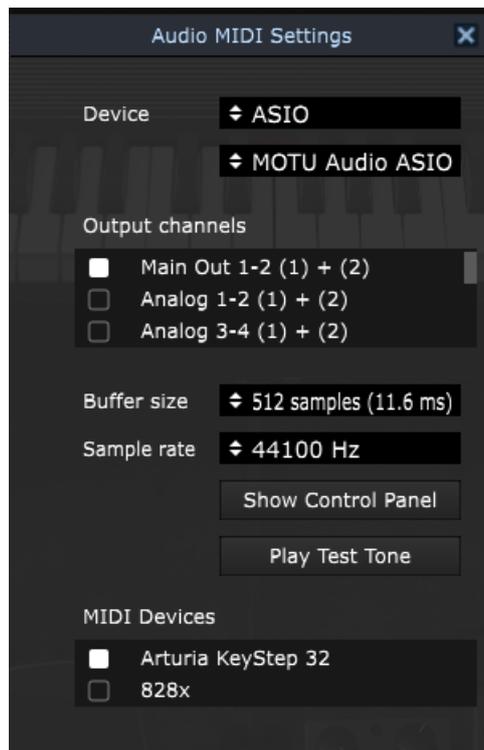
#### 2.2.1 Audio and MIDI settings: Windows

At the top left of the CS-80 V application is a pull-down menu. It contains various setup options. Initially you will need to go to the menu and choose the Audio Settings option to get sound and MIDI flowing in and out.



*CS-80 V main menu*

You will then see the Audio MIDI settings window. This works in the same way on both Windows and Mac OS X, although the names of the devices available to you will depend on the hardware you are using.



*Audio and MIDI settings window*

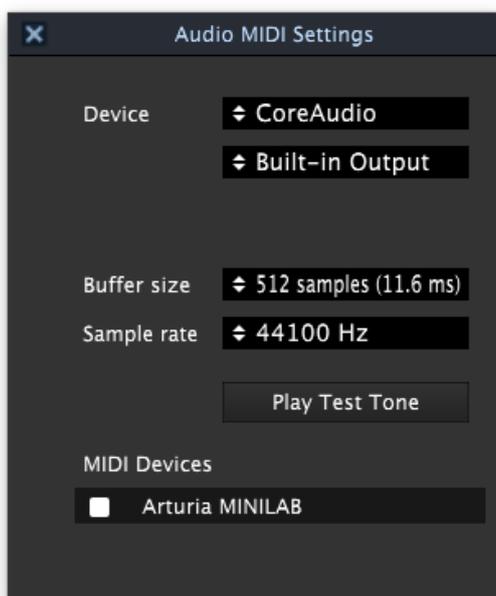
Starting from the top you have the following options:

- **Device** lets you choose which audio driver you want to use to route sound out of the instrument. This might be your computer's own driver like Windows Audio, or an ASIO driver. The name of your hardware interface may appear in this field.
- **Output Channels** lets you select which of the available outputs will be used to route audio out. If you only have two outputs, only two will appear as options. If you have more than two you can select a specific pair of outputs.
- The **Buffer Size** menu lets you select the size of the audio buffer your computer uses to calculate sound. A smaller buffer means lower latency between pressing a key and hearing the note. A larger buffer means a lower CPU load as the computer has more time to think, but can result in a small latency. Find the optimum buffer size for your system. A fast, modern computer should easily be able to operate at 256 or 128 sample buffer size without creating pops or clicks in the sound. If you are getting clicks, try raising the buffer a little. The latency is displayed on the right hand side of this menu.
- The **Sample Rate** menu lets you set the sample rate at which audio is sent out of the instrument. The options here will depend on the capability of your audio interface hardware though even most computers' own hardware can operate at up to 48kHz which is perfectly fine. Higher sample rates use more CPU power so unless you have a good reason to go up to 96kHz, then 44.1k or 48k is usually fine. The **Show Control Panel** button will jump to the system control panel for whatever audio device is selected.
- **Play Test Tone** helps you to troubleshoot audio issues by confirming whether sound can be heard through the correct device.

- Your connected MIDI devices will appear in the **MIDI Devices** area. Click the check box to accept MIDI from the device you want to use to trigger the instrument. In standalone mode, CS-80 V listens for all MIDI channels so there's no need to specify a channel. You can specify more than one MIDI device at once.

### 2.2.2 Audio and MIDI settings: Mac OS X

The process is very similar to initial setup for Windows and the menu is accessed in the same way. The difference is that OS X uses CoreAudio to handle audio routing and the audio device selection is made in the second dropdown menu. Apart from that, the options work the same way as described in the Windows section.



### 2.2.3 Using CS-80 V in plug-in mode

CS-80 V comes in VST, AU and AAX plug-in formats for use in all major DAW software such as Cubase, Logic, Pro Tools and so on. You can load it as a plug-in instrument and its interface and settings work the same way as in standalone mode, with a couple of differences.

- You can automate numerous parameters using your DAW's automation system.
- You can use more than one instance of CS-80 V in a DAW project. In standalone mode you can only use one at once.
- You can route CS-80 V's audio outputs more creatively inside your DAW using the DAW's own audio routing system.

## 3 USER INTERFACE

In this chapter we will give an overview of the features available to you with CS-80 V. As with every Arturia product, we have gone to great lengths to make the use of this software instrument as simple and as much fun as possible, while also striving to make sure you never run out of new things to do with it as your knowledge expands. After reading this chapter you should be ready to delve as deeply into the workings of CS-80 V as you would like.

### 3.1 The virtual keyboard

The virtual keyboard lets you play a sound without connecting an external MIDI device; just click a key to hear the active Voice. Drag the cursor across the keys to hear a glissando.



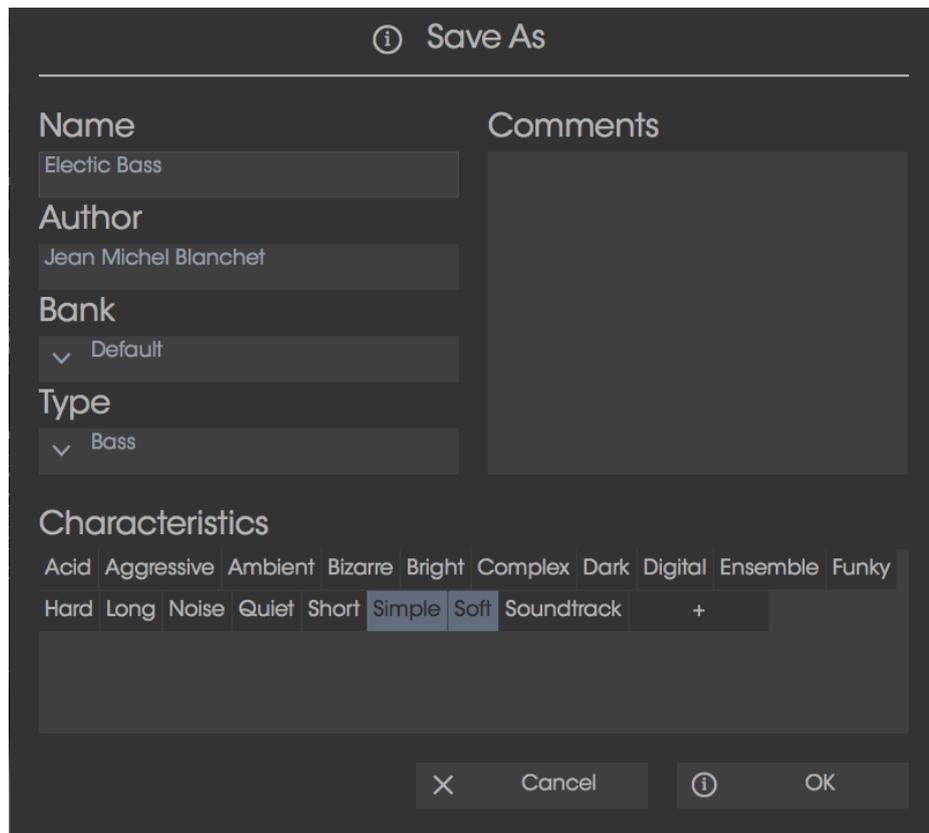
*The CS-80 V virtual keyboard*

### 3.2 Toolbar

The toolbar that runs along the top edge of the instrument both in standalone and plug-in mode provides access to many useful features. Let's look at them in detail. The first seven of these options can be found by clicking on the CS-80 V section at the very top left hand corner of the instrument window.

#### 3.2.1 Save Preset

The first option lets you save a preset. If you select this, you are presented with a window where you can enter information about the preset. In addition to naming it you can enter the author name, select a bank and type and select some tags that describe the sound. This information can be read by the preset browser and is useful for searching the preset banks later. You can also enter freeform text comments in the Comments field, which is handy for providing a more detailed description.



*The Save Preset window*

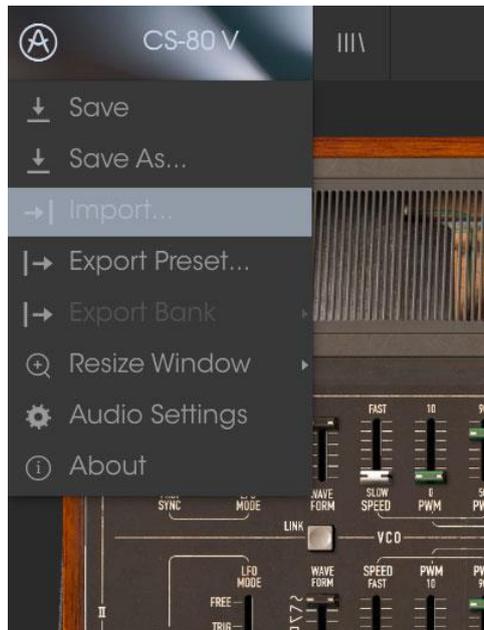
### **3.2.2 Save Preset As...**

This works in the same way as the Save command, but lets you save a copy of the preset instead of saving over the original. It's useful for creating variations on patches but still keeping individual copies of each one.

### **3.2.3 Import preset**

This command lets you import a preset file, which can be either a single preset or an entire bank of presets. Both types are stored in the .csx format.

After selecting this option, the default path to these files will appear in the window, but you can navigate to whichever folder you are using.

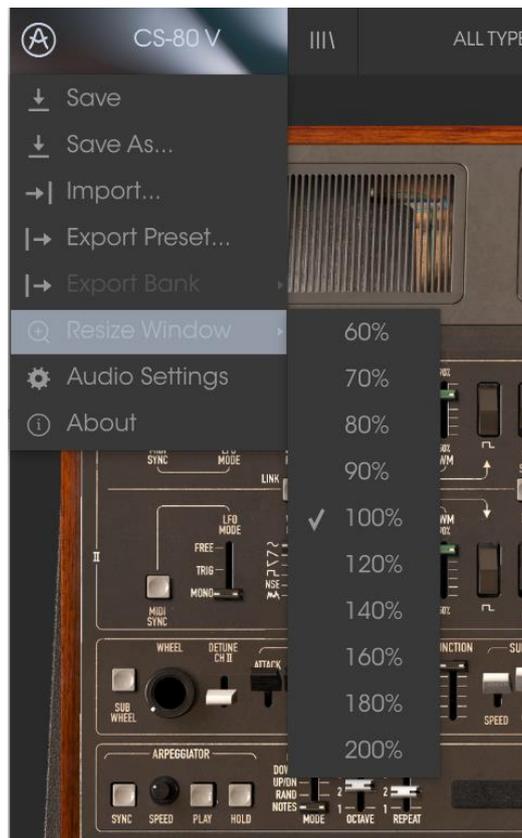


### 3.2.4 Export preset

You can export and share a single preset using this command. The default path to these files will appear in the window, but you can create a folder at another location if you like.

### 3.2.5 Resize window options

The CS-80 V window can be resized from 60% to 200% of its original size without any visual artifacts. On a smaller screen such as a laptop you might want to reduce the interface size so it doesn't dominate the display. On a larger screen or a second monitor you can increase the size to get a better view of the controls. The controls work the same at any zoom level but the smaller ones can be harder to see at the smaller magnification values.



*The Resize Window menu*

### **3.2.6 Audio settings**

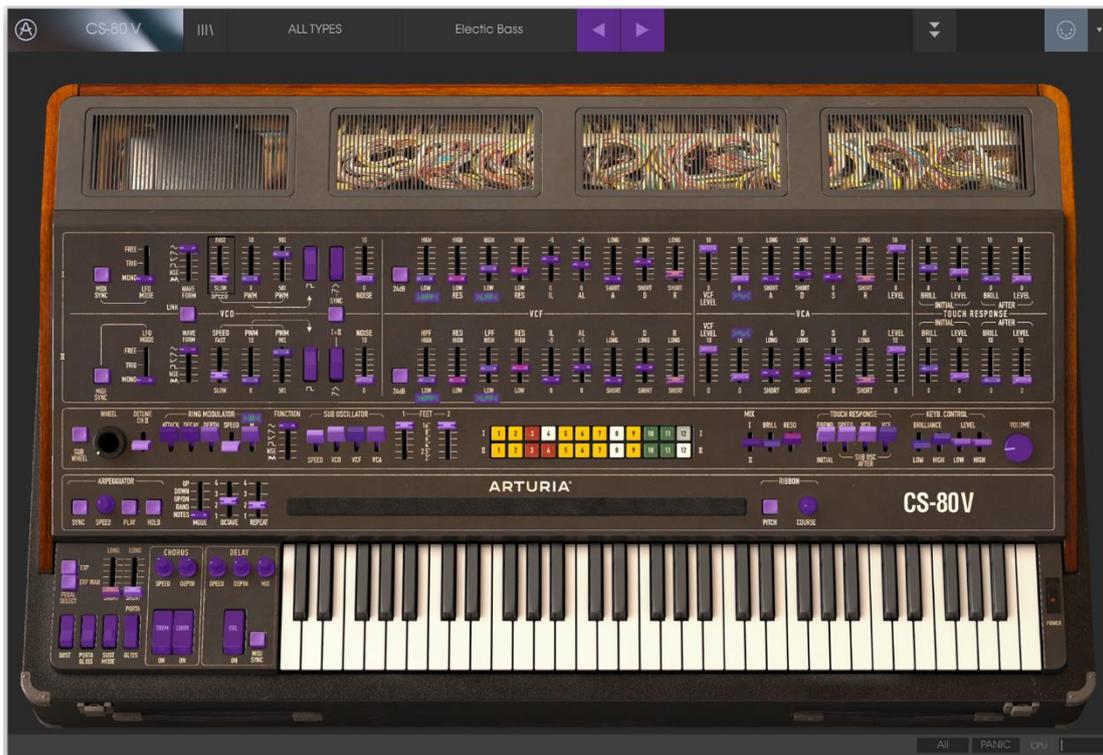
Here you manage the way the instrument transmits sound and receives MIDI. See section 2.2 of the manual for full details on this.

### **3.2.7 Preset browser overview**

The Preset browser is invoked by clicking the toolbar button that has four vertical lines. See section 3.3 of the manual for full details on this. The Filter, name field and left / right arrows in the toolbar all assist with preset selection.

### **3.2.8 MIDI Learn assignment**

The MIDI plug icon at the far right side of the toolbar places the instrument into MIDI learn mode. Parameters that can be assigned to MIDI controls will be shown in purple, and the idea is that you map physical buttons, knobs, faders or pedals from hardware MIDI controllers to specific destinations inside the instrument. A typical example might be to map a real expression pedal to the virtual volume pedal, or buttons on a controller to the effect switches so you can change the sound from your hardware keyboard.



MIDI Learn mode

### 3.2.8.1 Assigning / unassigning controls

If you click on a purple area you'll put that control into learning mode. Move a physical knob or fader and the target goes red, indicating that a link has been made between the hardware control and the software parameter. There's a popup window that displays which two things are being linked and a button to unassign the two from each other.



Low-pass filter resonance selected and assigned

### 3.2.8.2 *Min / Max value sliders*

There are also minimum and maximum value sliders that you can use to restrict the parameter change range to something other than 0%-100%. For example, you might want the filter cut-off be controllable via hardware from 30% to 90%. If you made this setting (Min set to 0.30 and Max set to 0.90) your physical knob would be unable to alter the volume lower than 30% or higher than 90%, no matter how far you turned it. This is very useful for making sure you can't accidentally make the sound too quiet or too loud when performing.

In the case of switches which only have two positions (on or off), those would normally be assigned to buttons on your controller. But it is possible to toggle those with a fader or other control if you like.

### 3.2.8.3 *Relative control option*

The final option in this window is a button labelled "Is Relative". It is optimized for use with a specific type of control: one which sends only a few values to indicate the direction and speed at which a knob is turning, as opposed to sending a full range of values in a linear fashion (0-127, for example).

To be specific, a "relative" knob will send values 61-63 when turned in a negative direction and values 65-67 when turned in a positive direction. The turn speed determines the parameter response. Refer to the documentation of your hardware controller to see if it has this capability. If so, be sure to switch this parameter on when setting up its MIDI assignments.

When configured this way, movements of the physical control (usually a knob) will change the software parameter by starting at its current setting, rather than being an "absolute" control and snapping it to some other value as soon as you start to move it.

This can be a great feature when controlling things like volume, filter, or effect controls, since you won't usually want them to jump massively out of their current setting as soon as you start to modify them.

### 3.2.8.4 *Reserved MIDI CC numbers*

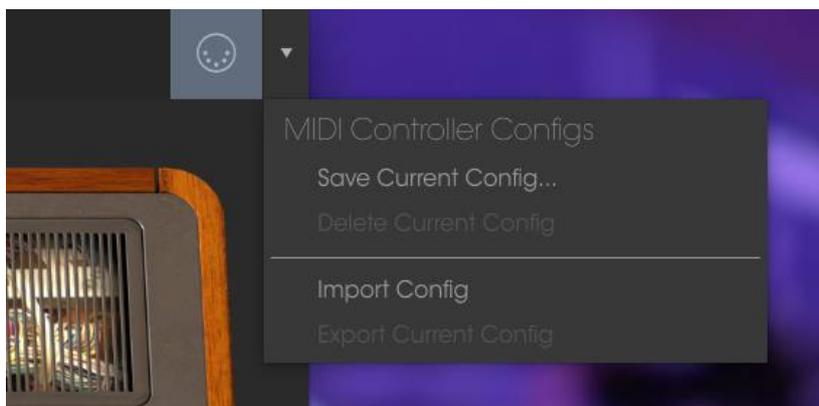
Certain MIDI Continuous Controller (MIDI CC) numbers are reserved and cannot be reassigned to other controls. These are:

- PitchBend
- Ctrl Mod Wheel (CC #1)
- Ctrl Expression (CC #11)
- AfterTouch
- Ctrl All Notes Off (CC #123)
- Ctrl Omni Mode Off (CC #124)
- Ctrl Omni Mode On (CC #125)
- Ctrl Poly Mode Off (CC #126)
- Ctrl Poly Mode On (CC #127)

All other MIDI CC numbers may be used to control any assignable parameter in CS-80 V.

### 3.2.9 MIDI controller configuration

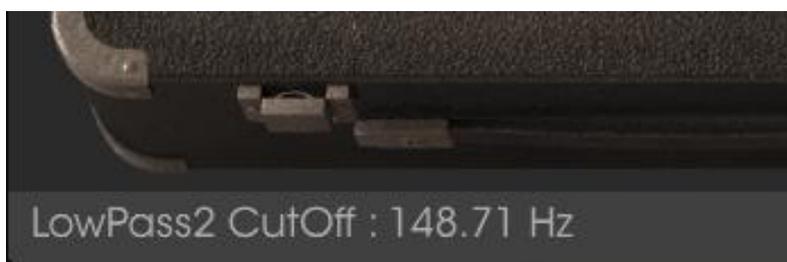
There's a small arrow at the far right hand side of the toolbar that deals with MIDI controller configurations. This allows you to manage the different sets of MIDI maps you may have set up for controlling the instrument's parameters from MIDI hardware. You can copy the current MIDI assignment setup or delete it, import a configuration file or export the currently active one. This is a quick way to set up different hardware MIDI keyboards or controllers with CS-80 V without having to build all the assignments from scratch each time you swap hardware.



### 3.2.10 The lower toolbar

#### 3.2.10.1 Current control value

At the left hand side of the lower toolbar you will see a readout showing the value or state of whatever control you are modifying. It will also display the current value of a parameter without editing it: just hover the cursor over the related control and the value will appear as pictured below.



### 3.2.10.2 *Midi Channel Setting*

At the right hand side of the lower toolbar are three small windows. The first one on the left indicates the current MIDI Channel setting. Click on it and it will expand to show the full range of values you can select (All, 1-16).

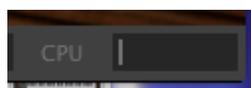


### 3.2.10.3 *Panic button and CPU meter*

The Panic button can be pressed to reset all MIDI signals in the event of stuck notes or other issues. The Panic button is also MIDI-assignable.



The CPU meter is used to monitor how much of your computer's CPU is being used by the instrument.



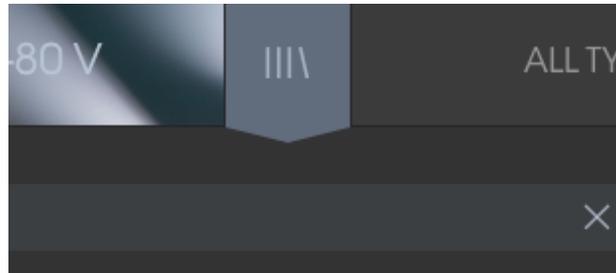
### 3.2.10.4 *Polyphony multiplier*

By clicking this button, you will be able to adjust the upper limit for the number of voices played the CS-80 V. The original CS-80 offered 8 voices of polyphony. With the CS-80 V you can multiply this number by the selected value, from 1 to 4. Having lower setting will result in less CPU being used. Setting the number too low can create situation where the voices cut off and create unnatural sustains. The key is to find a balance that you and your computer can both live with.

### 3.3 The Preset Browser

The preset browser is how you search, load and manage sounds in CS-80 V. It has a couple of different views but they all access the same banks of presets.

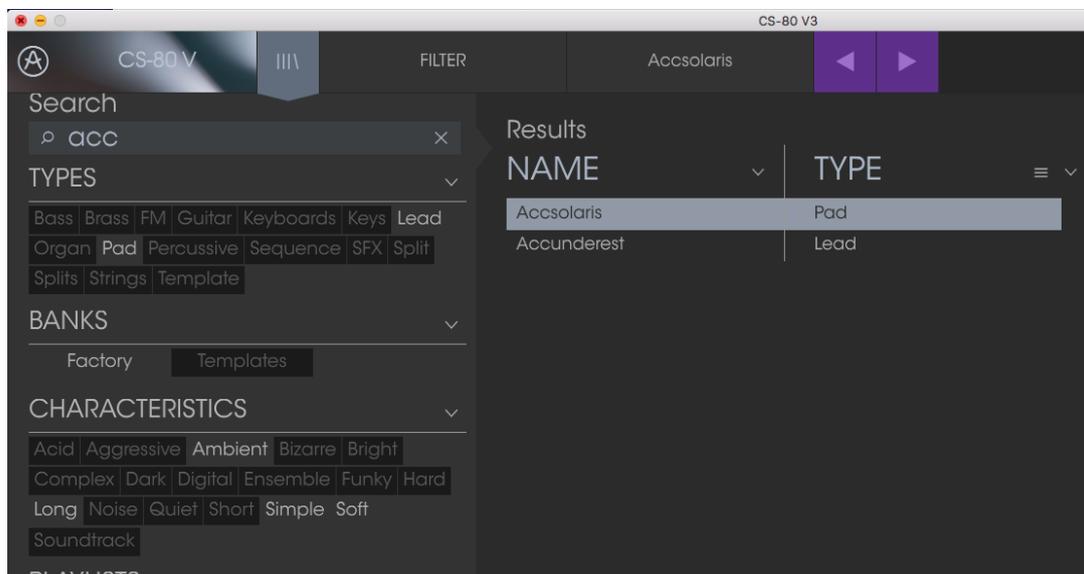
To access the search view, click on the browser button (the icon looks a bit like books on a library shelf).



*The Preset Browser button*

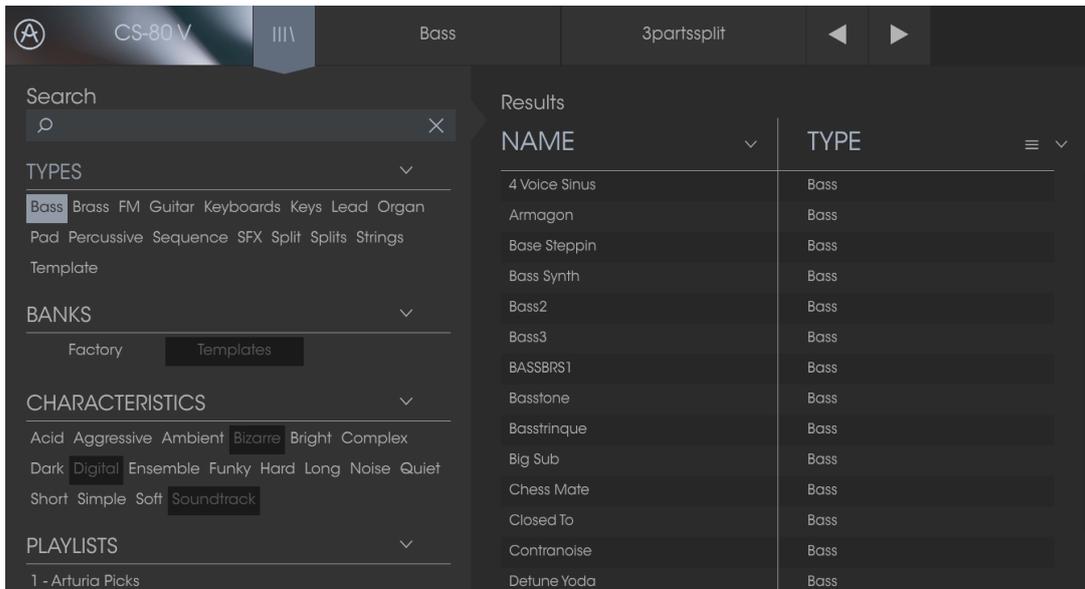
#### 3.3.1 Searching presets

The Search screen has a number of sections. By clicking on the Search field at the top left you can quickly enter any search term to filter the preset list by patch name. The Results column is updated to show the results of your search. Press the X button in the search field to clear the search.

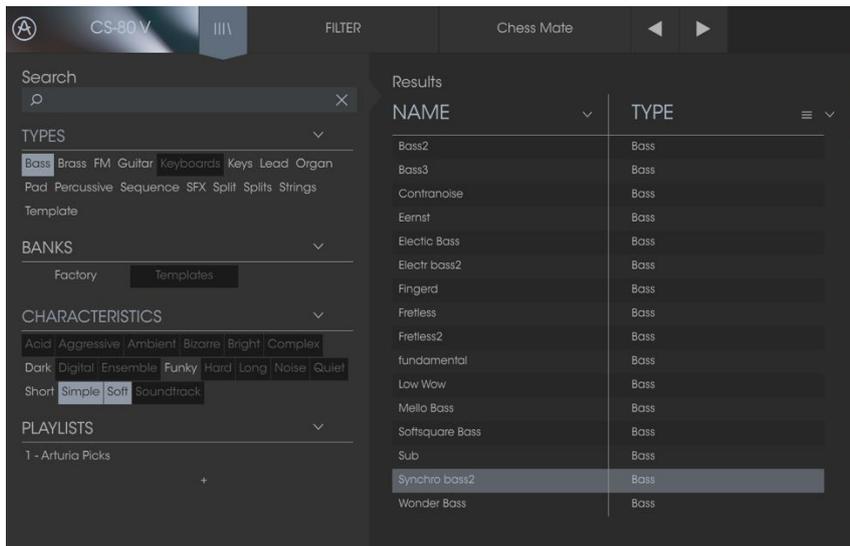


#### 3.3.2 Using tags as a filter

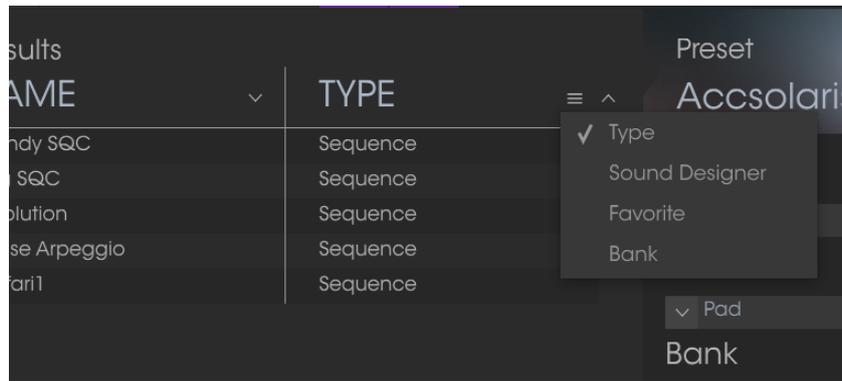
You can also search using different tags. Clicking on a Type field shows only presets that match that tag. The tag fields can be shown or hidden by using the small down arrow buttons in their title fields. Results columns can be sorted by clicking the same arrow button in their own section.



You can use multiple search fields to perform narrower searches. So by entering a text search and also specifying type, bank and characteristics options you could see only the presets that match those exact criteria. Deselect any tag in any area to remove that criteria and widen the search without having to go back and start again. Using “Ctrl + click” (Windows) or “Cmd + click” (Mac) will allow you to select multiple elements in the same area.



The second Results column can be switched to show Type, Sound Designer, Favorite or Bank tags depending on how you like to search. Click on its options menu button just next to its sort arrow.

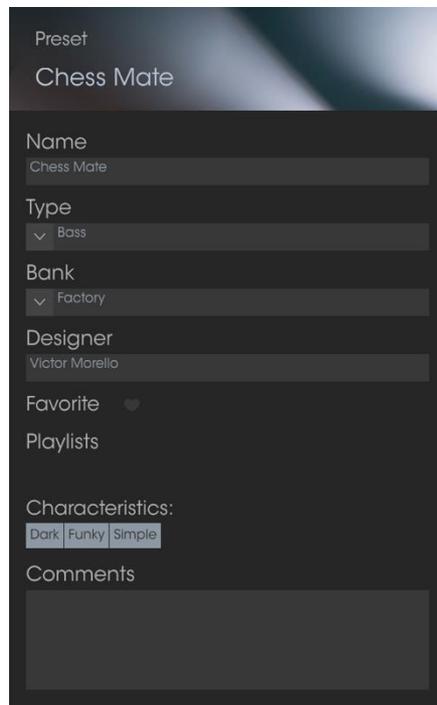


### 3.3.3 The Preset Info section

The Info column on the right of the search field shows you information about any preset. The information for User presets may be changed here: Name, Type, Favorite, etc.

However, if you want to alter the information for a Factory preset you must first use the Save As command to re-save it as a User preset. After this the Info section will gain Edit and Delete buttons at the bottom of the window.

Click Edit and then make the desired changes, either by typing in one of the fields or by using a pull-down menu to change the Bank or Type. You can even add new Characteristics by clicking the + sign at the end of that list. Click Save when you are done.

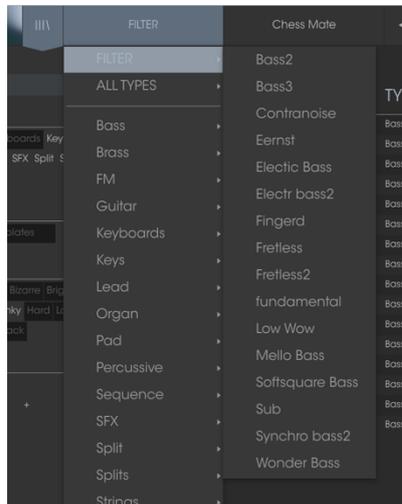


### 3.3.4 Preset selection: other methods

The pull-down menu to the right of the Search menu provides a different way to select presets. The first option in this menu is called Filter, and it will display the presets

that fit the search terms you used in the Search field. So if you searched for “Love” in the main search area, the results of that search will appear here.

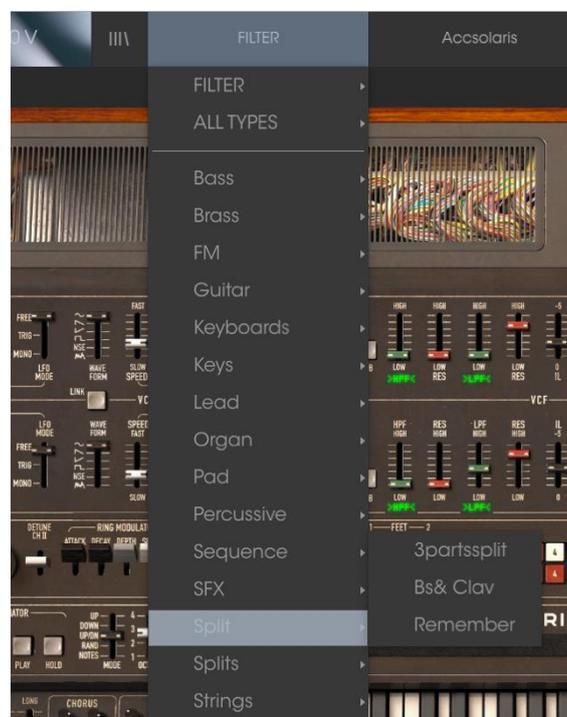
Similarly, if you previously selected a Type in the Search field you would see the results of that search in this area instead.



Filter results may differ based on Search criteria

Selecting the All Types option in the pull-down menu will bypass the Search criteria and show the entire list of presets.

The Categories below the line also ignore the Search criteria and display the presets based on their Type.



### 3.3.4.1 Selecting a preset by its Type

Clicking on the name field in the center of the toolbar will show you a list of all available presets. The list will also take into account any selections you have made

in the Search field. So if you have pre-selected a Characteristic such as “Funky” this shortcut menu will only show you presets that match that tag.

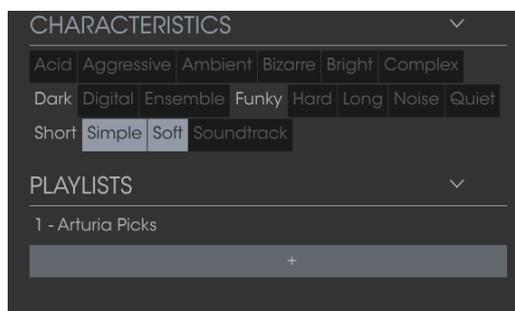
The left and right arrows in the toolbar cycle up and down through the preset list: either the full list, or the filtered list that resulted from the use of one or more search terms.

### 3.3.5 Playlists

In the lower left corner of the Preset Browser window is a feature titled Playlists. This is used to collect presets into different groups for different purposes, such as a set list for a particular performance or a batch of presets related to a particular studio project.

#### 3.3.5.1 Add a playlist

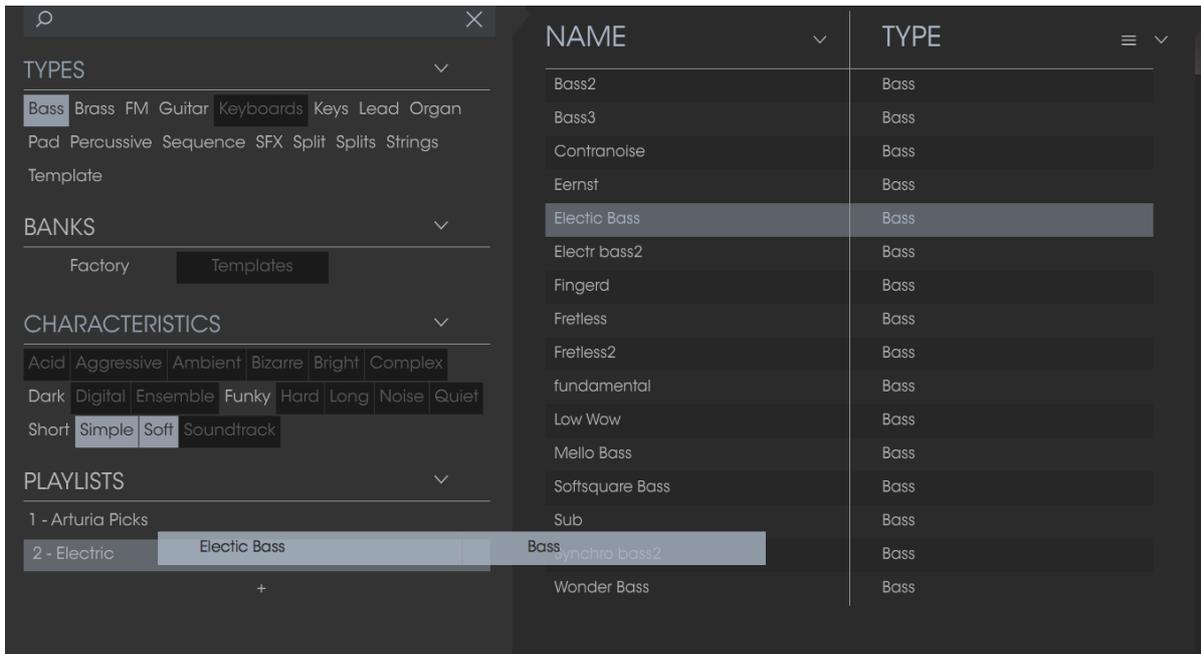
To create a playlist, click the plus sign at the bottom:



Give the playlist a name and it will appear in the Playlists menu. You can rename the playlist at any time; just click the pencil icon at the end of its row.

#### 3.3.5.2 Add a preset

You can use all of the options in the Search window to locate the presets you want to have in your playlist. Once you have found the right preset, click and drag it onto the playlist name.



Click and drag from the Search Results list onto one of the playlists  
 To view the contents of a playlist, click on the playlist name.

### 3.3.5.3 Re-order the presets

Presets may be reorganized within a playlist. For example, to move a preset from slot 2 to slot 4, drag and drop the preset to the desired location.  
 This will move the preset into the new location.

### 3.3.5.4 Remove a preset

To delete a preset from a playlist, click the x at the end of the preset row.  
 Click the X to remove a preset from a playlist

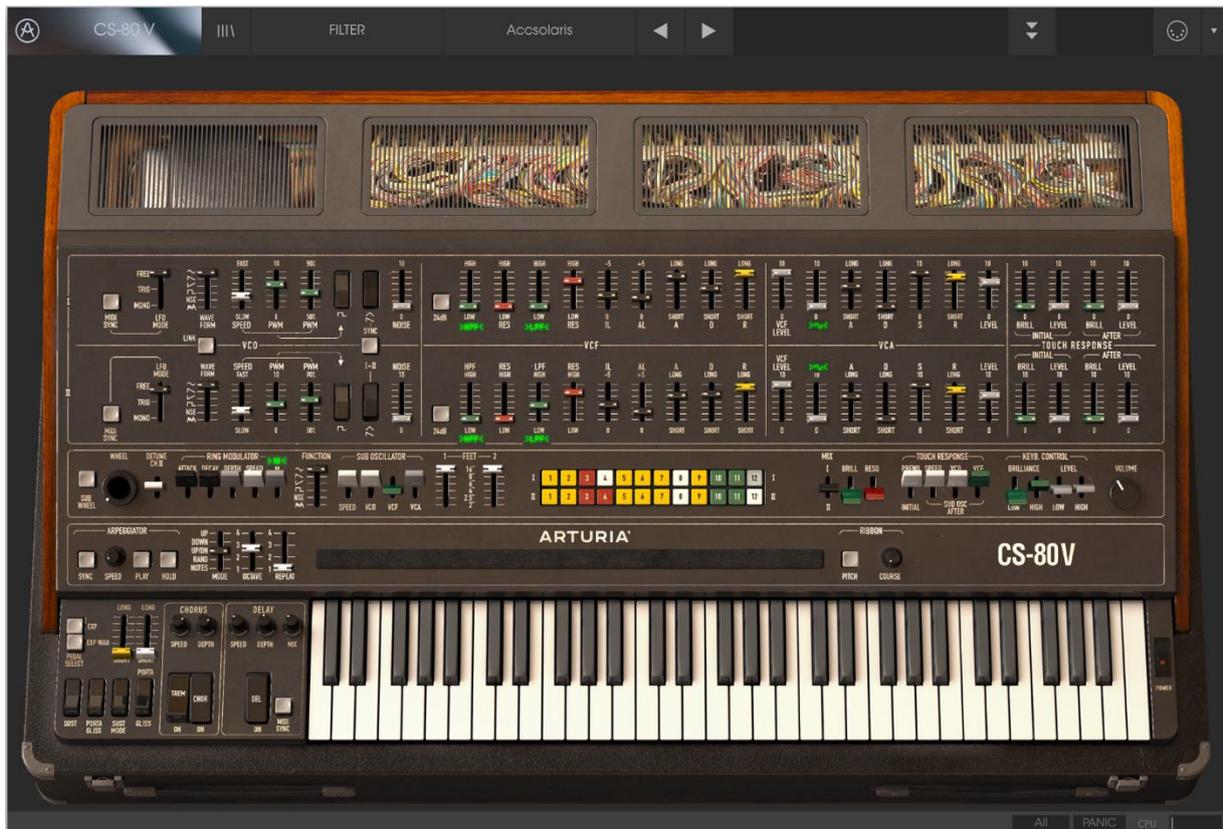
### 3.3.5.5 Delete a playlist

To delete a playlist, click the x directly to the right of the playlist name.  
 Click the X to delete a playlist.

### 3.4 Overview of the CS-80 V sections

The CS-80V offers 2 playing modes:

- The **Single** mode allows you to play a single sound (here we will call it timbre) redistributed across the keyboard.
- The **Multi** mode allows you to play a group of single timbres distributed across 4 zones on the keyboard (*Split*), or several single timbres superimposed across the keyboard (*Unison*).



The Single mode (similar to the original CS-80)



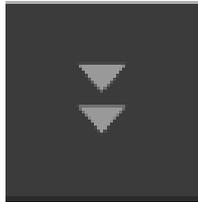
The Multi mode

**⚠** The **Single** mode presents the exact architecture of the original CS-80, which is a single timbre, distributed across the whole of the keyboard with an 8 note polyphonic limit.

The **Multi** mode takes from the GX1, the “father” of the CS-80, which used 3 keyboards (2 polyphonic and 1 monophonic) and a separate pedal keyboard to play different sonorities distributed to each of the keyboards.

To get to the *Multi* mode, click on the button to open the hatch situated above the synthesis parameters. A on/off button next to the tab *Multi* now indicates *Multi* mode is active.

To go back to *Single* mode, simply click on the close hatch button. The LCD display now indicates *Single*.



*Opening the Multi mode hatch*

### 3.4.1 Overview of the Single mode (CS-80)

The single mode contains 62 synthesis parameters, which will allow you to create a nearly infinite variety of sounds. The controllers associated with these parameters are found regrouped in 2 rows just under the Multi hatch.

Each of these 2 rows is composed of:

- **1 oscillator (VCO)**, which provides the base audio signal with its 3 waveforms: square, sawtooth and triangle. Also, this section allows control of the pitch of the oscillator (the frequency) and the impulse width of the waveforms.
- **1 low frequency oscillator (SUB OSCILLATOR)** used to modulate the impulse width.
- **A high-pass resonant filter**, tied to the 12 dB / 24 dB cutoff selector.
- **A low-pass resonant filter**, tied to the 12 dB / 24 dB cutoff selector.
- **An ADR envelope that modulates the high-pass and low-pass filters.**
- **1 amplifier (VCA)** allowing the amplification of the signal coming from the filter to direct it to the stereo output.
- **An ADSR envelope modulates the signal going through the amplifier.**
- **Velocity and aftertouch settings** on volume (VCA) and brilliance (VCF).



*The synthesis parameters*

---

⚠ A series of 24 buttons of factory presets will give you base examples for the programming of synthesis parameters. These presets are found on the control panel. They offer the presets of the original CS-80.

---



*Synthesis line presets*

### 3.4.2 Overview of the Multi Mode

The CS-80V allows the creation of 8 parallel voices and thus, in theory, 8 different sounds played at the same time.

---

⚠ On the original CS-80, a note was controlled by a card that was filled with electronic circuits that represented the complete synthesis architecture. It is for this reason that we could, for example, obtain notable differences in the settings of a sound between the notes played and the tuning of the oscillator. The CS-80V conserves this ideal: you can program eight different sounds (eight voices), which are assignable in a multitude of applications.

---

With the Multi mode, it is possible for you to assign each of these 8 voices to 4 keyboard zones and to 4 different MIDI channels. These 8 voices can also be superimposed across the entire keyboard in order to create a composite sound that is very rich and expressive (Unison mode).

Your keyboard now contains 4 different zones: first is a bass, second is a polyphonic keyboard, and third and fourth are leads.

You can change the parameters of all the voices as you want, for example, you can change the patch of each voice. Then you can play up to 8 different sounds on 4 zones. To do that, just click on the patch number close to the zone number. Select your patch and edit it by clicking on the red *Edit* button.

It's also possible to define various parameters like arpeggio or the MIDI channel of the zone. Below you will find a list of these parameters:

For each of the 8 voices, you can set:

- The choice of zone (from 1 to 4 or no zone)
- Transposition (in semitones)
- Fine tuning
- Volume
- Pan position
- Portamento/Glissando
- Ring modulator
- Chorus and delay effects

---

⚠ To quickly isolate a voice (where the EDIT button is lit) and play it across the whole keyboard, just close the Multi panel.

---

For the 4 zones:

- The MIDI channel (from 1 to 16 and Omni)

- The low and high notes (from C2 to C8)
- The playing mode (rotating polyphonic trigger, reassigned, reinitialized, monophonic unison)
- Arpeggio activity

---

⚠ If you wish to preserve CPU power, avoid using the Rotate mode, rather place the zone on ReAssign mode.

---

### 3.4.3 Overview of the effects section

The effects section lets you add Chorus, Stereo Delay or even a Ring Modulator to your sound. You can also impose a Portamento/Glissando to what you play on the keyboard.



*The effects section*

Settings concerning sustain and expression pedals are also available in this section.

---

⚠ It is important to know that effect settings are the same for all singles with the same patch.

---

### 3.4.4 Overview of the modulation matrix

The second tab on the left “Modulation” allow to display the modulation matrix. This contains an extension of the possibilities for modulation when compared to the original CS-80. It is presented in the form of a modulation matrix in which we choose 10 sources (*SubOsc*, *EG*, etc.) which will modulate 10 destinations (*VCO 1 Freq*, *LP 2 res*, etc.).



*The modulation matrix*

The choice of source and destination is done by clicking on LCD screens. The individual matrix positions will offer 12 modulation sources and 38 destinations, with an attenuation control in between.

## 3.5 Single mode in details

When the Multi mode hatch is closed, the CS-80V is in *Single* mode. In this mode, the 8 polyphonic voices available are set with the same sound. The sound that is used corresponds to the settings of the controls apparent in the graphical user interface.



*Multi mode hatch closed*

This mode should be selected if you require the same manner of use as the original CS-80.

### 3.5.1 Two lines of synthesis

The original CS-80 has a particular structure. Unlike many synthesizers of that time it used 2 independent generators of subtractive synthesis, each one with an oscillator, a filter and an amplifier. These two lines of synthesis are managed by the central part of the interface in two parallel groups of controls.



*Control of the two lines of synthesis*

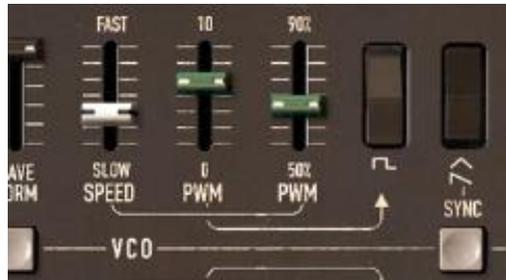
On each line of synthesis, there is an oscillator that can generate square, triangle, sawtooth, and sine signals. The first switch activates the square signal, while the second activates the second waveform, which can be either a triangular signal or a sawtooth.



*Selection of waveform*

To select the sine, first validate that the linear ~ slider is lit and then set its volume with this slider.

The square and triangle signals are affected by the pulse width settings noted *PW*. The fader is used to choose a pulse width from 50% to 90%. This pulse width can be modified by a low frequency oscillator (LFO). The modulation rate is set with the *PWM* fader and the speed with the *SPEED* fader.



*PWM Settings*

Unlike the original CS-80 LFO where only the sine waveforms were available, the wave can be set with the *WAVE FORM* selector. The waveforms available are sine, saw-up, saw-down, square, noise and random.

This LFO can function in three modes chosen on the *LFO MODE* selector:

- *FREE*: all LFOs of each of the polyphonic voices function independently of the others;
- *TRIG*: the LFO restarts at the beginning of its waveform each time that the polyphonic voice is activated;
- *MONO*: only the LFO of the first polyphonic voice is used.

The latter allows us to bring a general effect to all of the voices at the same time, like the original CS-80.

It is possible to synchronize the LFO speed with the tempo of the host application with the *MIDI SYNC* button.

The signal from the oscillators then goes through two filters in a series, one high-pass and one low-pass. The cut-off frequency and the resonance of each of these filters can be set with the green and red *HPF* and *LPF* faders (above or below the labels).



*Setting the filters*

By clicking on these labels, it is possible to activate or deactivate a filter in order to save on calculation power.

The *24dB* button allows us to go from a 12 dB filter to a 24 dB filter. The two low-pass and high-pass filters are simultaneously modified.

The filters are modulated by an envelope where the Initial Level (*IL*), Attack Level (*AL*), Attack (*A*), Decay (*D*) and Release (*R*) settings function in the following manner:

- **IL** represents the start of the envelope relative to the frequency of the filter. The filter frequency will be modulated starting with a frequency inferior to the frequency setting. The more *IL* is increased, the lower the starting frequency will be;
- **AL** represents the maximum level attained by the envelope;
- **A** is the attack time, meaning the time that the envelope takes to go from the *IL* level to the *AL* level;
- **D** is the decay time, meaning the time that the envelope takes to go from the *AL* level to zero level (no modulation);
- **R** is the release time, meaning the time that the envelope takes to go from the zero level (no modulation) to the *IL* level.



### Setting the filter envelope

The output of the filters is controlled by a volume *VCF LEVEL* before being added to a sine wave (>~<). The signal can thus be treated by the output amplifier (*VCA*) controlled by an envelope. The *LEVEL* control sets the volume at the end of line of the synthesis.

The envelope controlling the *VCA* is a standard *ADSR* envelope:

- **A** attack time: the time for the volume to go from silent to full volume;
- **D**, decay time: the time to go from the end of *A* to *S*;
- **S**, sustain level: reached after the decay period;
- **R**, release time: to come back to 0 once the note has been released.



### Setting the VCA envelope

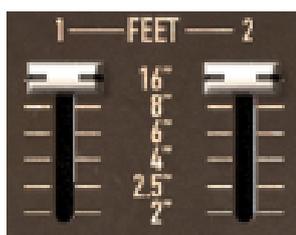
Four faders set the action of the velocity and of the pressure of the keys on the frequency of the filters and the level of the VCA. The green faders to control the frequency, the gray ones to control the volume.



### Setting the filter frequency and the amplifier volume modulations

Each of the lines of synthesis can be transposed with the *1-FEET-2* selector: an octave below (16'), default range (8'), a fifth above (5 1/3'), an octave above (4'), a fifth and an octave above (2 1/3'), two octaves above (2').

The second line can be tuned with the *DETUNE* fader, and finally the mixing between the two lines is controlled with the *MIX* fader.



Transposition of the lines of synthesis



Detuning of the second line



Mixing of the two lines

Additional buttons *SYNC* and *LINK* increase your sound design options:

- The *SYNC* button synchronizes the oscillator of the first line with the oscillator of the second. When activated, it is the frequency of the second oscillator that will be audible, the frequency of the first being imposed on the second in order to create new harmonics.
- The *LINK* button connects the oscillator of the second line toward the filters of the first. The filters and amplifier of the second line are not used and therefore deactivated to conserve calculation power.

### 3.5.2 The modulation matrix

The original CS-80 possessed no other sources of modulation than those described above. To increase the possibilities of synthesis, a new modulation matrix is available. To activate it, open the left hatch. (On the original CS-80 this hatch held four mechanical preset selectors.)



#### *Open modulation hatch*

There are ten modulation controls available. For each modulation, the source must be selected from 12 choices, and the destination in a list of 38 choices, by clicking on the *SOURCE* and *DESTINATION* displays. The *AMOUNT* knob sets the rate of modulation.

The sources of modulation are as follows:

- LFO1 : Low frequency oscillator of the first line
- LFO2 : Low frequency oscillator of the second line
- SubOsc : General low frequency oscillator
- EG Filter1 : Envelope of the filters of the first line
- EG Amp1 : Envelope of the VCA of the first line
- EG Filter2 : Envelope of the filters of the second line
- EG Amp2 : Envelope of the VCA of the second line
- Velocity : Velocity of the MIDI note
- AfterT : Pressure of the MIDI note (Aftertouch)
- Ribbon : Ribbon controller
- Wheel : Modulation wheel
- FootExp : Expression pedal
- Off : No modulation

The modulation destinations are as follows:

- VCO 1 Freq : Frequency of the oscillator of the first line
- VCO 1 PW : Pulse width of the oscillator of the first line
- Noise level1 : Noise level of the first line
- Noise level2 : Noise level of the second line
- VCO 2 Freq : Frequency of the oscillator of the second line
- VCO 2 PW : Pulse width of the oscillator of the second line
- HP 1 cutoff : High-pass filter cut-off frequency of the first line
- HP 1 res : Resonance of the high-pass filter of the first line
- LP 1 cutoff : Low-pass filter cut-off frequency of the first line
- LP 1 res : Resonance of the low-pass filter of the first line
- HP 2 cutoff : High-pass filter cut-off frequency of the second line
- HP 2 res : Resonance of the high-pass filter of the second line

- LP 2 cutoff : Low-pass filter cut-off frequency of the second line
- LP 2 res : Resonance of the low-pass filter of the second line
- VCA 1 Level: VCA level of the first line
- VCA 2 Level: VCA level of the second line
- SIN 1 Level : Level of the sine of the first line
- SIN 2 Level : Level of the sine of the second line
- LFO 1 Speed : Frequency of the LFO of the first line
- LFO 1 Level : Level of LFO output for the first line
- LFO 2 Speed : Frequency of the LFO of the second line
- LFO 2 Level : Level of LFO output for the second line
- EG VCF1 IL : Starting level for the filter envelope of the first line
- EG VCF1 AL : Attack level of the filter envelope of the first line
- EG VCF1 A : Attack time of the filter envelope of the first line
- EG VCF1 D : Decay time of the filter envelope of the first line
- EG VCF1 R : Release time of the filter envelope of the first line
- EG VCF2 IL : Starting level for the filter envelope of the second line
- EG VCF2 AL : Attack level of the filter envelope of the second line
- EG VCF2 A : Attack time of the filter envelope of the second line
- EG VCF2 D : Decay time of the filter envelope of the second line
- EG VCF2 R : Release time of the filter envelope of the second line
- EG VCA 1 A: Attack time of the VCA envelope of the first line
- EG VCA 1 D: Decay time of the VCA envelope of the first line
- EG VCA 1 S : Sustain level of the VCA envelope of the first line
- EG VCA 1 R : Release time of the VCA envelope of the first line
- EG VCA 2 A: Attack time of the VCA envelope of the second line
- EG VCA 2 D: Decay time of the VCA envelope of the second line
- EG VCA 2 S : Sustain level of the VCA envelope of the second line
- EG VCA 2 R : Release time of the VCA envelope of the second line
- Off : No destination

To remove a modulation, select *OFF* in input and output. You could set the level to zero but the calculation would still be carried out, thus using CPU power (which is always preferable to avoid).

A destination can only accept six sources of modulation. Above this, the modulation is ignored.

### 3.5.3 The sub-oscillator

The sub-oscillator is a low frequency oscillator (*LFO*) that affects all of the polyphonic voices. The *SPEED* fader sets the speed and *FUNCTION* sets the waveform: sine, saw-up, saw-down, square, noise and random.



*Setting the sub-oscillator*

The action of this LFO is determined through the *VCO*, *VCF*, and *VCA* faders which sets the modulation rate of the oscillator frequency, filter frequency and output level for both lines of synthesis.



*Setting the modulation through aftertouch*

The *VCO* and *VCF* modulation rate can also be modified through aftertouch with the faders under the *TOUCH RESPONSE* label. The *SPEED* control also modulates the speed of the sub-oscillator through aftertouch.

### 3.5.4 The keyboard modulations

The *INITIAL* fader performs a slight frequency modulation on the oscillators. This modulation is a linear ramp that depends at the same time on the fader setting and the velocity.



*Initial tuning*

Fader at the top, there is no modulation; at the bottom, the modulation is set to the maximum.

---

⚠ About the orientation of these faders, the original CS-80 operates in that way, which can be confusing. But we chose to reflect the original character of the machine.

---

The faders under the *KEYB. CONTROL* label set the key follow rate. The faders under the *BRILLIANCE* label set the key follow of the filters, and those under the *LEVEL* label set key follows for the amplifier:

- The *LOW* faders set the key follow slope for the lower part of the keyboard (below C3);
- The *HIGH* faders set the slope for the higher part;
- The slopes can be positive or negative.



*Key follows*

### 3.5.5 The ring modulator

The ring modulator is an effect that creates a number of harmonics in the sound through the multiplication of the input signal with a sine wave.



*Setting the ring modulator*

Dry and wet mixing is set with the >M< fader. Dry sound is at maximum in the high position. The frequency of the multiplying sine is set with the *SPEED* fader. The lower the fader is positioned, the higher the sine frequency. The generated harmonics will then move away from harmonics of the treated sound.

Three other faders modulate this effect. These set an envelope applied to the frequency of the sine. *ATTK* gives the time taken for the sine to go from the initial frequency set by *SPEED*, to the frequency set by *DEPTH*, while *DECAY* sets the time for the return to the initial frequency.

### 3.5.6 chorus/tremolo

Chorus/Tremolo is an effect that allows a variety of effects, from simulation of an ensemble to that of a rotary speaker. It is activated with the *CHOR* switch.



*Setting chorus/tremolo*

The *TREM* switch takes us from chorus mode to tremolo mode. While the rotary *SPEED* and *DEPTH* knobs respectively set the speed of rotation and depth of the effect.

### 3.5.7 Stereo delay

Delay is an effect that simulates an echo. It is activated with the *DEL* switch.



*Setting Delay*

The rotary *SPEED*, *DEPTH* and *MIX* knobs set the time between each echo, the echo decay time and finally the output level for the effect.

The *MIDI SYNC* button is used to obtain echo times as a multiple or sub-multiple of the host application tempo. You choose the multiple or sub-multiple with the *SPEED* knob.

### 3.5.8 The pedals

The original CS-80 was a synthesizer possessing all of the functions of a real playing surface. A number of settings and possibilities of expression and sustain are explained below.



*Expression pedal*

The *EXP* and *WAH* buttons, when activated, allow the use of a pedal expression MIDI message (0x04) either on the amplification of the volume (expression), or on a sweeping filter (wha-wha).



*Portamento and sustain pedal settings*

The *PORTA* fader allows the control of a portamento on notes. This means that for a given polyphonic voice, when a new note is activated, the frequency of the VCO will gradually move from the frequency of the previous note to the frequency of the currently held note.

When the *GLISS* switch is at the high position (Off), the passage will be done continuously, at the low position (On) it will be done by semi-tone.

When the play mode of the zone is *CSASSIGN* (see §6.14), then the portamento transitions from note played at least 200 ms before.

It is possible to enable or disable the portamento for each voice (see §6.14).

When the *PORTA/GLISS* switch is at the low position (On), the choice between the portamento (continual variation) and the glissando (variation by semi-tone) is controlled by MIDI messages corresponding to the sustain pedal.

The fader above the *SUST MODE* switch sets the sustain time. When the *SUST* switch is at the top (Off), sustain time is given by the fader setting. When it is set to the bottom (On), sustain time depends on the MIDI messages from the sustain pedal. When the pedal is off, there is no sustain, when it is on, sustain follows the fader setting.

The two positions of the *SUST MODE* switch allow standard functioning (switch off, towards the top), or a mode where the sustain is interrupted when a new note arrives (switch on, towards the bottom).

### **3.5.9 The arpeggiator**

The arpeggiator is used to transform a chord into a succession of individual notes.

The *SPEED* knob sets the speed for the arpeggio; the *SYNC* button allows us to obtain a multiple or sub-multiple tempo of the host application. The *PLAY* button triggers the arpeggiator, which when a note is played activates the notes one after the other, but stops when there are no active notes held on the keyboard. The *HOLD* button memorizes the notes played as long as it is active. The arpeggiator in *HOLD* mode is stopped through the use of the *PLAY* button.

The *MODE* selector chooses the arpeggio mode: increasing, decreasing, back and forth, random, and in the order that the notes appear.

The *OCTAVE* selector presents the choice of the number of octaves that the arpeggiator will traverse for each cycle. The *REPEAT* selector is to choose the number of cycles repeated for each octave.



*Arpeggiator settings*

### 3.5.10 The original preset buttons

These buttons, like on the original CS-80 allow the selection of pre-set sounds. These selections work like a help system, and as soon as a control is modified, we find the 12 selection (panel) indicates that the audible sound corresponds to the settings modified by the user.



*Pre-selections*

Each pre-selection line corresponds to the control of each line of synthesis.

### 3.5.11 The ribbon

The ribbon works like a pitch wheel when the *PITCH* button is triggered. The *COARSE* knob sets the upper range of frequency variation. It also responds to the pitch bend MIDI message. It should be noted that the original CS-80 had an unusual behavior when using the pitch ribbon to control downward pitch shifts. When sliding the pitch range up, the *COURSE* knob limits the amount of pitch shifting, but when bending the frequency down, the range goes all the way down to 0 Hz. This is a feature that's unique to the CS-80, and is faithfully reproduced in the CS-80V, allowing this emulation to create truly unique performances, just like its hardware predecessor.



*The ribbon*

### 3.5.12 General settings

Three supplementary settings control the synthesizer's general brilliance, resonance and volume. They each effect polyphonic voices in the same way.



Brilliance and Resonance



General volume

### 3.6 The Multi mode

When the Multi mode hatch is open, the playing mode is called “multiple”. In this mode, each of the eight polyphonic voices available can take a different sound and can be commanded by four zones of MIDI control.



Opened Multi mode hatch

Under the Multi mode hatch are two identical groups of four lines of settings and a supplementary group of four lines. The two first groups set each of the eight voices, while the last set the MIDI message control zones.

The zones allow the independent control of the polyphonic voices. Each zone responds to a MIDI channel, which can be assigned to the same or a differing channel. When a note comes through the selected channel, it is only taken into account if it is between the limits of the *KEYB RANGE* display. The zone will therefore activate the polyphonic voices associated with it depending on the choice in the *VOICE MODE* display.

To modify the *KEYB RANGE* limits, double-click on the display and choose the low note with a left click and the high note with a right click (or [Shift]+click for Mac).

There are 6 polyphonic voice modes possible:

- **CsAssign:** This mode of voice control is identical to the original CS-80. The zone plays a voice randomly among the voices that have been affected to it. The portamento (or the glissando) is reinitialized when the time between the arrival of this note and the release of the previous note exceeds a certain value (in the area of 170 ms). Thus, in the case of chords, all of the voices will start their portamento (or glissando) from the same note.
- **Rotate:** The polyphonic voices are used in a rotating assignment. The zone uses the next free available voice. When the last voice is reached, then the zone takes the newest note played by releasing the first one.
- **Reset:** The polyphonic voices are played in order by their number. The zone uses the first free available voice, beginning with the lowest one.

- **ReAssign:** When a new polyphonic voice is chosen, the zone uses the voice which has just played the same note.
- **UniLow:** Unison with priority to the lowest note. This means that if two notes are presented at the same time it is the lowest note that is played.
- **UniHigh:** Unison with priority to the high note. This means that if two notes are presented at the same time it is the highest note that is played.
- **UniLast:** Unison with priority to the last note played. The newest note is prioritized.

The *VOICE ARP* button allows you to accept or not accept the use of the arpeggiator on this zone, independently of the others.

The arpeggiator possesses one setting for all zones, but each zone uses the arpeggiator independently. This means that each zone can choose to activate the arpeggiator (or not), and when a note is present in two zones, the arpeggios remain independent.



*Control of polyphonic voices*

For each voice, you need to choose the zone by clicking on the *ZONE* display. The OFF position allows you to deactivate a particular voice (it is possible to limit the polyphony).

Once the zone has been chosen, the sound (or single) that the voice will use needs to be selected. By clicking on the *SINGLE PATCH* display, we can select one of the singles of the current preset or a new single. For a given preset, there can be up to 8 singles (one per voice).

It is important to note that the choice of zones and the choice of sounds are independent. Two zones can manage cards using the same sound, and one zone can manage voices with different sounds.

The *ACTIVE* indicator shows the polyphonic voices that are currently active.

Four knobs set (for each voice) the range (+/- two octaves, by semi-tone), fine tune (+/- a semi-tone), volume and the position in the stereo field (pan).

In this section it is also possible for each voice to use or not to use the portamento (or glissando), the ring modulator or the effects (chorus and delay) with the *PORTA*, *R.MOD* or *FX* buttons.

The *EDIT* button is to edit the sound (or single) assigned to the polyphonic voice. This updates the graphical interface controls so that they display the single settings.

The Multi mode possibilities are extremely varied. It is possible to separate the keyboard into different zones, each zone with a different sound, to widen an accompaniment sound with the stereo image or fine tuning for a large chorused

effect. Another example would be to use the ring modulator only on one voice in order to limit intermodulation effects, and so forth.

In order to listen to a particular sound, just close the Multi hatch. The sound used is thus the sound being currently edited. The closing of the hatch corresponds to solo mode with a voice control using the CsAssign mode on the entire of the keyboard.

Certain settings are the same for all voices. This is the case for settings that control the effects (chorus, delay, ring modulator), pedals, sustain and portamento. It is also the case for the settings controlling the sub-oscillator, the pressure on the keys that affect the sub-oscillator, the key follows and finally the general brilliance and resonance of the synthesizer.



General settings

The other settings affect each sound independently of the others, setting the different parameters of a single voice.



Polyphonic Settings

## 4 THE BASICS OF SUBTRACTIVE SYNTHESIS

Of all forms of sound synthesis, subtractive synthesis is one of the oldest and still certainly one of the most employed today.

It is this method that was developed toward the end of the 60's on analog synthesizers like the Bob Moog's ones, ARP™, Yamaha™, Buchla™, Oberheim™, Sequential Circuits™ (Prophet series), Roland™, Korg™ (MS and PS series) and many others. This concept of synthesis is still used on most current digital synthesizers, complementing sample reading or wave tables, which have progressively replaced the analog oscillators of the first synthesizers in the 80's. The Yamaha™ CS-80 or even your own CS-80V constitutes the best illustration of the enormous possibilities of subtractive synthesis.

### 4.1 The three main elements

#### 4.1.1 The oscillator (VCO)

The oscillator (**Voltage Controlled Oscillator**) is the starting module (with the noise module which is often classed among the oscillators) for the creation of a sound on an analog system.

It will generate the initial sound signal. We can think of the oscillator like a violin string that once stroked or plucked, vibrates to create its sound.

The main oscillator settings are:

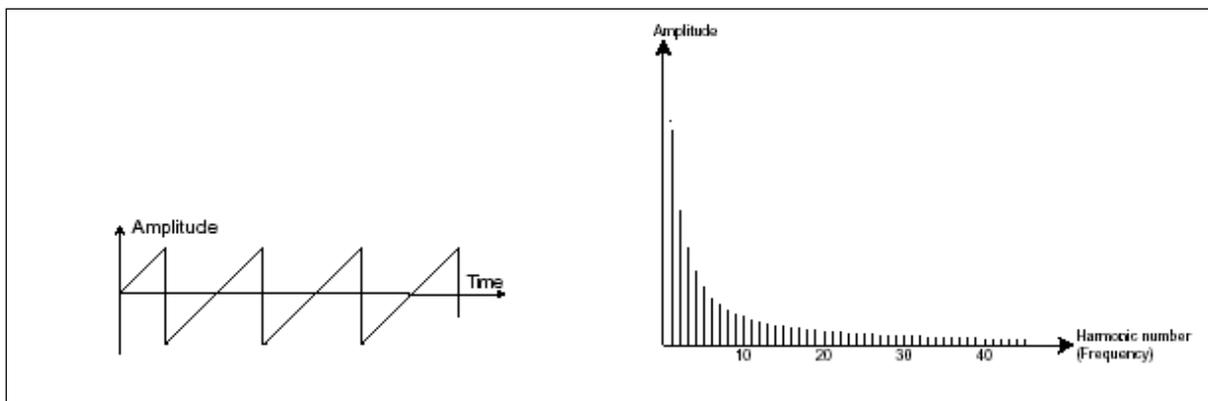
- The **pitch** determined by the oscillation frequency. You can set the frequency of the oscillator with 2 controllers: first, the *FEET* selector (or "range" on other synthesizers) which determines the fundamental frequency – it is expressed in feet it contains all of the harmonics at decreasing volume levels in high frequencies): 16, 8, 4, 2; the highest number (16) brings the deepest tone, inversely, the smallest number (2) brings the highest tone. – Secondly, the detune setting (*detune* or *fine tune*) allows you to tune the oscillator more precisely.

---

 On the CS-80V, the height settings (FEET) and detune (DETUNE) are found among the real time controllers above the keyboard.

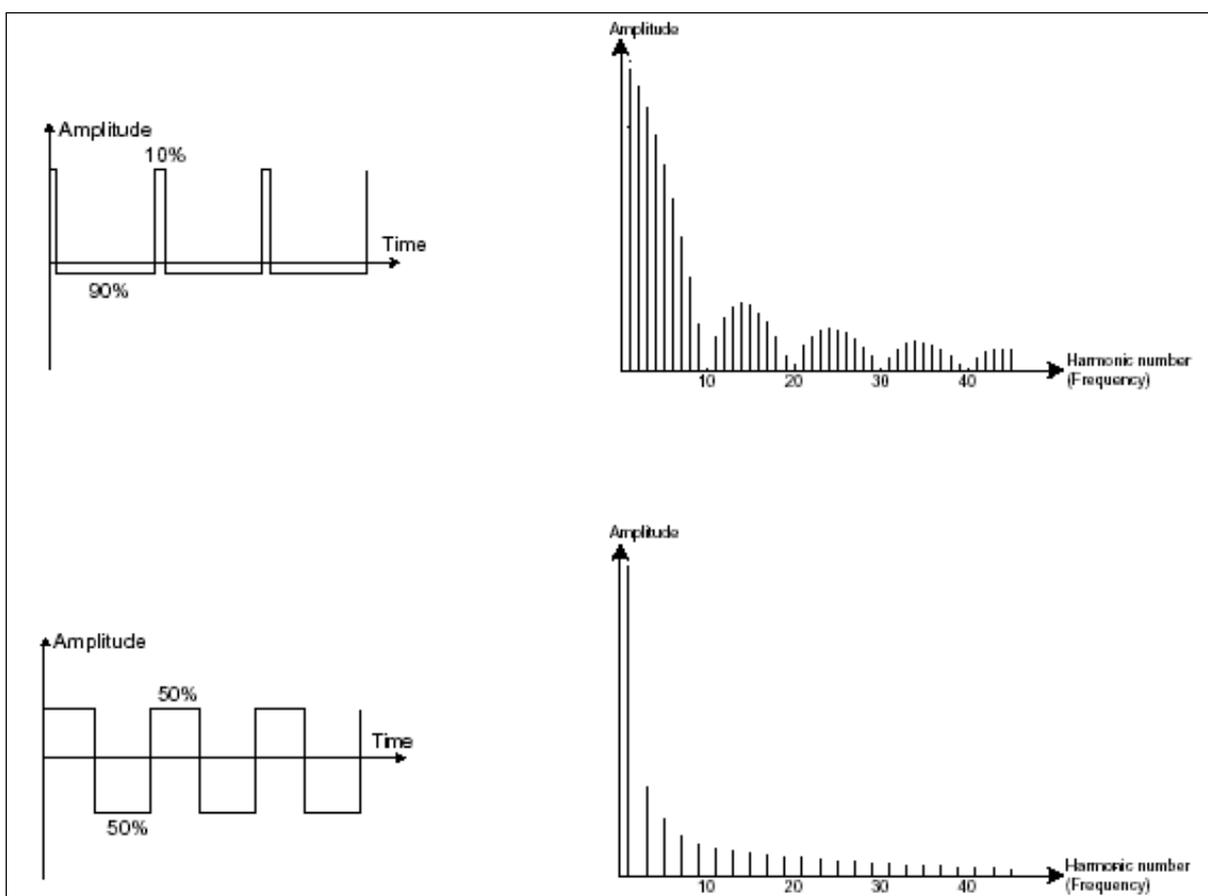
---

- The **waveform** which determines the harmonic richness of the audio signal. On the CS-80V, 4 waveforms are available:
  - The **sawtooth** presents the richest audio signal of the 4 waveforms (it contains all of the harmonics at decreasing volume levels in high frequencies). Its sound is ideal for brass sounds, percussive bass sounds or rich accompaniments.



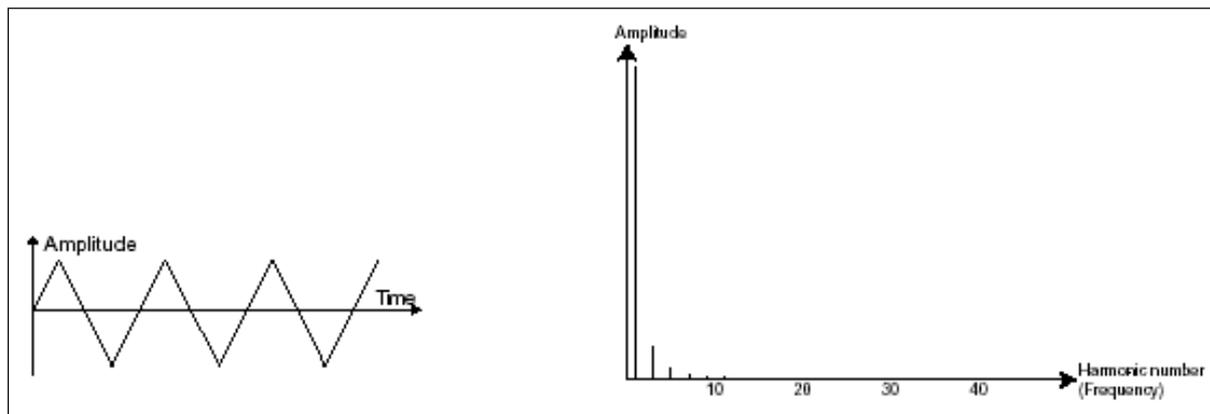
*Time and spectral representations of a sawtooth signal*

- The square possesses a more hollow sound than the sawtooth (it only contains odd harmonics) but none the less, its rich sound (notably in low frequencies) can be used for sub-bass sounds that will come out well in the mix (the square oscillator is often set an octave below that of the sawtooth), wood sounds (clarinet, if the square signal is a little filtered), etc.



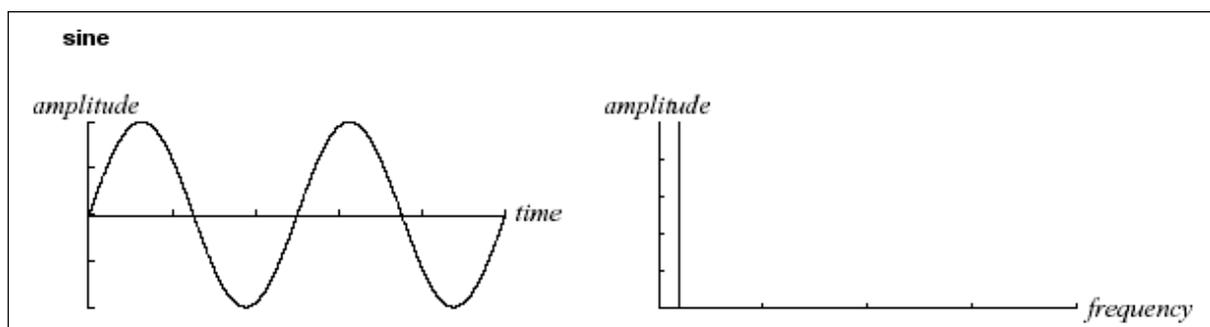
*Time and spectral representations of a square signal, and with modulated pulse width.*

- The triangle can be considered like a highly filtered (and so soft) square signal. It is very low in harmonics (odd only) and will be very useful for creating sub basses, flute sounds, etc.



*Time and spectral representations of a triangle signal*

- The sinusoid is the purest of all. It is a unique harmonic and produces a much “damped” sound. It can be used to reinforce the low frequencies of a bass sound or as a frequency modulator in order to create harmonics that don't exist in the original waveforms.



*Time and spectral representations of a sinusoid signal*

- **PWM (Pulse Width Modulation)** is a setting that allows you to modify the waveform cycle (or wave length). This can be done manually with the help of a knob PW or by modulation (with an envelope or LFO). This impulse width variation translates to a spectrum modification, resembling a waveform change.

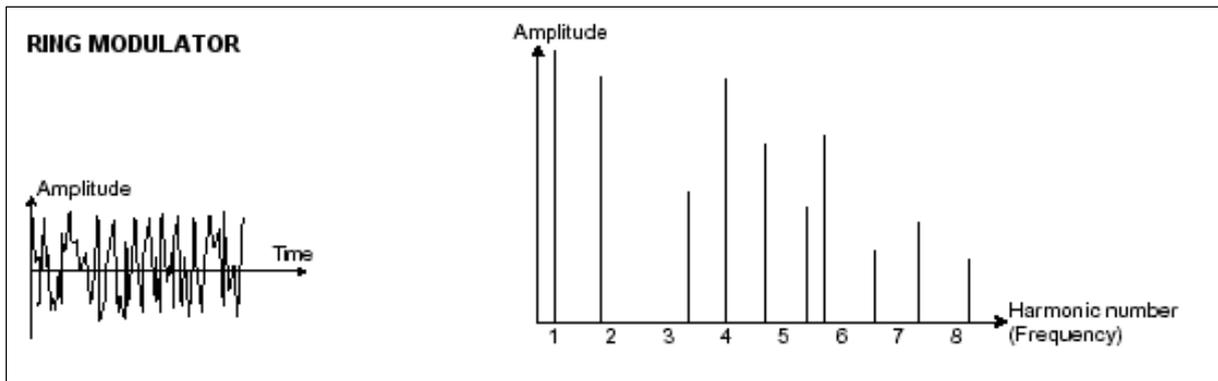
---

⚠ Unlike many other classic analog synthesizers, the CS-80V allows you change the impulse width not only for the square waveform but also for the triangle.

This brings a large number of additional sound possibilities to compliment the base signal.

---





*Ring modulation*

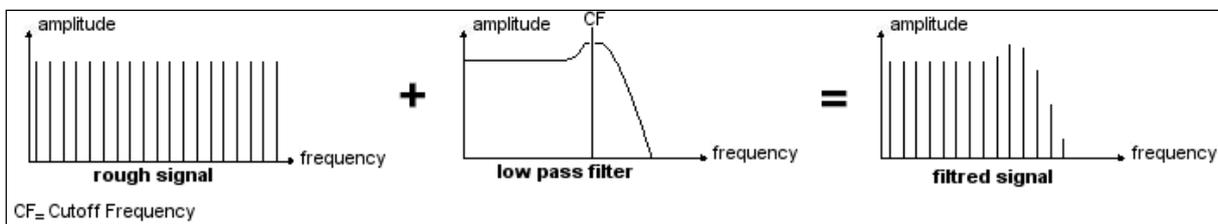
- The **noise module**: the noise signal spectrum has all frequencies at an equal volume level, often referred to a “white noise”. For this reason, the noise module is used to create different noises like the imitation of wind or special effects. White noise is the richest of noises. Pink noise is also regularly present on synthesizers. It is less rich in the high frequencies than white noise.

Also note that the audio output of noise can also be used as a modulation signal (especially when strongly filtered) to create random cyclic variations.

On pre-cabled synthesizers, the noise module is either integrated into the oscillator (its audio output being placed to compliment the waveform outputs), or within the mixer directing the signals towards the filter. On the other hand, on modular synthesizers, it is an independent sound source.

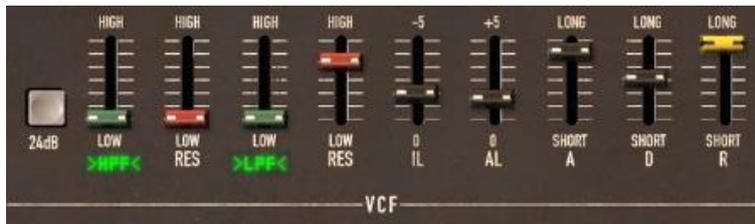
#### 4.1.2 The filter or VCF

The audio signal generated by an oscillator (the waveform) is next generally directed to a filter module (**Voltage Controlled Filter**). It is this module that we use to model the sound by filtering (by subtraction, which explains the name given to this type of synthesis) the harmonics situated around a cut-off frequency. It can be considered like a sophisticated equalizer that reduces, depending on the case, the high or low frequencies of a sound.



*Spectral representation of the filtering action*

The removal of undesirable frequencies, with a **cut-off frequency** is not done suddenly but progressively, this, depending on the filtering slope. This filtering slope is expressed in decibels per octave (or dB/Oct). The filters used in classic analog synthesizers have 24 dB/Oct or 12 dB/Oct slopes.

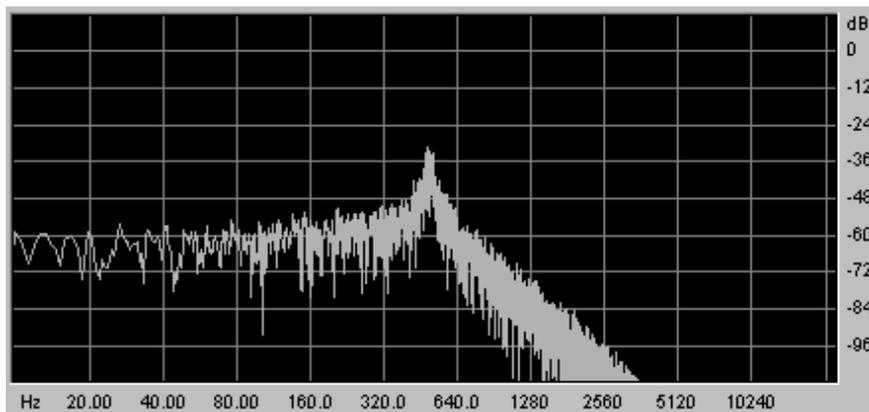


*The filter settings*

The CS-80V offers 2 types of slope (where the CS-80 had only the 12 dB/Oct slope).

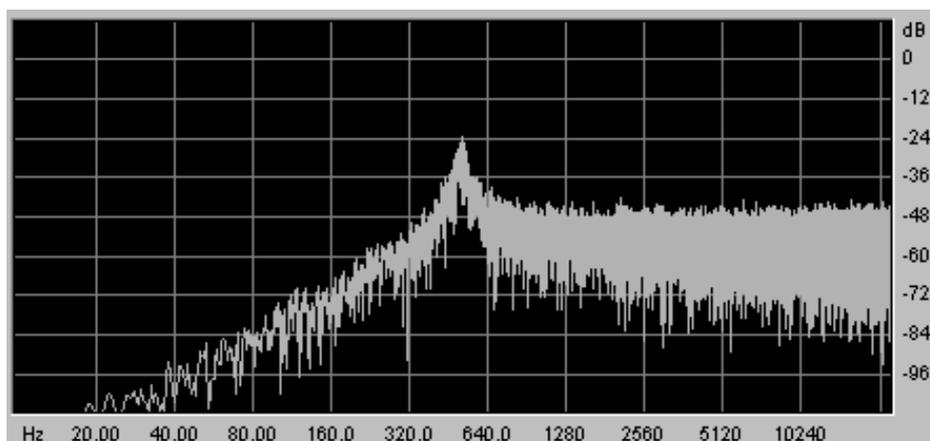
On the CS-80V, you have access to 3 different types of filtering. Let's have a look at some of their properties:

- The **low-pass filter** (*LPF*) deletes high frequencies going from a frequency limit (the famous cut-off frequency) and only allows low frequencies through. Depending on the setting we will hear the sound becoming more or less "brilliant", more or less "dampened". This is the type of filtering that you will find more often than not on synthesizers that use subtractive synthesis. It can be found on most of the recent analog and digital synthesizers



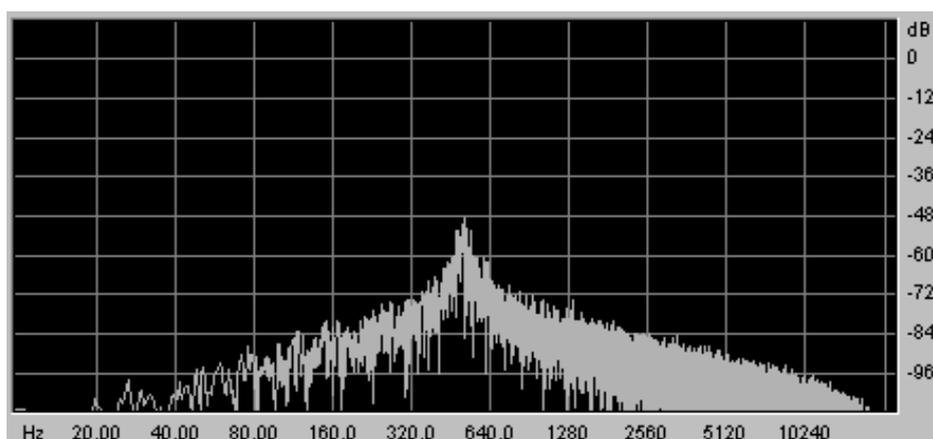
*The low-pass filter*

- The **high-pass filter** (*HPF*), unlike the low-pass, eliminates low frequencies and only allows high frequencies through. The sound will become "finer". It is very useful for removing redundant low frequencies with a bass sound for example.



*The high-pass filter*

- The **band-pass filter (BPF)** eliminates frequencies situated on either side of the cut-off frequency. It is in fact the addition of a low-pass and a high-pass filter. Use it to focus on a particular band of frequencies that you wish to emphasize. This will make the sound more “pinched”. On the CS-80V, you obtain this type of filtering by combining the actions of a high-pass filter and a low-pass filter as there is technically speaking no separate band-pass filter.



*The band-pass filter*

A second setting to compliment the cut-off frequency: the **resonance**. You will also find it called “Emphasis”, or even “Q” – for “Quality of filtering” – on many synthesizers.

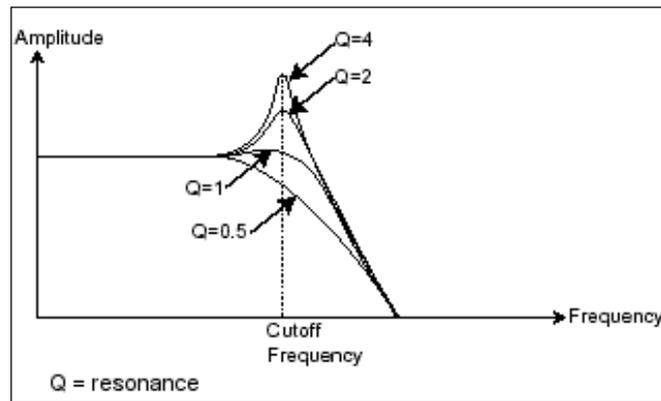
The resonance amplifies frequencies close to the cut-off frequency; the other frequencies remaining are either unchanged (before the cut-off frequency) or reduced (after the cut-off frequency).

On the CS-80V, you can increase the rate of resonance through the *RES* slider.

When you increase the resonance, the filter becomes more selective, the cut-off frequency is amplified, and the sound begins to “whistle”.

With a high resonance level, the filter will begin to produce a sound close to a sine waveform. At this stage, the use of a key follow is very important as you can create

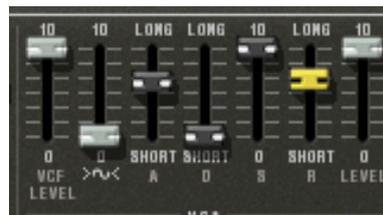
a melody by tuning the cut-off frequency of the filter with the frequency of the oscillators.



The resonance

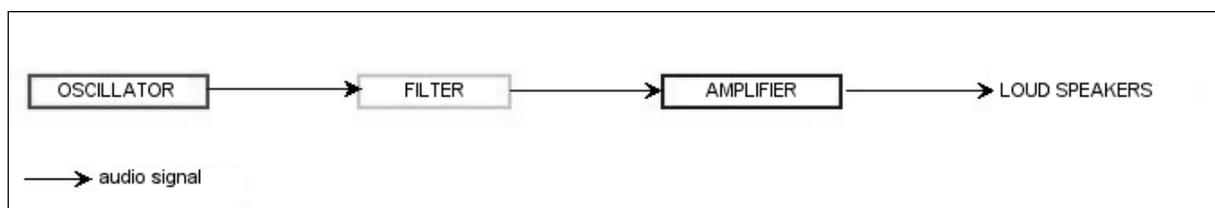
### 4.1.3 The amplifier or VCA

The amplifier (**Voltage Controlled Amplifier**) receives the audio signal coming from the filter (or directly from the oscillator if it is not being filtered) to adjust before the volume is sent to the outputs.



The CS-80V VCA

In conclusion, here is a diagram that should help you to understand the composition of a basic sound:



Audio signal path

## 4.2 Other modules

### 4.2.1 The keyboard

If we stop here, the sound that you will obtain will be uniform, without life and without an end. The oscillator delivers a sound signal (the audio output of a waveform) of a

fixed pitch in a continuous manner. In the diagram above, the only way to stop this quickly disagreeable sound is to lower the filter cut-off frequency so that it becomes more and more damp until it finally disappears; or simpler yet, lower the volume of the amplifier.

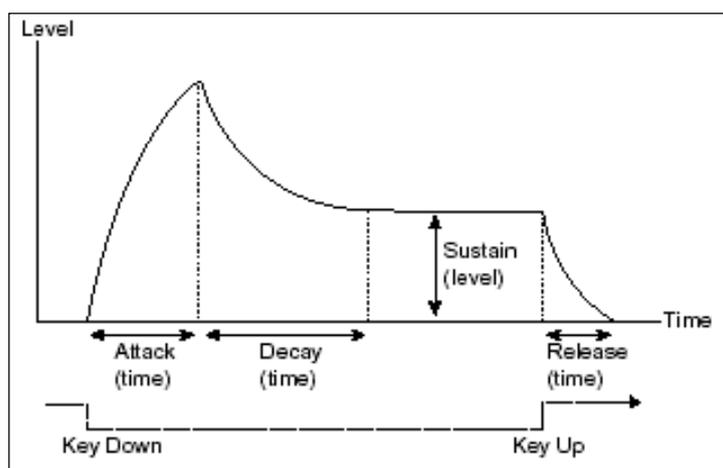
To start and stop the sound, and at the tone that we require, we use a keyboard that is connected to the oscillator. This will play the sound as soon as a key is pressed, and mute it when released. Of course, this connection is made through MIDI (it replaces the “gate” type of connections on analog synthesizers, which triggers the note when a key is pressed and stop it when released). On analog synthesizers, the key provides a gate which is often used to open and close the volume of the amplifier. The key position provides a control voltage that tells the oscillator what pitch level to play when the gate opens.

### 4.2.2 The envelope generator

The envelope generator, connected to the amplifier, is used to sculpt the volume of the sound when we press a key on the keyboard and ends after the note is released.

The most common modules developed use 4 settings that we can vary:

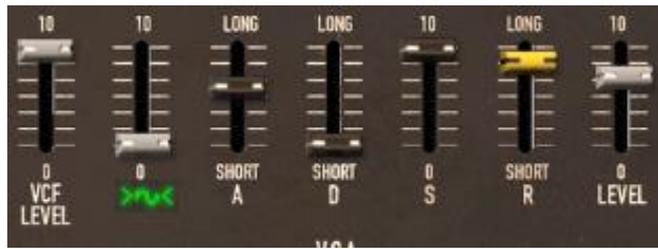
- The **Attack** is the time that the sound will take to reach its maximum volume once we have pressed a key on the keyboard;
- The **Decay** (fall) is the time that the sound will take to diminish when a note is pressed;
- The **Sustain** (hold) is the maximum volume level that the sound will reach when a key is pressed;
- The **Release** is the time that the sound will take to diminish once the key has been released.



*ADSR envelope*

On the VCF of the CS-80V, the envelopes include 2 additional settings:

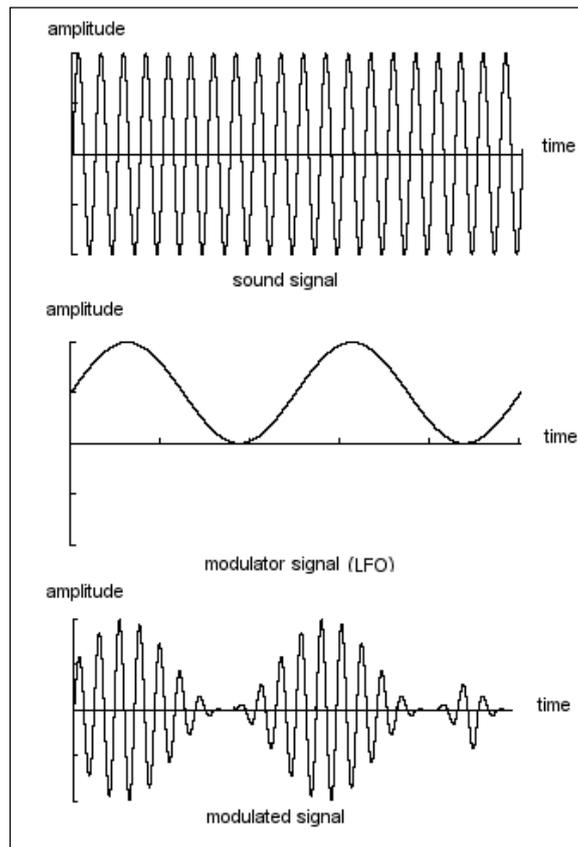
- The **initial level** (*IL*) is the start level of the envelope relative to the frequency of the filter. The filter frequency will be modulated starting with a frequency inferior to the frequency setting.
- The **attack level** (*AL*) is the maximum level of the filter envelope.



The CS-80V ADSR envelope

### 4.2.3 The low frequency oscillator

The LFO (Low Frequency Oscillator – or *SUB OSCILLATOR* on the CS-80V) possesses more or less the same characteristics of the classic oscillator but it only produces frequencies lower than 20 Hz. In other words, you won't hear the pitch of its sound, but rather use it as a cyclic modulation on the setting to which it is connected.



Low frequency oscillator modulation

For example:

- If the LFO sinusoid waveform modulates the volume of an amplifier, the sound will increase in volume then disappear in a varying manner following the speed (the frequency) of this LFO. This will produce a **tremolo** effect.

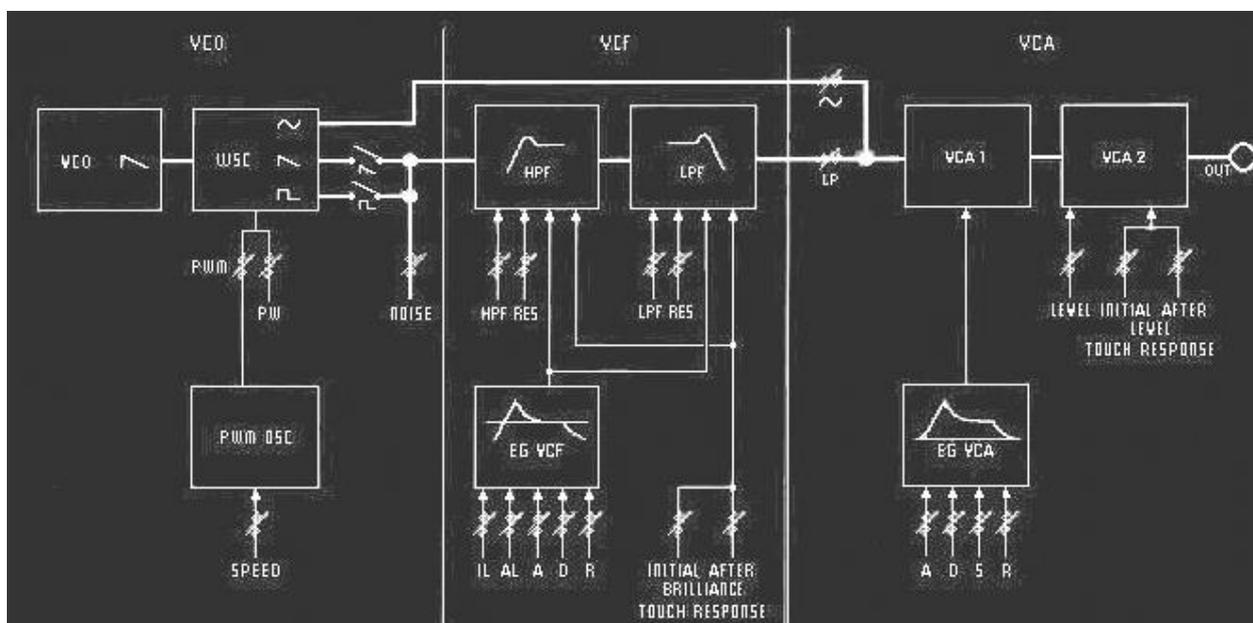
- An LFO sinusoid waveform modulating the frequency of an oscillator would produce a **vibrato** effect. The frequency of this oscillator will thus be modulated up and down.
- With an LFO sinusoid waveform modulating the cut-off frequency of a slightly resonant band-pass filter, you will obtain a **wah wah** effect.



The LFO section of the CS-80V

Now to finish, here is the diagram of a complete synthesis voice on the CS-80V containing:

- 1 oscillator (VCO)
- 1 noise module
- 1 mixer (mixing of the 2 VCO and the noise module towards the low-pass and high-pass filters)
- 2 filters (VCF) high-pass and low-pass
- 1 amplifier (VCA)
- 2 envelopes (one for the filters and the other for the VCA)
- 1 LFO



A complete CS-80 synthesis voice

## 5 A FEW ELEMENTS OF SOUND DESIGN

Here is a series of examples designed to guide you through the creation of various sounds as well as a vintage analog styled note sequence. They progress in order of difficulty going from the easiest to the most difficult and are organized into 3 parts:

- The first part will help you to grasp subtractive sound synthesis. You will start with the most basic patch (patch a VCO oscillator through a filter and a VCA amp output), to finish by touching on the programming of a more rich sound (several VCO sources, VCF filters, VCA envelopes, etc.);
- The second will help you to use the Multi mode and the arpeggiator;
- The third will give you tips on creative use of key follows, and creating a stereo sound without the use of additional chorus and delay effects.

### 5.1 Subtractive sound synthesis

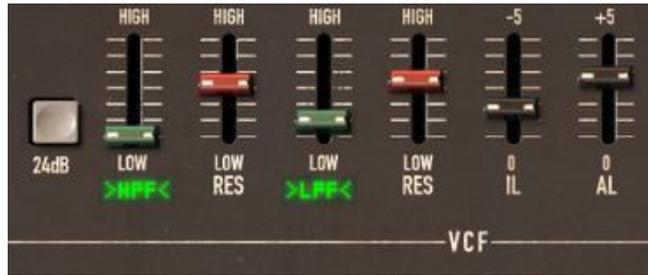
#### 5.1.1 A basic sound

To begin we will see how to program a basic sound. As we saw in *Quick Start* chapter 3, the CS-80V uses two identical and independent lines of synthesis. We will only use the first (the one above) for this example. It will be simply composed of:

- an oscillator
- a low-pass filter
- an output VCA
- the envelope corresponding to the output VCA.

Choose the preset saw in the *Templates* bank. This sound uses a sawtooth waveform, the high-pass filter is closed (but not deactivated), while the low-pass is completely open. The amplifier envelope has a minimum attack time (A) as well as a short release time (R). This minimalist configuration will let you easily perform some simple experiments with this basic sound.

Start by progressively lowering the cut-off frequency of the low-pass filter. The sound gets softer and softer.



*Decrease the frequency of the low-pass filter*

Increase the frequency of the high-pass filter. You will hear the sound lose its low frequencies; to clearly hear this effect, make sure not to set the cut-off frequency of the low-pass filter too low as the sound will be too soft.

Change the range of the oscillator from 8" to 16" with the *FEET 1* fader.



*Change the range of the oscillator*

Now increase the release time (*R*) of the VCA1 to the value 1000 ms so that the sound persists after the release of the keys. Be sure to set the level of the general sustain fader (*S*) to 0, so that the changes on the release time can be effective.



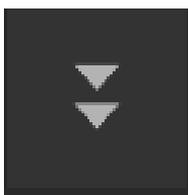
*Increase the VCA release time*

Now you can add all the parameters you want, like changing the oscillator waveform, activate the sine waveform, change the filter attack.

### 5.1.2 The modulation matrix

We will discover one of the many additions to the CS-80V: the modulation matrix.

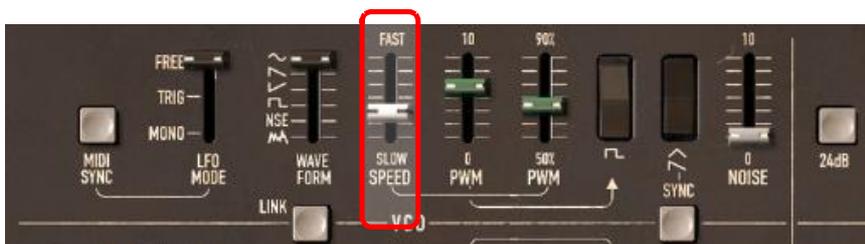
To begin, open the matrix hatch by clicking on its bottom-left corner:



*Open the Modulation Matrix*

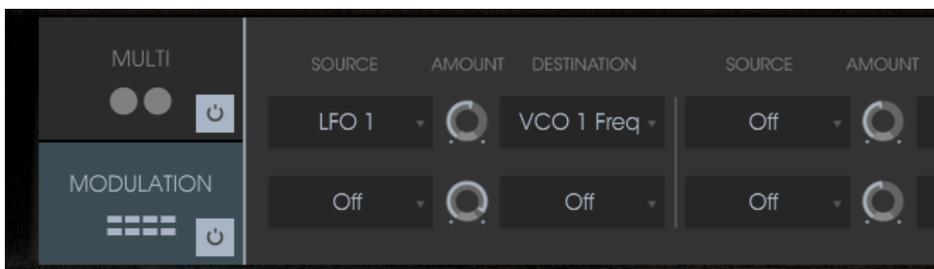
Now set the LFO1 as a source in the first modulation source area, and the VCO 1 Freq as destination.

The LFO1 speed can be changed with the speed button:



*Set the LFO Speed*

The VCO1 frequency is now modulated by the LFO1. It creates a kind of detune, if you set the amount to the maximum, the sound becomes much more pronounced.



*Matrix amount*

For the second modulation, we will now modulate the filter by the sub-oscillator.

For that, select the *SubOsc* as source and the *HP1 cut* as destination. Set the amount you prefer and listen to the sound. You can choose the threshold of the filter by lowering the filter frequency.

And to finish this part, connect the modulation *Wheel* to the *LFO2* speed, and the *LFO2* to the *LP1 cut*:



Your sound is now modulated by different parameters, adding unique complexity.

Try different matrix settings to see how the CS-80V can become an effective solution to design your own sounds.

### 5.1.3 Use of real time controllers

As we have previously seen, the use of real time controllers is one of the strong points of the CS-80V. They will allow you to apply a large variety of simple and quick modulations to the sound all while playing the keyboard.

#### 5.1.3.1 Velocity and aftertouch

These 2 controllers are directly linked to the playing on the keyboard:

- Velocity controls the cutoff frequency (*BRILL*) and the VCA volume.
- Aftertouch controls the speed of the vibrato modulation, and the VCA volume.

This was the configuration of the original CS-80. But you will be able to go further thanks to the modulation matrix, as these controls are among the sources of modulation.

Aftertouch can be employed to accentuate one of the 2 voices of synthesis: apply aftertouch on the VCA volume. When you press harder on a note on the keyboard, the volume of voice 2 will progressively appear. This will create a morphing effect between these 2 voices.



*Apply aftertouch on the VCA volume*

#### 5.1.3.2 The ring modulator

The ring modulator is essentially used to add a variety of harmonics to a sound.

Let's use the example of the sound from a bell:

Start by activating the ring mode by clicking in the >M< logo:



*Activate the ring modulator*

Increase the release time (R) on the envelope of VCA1 towards 440 ms.

The *SPEED* setting of the ring modulator allows you to very quickly increase the number of secondary harmonics in order to create a bell sound (around 150 Hz, barely the halfway mark for the knob), or a simple beating identical to a tremolo (around 2 Hz).

To get a bell sound, the oscillation frequency must be high, set this knob around 2,000 Hz.



*The SPEED setting*

Lightly lower the >M< lever (around 0.20) to mix the volume of the raw sound with the one coming from the ring modulator.



*Using the ring modulator for a bell sound*

If you wish, you can control the speed of the ring modulator in a progressive manner with an attack envelope (A) or even through an external MIDI controller. This helps you to easily create special effects.

## 5.2 Multi Mode

The Multi mode allows the creation of a combination of different sounds (up to 8) spread across keyboard zones (up to 4) within an individual preset. They bring very different results which directly influence how a sound or sequence is played.

### 5.2.1 Four different sounds on the keyboard

Choose the preset *Multi Sequence* in the bank *Templates*. On launch the 8 voices are assigned to the voice1 (C0 to C8). Each of the 4 zones has a different single sonority (the singles named 1, 2, 3 and 4). These singles can be detuned, assigned to a pan position and mixed. In this example, voices 1 to 8 are the same and have the same settings such as Pan and volume.

Change the pan position of the first voice. Place the sound to the left of stereo space: turn the *PAN* knob fully to the left, value 1.00L.

Also detune it by lightly turning the *DET* knob to the left, value of 0.99.

Now change the pan position of the fifth voice fully to the right, value 1.00R.

Detune the third: set the *DET* knob to a value of 1.01.

Use pan to position this single lightly to the right, value 0.78R.

Detune the fourth: put the *DET* knob to a value of 1.00.

Place these 4 voices to unison play mode by selecting the *UniLast* function in the play mode menu of the edit zone.

Now change the second and the seventh voice to zone 2 with single patch 2.

Change the voice mode of the second voice to *Unilow*.

You can now edit the second single patch by clicking on the *EDIT* red button

Set the transpose of the seventh voice to -12.

Now set the different level of each voice to get your sound.

By performing these first settings, you have modified the *Multi\_Sequence* preset. You can now save it in your own bank.

If you wish to use this configuration with a MIDI sequencer playing each single on a different MIDI channel, choose a channel for each zone.

---

 Don't forget that the notes played outside the limits of each of the 4 zones will not sound.

---

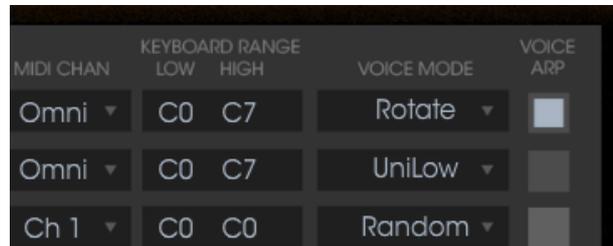
### 5.2.2 A composite sonority in unison mode

Now let's see a different use of the unison mode: layering several singles on the same note (remember you can go as far as 8 simultaneous voices).

Choose the preset *Multi\_Sequence* in the bank *Templates*, sub-bank *Sequences\_arp*. This preset contains 8 different singles but they are played

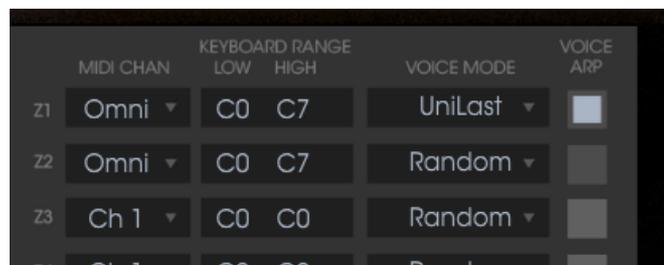
successively to each note played. They are all assigned to zone 1 which covers the whole keyboard.

Deactivate the VOICE ARP next to the voice mode:



*Deactivate the arpeggiator*

Begin by placing zone1 to *UniLast* unison mode. All of the singles should be played by the same note.



*Placing zone1 to UniLast unison mode*

Detune them with the *DET* knobs. The global sound will achieve more complexity.

Also change the pan position of each of the singles in order to form a very large stereo sound.

Singles can be sent to delay and chorus effects using the *FX* button. The ring modulator will not be used for this sound. Deactivate the *R.MOD* button on all of the singles.

It is also possible to change the pitch of certain singles by detuning them by an octave or a fifth below.

You will thus obtain a rich and powerful lead sound.

### **5.2.3 Introduction of the arpeggiator in a Multi preset**

Now let's program a Multi preset using the arpeggiator on one of the 4 zones. Take the preset *2Parts Splits*, from the *Templates* bank.

2 split zones on the keyboard are already in place:

- A single bass sound on zone 1, from C0 to B2, which will be played in ARP mode;
- A lead accompaniment single on zone 2, from C3 to C8.

The arpeggiator will act on zone1.

Click on the arpeggiator PLAY button and set a speed next to 160 ms, or Tempo\*4 if you have clicked the MIDI sync button.



*The arpeggiator PLAY button*

Play a chord between C0 and B2, the notes one after the other on the order that you placed them.

It is possible to change the playing order by clicking on the MODE slider.



*The linear MODE slider*

If you wish, you can hold the chord by clicking on the HOLD switch.

To remove one or several notes, click again on the HOLD button and play the note to be removed.

It is now possible to simultaneously play or record a bass part on the first octave of your keyboard, accompaniments on the next 2 octaves, while having the arpeggio on the last.



The arpeggiator settings

## 5.3 Other sides of the CS-80V

When we move away from the conventional methods of play, the CS-80V offers programming options that help you to go further.

Here are a few examples...

### 5.3.1 A step sequencer

By conjointly using the arpeggiator and Multi mode settings, it is possible to obtain an 8-note step sequencer.

Load the preset *Multi Sequence*, from the *Templates* bank: the 8 voices are on the same zone (the first) and the same single 1. The *VOICE ARP* button is active on the 8 voices.

Start by clicking on the *PLAY* button on the arpeggiator and play one note on the keyboard. You can hear that all of the voices play one after the other (zone 1 is set to *Rotate* mode) with the same height.

When the arpeggiator is playing, you can set the decay time (*D*) on the *VCA1* and *2* amplitude envelopes. The shorter the time, the more percussive the sound. Of course the effect produced will only be heard correctly if the sustain level (*S*) is 0.

So that the arpeggio plays alone, click on the arpeggiator *HOLD* switch.

Set the height of each of the 8 notes by turning the *HOLD* transposition knob among the single voice settings. When you turn to the right, the height of the note increases by semi-tone, if you turn to the left, the height decreases by a semi-tone. Choose the values that suit you to make an 8-note melody.

It is also possible to change the note order by moving the *MODE* slider of the arpeggiator.

To obtain a better distribution of the notes in stereo, you can set the stereo position of each voice to the left and to the right through the use of the pan pots.

To create silence on one of the 8 voices, lower the *VOL* knob for the selected single.

---

⚠ By choosing the *UniLast* mode for zone1 you will get a series of notes. If you wish to transpose the note, make sure that the arpeggiator *HOLD* button is deactivated.

---

### **5.3.2 Stereo sound without the effects**

If you use a preset with one of the 3 unison modes (*High, Low, Last*), it is possible to make the sound fatter and heavier without using a chorus effect.

Remember that in this mode, all of the voices assigned to that zone play at the same time when we press a note.

Start by slightly detuning all of the voices used in this sound.

Separate the stereo position of each voice.

You will get a sonority that is naturally large and nearly identical to what can come from a chorus effect. It should be noted that the more voices you use, the richer the sound.

## 6 END USER LICENSE AGREEMENT

### 1. General

**1.1** In consideration of payment of the Licensee fee, which is a portion of the price you paid, Arturia, as Licensor, grants to you (hereinafter termed "Licensee") a nonexclusive right for the use of software including related media, documentation (for example program descriptions, manuals) and other documents and materials manufactured by Arturia SA ("Product(s)").

All intellectual property rights in the software belong to Arturia SA (hereinafter: "Arturia").

**1.2** The following editions of the Product are available: "**Demo**", "**Standard**", "**EDU**" and "**NFR**". Whilst each edition equips the User with the same software, the editions vary as regards both the scope of functions activated in the Product, and the rights of use granted under this EULA.

**1.3** By installing the software on your computer you agree to these terms and conditions. If you do not approve these terms and conditions, you must not install this software.

**1.4** If you do not approve these terms and conditions, please return the complete Product (including all written matter, packaging and similar material) to the dealer from whom it was originally bought within 14 (fourteen) days after the day of purchase. For purchases from the Arturia Online Store, please contact Arturia on the internet website: [www.arturia.com/support/askforhelp/purchase](http://www.arturia.com/support/askforhelp/purchase).

**1.5** Arturia reserves all rights not expressly granted in the EULA.

### 2. Right of use

**2.1** The Product is protected by copyright. The Licensee may not lease, loan or sub-license the software. The Licensee is not authorized to modify the software.

**2.2** Owning any product provided to the Licensee as "**Standard**" version grants the Licensee a non-exclusive right to use the Product in perpetuity including commercial purposes. The Licensee can activate the Product on up to five computers, as long as only one installation is used at any given time. The Licensee must register the Product to Arturia to get access to client support, and to activate his Product. (An internet connection is required to register and activate the Product, either on the computer on which the Product is installed, either on another device able to exchange files with the computer on which the Product is installed). Owning a license of the Products entitles the Licensee to get access to the future updates of this Product.

**2.3** Any Products provided to you as "**NFR**" (Not For Resale) version grants the Licensee a non-exclusive right to use the Product for a limited period of time. The Product shall only be used for demonstration, testing and evaluation purposes. NFR Products must not be used for commercial purposes, and must

not be resold or transferred. The Licensee can activate the Product on up to five computers, as long as only one installation is used at any given time. The Licensee must register the Product to Arturia to get access to client support, and to activate his Product. (An internet connection is required to register and activate the Product, either on the computer on which the Product is installed, either on another device able to exchange files with the computer on which the Product is installed). NFR Products are exempt from update, upgrade or crossgrade offers, and cannot be purchased with or exchanged for vouchers or coupons. Furthermore, as an owner of a NFR Product, you are not entitled to any vouchers that ship with the standard version of the Product.

**2.4** Any Products labelled or otherwise provided to you as an “**Educational**” version grants the Licensee a non-exclusive right to use the Product in perpetuity. The Product shall only be used by students or those working in educational institutions. This definition includes students, faculty, staff and administration attending and / or working at an educational institutional facility: private / public schools, colleges, universities and similar. These Products must not be used for commercial purposes, and must not be resold or transferred. The Licensee can activate the Product on up to five computers, as long as only one installation is used at any given time. The Licensee must register the Product to Arturia to get access to client support, and to activate his Product. (An internet connection is required to register and activate the Product, either on the computer on which the Product is installed, either on another device able to exchange files with the computer on which the Product is installed). These Products are exempt from upgrade or crossgrade offers, and cannot be purchased with or exchanged for vouchers or coupons. Furthermore, as an owner of an educational Product, you are not entitled to any vouchers that ship with the standard version of the Product.

**2.5** Any Products labelled or otherwise provided to you as a “**Demo**” version grants the Licensee a right to use the Product only for demonstration and evaluation purposes. These Products must not be used for commercial purposes, and must not be resold or transferred. These Products are exempt from upgrade or crossgrade offers, and cannot be exchanged for vouchers or coupons.

### **3. No Unbundling**

Bundles (product bundles are an association of software and hardware or software-only products) can only be resold / transferred as a whole. The individual components of a bundle must not be resold / transferred separately.

### **4. Resell**

**4.1** Renting or lending the licensed Software to a third party is expressly forbidden. Apart from that and if not provided otherwise within this EULA.

**4.2** Except if otherwise stated within this EULA, Licensee may resell the software to a third party or transfer the software permanently free of charge, provided

the third party agrees in writing with this EULA and Licensee ceases all use of the software, completely removes all installed copies of the software from his computers and – if the software was not purchased via download – deletes or transfers the original media delivered with the software to the third party. In addition, Licensee is required to de-register the purchased software with Arturia (more information available on [www.arturia.com](http://www.arturia.com)).

## **5. In case a sound library is part of the purchased Product the following shall apply in addition to the EULA**

The provided samples, instruments and presets can be used for commercial or non-commercial music and audio Productions without the prior permission from Arturia under the terms of this Agreement. The usage of this Product (in particular samples, instruments and presets) for the creation of a sound library or as a sound library for any kind of synthesizer, virtual instrument, sample library, sample-based Product or other musical instrument is strictly prohibited. Individual samples, sound sets or audio loops may not be distributed (commercially or otherwise) standalone. Furthermore these samples, sound sets or audio may not be repackaged in whole or in part as audio samples, sound libraries or sound effects.

## **6. Data Protection**

Arturia attaches great importance to compliance with legislation on data protection. The User data collected are used exclusively for performing its contractual obligations. No data is passed on to third parties. Further information can be obtained from our Privacy Policy at [www.arturia.com/privacy](http://www.arturia.com/privacy).

## **7. Limited Warranty**

Arturia warrants that the physical media on which the software is provided is free from defects in materials and workmanship under normal use for a period of thirty (30) days from the date of purchase. The Licensee's invoice shall be evidence of the date of purchase. Any implied warranties on the software are limited to thirty (30) days from the date of purchase. Some states do not allow limitations on duration of an implied warranty, so the above limitation may not apply to the Licensee in this case. All programs and accompanying materials are provided "as is".

## **8. No Liability for Consequential Damages**

Neither Arturia nor anyone else involved in the creation, production, or delivery of this Product shall be liable for any direct, indirect, consequential, or incidental damages arising out of the use of, or inability to use this Product (including without limitation, damages for loss of business profits, business interruption, loss of business information and the like) even if Arturia was

previously advised of the possibility of such damages. Some states do not allow limitations on the length of an implied warranty or the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusions may not apply to the Licensee in this case. This warranty gives the Licensee specific legal rights, and the Licensee may also have other rights which vary from state to state.