

YAMAHA

Virtual Acoustic Synthesizer

VL1



The World's First Practical Application Of Computer Modeling in Musical Synthesis

What Are the Advantages?

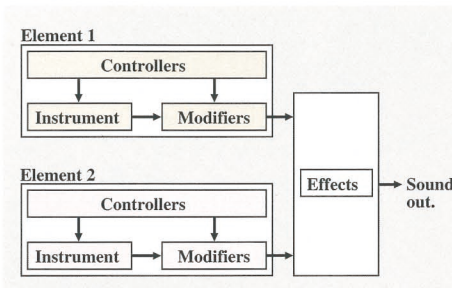
The VL1 offers many advantages in terms of musical performance. Not just in terms of sound, but also in terms of the "behavior" that makes acoustic instruments so "musical". The physical model can be programmed to have certain attributes — the length of a pipe or the stiffness of a reed, for example — but the actual sound produced by any configuration can only be accurately determined by playing it. Because of its natural acoustic behavior the VL1 is undoubtedly a little harder to play than conventional synthesizers, but when mastered this is the very characteristic that is its greatest strength.

- The VL1 sounds better, has more depth, and is more realistic in the musical sense than any other synthesizer system.
- Simply pressing a key in the same way does not always produce precisely the same sound. The instrument is responsive and "alive".
- Note-to-note transitions have the same continuity exhibited by acoustic instruments. What goes on in between the notes is just as important musically as the notes themselves.
- It has extraordinary expressive capability. Rather than simply controlling parameters like volume or pitch, you can control characteristics such as breath and reed pressure with appropriate complex effects on the timbre of the sound.
- In addition to super-realistic simulations of existing acoustic instruments, the VL1 can produce totally new "acoustic" voices and hybrids which can vastly expand the player's expressive scope.

The VL1 Model

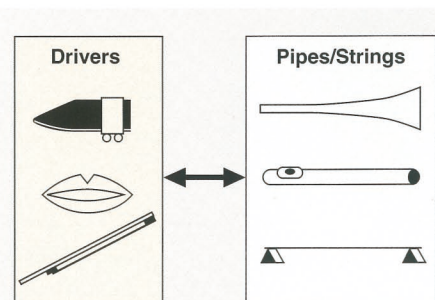
The overall VL1 model or "algorithm" consists two "elements", each including three main blocks: the instrument, controllers, and modifiers. The two elements actually function as

independent tone generators, so although it is basically a monophonic solo instrument the VL1 can produce two notes at once. The two elements can also be used as layers of a single voice.



The Instrument

The key block in this algorithm is the instrument, since it is here that the fundamental tone or "timbre" of the sound is defined. Various instruments for the VL1 are provided in the form of pre-programmed voices — primarily woodwind, brass, and string voices, since the VL1's physical model is capable of most accurately simulating the sound-generating mechanism of these three instrument categories. Internally the instrument model consists primarily of a driver — the reed/mouthpiece, lip/mouthpiece, or bow/string system — and a resonant system corresponding to the tube and air column or string. One of the main differences between the VL1 and an acoustic instrument is that just about any driver can be used with any type of pipe or string, resulting in totally new instruments with "acoustic" properties and expressive power.



The Controllers

The input to an acoustic wind instrument comes from the player's lungs, trachea, oral cavity, and lips. In a string instrument it comes from the player's arm movement, transmitted to the string via a bow. These elements actually form an important part of the sound generating system and, in the VL1 model, are simulated in the controllers block. In essence, the controller parameters, listed below, determine how the instrument "plays". All of these parameters can be assigned to any of the external controllers that can be used with the VL1: the breath controller, foot controller, modulation wheels, etc.

Pressure: The amount of breath pressure applied to a reed or mouthpiece, or the speed of the bow applied to a string.

Embouchure: The tightness of the lips against the reed or against each other. In a string instrument voice Embouchure corresponds to how strongly the bow is pressed against the string.

Pitch: Changes the length of the air column or the string, and thereby the pitch of the sound.

Vibrato: Vibrato can be applied via the Pitch or Embouchure parameters for exceptionally natural vibrato effects.

Tonguing: Simulates the half-tonguing technique used by saxophone players by damping of the reed.

Amplitude: Controls the volume of the sound without varying timbre.

Scream: Drives the entire system into chaotic oscillation, creating effects that can only be achieved with physical modeling technology.

Breath Noise: Adds breath noise. The sound of the breath noise itself can be varied over a wide range.

Growl: A periodic pressure modulation which produces the "growl" effect often heard in wind instruments.

The Yamaha VL1 Virtual Acoustic Synthesizer produces sound in an entirely new way. It has no oscillators or function generators, no preset waveforms or samples. In fact, it uses none of the sound generation concepts employed in conventional synthesizers. The VL1 represents the world's first practical application of computer-based "physical modeling" in musical sound synthesis, generating sound using the same principles as acoustic instruments, but with far more versatility and creative power.

The Yamaha VL1 is the most musical synthesizer ever made. A soloist's dream!

Throat Format: Controls the characteristics of the simulated player's lungs, trachea, and oral cavity.

Dynamic Filter: Controls the cutoff frequency of the Dynamic Filter in the VL1 Modifiers block.

Harmonic Enhancer: Controls the depth of the Harmonic Enhancer in the VL1 Modifiers block.

Damping: Simulates the effect of damping due to losses within the body of a wind instrument or in a string due to air friction.

Absorption: Simulates the effect of high-frequency loss at the end of the air column or string.

The Modifiers

Although you don't have direct programming access to the VL1 instrument block, the modifiers allow a significant degree of control over the final timbre of the voice. The modifiers block consists of 5 sections, listed below.

Harmonic Enhancer: The Harmonic Enhancer allows you to manipulate the harmonic structure of the sound to the extent that you can create radical timbral variations within the current instrument "family" (e.g. saxes).

There's More ...

In this brief introduction to the VL1 we've only looked at the central physical model which is the key to the VL1's unprecedented sound and musical performance. There's actually much more to it. The VL1 has an extensive range of other functions and features that are similar to those you may be familiar with from conventional synthesizers. And, of course, there's a comprehensive selection of MIDI, disk, and other utility functions that give the VL1 maximum versatility and convenience. For luxurious looks and feel the VL1 even has beautiful claro walnut top and rear panels, aptly complementing the advanced technology inside.

Rear Panel



Specifications

■ Tone Generator

Type	S/VA (Self-oscillating Virtual Acoustic Synthesis).
Modifiers	Harmonic Enhancer. Dynamic Filter (LPF, HPF, BPF, BEF, with resonance). Equalizer (5 bands with frequency, resonance, and boost/cut control). Impulse Expander. Resonator.
Effects	32-bit digital signal processor, stereo in/stereo out. Modulation effects (flanger, pitch change, distortion). Feed back delay. Reverberation.
Play Mode	Voice mode only. Smallest tone generator units: elements. Voices use 1 or 2 elements. Voices are composed on "common data" and "element data".
Polyphony	2 notes max.
Assign Modes	Mono, Poly, Unison

■ Memory

Internal	128 voices.
Disk	3.5" 2DD or 2HD floppy disk.

■ Keyboard

Keys	49 (C scale, FS type).
Sensitivity	Velocity. Channel aftertouch.

■ Controllers

Master volume slider.	Modulation wheel × 2.
Continuous sliders × 2.	Data entry dial.
Pitch bend wheel.	LCD contrast control.

■ Panel Switches

Play (with LED).	Program change × 16 (with LEDs).
Edit (with LED).	Data entry × 2.
Utility (with LED).	Cursor × 4.
Octave × 2 (with LEDs).	Function × 8.
Copy.	Exit.
Store.	Enter.
Bank select × 8 (with LEDs).	

■ Display

240 × 64 dot liquid crystal display (black and white type) with fluorescent (CFL) backlight.

■ Connectors

Front Panel	Stereo headphones. Breath controller.
Rear Panel	Output × 2 (L and R). Foot controller × 2. Foot switch × 2. MIDI IN. MIDI OUT. MIDI THRU.

■ Output Level

Line	2.5 ±2 dBm into 10 kΩ.
Headphones	7.5 ±2 dBm into 150 Ω.

■ Power Requirements

US model	120V, 16W
General model	220...240V, 16W

■ General

Dimensions (W x D x H)	914 mm × 380 mm × 105 mm (36" × 14-7/8" × 4-1/8")
Weight	12.5 kg (27.6 lbs.)

■ Accessories

Power cable.
BC2 Breath Controller.
FC7 Foot Controller.
Floppy disk.

All specifications subject to change without notice.

For details please contact:

YAMAHA
YAMAHA CORPORATION
P.O. Box 1, Hamamatsu, Japan