

iVCS3 Programming & The Repurposing of Audio Files To Carry Control Voltage Levels.

Author: James Edward Cosby

jamesedwardcosby@jecdesign.com

Abstract...

1. To Show how CV Signals can be encoded using Audio Samples and stored within a standard “.wav” File to be used to expand the sonic possibilities of iVCS3 and equivalent hardware...
2. To show Examples of iVCS3 Programming including the transmission of CV Signals over Audio busses within iOS showing the Control of another iSO Synth using APEMatrix for the audio bus connection. Show the use of CV Audio Files to add highly programmable enveloping to iVCS3 patches...

Keywords: iVCS3, Control Voltages, Audio Files, Sound Design, Modular Synthesis.

The Author...

The author has over forty years of experience in hardware analogue synthesis and around thirty years of experience with analogue/digital hybrids and FM. His other credits include 1980's 8-bit game design primarily on Z80 platforms at an Assembler Level and including Graphic and Sound Design. In addition to iVCS3 the author has recently contributed presets to several iOS Software Synths including Audio Kit Synth One and D1.

1 CV Changes over Time, Encoded using Audio Samples.

Consider the similarity between Audio Signals and Control Voltage Signals... Both are Bi-Polar Voltages which change over time... Thus it follows that both can be represented digitally and stored for subsequent replay at will.

In the case of an LFO CV Signal, this can be **simply** represented by an audio wave with a cycle frequency in the sub audio range..

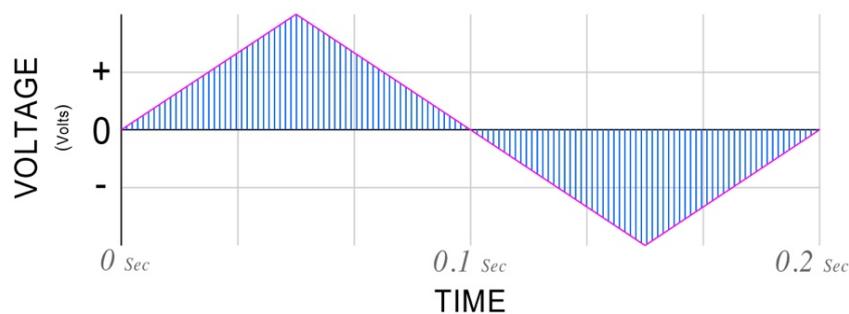


Fig1.

In the case of an Envelope, the perceived change in amplitude over time of any given sound wave can also be represented by samples in the same way...

First, consider Fig 2. a simple Sine Wave upon which an Amplitude envelope is applied resulting in a Percussive Transient...

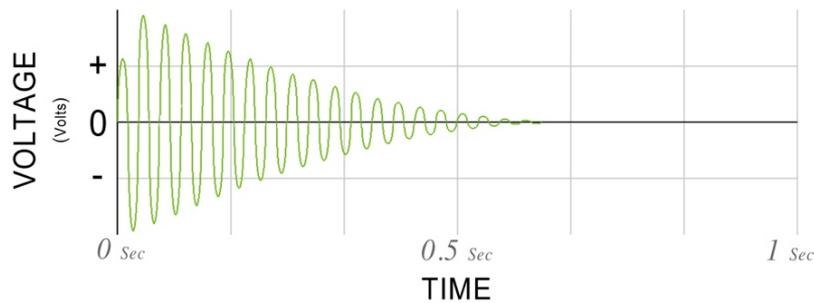


Fig 2: Wave with percussive transient

The Perceived Rise and Fall of Amplitude over Time (Envelope), shown in Fig 3. can be shown by considering the “Absolute Values” of the Sampled Waveform...

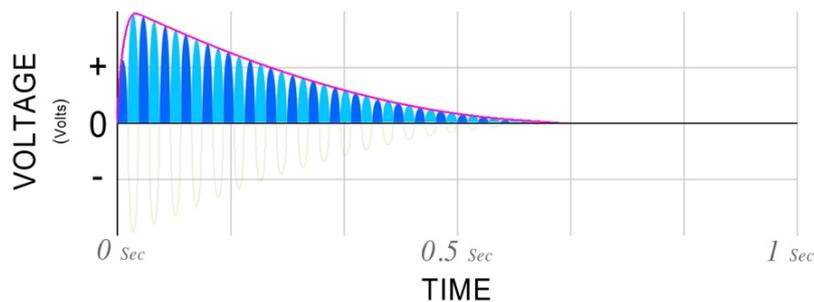


Fig 3: Wave Absolute Showing Percieved Transient

Thus, as shown below in Fig 4. The Perceived Envelope can be represented by digital samples which can therefore be stored in a standard “.wav” or other format “Audio” file. This “Audio” file can then be processed using existing subroutines and used to Modulate any desired parameter...

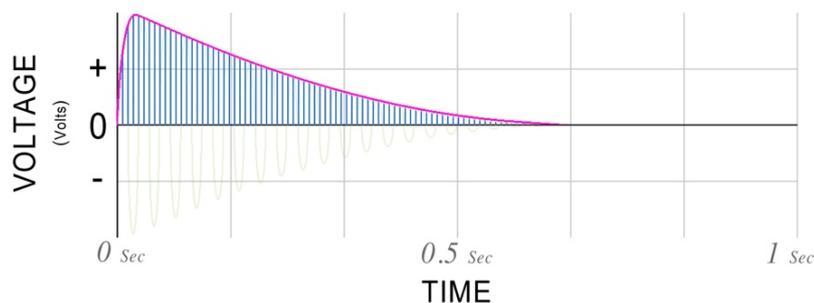


Fig 4: Percieved Transient Defined By Samples

Loading into iVCS3 to Modulate Parameters...

Once loaded into iVCS3's Sampler Module using the Folder Icon, in this case, Fig 5, the file is loaded into Channel 2, various parameters can be set to refine the modulation effect...

“Rate” will adjust the duration of the modulation, (the rates of both sampler channels can also be synchronised to each other). The “Mix” parameter will adjust level balance between the sample file and the incoming iPad audio bus. For a stereo file, the “L/Mix/R” switch assigns which stereo channel(s) of the file are used. The “Off/DK/Seq” switch selects the Retrigger Mode, i.e. simple continuous loop or Dynamic Keyboard/Midi Note Triggering or Internal Sequencer Note Triggering. A portion of the file can also be selected using the Crop Icon.

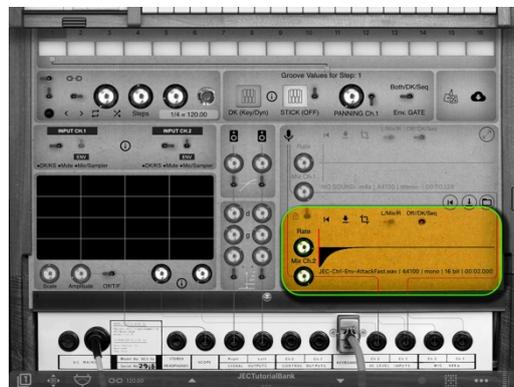


Fig 5. CV Envelope Loaded into iVCS3

Once the CV File is loaded to the desired Sampler Channel, the signal will be present at the Matrix... Row 8 for Input Channel 1 and Row 9 for Input Channel 2. This Signal can be attenuated using the Input Channel Level Parameter Knobs and thus setting the “Amount” of modulation applied to the destination parameter. The example in Fig 6. shows a basic playable patch with Osc 1&2 patched through the Filter and Trapezoid to the Outputs. Both Osc 1&2's Frequencies are modulated by the DK which is routed through Input Channel 1. The loaded CV Envelope File is patched from Input Channel 2 to modulate the Filter Cutoff Frequency and synchronised to trigger with a DK/Midi Note.

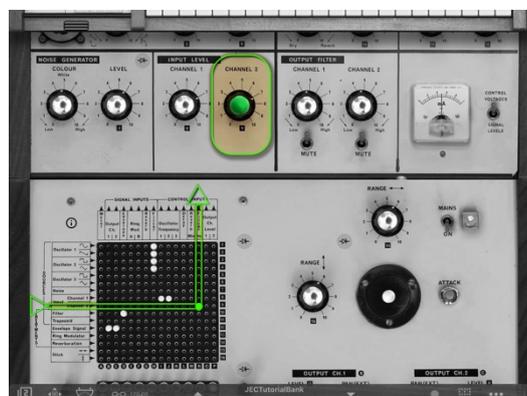


Fig 6. Example CV File Filter Modulation

This results in much greater dynamic possibilities than are otherwise achievable, indeed, the idea has been tested and found to work well on the original hardware using a synchronised sample player and transmitting the CV Files over an audio bus. The idea has also been tested using the iPad internal audio busses allowing successful modulation control of one modular synthesiser from another.

2 Video Presentation using iVCS3 as the prevalent sound source

Show a video of the re-created 1960's Dr Who television theme using iVCS3 as the main sound generator synchronised to the original black & white recursive graphics...

3 iVCS3 Programming Examples and using Audio CV Files.

This section of the presentation to include a short description of iVCS3's modules and their peculiarities and will be an open Q/A discussion on iVCS3 / VCS3 programming, including a breakdown of some patches used in the aforementioned theme...

Available Topics to Include...

The Matrix, direction of signal flow, touching on Pin values and Meter.

Oscillators 1, 2 & 3... and their waveforms, briefly describing their hardware voltage control specifications and how this relates to Pin & DK settings for equal temperament.

Ring Modulator... functionality, "Differential" output and how this can be used to alter the amplitude of signals including use of the Joystick to generate a "bowing" effect.

Filter... Parameters including Ladder & ZDF_Diode selection, "Slew" and "Saturation"

AHDR Trapezoid Envelope Shaper... covering Decay Modulation, Looping, CV and Signal Paths

Spring Reverb... Level, Mix Modulation and Settings.

Noise Generator... Colour and Level Parameters and S&H / Glide Modes

Output Filters... Twin Dual Low/High Pass Filters

Joystick and Range Parameters... Covering Modulation possibilities and demonstration of special values / calculations for Octave and Note transposition and OSC3/Filter DK Tracking.

Output Channels 1 & 2... Level Modulation including CV File Amp Envelope Modulation and Panning.

References

EMS: EMS VCS3 “The Putney” User’s Manual...
<https://www.manualslib.com/products/Ems-Vcs3-Putney-3970479.html>