



Sweep WAV Generator Notes

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Introduction

These are notes to accompany the Sweep WAV generation application for use with Prism Sound dScope Series III. This is primarily aimed at the creation of sine sweep test signals for playback only audio devices.

Background

The audio testing of playback only devices such as media players is made difficult by the fact that they are not able to accept a signal from a signal generator and therefore must rely on playback of pre-constructed test signals. Construction of accurate test signals is a laborious process when attempted using audio editing software and is much more reliable when done mathematically. The purpose of this program is to make the generation of sinusoidal sweeps easy and accurate. These sweeps can be frequency sweeps, amplitude sweeps or both. They can be at a range of word lengths, sample rates and channel counts.

Requirements

This script is intended for use with dScope Series III and requires that the dScope Series III software be installed. The resulting waveforms are stored in the dScope Series III "User wavetables" folder. The software is a single VB6 executable that should run on any recent Windows computer.

Installation

Simply copy the file "Sweep_Generator.exe" to an appropriate location on your computer and run it. It makes no changes to the computer other than generating files. To un-install it, simply delete it.

Limitations

- The script generates canonical format WAV files at 16, 18, 20, 22 and 24 bit resolution. For word lengths above 16 bit, the file format uses three bytes per sample – for 18, 20 and 22 bit word lengths, the data is simply zero padded. These files will play on most devices capable of playing WAV files, however, recent versions of Windows Media Player will refuse to play them and give a message about missing codecs. This is because they do not have the additional headers that Windows wants them to have. The audio data is the same. You can get round this by opening them in an audio editor such as Audacity and re-saving them. If you do this, be careful not to re-dither them or apply any processing.
- The script always saves its output files to the dScope "User Wavetables" folder. This is normally located at [C:\program files\Prism Sound\dScope Series III\User Wavetables](#)".
- The script will **overwrite** existing files with the same name **without warning**.



Operation

When you run the program, you will be presented with the user interface shown below:



The basic principle is that you define the sweep you want to generate using the top half of the interface and the WAV file parameters using the bottom half and then click "Generate file". File generation can be quite slow depending on the word length, sample rates and number of channels, as well as the length of the sweep. Two progress bars show the progress through the sweep step and the overall sweep.

Operation Notes and options

The options are mostly obvious and have tool-tips to describe them in more detail. Some additional points may be necessary:

- Frequencies should be entered in Hz and are limited to between 10Hz and 0.98 x the Nyquist frequency of the selected sample rate. Entries in kHz are not recognised.
- Amplitudes should be entered in dBFS (decibels relative to full scale) where 0 is full scale. Values between 0 and -200 are accepted.
- Number of sweep steps defines the number of transitions between different tones so setting a sweep step value of 1 will have two tones with one step between them.
- Using log frequency steps means that the frequency progression is computed using multiplication rather than addition: eg, the next frequency will be a factor larger than the current one, rather than a fixed frequency interval in Hz.
- Sweep duration is defined by two parameters, the time in milliseconds and number of cycles: the longer of the two will apply. For example, in the screen shot above, the 20Hz tone will be 1 second long and not 200ms because 20 cycles of 20Hz (1 second) is longer than 200ms. The reason for this is that many measurements require a complete number of cycles to calculate correctly (RMS voltage for example) and it often takes longer to track frequency for applying filters or using sensed sweeps. For these reasons, in practical tests, it can help if the lower frequency signals last longer than the higher frequency ones.



- By default TPDF (Triangular Probability Density Function) dither (ie, flat noise spectrum dither) is applied at the word length defined in the WAV file parameters. There are very few circumstances when you would wish to turn this off.
- Shift Mode is used to create a test signal with clean transitions between different tones. By default the program will extend the time of each tone beyond the value set up until the next positive zero crossing. This makes sure that the transition between adjacent tones is clean and free of glitches. As an alternative, you can set it to adjust the frequency by shifting it up so that the next positive going zero crossing occurs at the time specified. A third option is to generate the file as specified, without any shifting: this will usually result in steps in the waveform where one tone ends and another begins.
- The "Show Info" button simply displays data about the waveform that will be generated, including the frequencies and durations of each step, the total duration and the file size.
- The "Make file name" button makes a file name based on the sweep settings so that it is easy to see what the sweep is. It doesn't attempt to save any information about the WAV file itself. This information is usually available from the software that plays the file.
- This program ONLY generates canonical WAV files. If you want any other format, you will have to use an external encoder to convert the files.
- To generate a single tone, set the number of steps to 0 and set the start frequency and amplitude to the required values for the tone you want.