Additional Example Wave Files

Here are some additional example audio samples for use with DCForensics 10.5 and later.

Signal Suite File

(Download file here)

All signals are monophonic, 44.1 kHz with 16 bit depth (resolution). The file contains 7 concatenated signals. These are useful for audio system testing presented in a convenient format. The total length of the file is 3 minutes 6 seconds. Each signal is roughly 30 seconds long and -10 dB peak in amplitude (except the impulse signal, which is just one full-scale event).

1. 1 kHz Sine Wave: 00:00:00
2. 1 kHz Triangle Wave: 00:00:31
3. Square Wave: 00:01:02
4. Random (white) Noise: 00:01:34
5. Swept Sine Wave (20 Hz – 20 kHz): 00:02:04
6. Impulse (Single Event): 00:02:37
7. Silence (all zeros): 00:02:40

Note: Looped play mode may be useful if you want a longer version of a signal. Just highlight the signal sector and loop play it for longer play times. You can create your own signals using the Make Waves Generator found under the Edit Menu.

1 Percent THD Sine Wave

(Download file here)

The "1 Percent THD Sine Wave" file (% Total Harmonic Distortion) is an experimental 1000 Hz test file that allows you to test the Distortion Analyzer in your Diamond Cut Productions software. The fle was created with the Make Waves Generator (Edit Menu) using a 16 bit depth at 44.1 kHz Sine Wave in conjunction with the Virtual Valve Amplifier (using the 12AX7 Triode in Warm mode). It is stereo, containing two slightly distorted sine waves of roughly 0.99% THD.

To measure the distortion of this test file, bring it up in the source window. Bring up the Spectrum Analyzer found under the View menu. Set the Spectrum Analyzer as follows:

- Options: Set for "Show THD"
- Display Mode: Fast
- Amplitude Range: 100 dB
- FFT Size: 4096
- Window: Bessel
- Frequency Resolution: 10.77 Hz

After the spectrum analyzer is set up, play the file (play looped is sometimes the most convenient way to use the file). You will see the distortion displayed on the left side of the Spectrum Analyzer dialog box just above the spectral graph. It should read:

THD = 0.9938 %

Note the numerous spectral lines above the fundamental frequency of 1 kHz. For more details, go to the user's manual or the help-file and read up on the Spectrum Analyzer system.

Variable Velocity Lissajous Signals 2

(Download file here)

The Variable Velocity Lissajous is an experimental test file having a number of useful characteristics to help in gaining experience with the "XY display" and the "View Channel Phase vs Time" forensics function. It was created using a 16 bit depth at 44.1 kHz. It is dual-channel (containing two sine waves), different signals on each channel with neither phase-locked to the other. The right channel repetition rate is nominally 50 Hz (50 cycles per second). The left channel is nominally 150 Hz, but swept in frequency. Random (white) noise has been added into both channel signals for realism. The left channel signal starts at 149 Hz and ends at 151 Hz and is 150 Hz in the middle of this 30 second long file. The peak amplitude of both signals are the same and are -10 dB. The total length of the file is 10.0000 seconds. Gain change edits occur at two locations in the file. The left channel gain change edit occurs at 18.76 seconds and the right channel edit occurs at 19.07 seconds. This file is useful for experimenting with the "XY Display" (XY Vector Display) found under the View Menu. When this file is played with the XY display opened, you should see a

rotating three-to-one lissajous pattern, indicating signal non synchronous operation at a roughly 3:1 frequency ratio. Slowly, the pattern rotation should slow down and then seem to stop in the middle of the time display and then reverse rotational direction. Where the pattern seems to 'freeze', that is where they are exactly 3:1 in frequency ratio with respect to one another.

It is recommended that you perform this experiment in classic edit mode, so that you can see the relationship between the time domain view and the average phase domain view of these two signals and the edits.

If you bring up the "View Channel Phase vs Time" function found under the Forensics menu, you will see green line in the middle of the lower display. You can see it slowly rise at the beginning (left side of the graph) and slowly fall near the end of the file. Note that there are two disturbances in the green line somewhere in-between. These are gain change edits placed intentionally into the two file channels, but at different locations. The left channel edit occurs at 18.76 seconds and the right channel edit occurs at 19.07 seconds. Use this file to help better understand the "XY Display" and the "View Channel Phase vs Time" features of the Diamond Cut Production's software.

Note: The "View Phase vs Time" feature is only found in the Forensics Version of the Diamond Cut Productions software.

90 Degree Phase Shift at 60 Hz

(Download file here)

The 90 Degree Phase Shift at 60 Hz is a calibration test file having a number of useful characteristics. It is dual-channel containing two sine waves, one on each channel. The repetition rate is 60 Hz (60 cycles per second) with the two signals in quadrature with respect to one another (90 degrees phase shifted). The right channel leads the left channel by 90 degrees (or looked at another way, the left channel is lagging the right channel by 90 degrees). The peak amplitude of both signals are the same and are -10 dB at the peak of the sine wave function. The total length of the file is 10.0000 seconds.

The file is useful for testing the “XY Display” (XY Vector Display) found under the View Menu. When this file is played with the XY display opened, you should see a nearly perfect circle, indicating signal quadrature. The circle defines the signal(s) as 90 degrees phase shifted with respect to one another. The average phase shift (shown in red on the XY display) shows the average angle to be ~45 degrees (45 degree angle, having a slope that is up and to the left). The average angle is best viewed with averaging control set for ‘long’.

If you bring up the “View Phase vs Time” function found under the Forensics menu, you will see a wide green stripe in the middle of the display. The middle of that line represents a 45 degree average phase shift between the two quadrature signals. It is recommended that you perform this experiment in classic edit mode, so that you can see the relationship between the time domain view and the average phase domain view of these two signals.

Use the “90 degree phase shift at 60 Hz” file to help better understand the “XY Display” and the “View Phase vs Time” features of the Diamond Cut Productions software.

Note: The “View Phase vs Time” feature is only found in the Forensics Version of the Diamond Cut Productions software.

Dynamic Range Tester – 440 Hz, -90 to 0 dB

(Download file here)

Often, people debate the dynamic range of their hearing. Here is a file that allows users to measure it easily. The file starts out with a 440 (A4) note at full – scale (0 dB) for ten seconds. Then it goes through a two minute slew in loudness from -90 dB to 0 dB again. You will need a decent sound system to run this test. The speakers in a laptop computer will not be able to achieve the power levels needed for this test. If you decide to run the test using set of headphones, you will need to convert this mono file to stereo first using the file conversion filter found under the filter menu. Use the “From Mono to Stereo” feature.

To run this test, open the file and play it. Then, adjust the loudness of your system during the first 10 seconds of the file playback to the loudest level that you can stand without feeling **any pain**. Then, watch the software VU meter as it starts at -90 dB and slowly

increases up to 0 dB. Simply make a mental note the VU meter indication where you just barely begin to hear the 440 Hz signal again. That is roughly the dynamic range of your hearing (at 440).

Note 1: **DO NOT** turn the level up on your sound system past a comfortable point. Do not increase it to the point of pain or sound system clipping as it could damage your hearing or your sound system.

Note 2: There are other variables that impact this measurement, so it is by no means absolute in terms of accuracy. For example, your sensitivity at 440 Hz may be different than it is at 1000 Hz. Also, the ambient noise in the room in which you conduct this test will impact the result. The quieter the room, the more accurate will be the result of the test, so turn off all sources of noise before testing yourself. Also, consider the recovery time of your aural sense; if you had just returned from a loud rock concert or a car racing event, you will not obtain an accurate result unless you wait for 24 hours after the event.