

C-Chord (chord.wav)

The screenshot displays the TWE audio editor interface for a file named 'chord.wav'. The main window shows a waveform with a vertical cursor at 00:00:02.204. The interface includes a menu bar (File, Edit, View, Option, Window, Help), a toolbar with various editing tools, and a control panel with 'Play location', 'Sel', 'Loop', and 'Zoom' sections. A 'File Info' panel on the left provides technical details about the audio file.

Play location	Sel	Samples	Time	Loop	Samples	Time	Zoom
00:00:02.204		97240	00:00:02.204		0	00:00:00.000	13
97240		97240	00:00:02.204		0	00:00:00.000	2
		0	00:00:00.000		0	00:00:00.000	

File Info

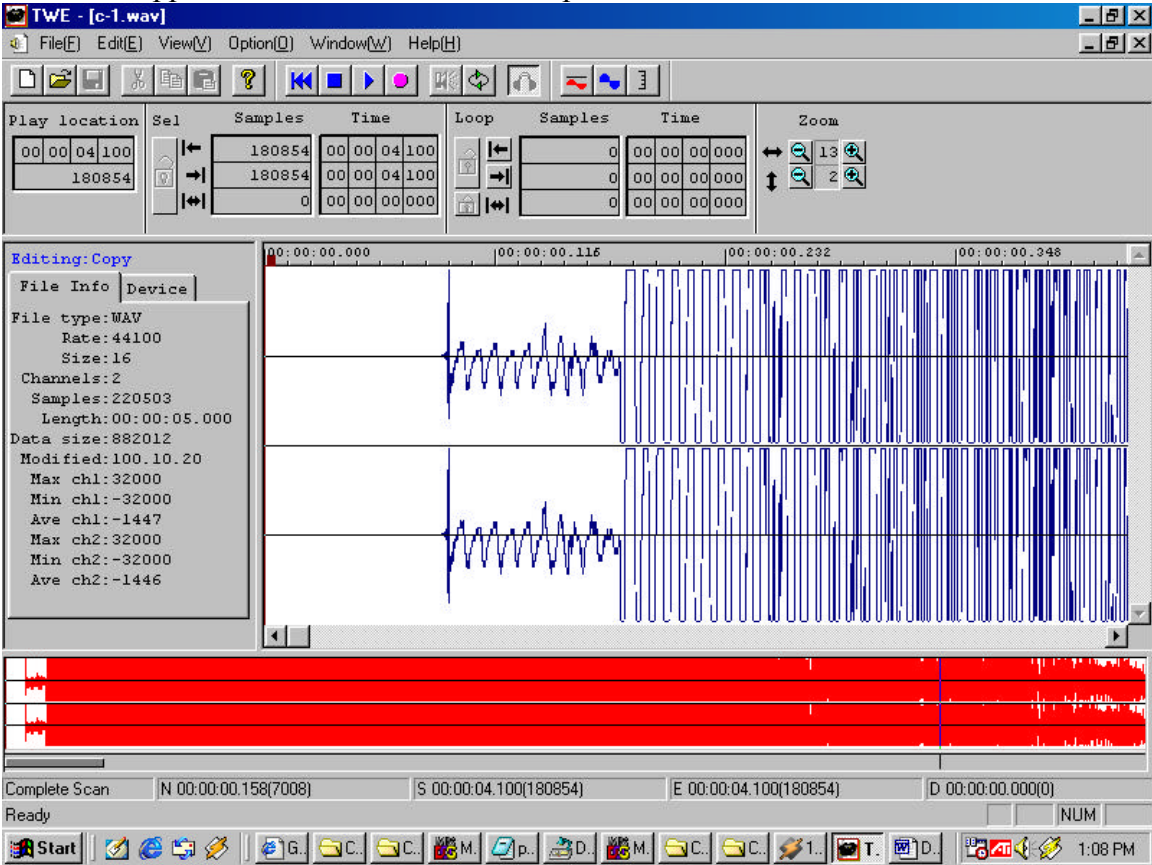
File type:	WAV
Rate:	44100
Size:	16
Channels:	2
Samples:	220500
Length:	00:00:05.000
Data size:	882000
Modified:	100.10.13
Max ch1:	32512
Min ch1:	-32768
Ave ch1:	-294
Max ch2:	32512
Min ch2:	-32768
Ave ch2:	-294

Complete Scan N 00:00:00.296(13056) S 00:00:02.204(97240) E 00:00:02.204(97240) D 00:00:00.000(0)

Ready NUM

1:08 PM

C-Chord clipped at $\frac{1}{10}$ of the maximum amplitude



Notes12.wav

The screenshot shows the Audacity audio editor interface. At the top, the title bar reads "TWE - [Notes12.wav]". Below it is a menu bar with "File(F)", "Edit(E)", "View(V)", "Option(O)", "Window(W)", and "Help(H)". A toolbar contains various editing tools like selection, copy, paste, undo, redo, and playback controls.

Below the toolbar is a table for "Play location" and "Loop".

Play location	Sel	Samples	Time	Loop	Samples	Time	Zoom
00:00:00.502	←	22182	00:00:00.502	↔	0	00:00:00.000	13
22182	→	22182	00:00:00.502	↔	0	00:00:00.000	2
	↕	0	00:00:00.000	↔	0	00:00:00.000	

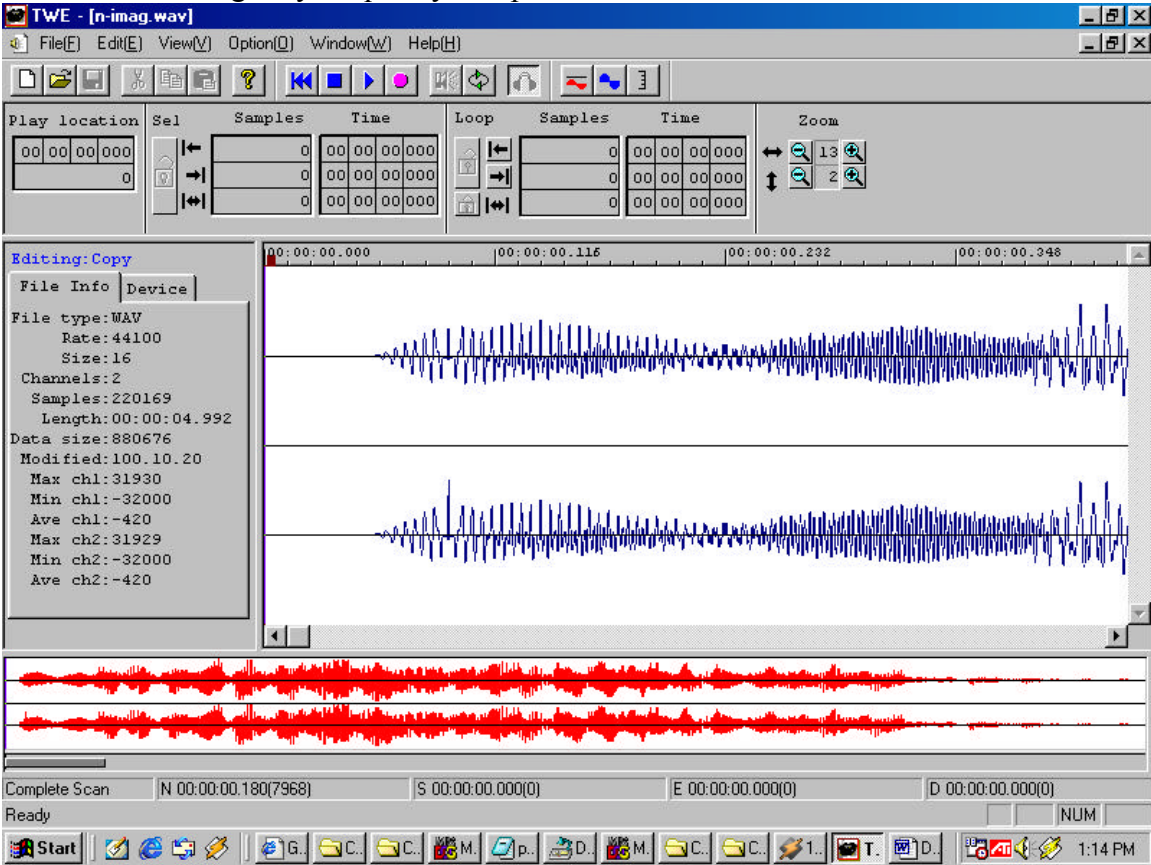
The main area features a "File Info" panel on the left and a waveform display on the right. The waveform shows two channels of audio data in blue, with a red waveform below it. The time axis at the top of the waveform is marked with 00:00:00.000, 00:00:00.116, 00:00:00.232, and 00:00:00.348.

Below the waveform is a status bar with "Complete Scan" and "Ready" indicators, and a taskbar at the bottom showing the Start button, several open application windows, and the system clock at 1:09 PM.

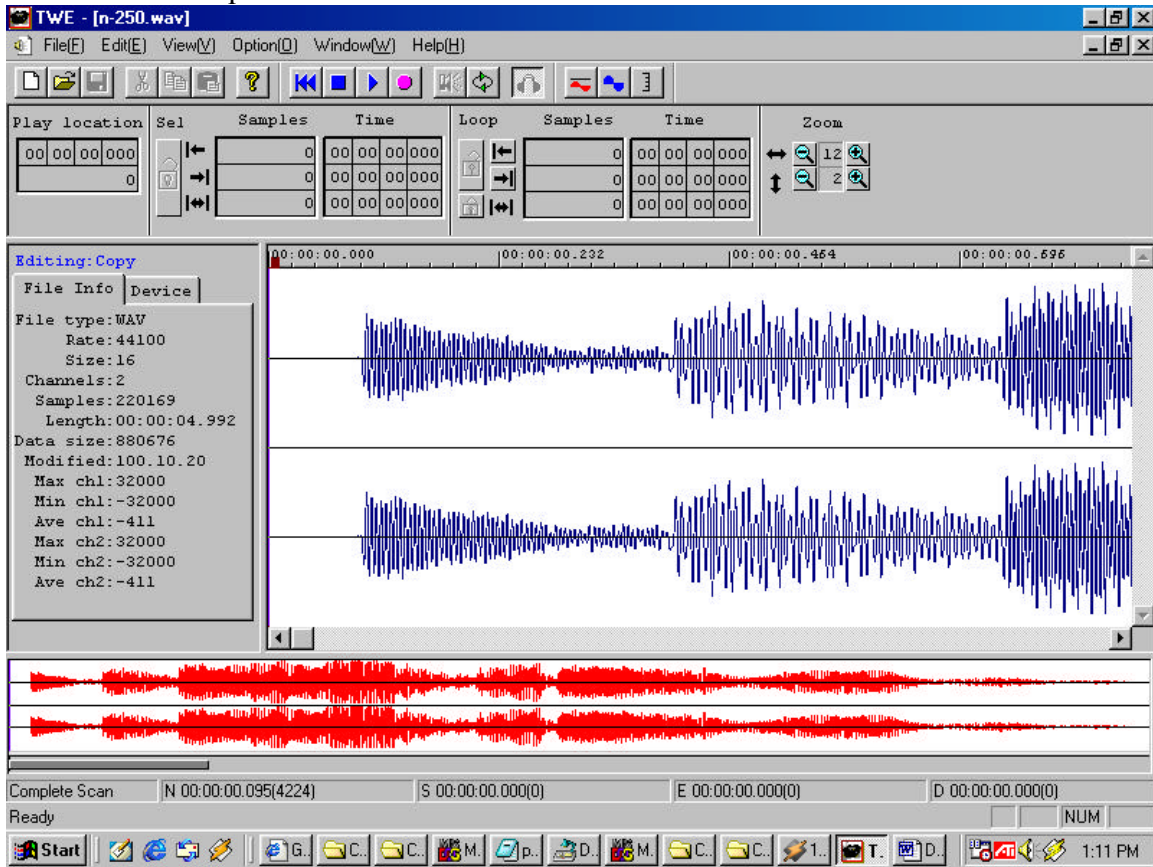
Notes12 pitch shifted up 25Hz

The screenshot shows the Audacity audio editor interface. The title bar reads "TWE - [n+25.wav]". The menu bar includes File(F), Edit(E), View(V), Option(O), Window(W), and Help(H). The toolbar contains various editing tools. Below the toolbar is a table with columns for Play location, Sel, Samples, Time, Loop, Samples, Time, and Zoom. The table contains three rows of data, all with "0" in the Samples and Time columns. To the left of the table is a "Play location" section with a "Sel" dropdown and navigation arrows. Below the table is a "Zoom" section with a magnifying glass icon and a "13" value. The main editing area features a "File Info" panel on the left with the following details: File type: WAV, Rate: 44100, Size: 16, Channels: 2, Samples: 220169, Length: 00:00:04.992, Data size: 880676, Modified: 100.10.20, Max ch1: 32000, Min ch1: -32000, Ave ch1: 2, Max ch2: 32000, Min ch2: -32000, Ave ch2: 2. The main editing area displays two waveforms: a blue waveform at the top and a red waveform at the bottom. The time axis at the top of the editing area shows markers at 00:00:00.000, 00:00:00.115, 00:00:00.232, and 00:00:00.348. The status bar at the bottom shows "Complete Scan", "N 00:00:00.219(9696)", "S 00:00:00.000(0)", "E 00:00:00.000(0)", "D 00:00:00.000(0)", and "Ready". The Windows taskbar at the very bottom shows the Start button, several open application windows, and the system clock at 1:10 PM.

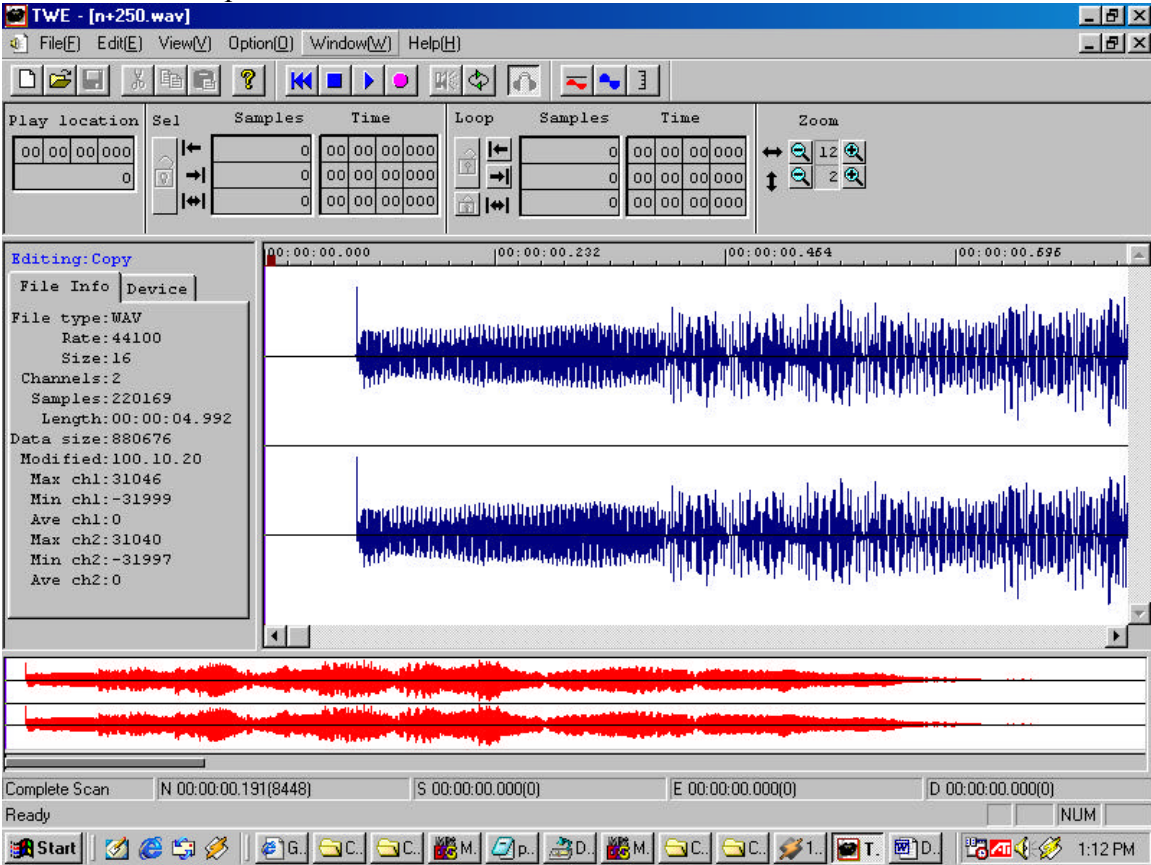
Notes12 with Imaginary frequency components removed



Notes12 with frequencies above 250 Hz removed



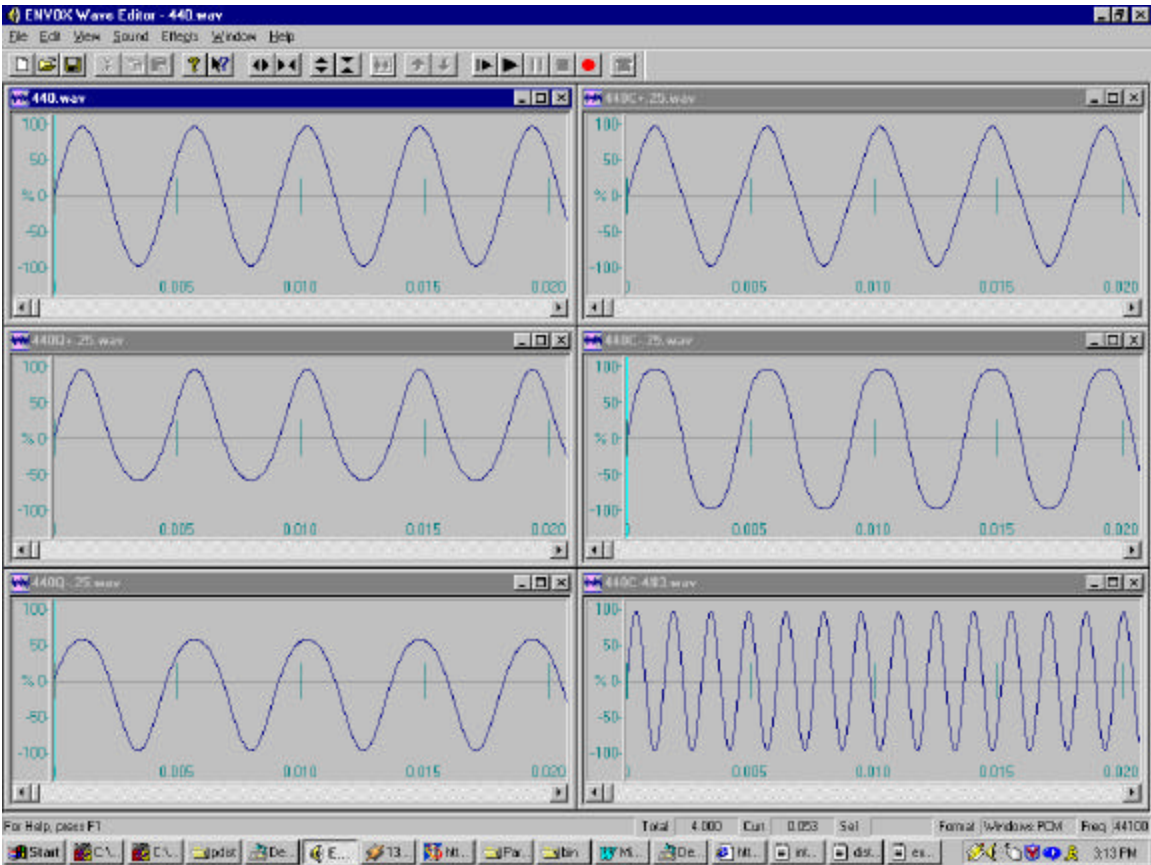
Notes12 with frequencies below 250 Hz removed



Nonlinear Distortion [K = 1, A = 1]

- 220 Hz WAV file
- 220 w/ Quadratic Non-Linearity $\epsilon = .25$
- 220 w/ Quadratic Non-Linearity $\epsilon = -.25$
- 220 w/ Cubic Non-Linearity $\epsilon = .25$
- 220 w/ Cubic Non-Linearity $\epsilon = -.25$
- 220 w/ Cubic Non-Linearity $\epsilon = -4/3$

I accidentally labeled it 440.wav here, but the waveform below is a 220 Hz WAV file.



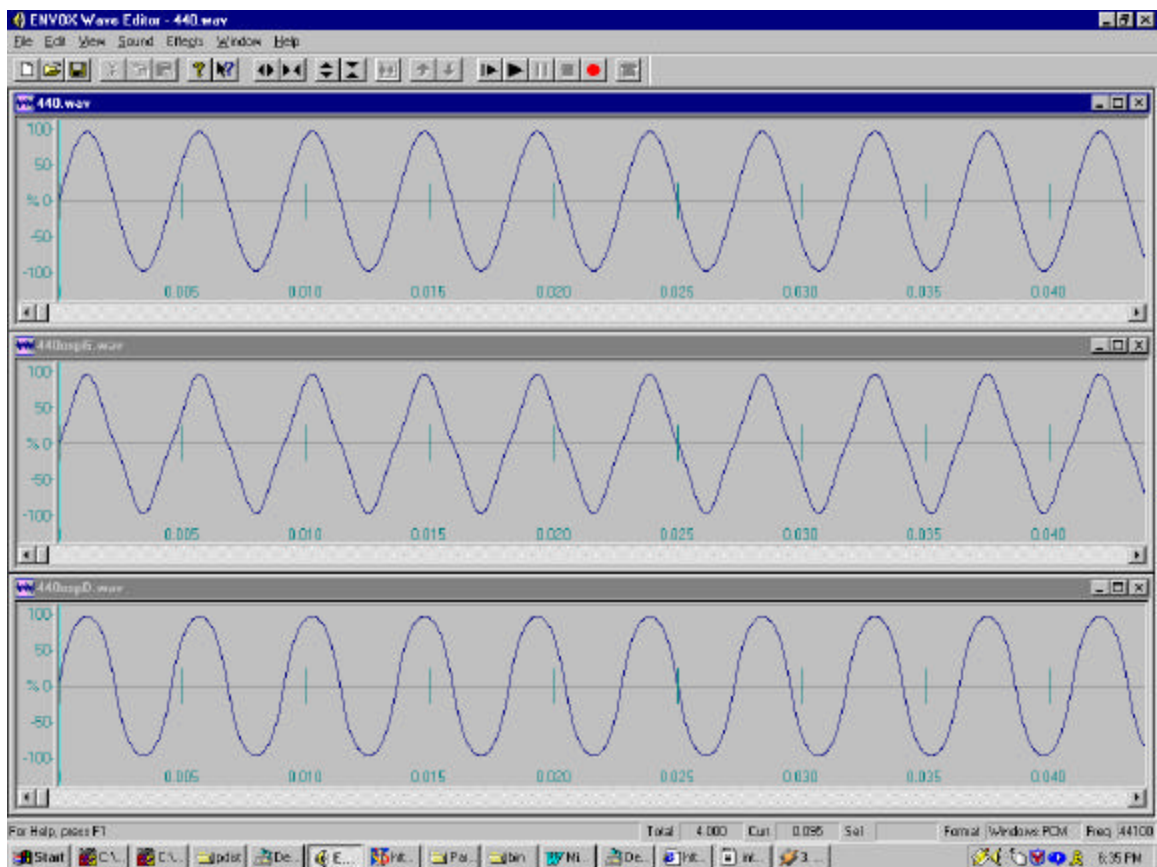
Exponential Non-Linearities [$K = 1$, $A = 1$]

220 Hz WAV File

220 w/ Exponentially-Growing Non-Linearity $\alpha = 1$

220 w/ Exponentially-Decaying Non-Linearity $\alpha = 1$

I accidentally labeled it 440.wav here, but the waveform below is a 220 Hz WAV file.

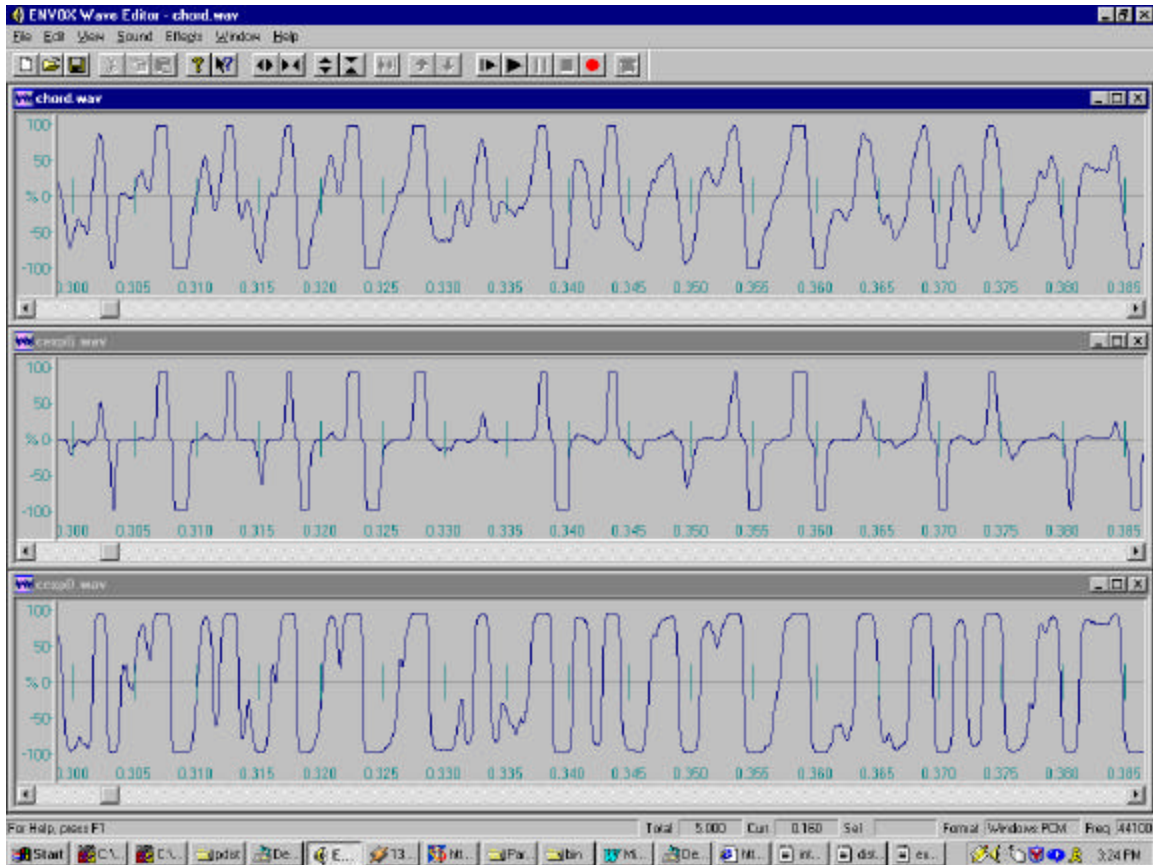


Chord WAV

Chord WAV file run through exponentially-growing non-linearity distortion

Chord WAV file run through exponentially-decaying non-linearity distortion

where $\alpha = 5$, $K = 1$, $A = 1$

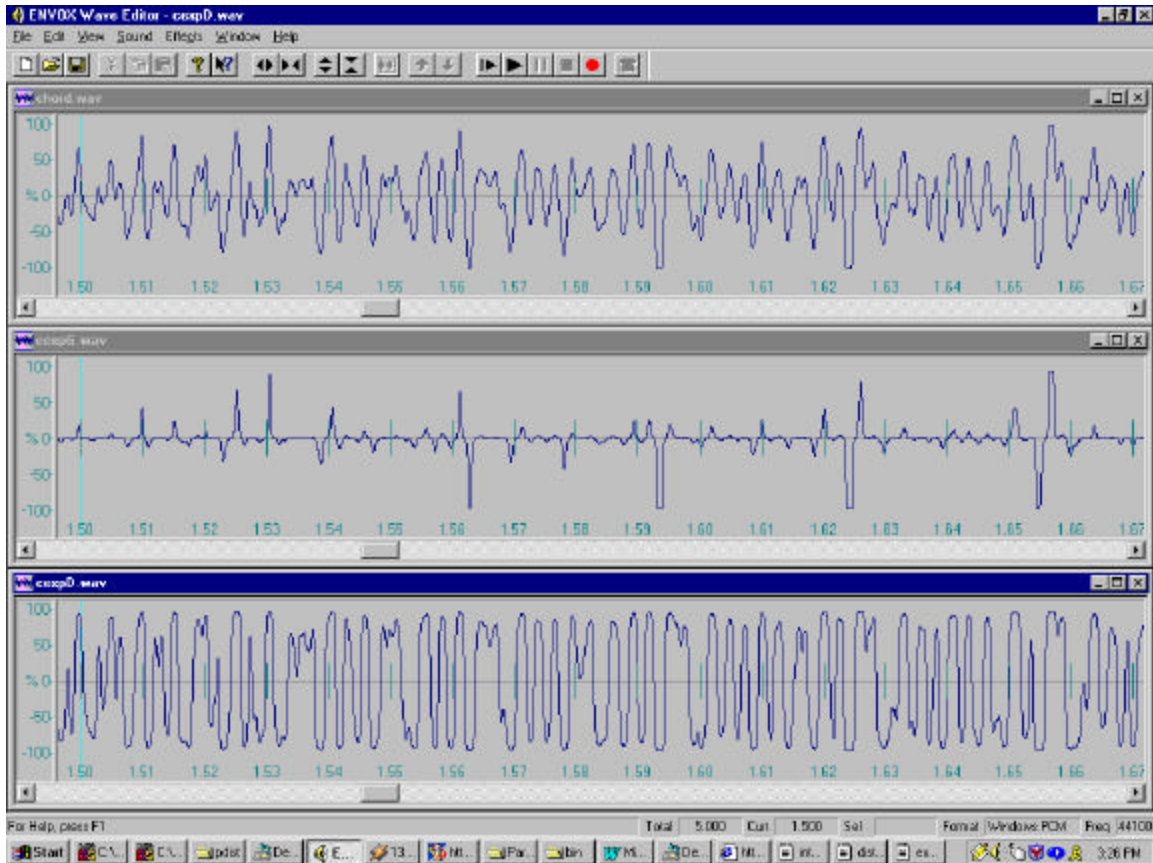


Chord WAV file

Chord WAV file run through exponentially-growing non-linearity distortion

Chord WAV file run through exponentially-decaying non-linearity distortion

where $\alpha = 5$, $K = 1$, $A = 1$

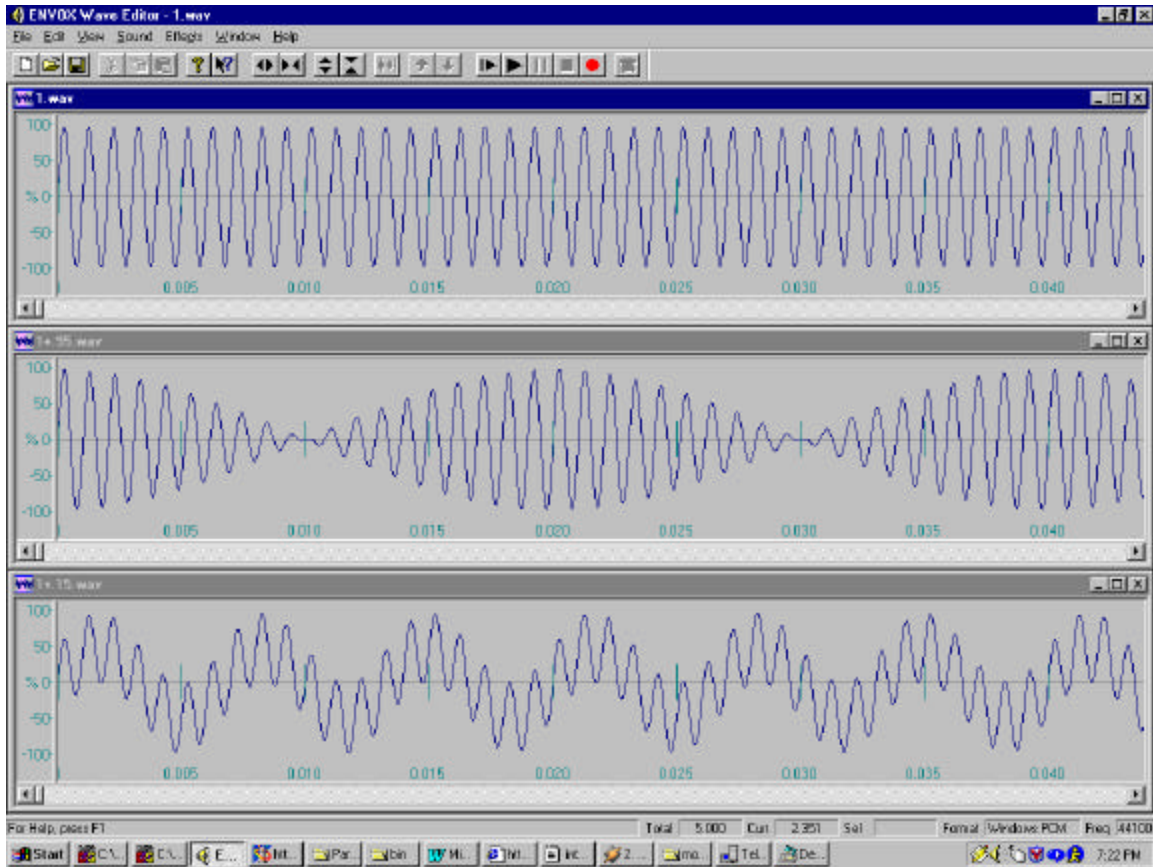


Intermodulation - No Distortion [$K = A_1 = A_2 = 1$]

Plain 1000 Hz wave

1000 Hz wave + 950 Hz wave

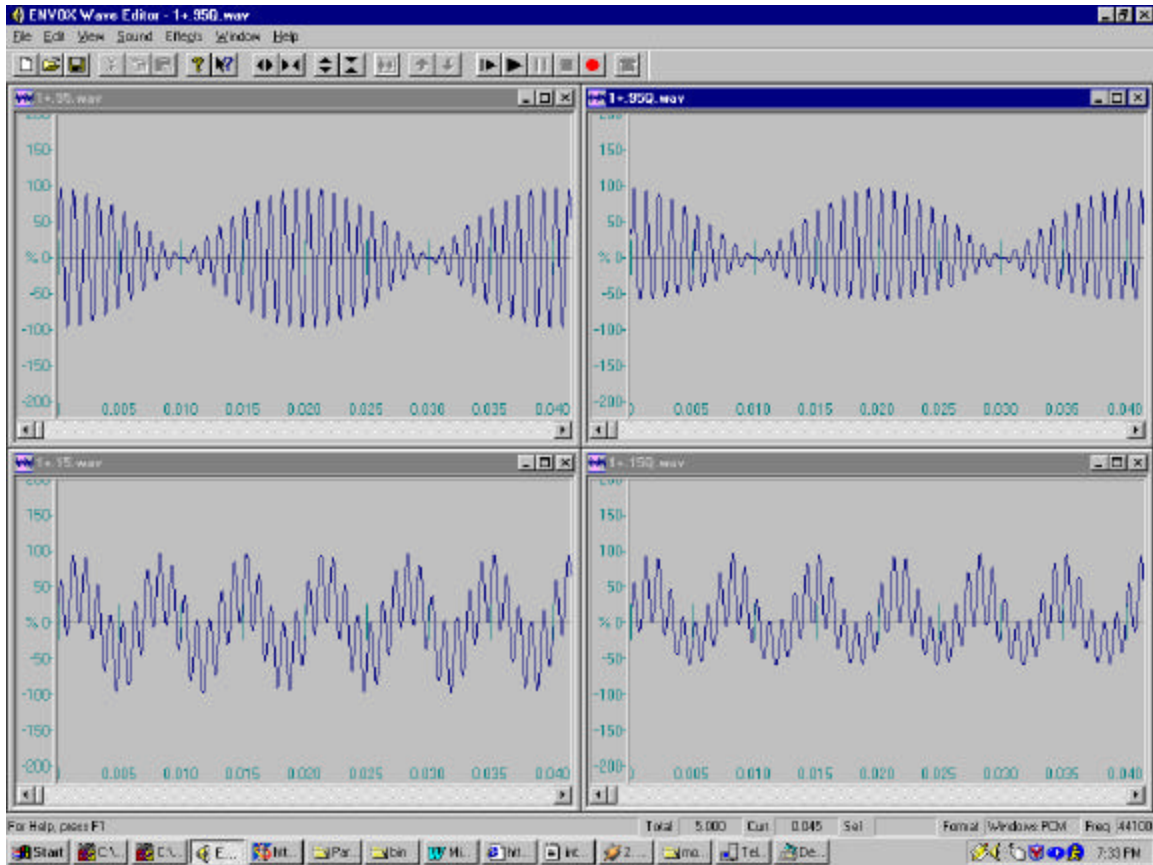
1000 Hz wave + 150 Hz wave



Intermodulation → $\epsilon = .25$ Quadratic Distortion [$K = A_1 = A_2 = 1$]

1000 Hz wave + 950 Hz wave Clean
 1000 Hz wave + 150 Hz wave Clean

1000 Hz wave + 950 Hz wave Distorted
 1000 Hz wave + 150 Hz wave Distorted



Intermodulation → $|\epsilon| = 1$ Cubic Distortion [$K = A_1 = A_2 = 1$]

1000 Hz wave + 950 Hz wave Clean

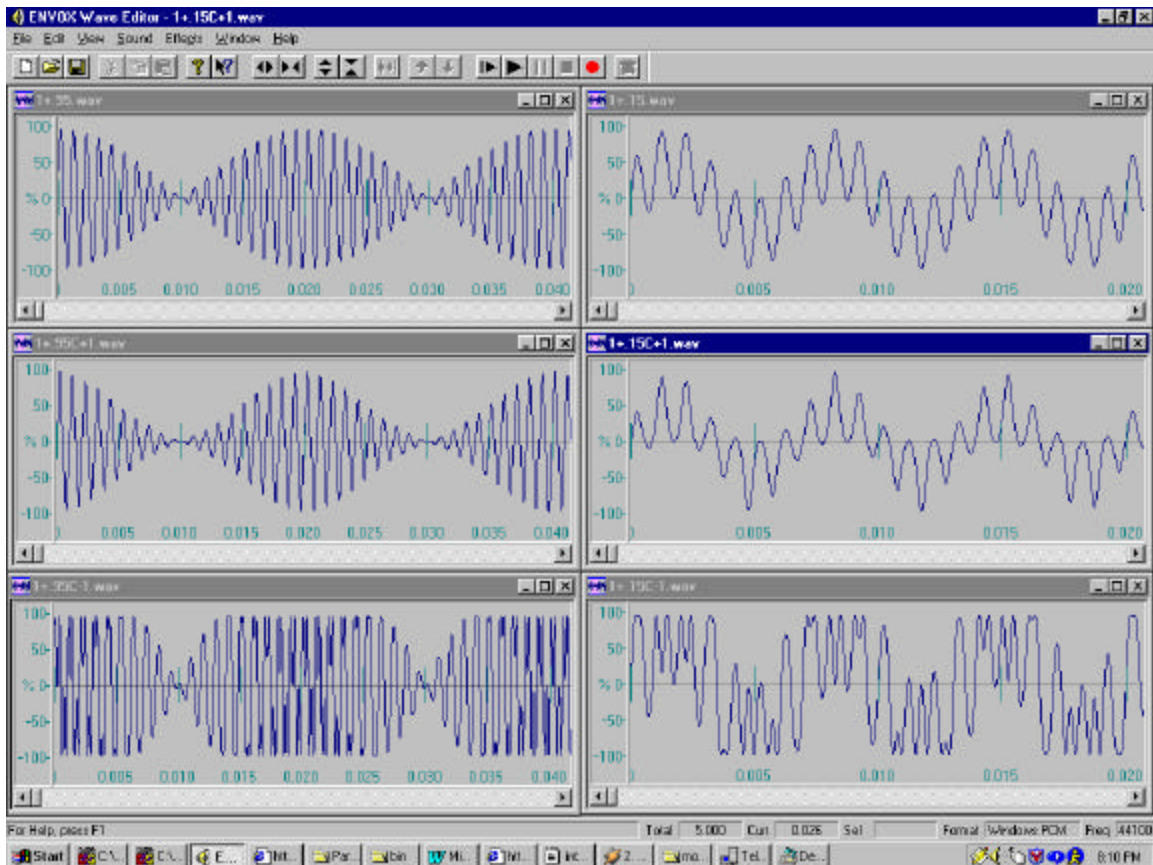
1000 Hz wave + 950 Hz wave $\epsilon = 1$

1000 Hz wave + 950 Hz wave $\epsilon = -1$

1000 Hz wave + 150 Hz wave Clean

1000 Hz wave + 150 Hz wave $\epsilon = 1$

1000 Hz wave + 150 Hz wave $\epsilon = -1$



Ring Modulation

220 Hz Sine Wave

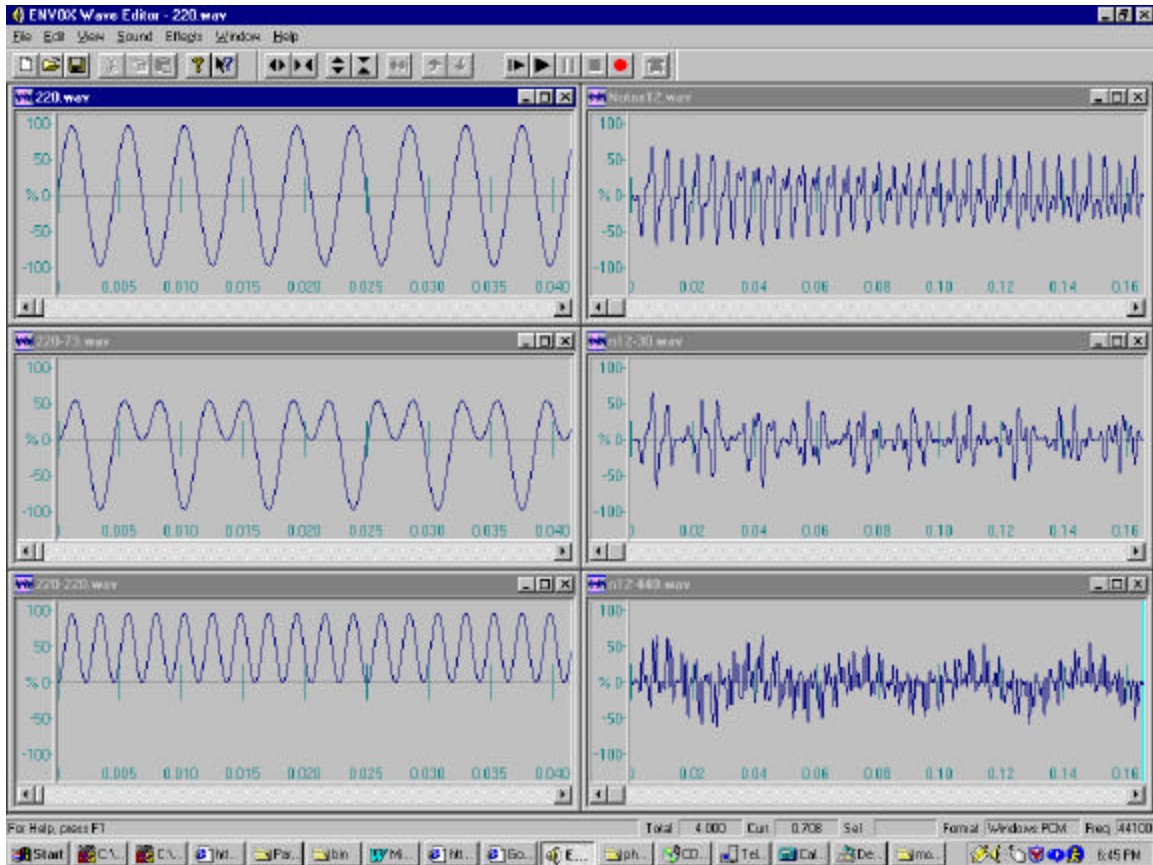
220 Ring Modulated with $73\frac{1}{3}$ Hz sine

220 Ring Modulated with 220 Hz sine

Notes12.wav

Notes12 Ring Modulated with 100 Hz sine

Notes12 Ring Modulated with 440 Hz sine



Flanging / Phasing

Notes21.wav

Notes21 flanged (3.5ms, 1ms, 1/3 Hz)

Notes21 flanged (1 ms, 0.5 ms, 1/3 Hz)

Notes21 phased (1 ms, 0.5 ms, 1/3 Hz)

(D, S, f) = Average Delay Time, Time Amplitude of LFO, Frequency of LFO
 mix amplitude = original amplitude (A = 1)

