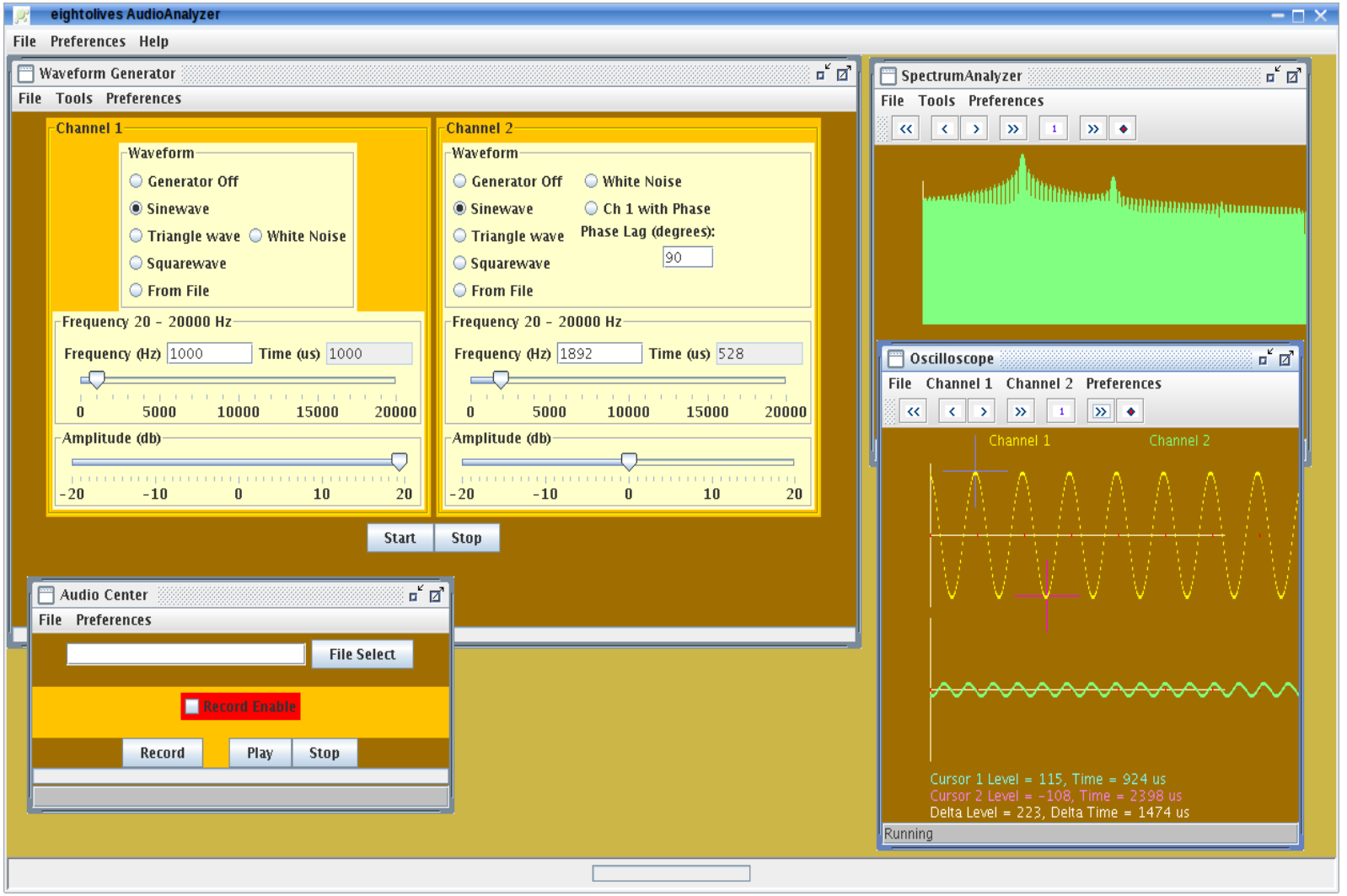
eightolives.com

AudioAnalyzer

An Overview



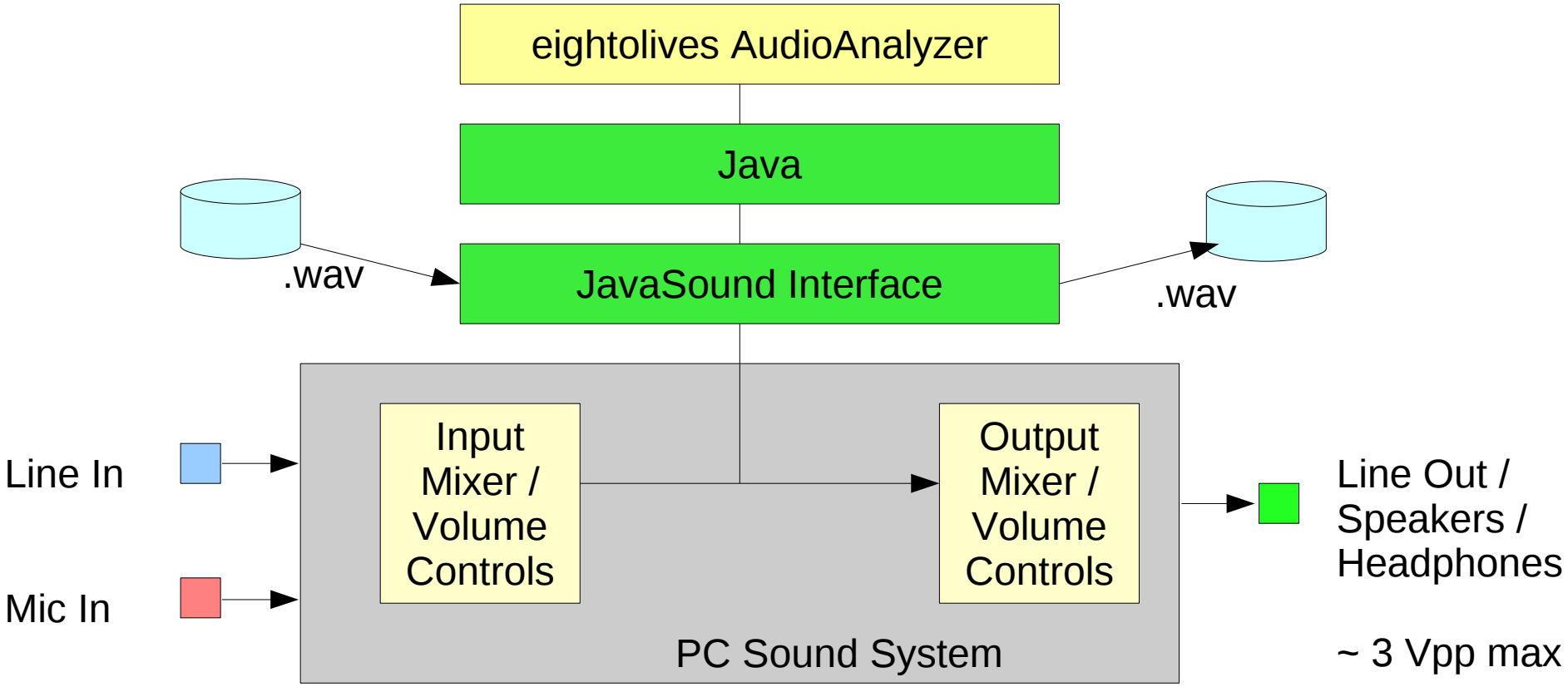
William_Kaupinis@eightolives.com
August 29, 2010

The eightolives AudioAnalyzer provides a set of audio signal generation and analysis tools that interface to a PC's audio system.

You get:

- 2 – Waveform Generators – sine, triangle, rectangle, white noise, AM, FM, phasing, harmonics, file
- Oscilloscope for viewing 2 channels
- Spectrum Analyzer – FFT view of the audio spectrum
- Recorder

AudioAnalyzer Uses Your PC's Sound System



AudioAnalyzer is a Java-based application requiring Java version 1.6+

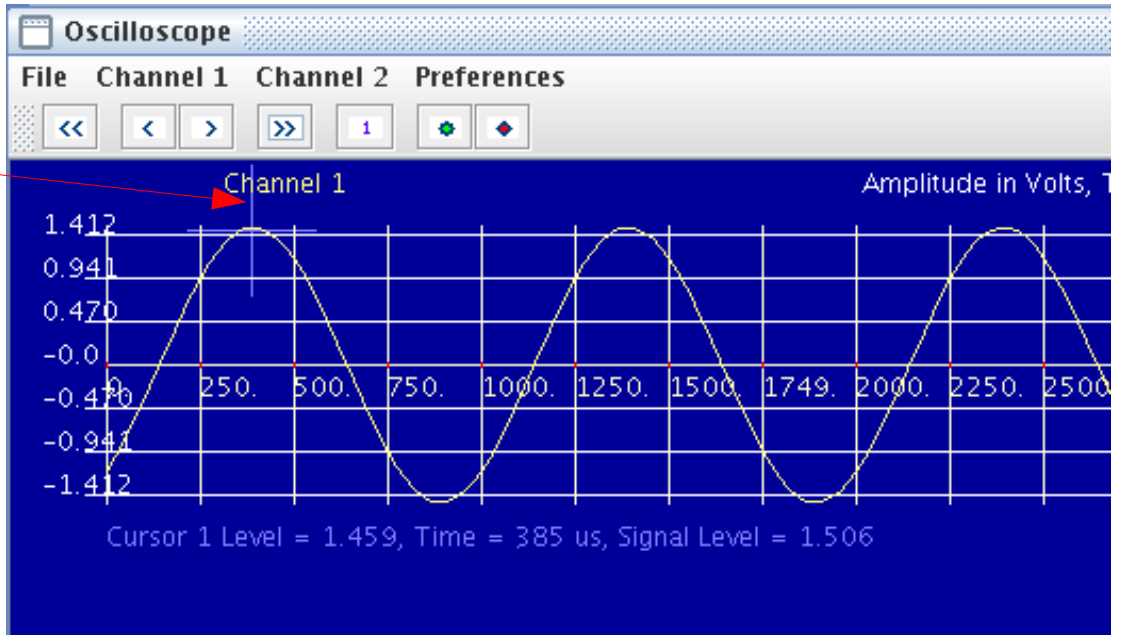
PC Audio Basics

- Line In – 3.5 mm (1/8”) Tip Ring Sleeve (TRS) connector (light blue)
  - Nominal level = .316 Vrms (.447 V peak, .894 Vpp)
  - Input impedance ~ 10 Kohms
- Line Out – 3.5 mm TRS (lime green)
  - Max output voltage ~ 3 V peak-peak
  - Output impedance ~ 100 ohms
  - Frequency Range = 20 Hz – 20,000 Hz

Source: Wikipedia

Definitions

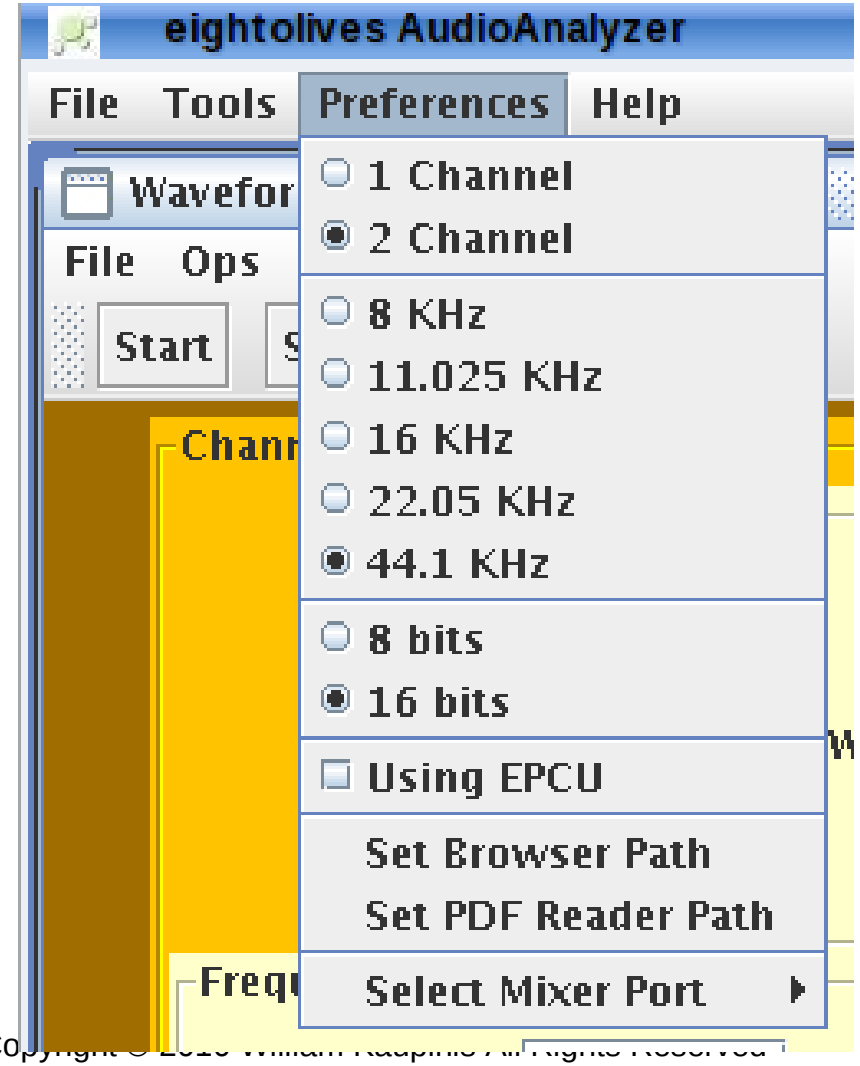
VPEAK is defined as the most positive voltage that the sine wave achieves



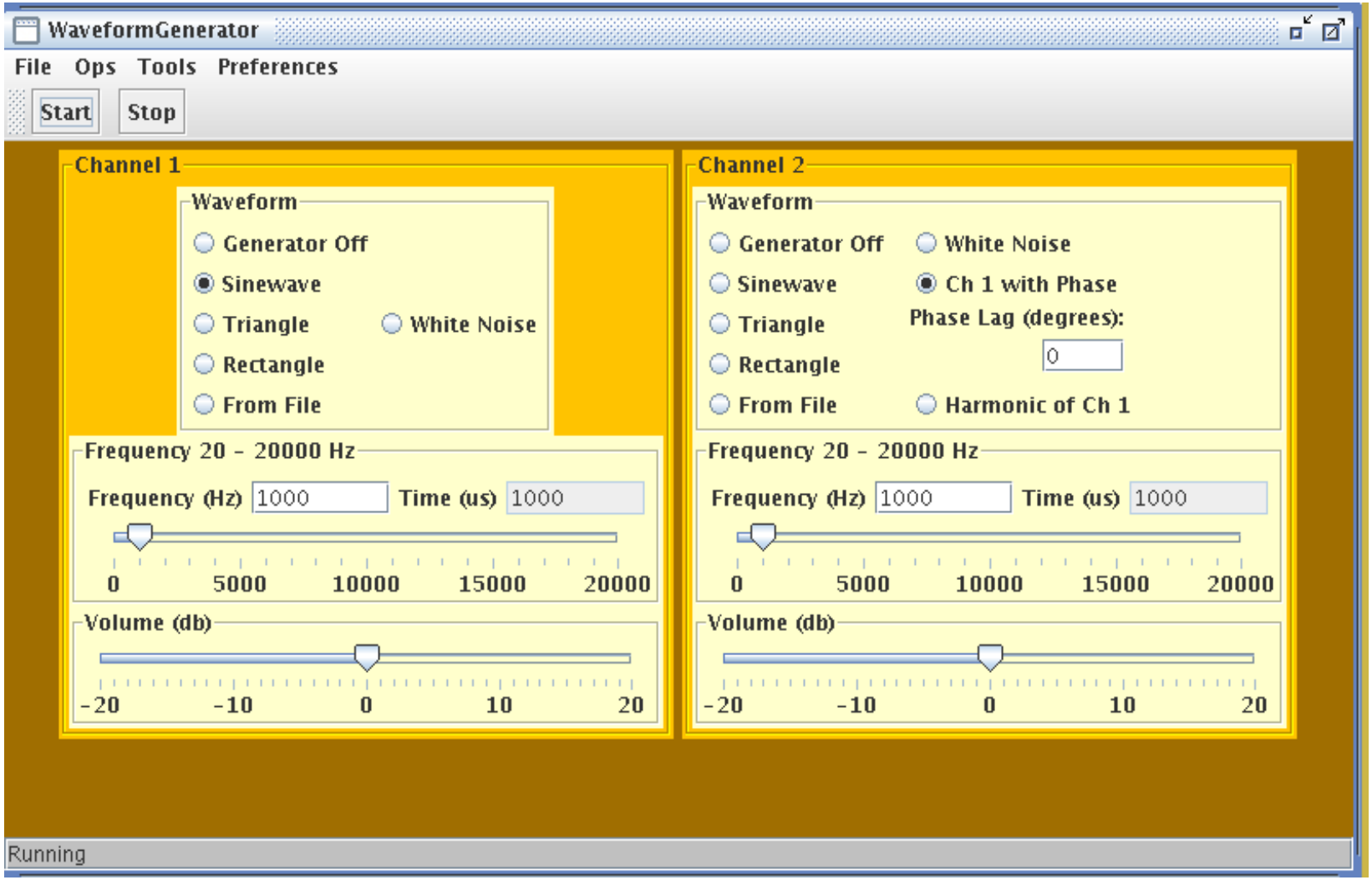
VRMS is defined as:

0.707 * Vpeak

for a sine wave and represents the equivalent DC voltage



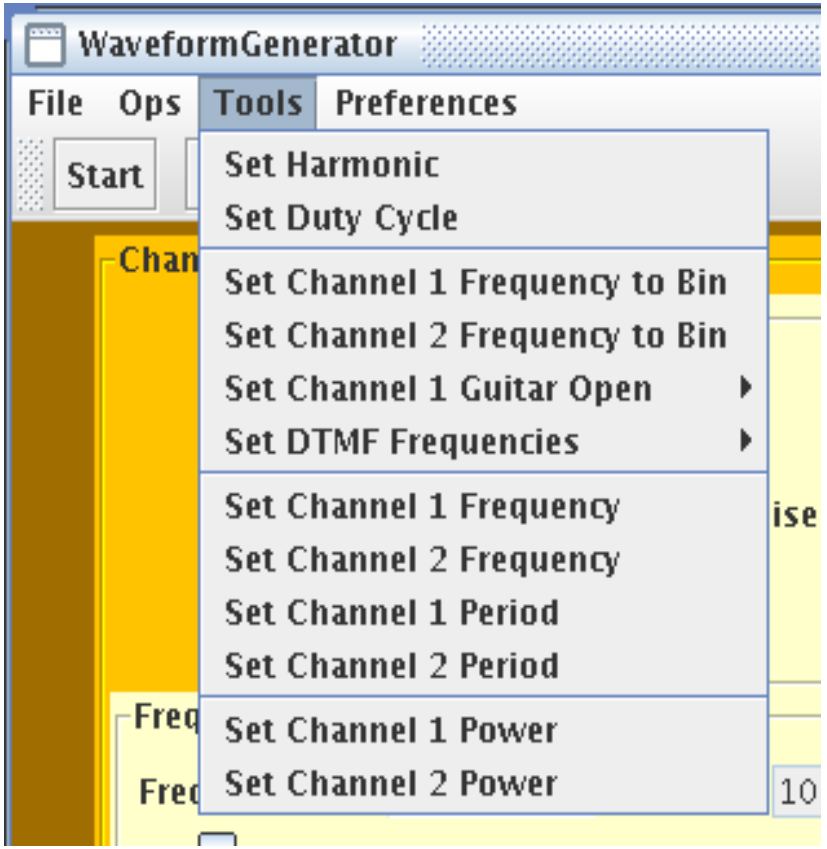
- You can select the general operating parameters from the Preferences Menu



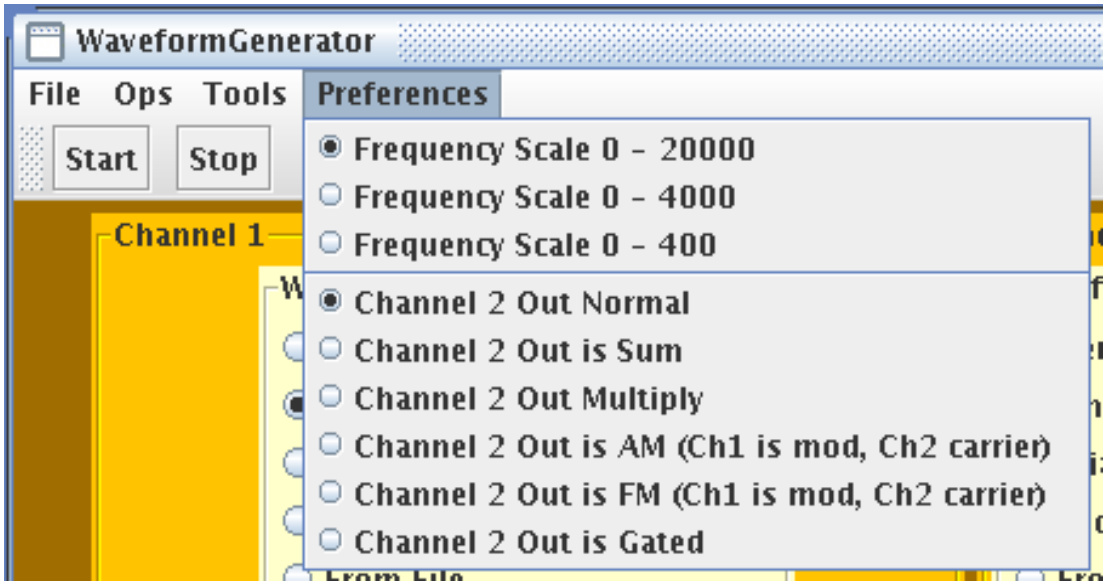
Waveform Generator

Drives 2 Audio Channels

- Channel 1 (Left)
- Channel 2 (Right)



Tools Menu options help accurately specify signal parameters



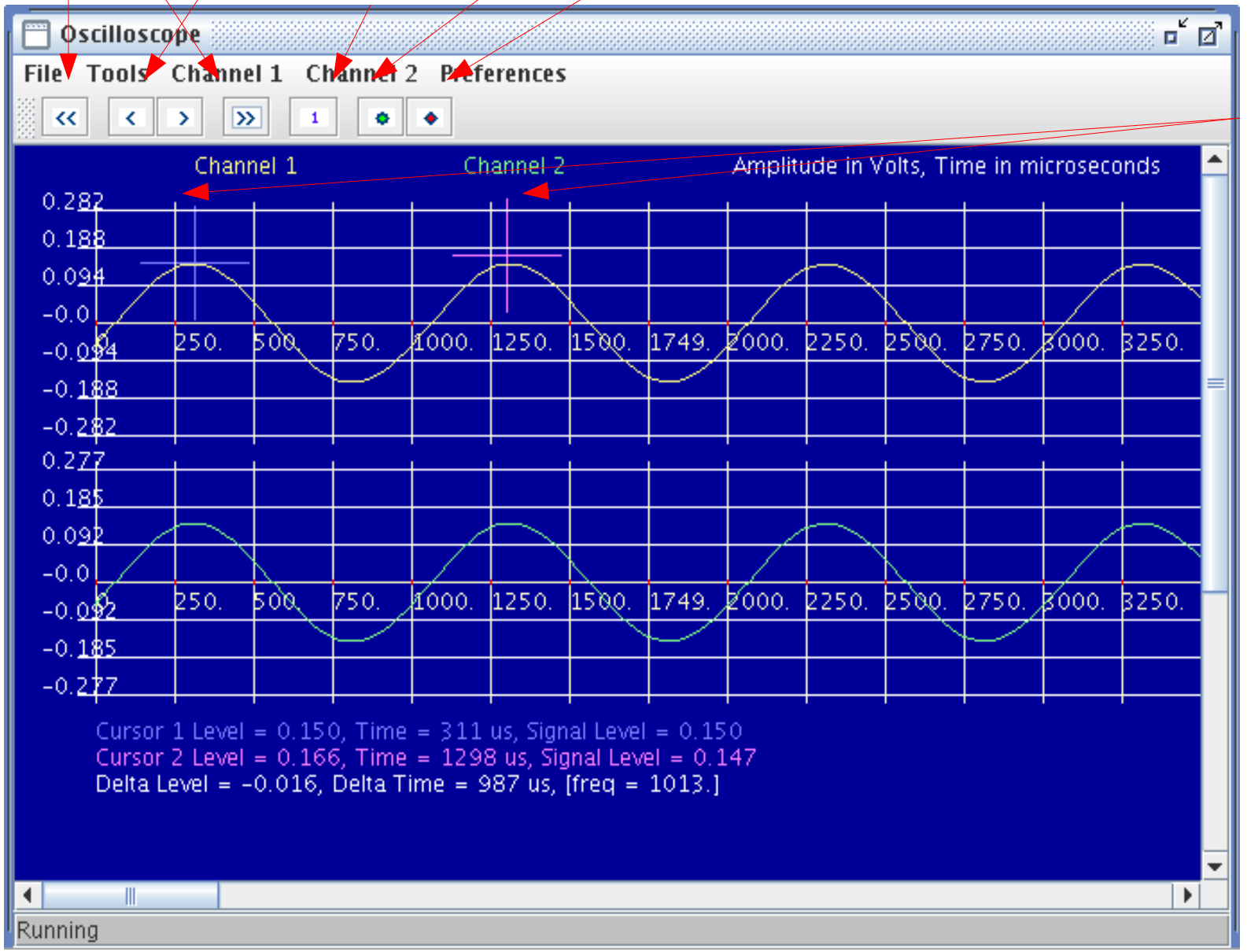
Preferences Menu options let you specify special roles for Channel 2

About Signal Levels

- Waveform Generator defines the maximum undistorted sine wave amplitude as +20 db
  - For 16 bit resolution, +20 db peak-to-peak is digitally expressed as +32767 to -32768
  - 0 db (nominal level) peak-to-peak is 10 times less
- Actual analog output levels on LINE OUT are determined by the PC mixer's volume controls
- Analog input signal levels are also affected by the PC mixer's volume controls

Zoom Scroll Single Trace Run Stop

eightolives.com



2 Cursors help make Measurements

Double left click for Cursor 1

Double right click for Cursor 2

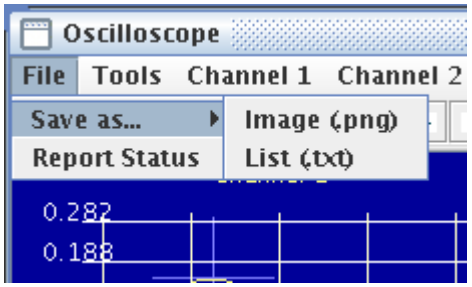
Shown with Ch 2 having -90 degree phase shift

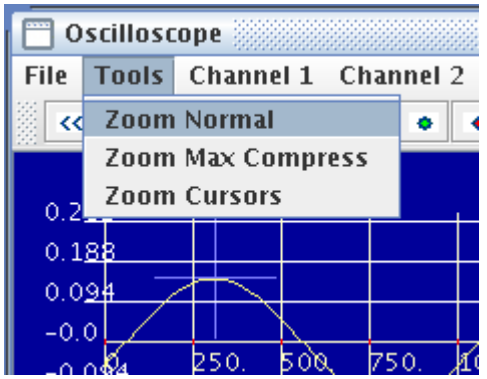
You can select colors of lines, text, background

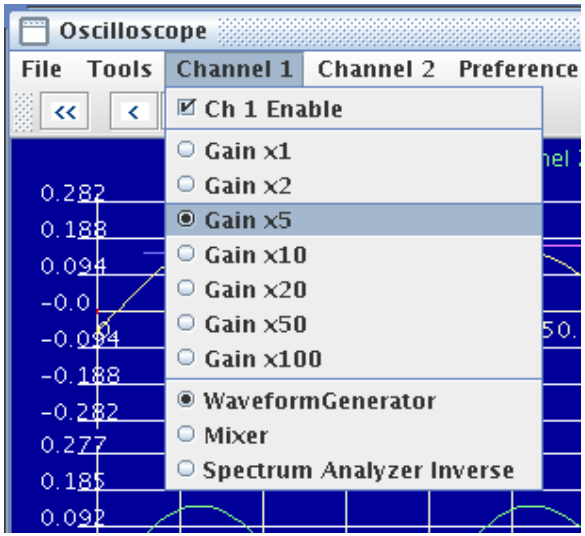
Oscilloscope

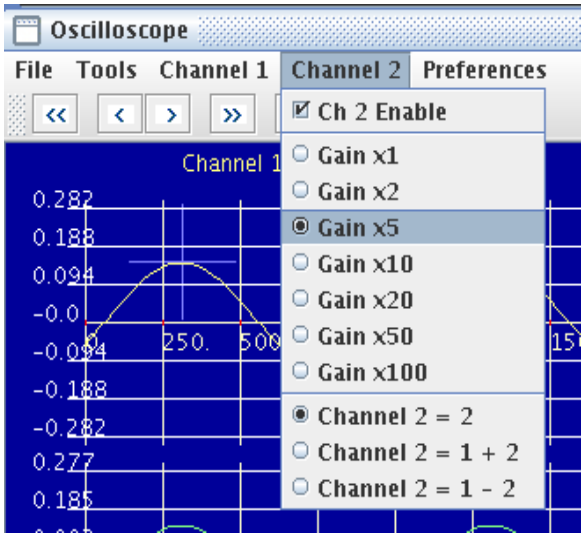
Displays 2 Channels

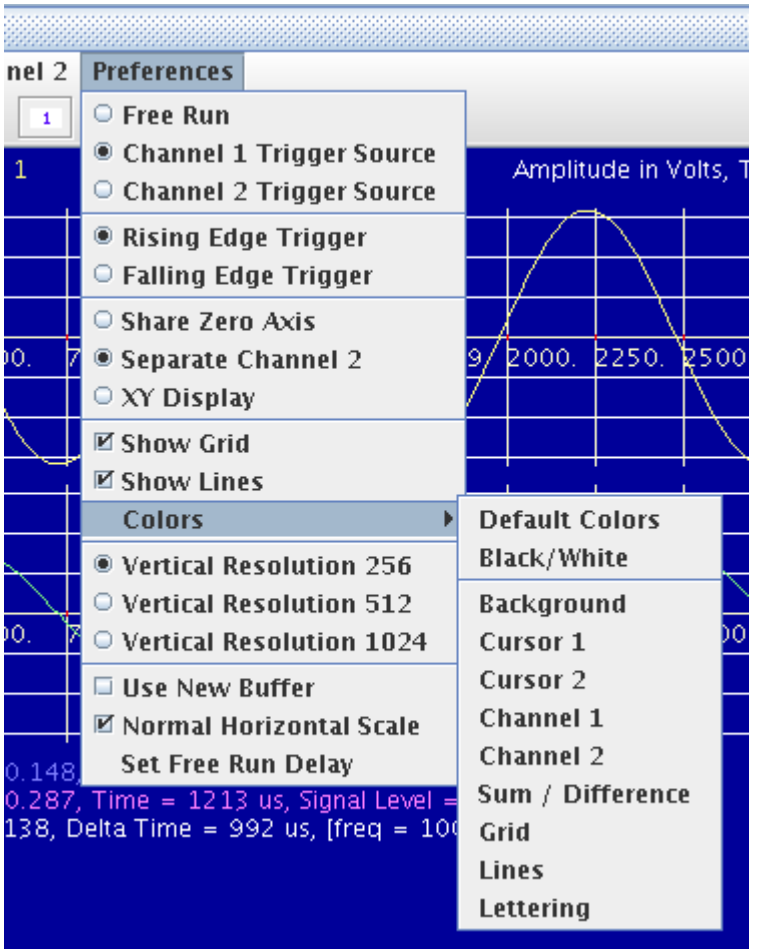
Oscilloscope Menu Options





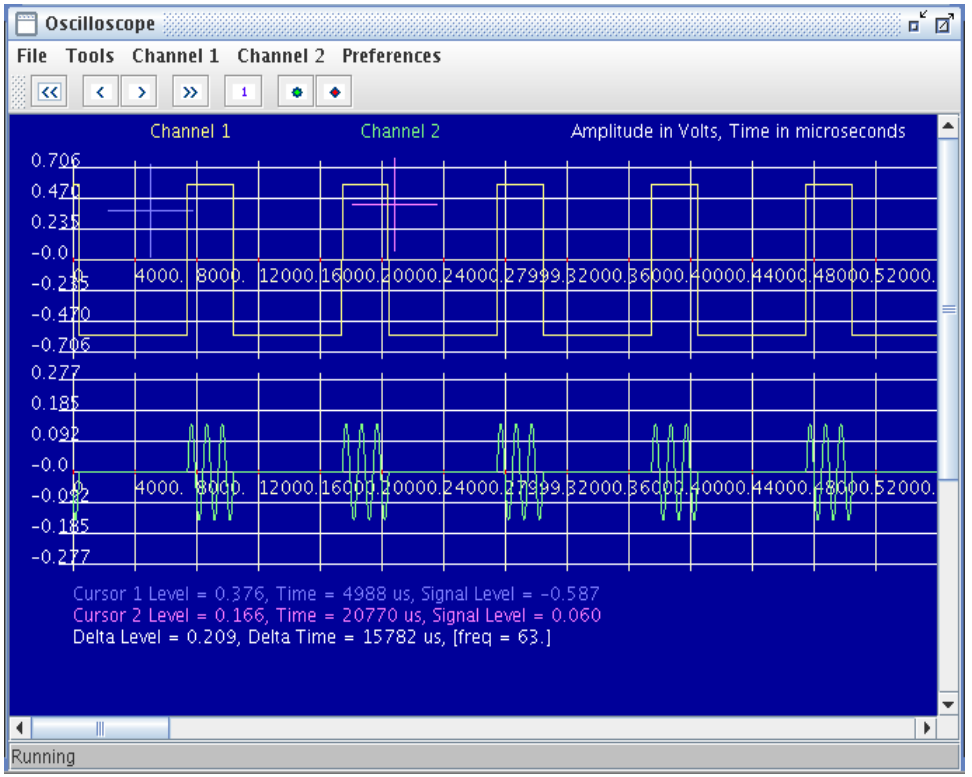




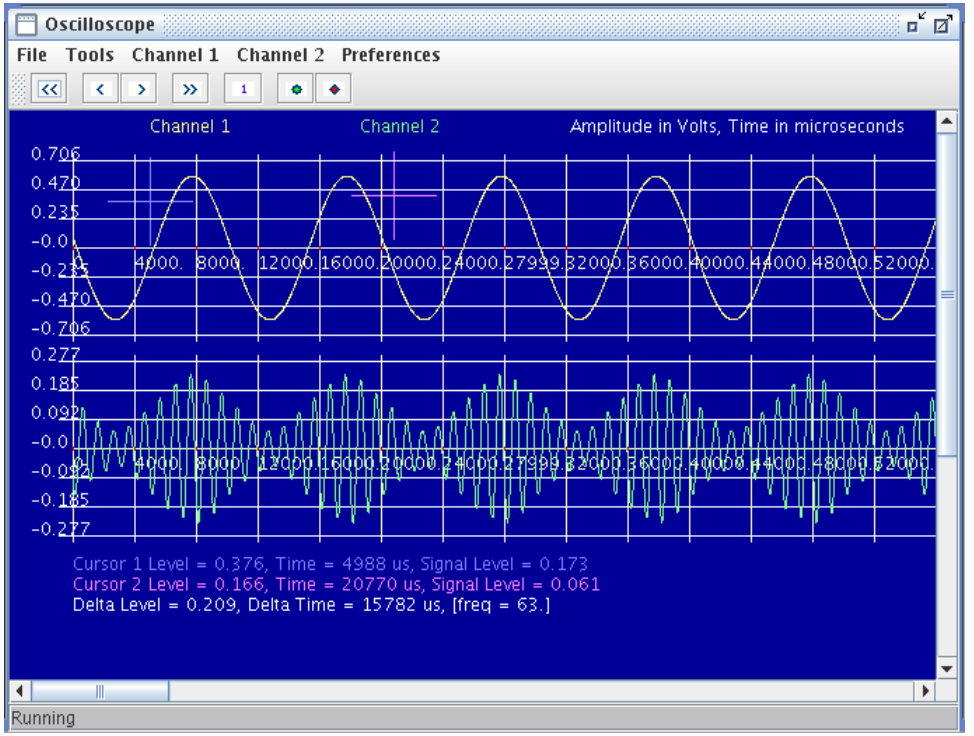


Sample Waveforms

Ch 1 = Rectangular Wave
Ch 2 = Gated sine wave



Ch 1 = Sine Wave
Ch 2 = AM



Spectrum Analyzer

Shows FFT results with various options

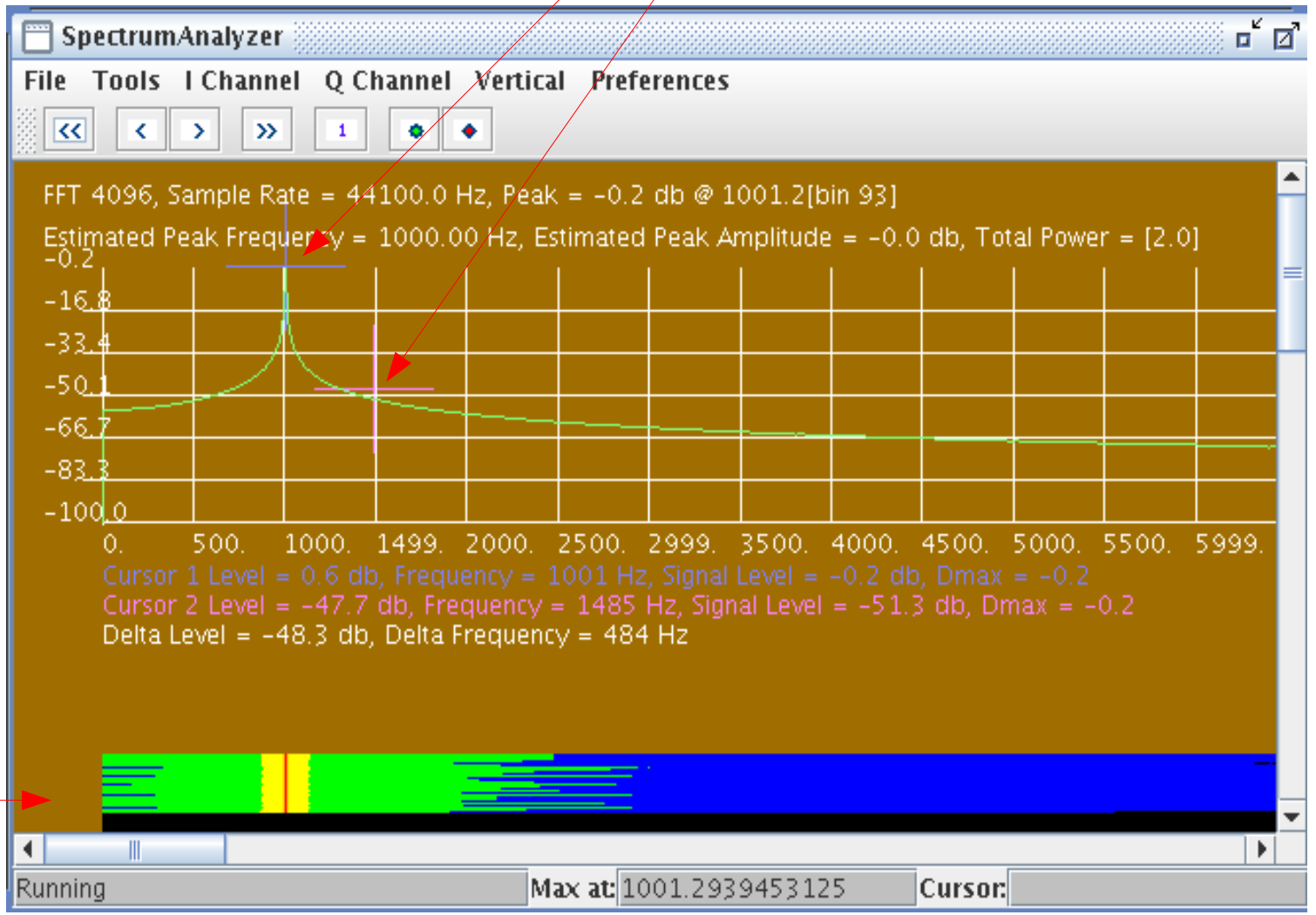
Two Cursors

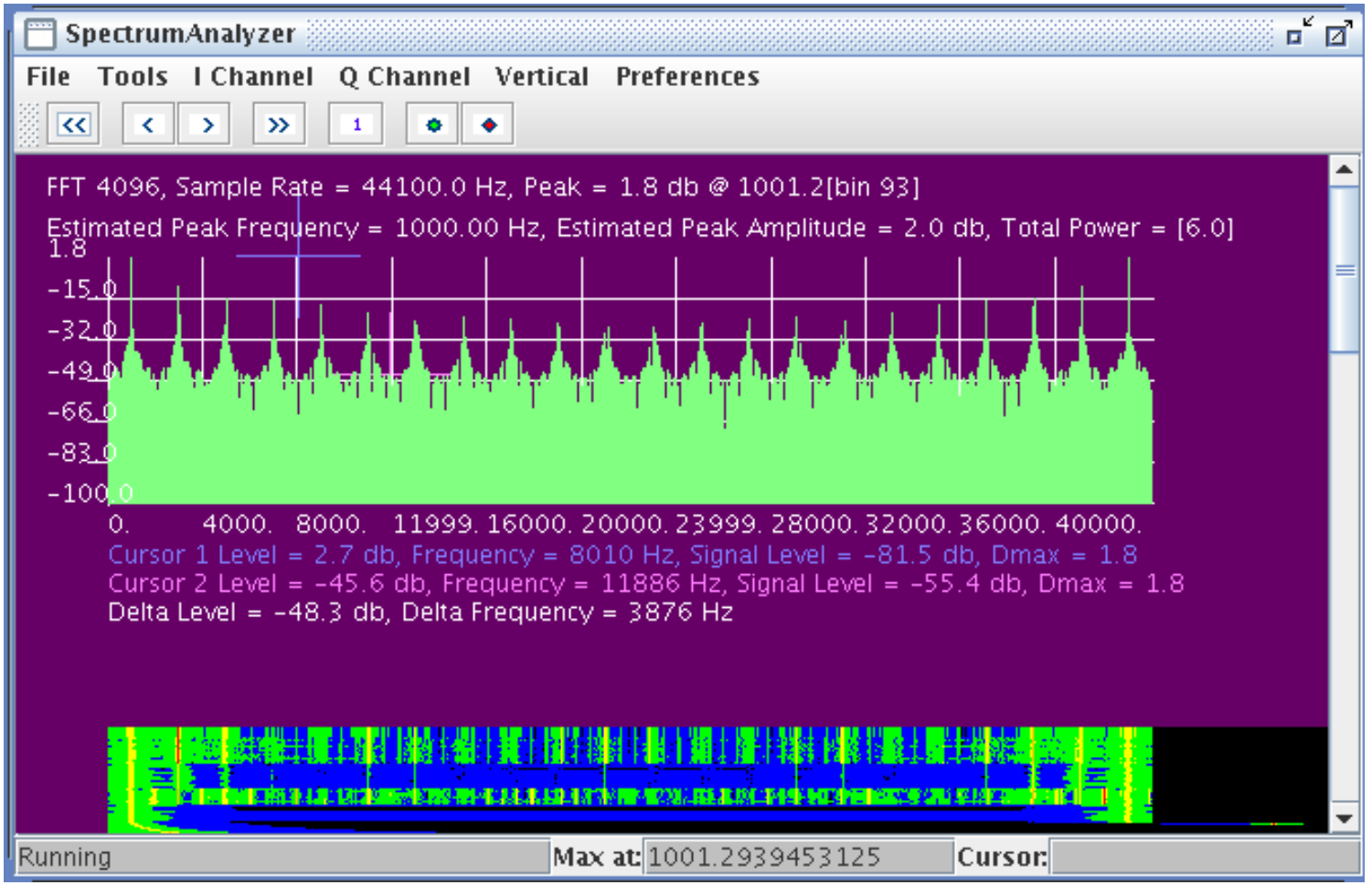
This display is a 1000 Hz sine wave

Vertical is Log

Line Mode Display

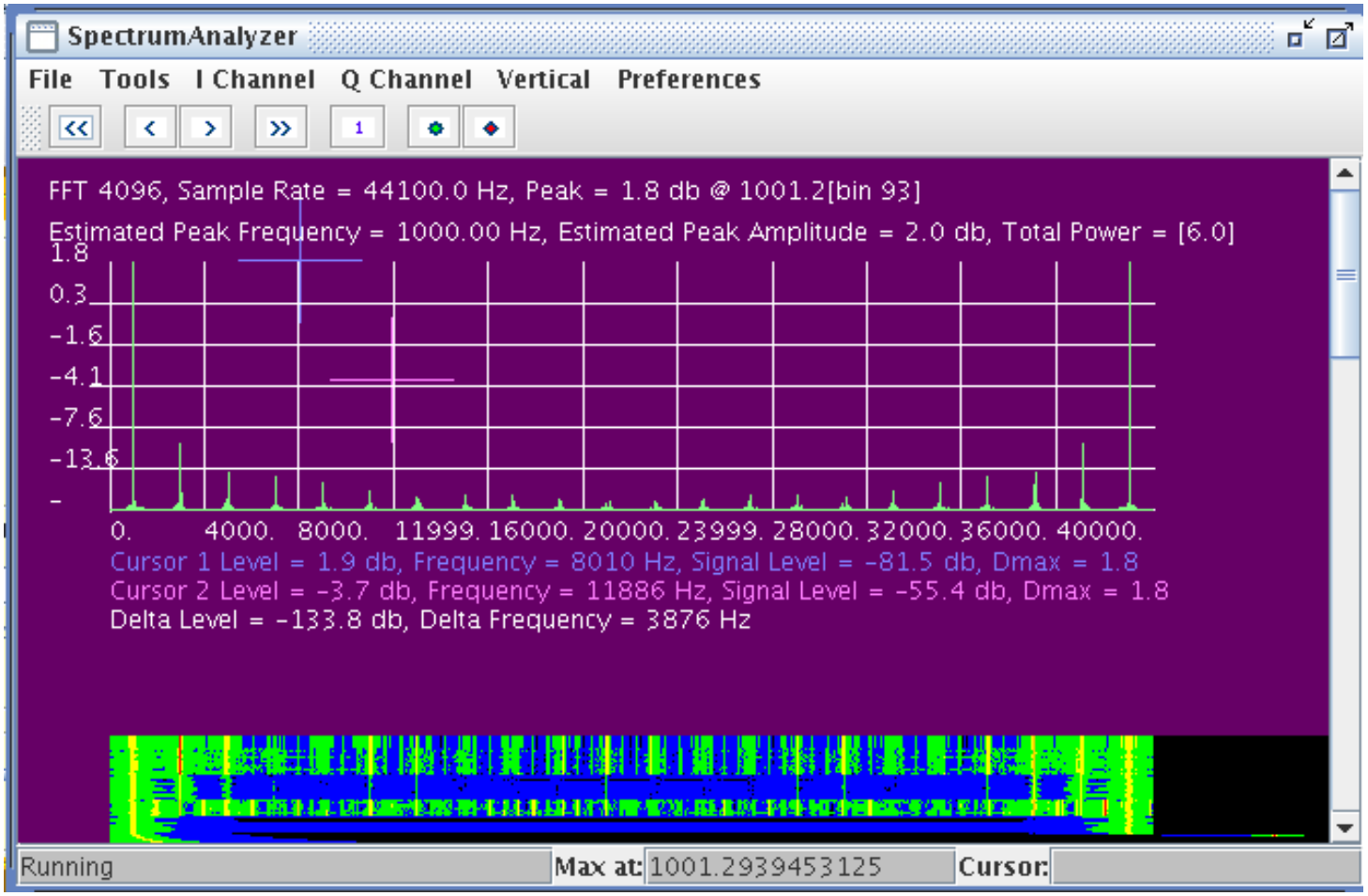
Waterfall Display enabled





Display shows 1 Khz square wave

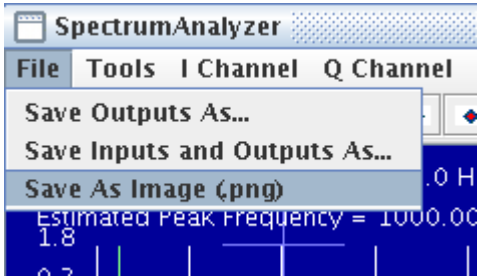
Vertical Log Display, Non-line mode, Zoom out

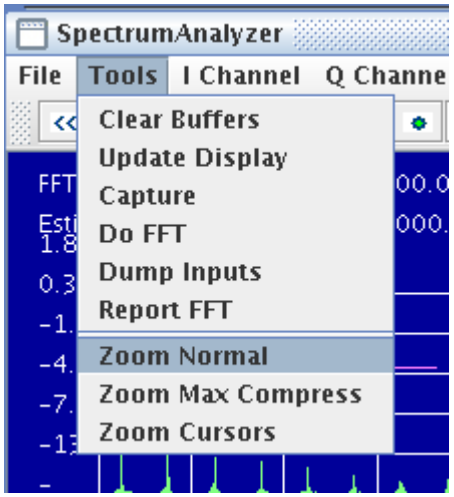


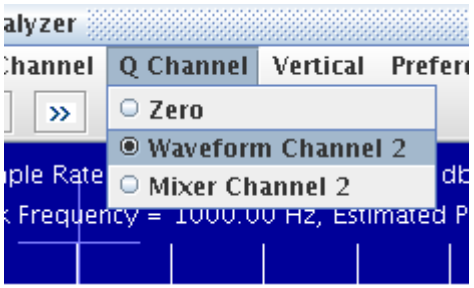
Display shows 1 Khz square wave

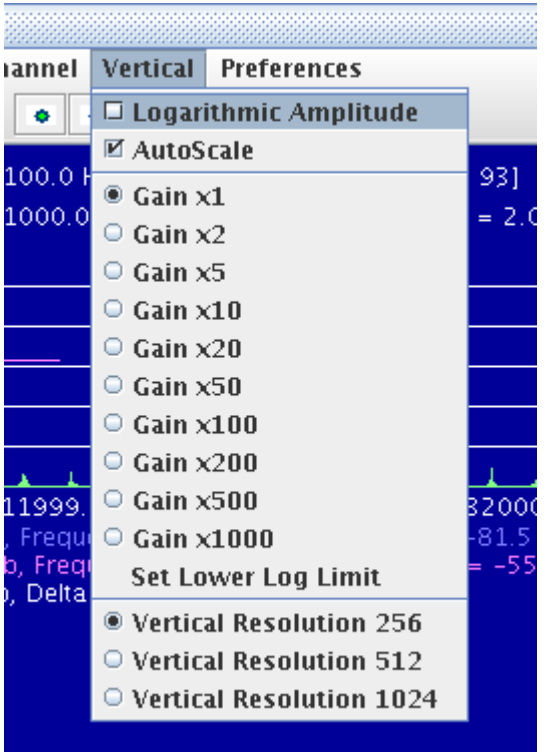
Vertical Linear, Non-line mode, Zoom out

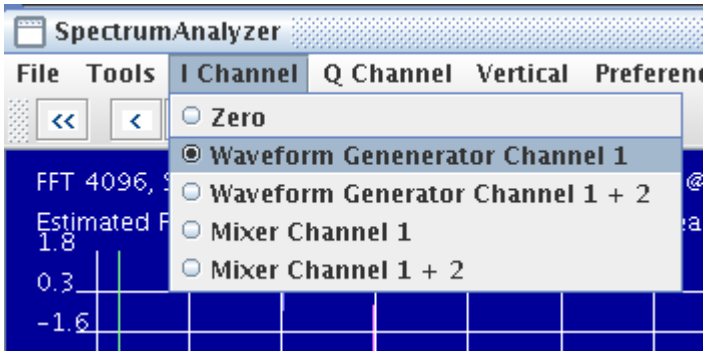
Spectrum Analyzer Menu Options

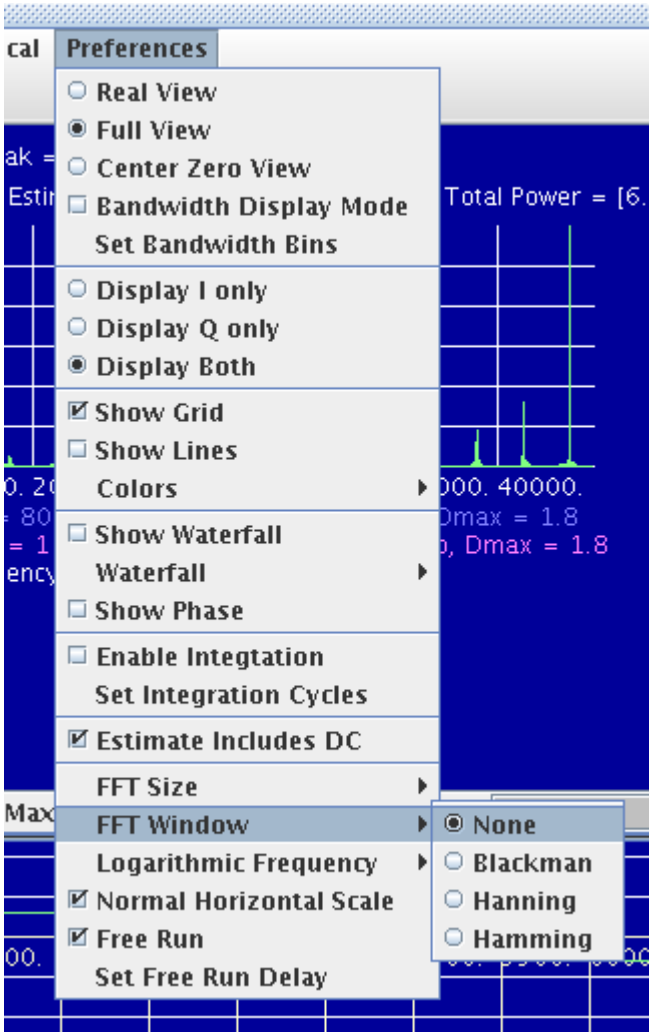




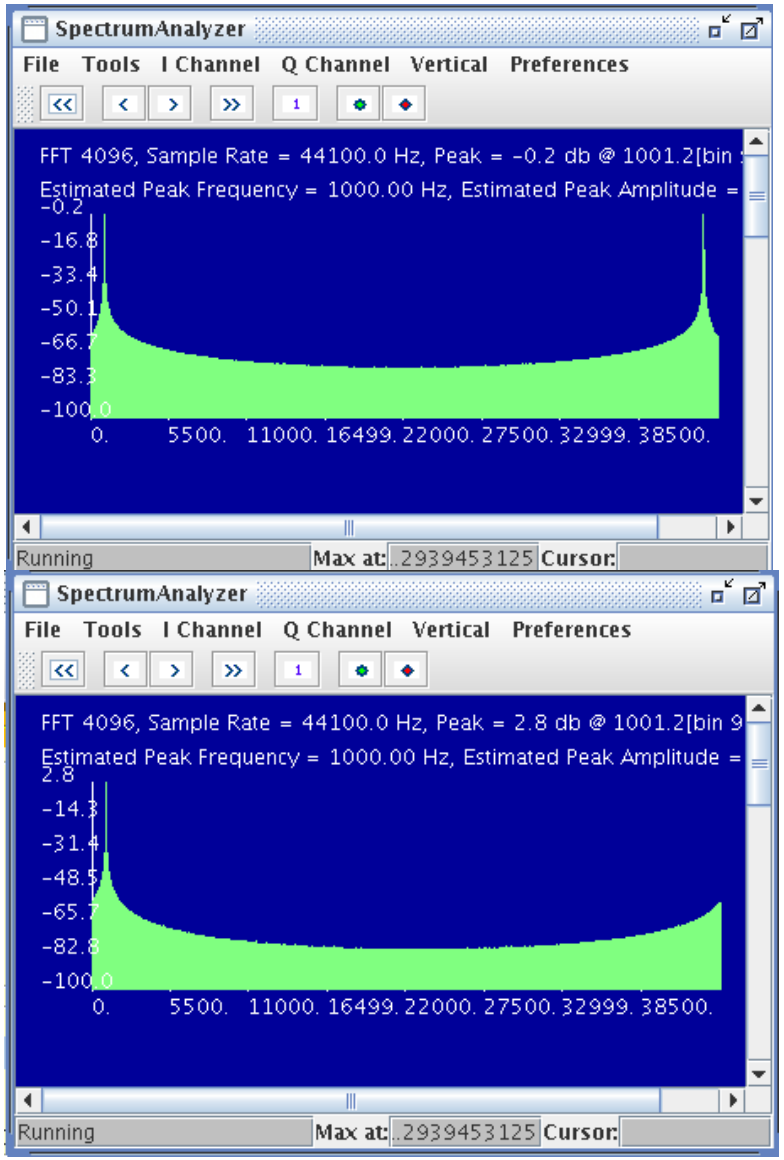




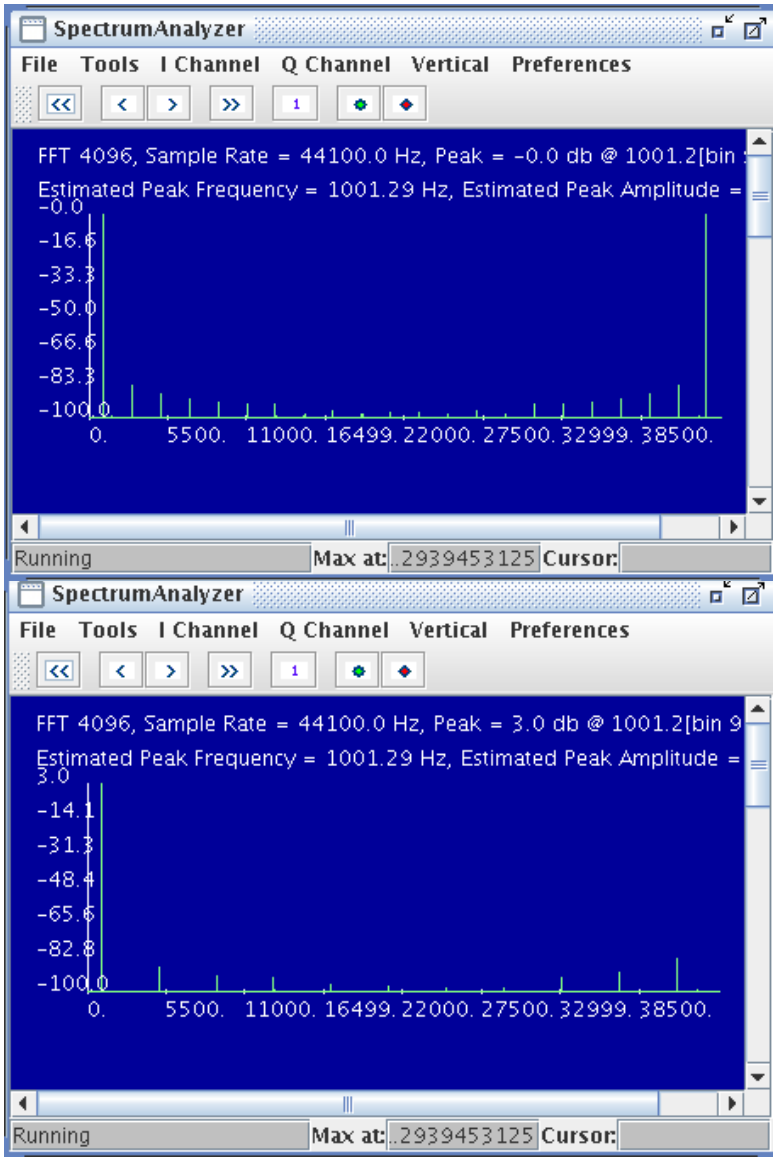




1000 Hz Sine wave



1001.2939453125 Hz (FFT bin 93)

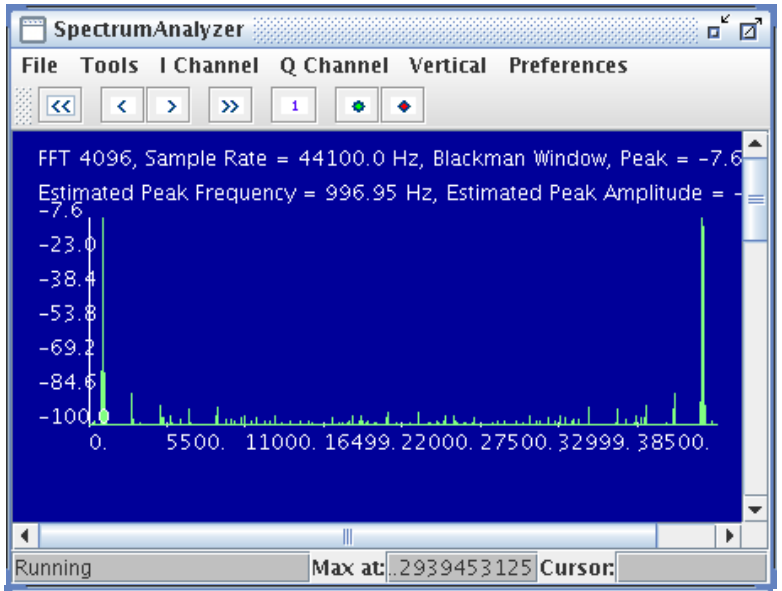


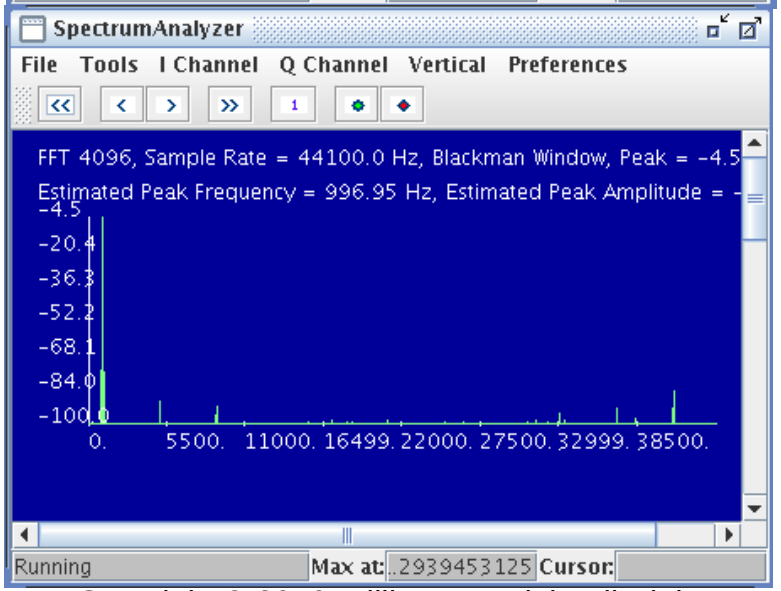
Channel 1 =
Channel 2

Channel 2 =
Channel 1
With -90 degrees

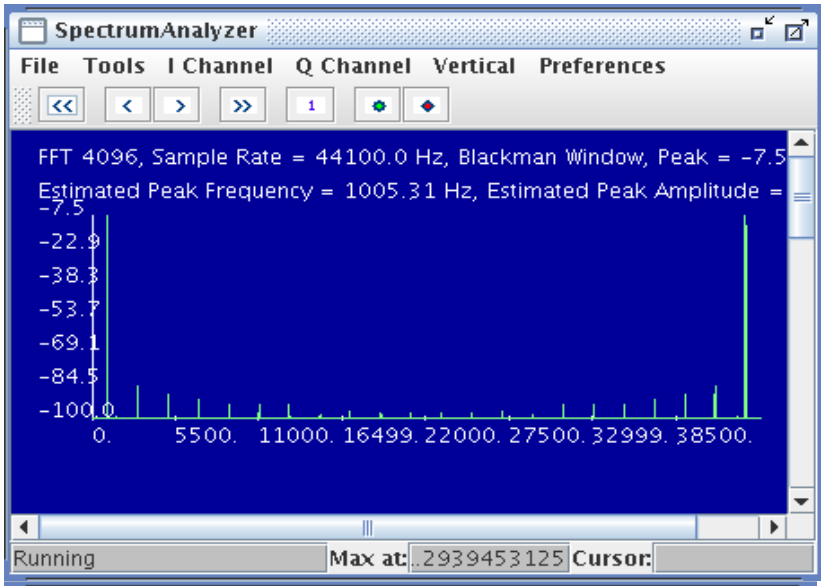
No Window Function

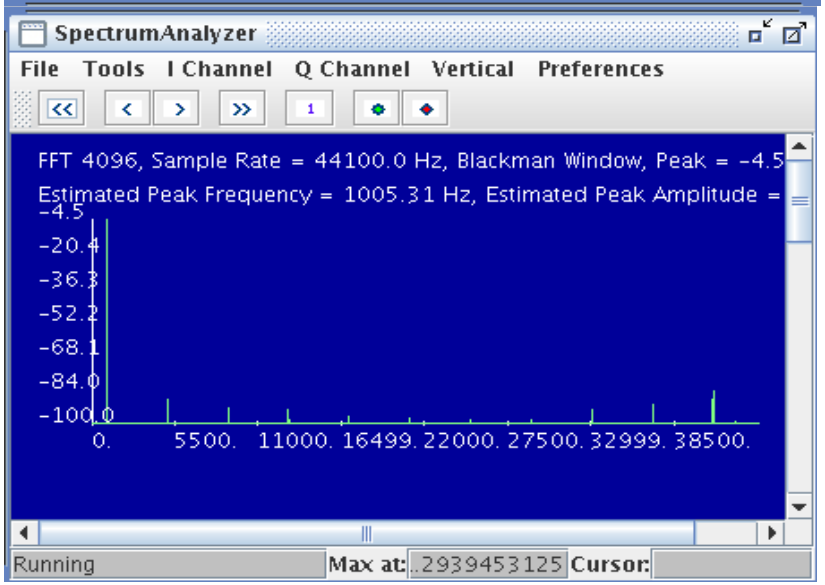
1000 Hz Sine wave





1001.2939453125 Hz (FFT bin 93)



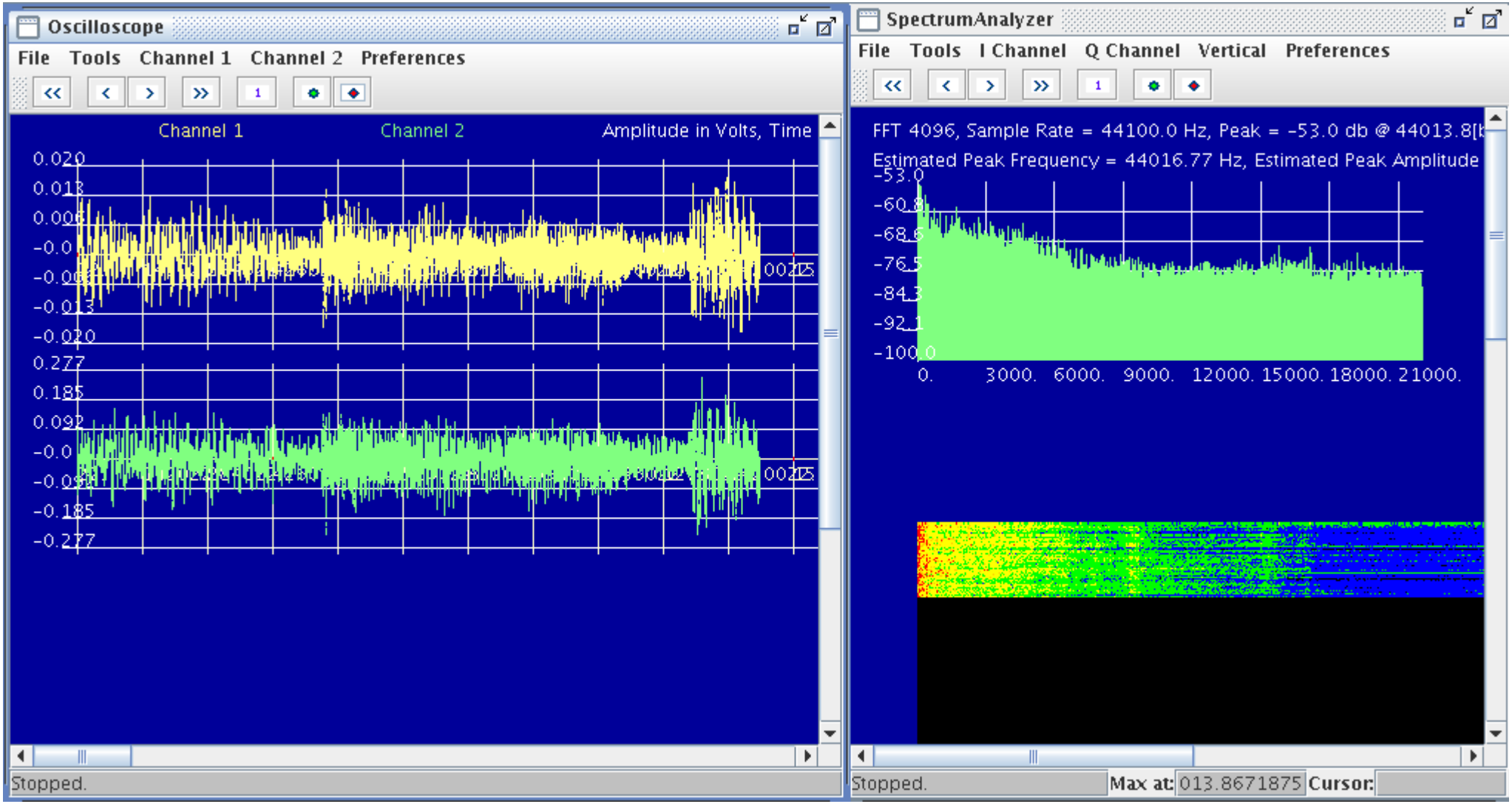


Channel 1 =
Channel 2

Channel 2 =
Channel 1
With -90 degrees

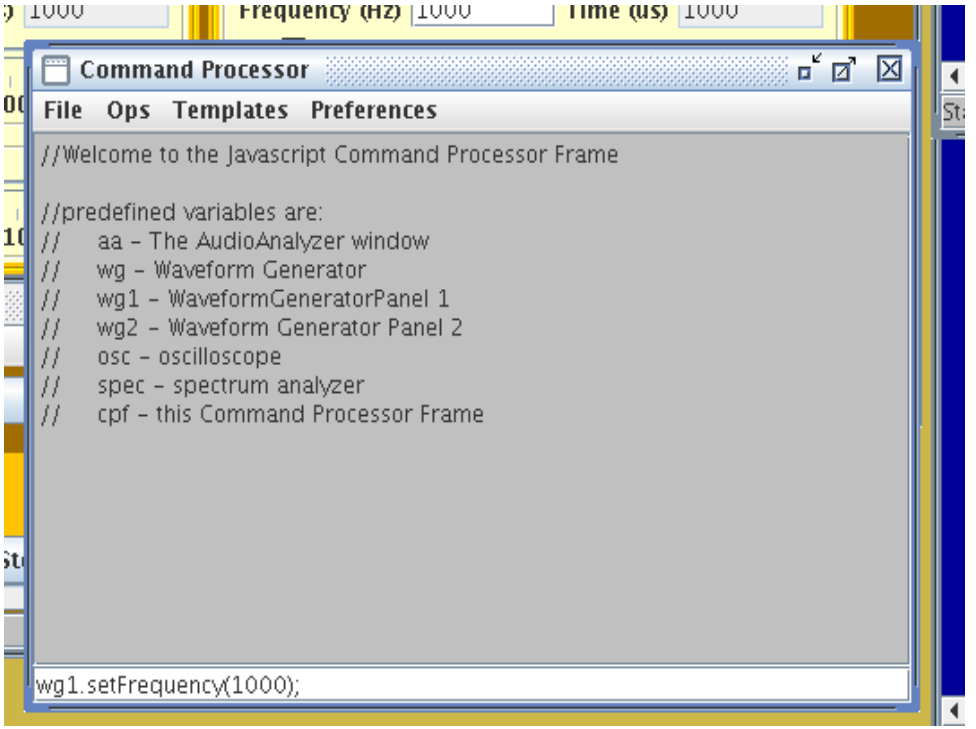
Blackman Window

Observing music



Other AudioAnalyzer Features

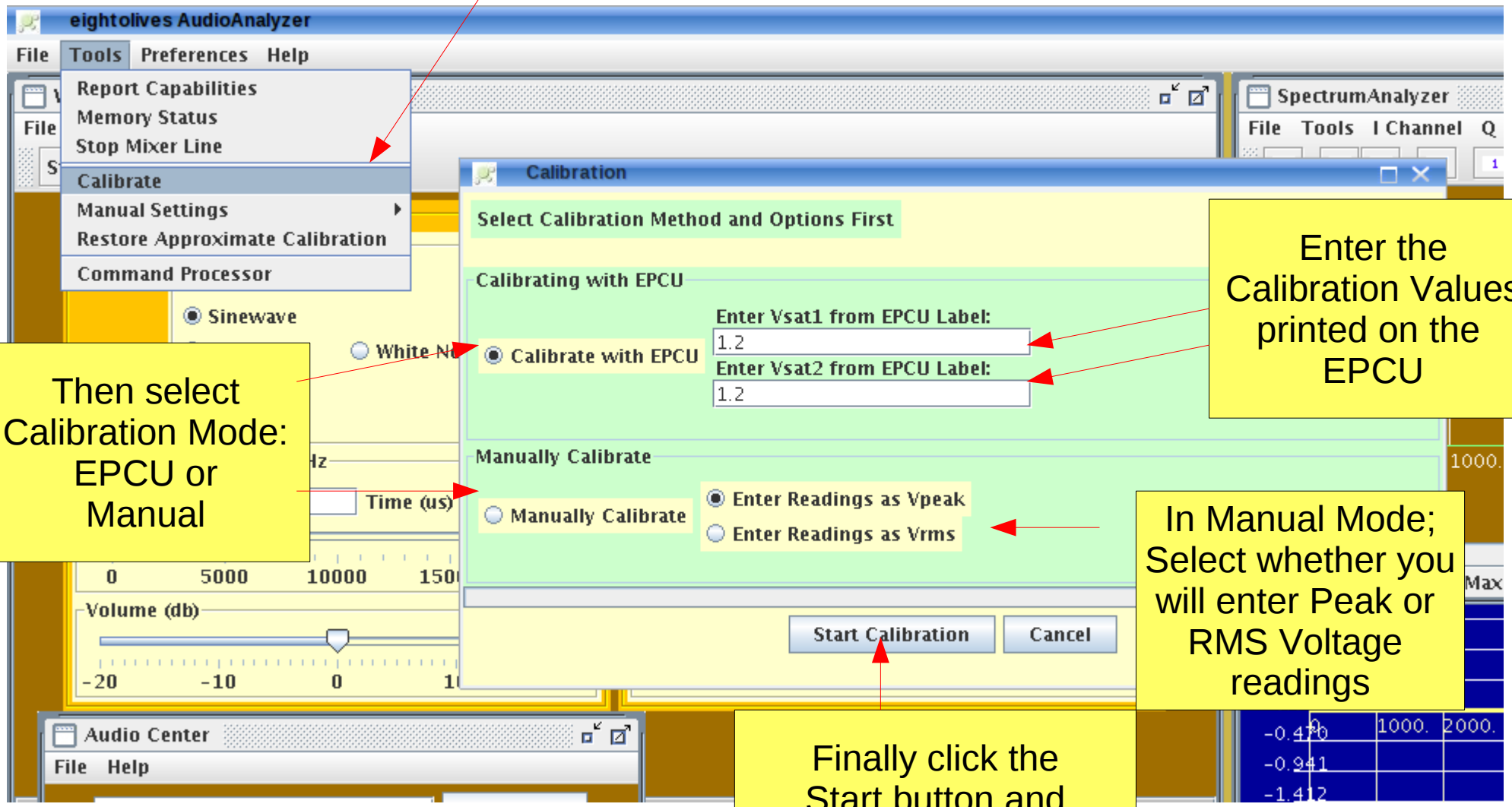
- Javascript Interface
- The Command Processor provides an interactive and scripting option
- Use ECMA Javascript
- Predefined variables access the various AudioAnalyzer tools



You can calibrate signal levels

- Calibration adjusts the voltage scale displayed by the oscilloscope to accurately reflect the actual output on the HEADPHONE / LINE OUT connector and inputs on LINE IN
- Three factors are resolved in calibration
  - The Output Mixer volume control and amplifier gain
  - The Input Mixer volume control and amplifier gain
  - The effect of input impedance
- You can calibrate automatically with an eightolives EPCU or manually with external test equipment

Select Menu Option: Tools > Calibrate



Then select Calibration Mode: EPCU or Manual

Enter the Calibration Values printed on the EPCU

In Manual Mode; Select whether you will enter Peak or RMS Voltage readings

Finally click the Start button and respond to the pop-up dialog instructions

For more information

- Check the tutorials at: http://www.eightolives.com/tutorials.htm
  - AudioAnalyzer Calibration
  - Using the AudioAnalyzer
- Review bug reports and status from the AudioAnalyzer home page at: http://www.eightolives.com/docs/AudioAnalyzer/index.htm