

AudioAnalyzer

An Overview



The screenshot displays the **eightolives AudioAnalyzer** application window, which is divided into several functional panels:

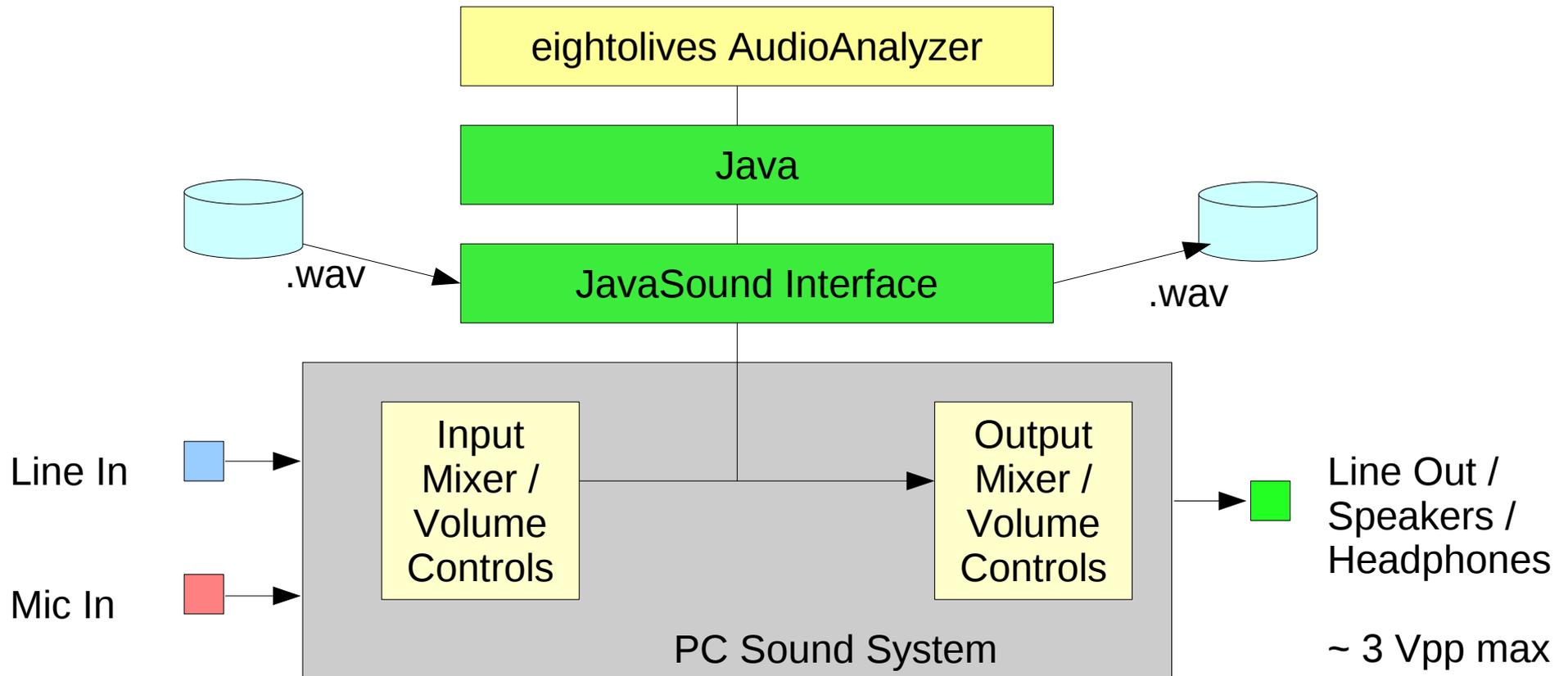
- Waveform Generator:** This panel is split into two channels.
 - Channel 1:** Offers waveform options: Generator Off, Sinewave (selected), Triangle wave, White Noise, Squarewave, and From File. It includes frequency (1000 Hz) and time (1000 us) sliders, and an amplitude (db) slider ranging from -20 to 20.
 - Channel 2:** Offers waveform options: Generator Off, Sinewave (selected), White Noise, Ch 1 with Phase, Triangle wave, Squarewave, and From File. It includes a phase lag input set to 90 degrees, and frequency (1892 Hz) and time (528 us) sliders, along with an amplitude (db) slider ranging from -20 to 20.
- Spectrum Analyzer:** Shows a frequency spectrum plot with a prominent peak at approximately 1892 Hz, corresponding to the frequency of Channel 2.
- Oscilloscope:** Displays two waveforms: Channel 1 (yellow) and Channel 2 (green). Channel 1 shows a high-amplitude sine wave, while Channel 2 shows a lower-amplitude sine wave. Two vertical cursors are present, with the following data:
 - Cursor 1: Level = 115, Time = 924 us
 - Cursor 2: Level = -108, Time = 2398 us
 - Delta Level = 223, Delta Time = 1474 us
- Audio Center:** A control panel at the bottom left featuring a "File Select" button, a "Record Enable" checkbox (which is currently unchecked), and "Record", "Play", and "Stop" buttons.

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

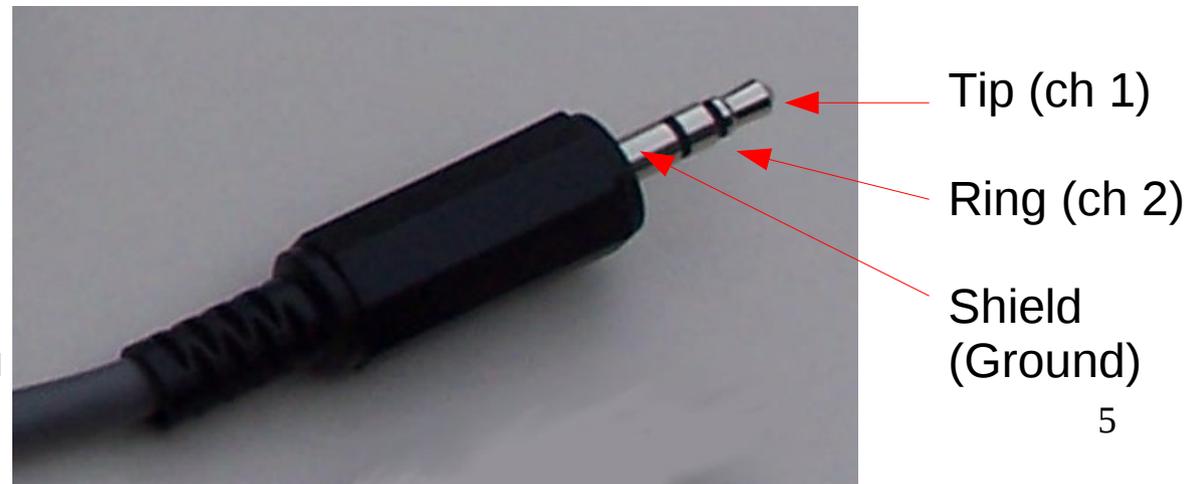
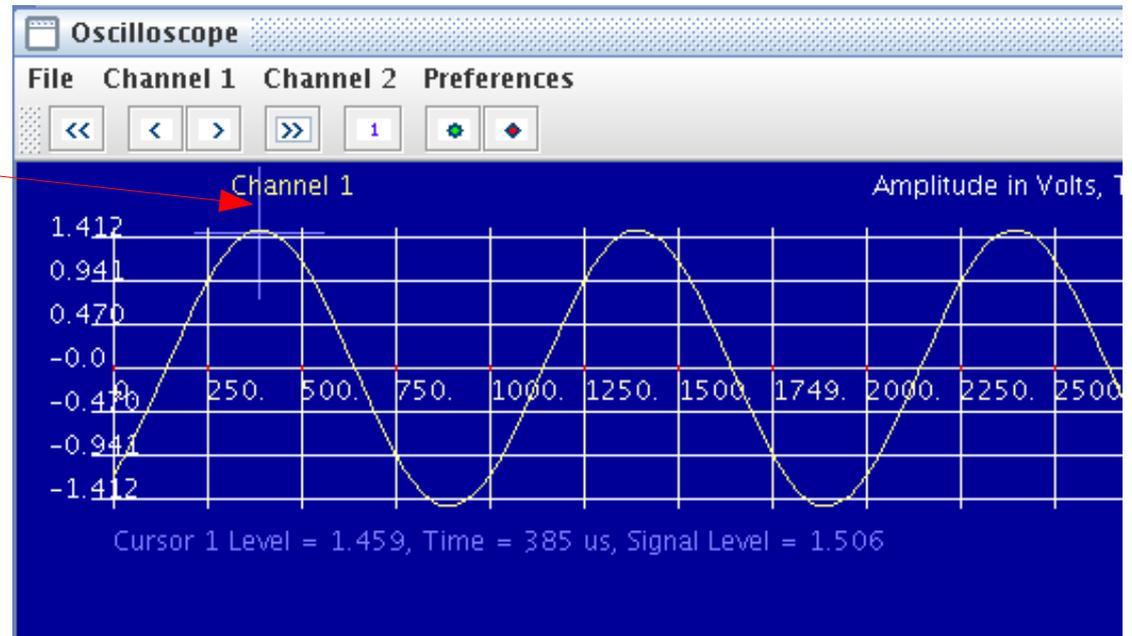
Definitions

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

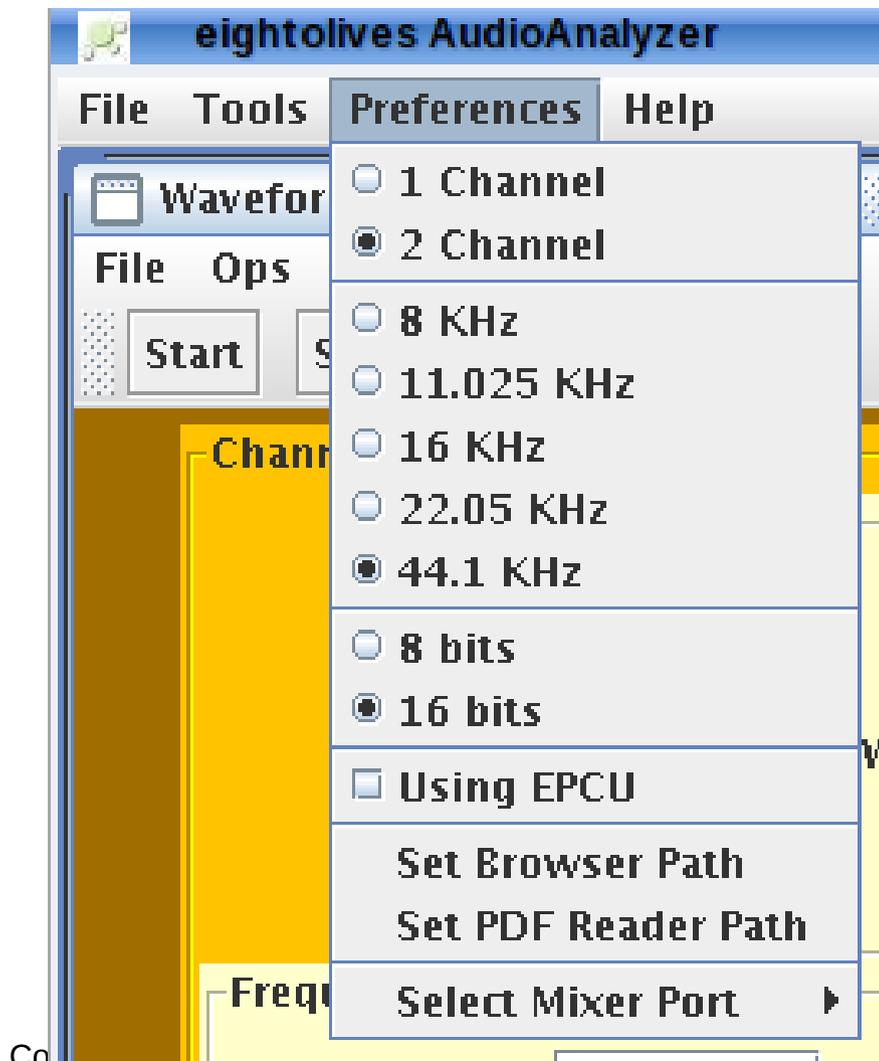
VRMS is defined as:

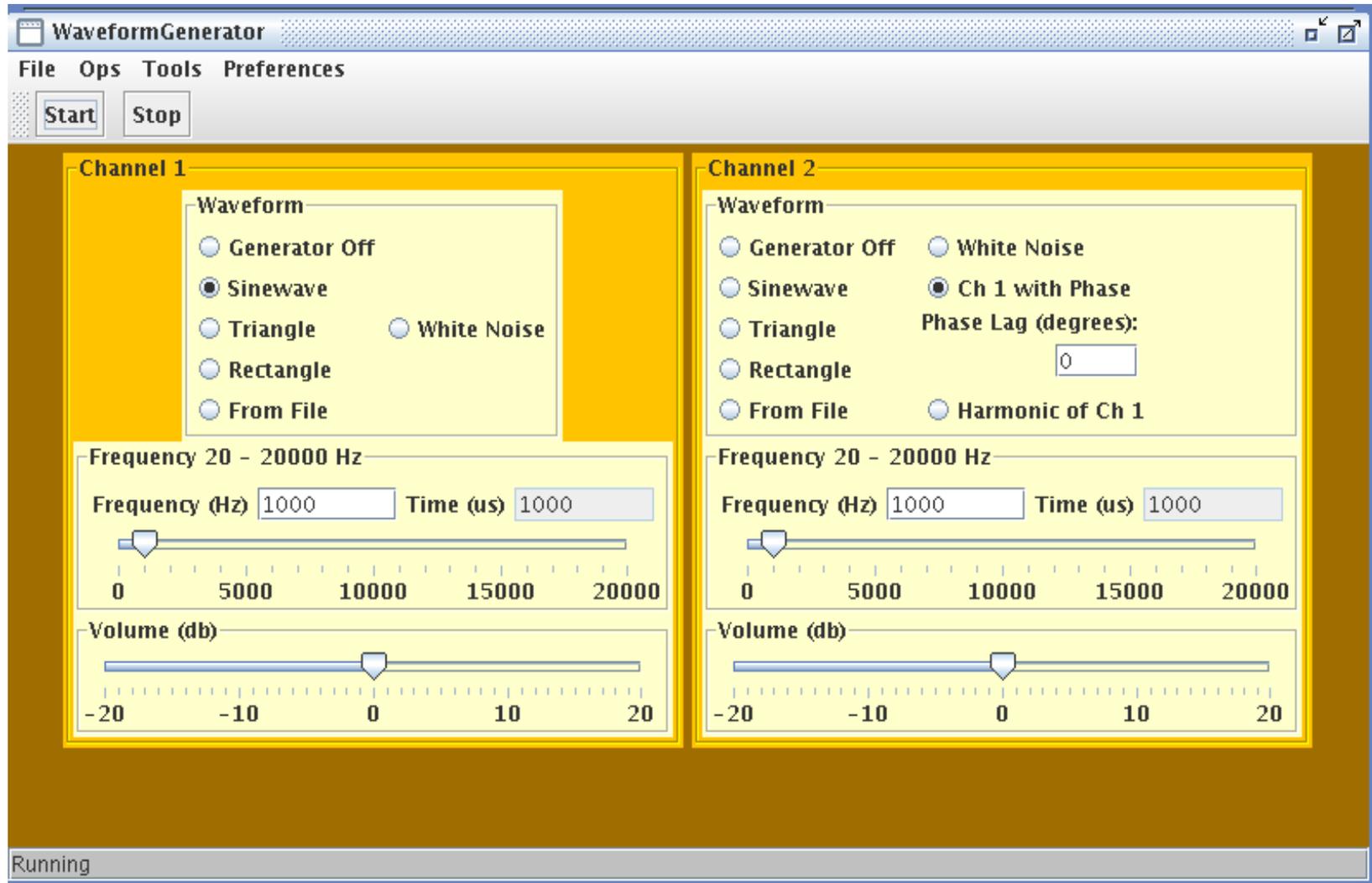
$$0.707 * V_{peak}$$

for a sine wave and represents the equivalent DC voltage



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



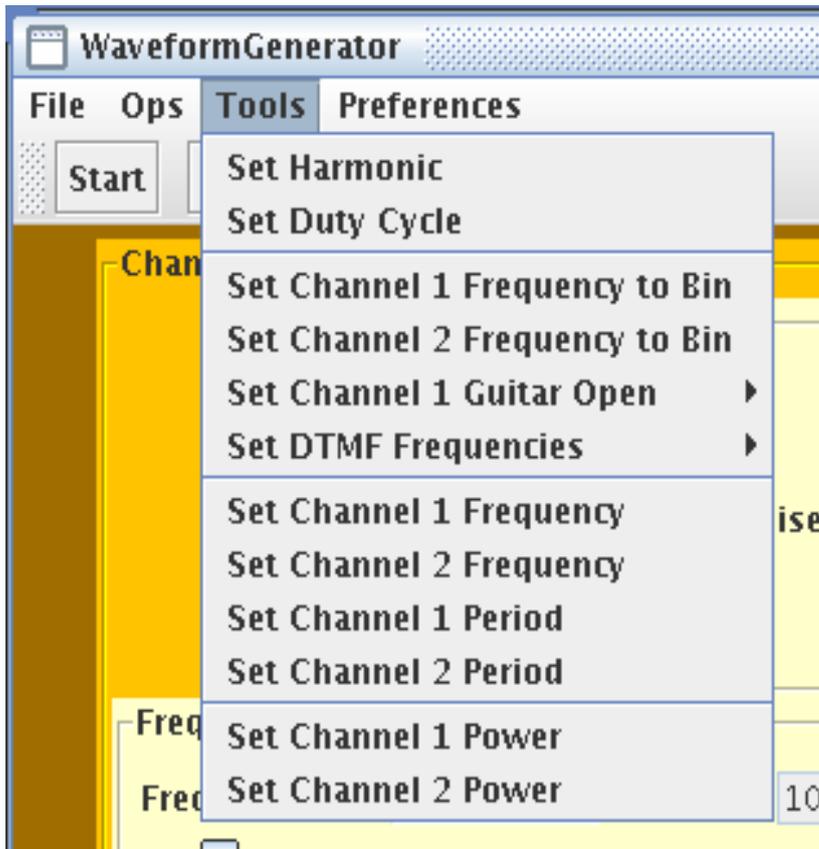


Waveform Generator

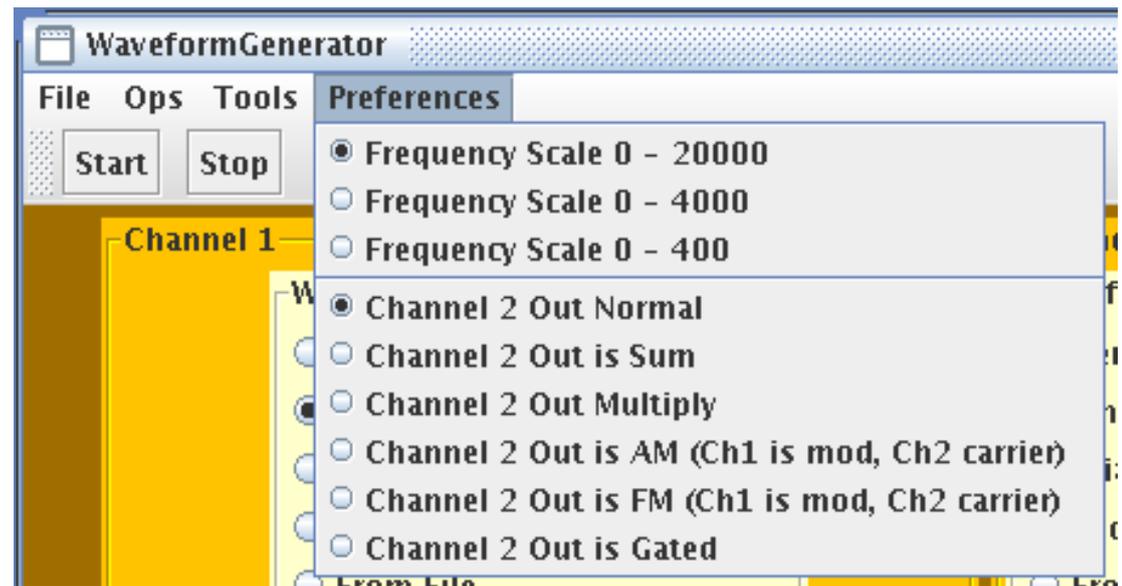
Drives 2 Audio Channels

Channel 1 (Left)

Channel 2 (Right)



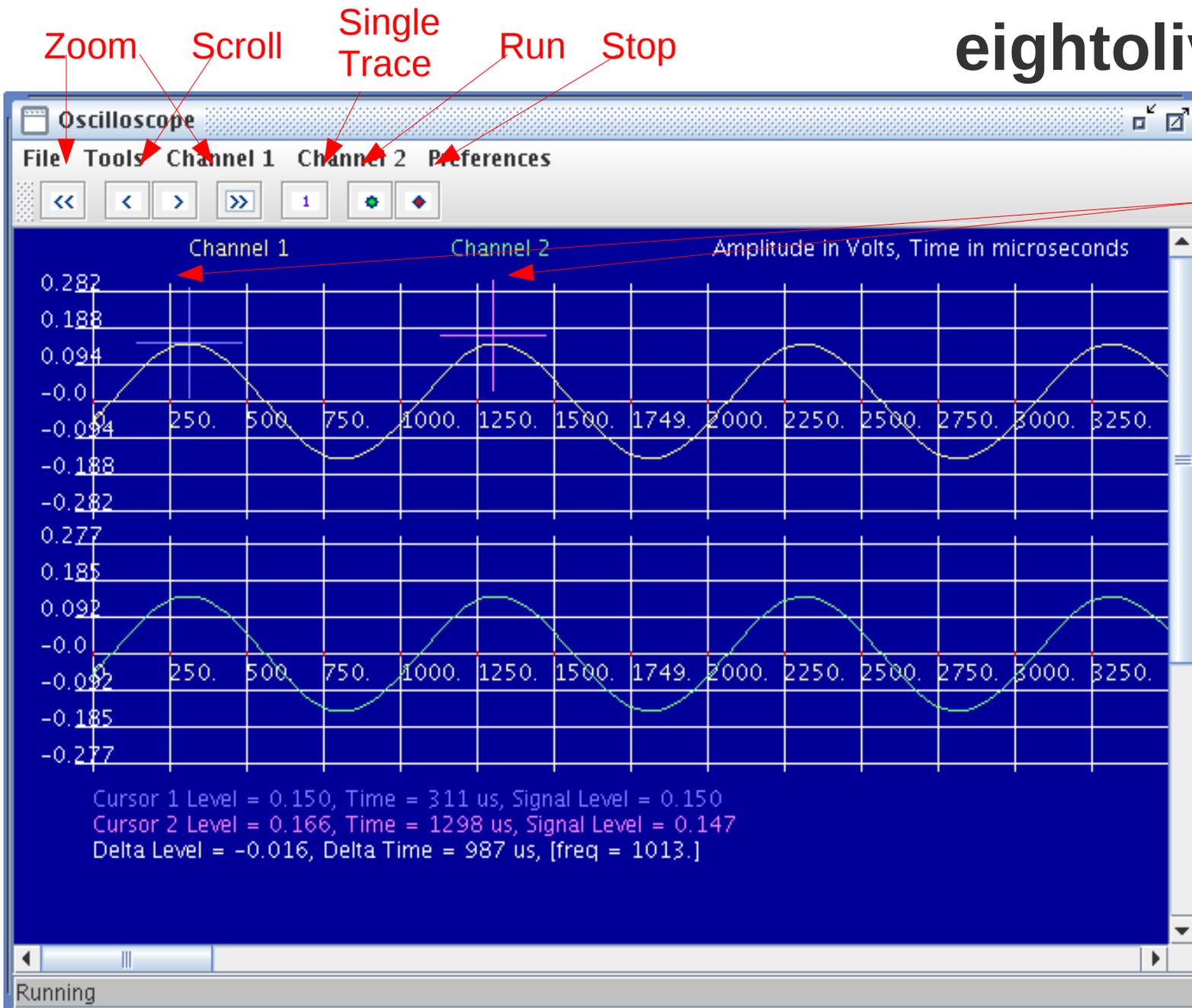
Tools Menu options help accurately specify signal parameters



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



2 Cursors help make Measurements

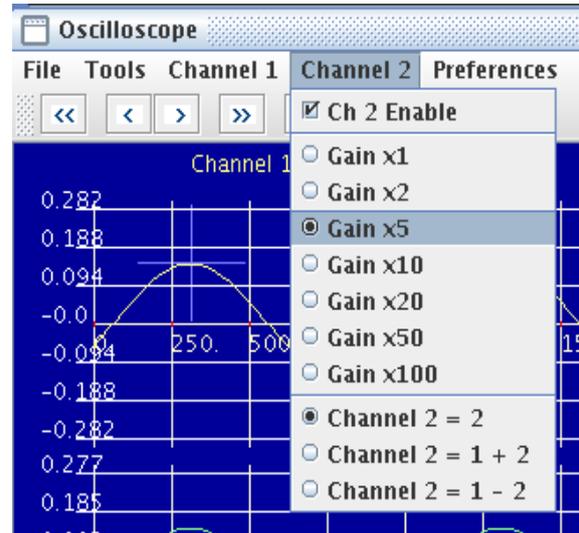
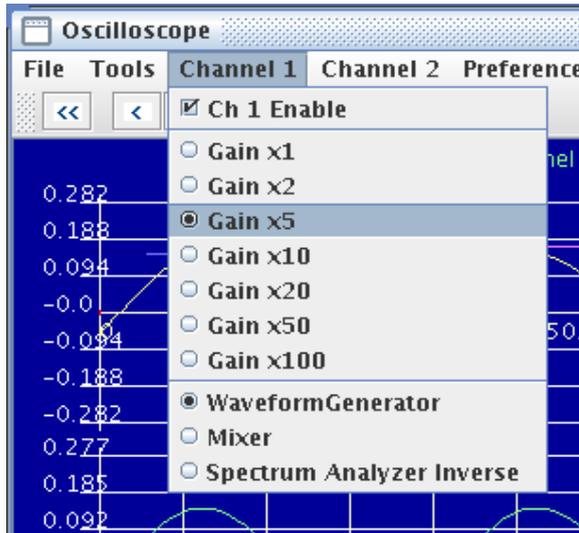
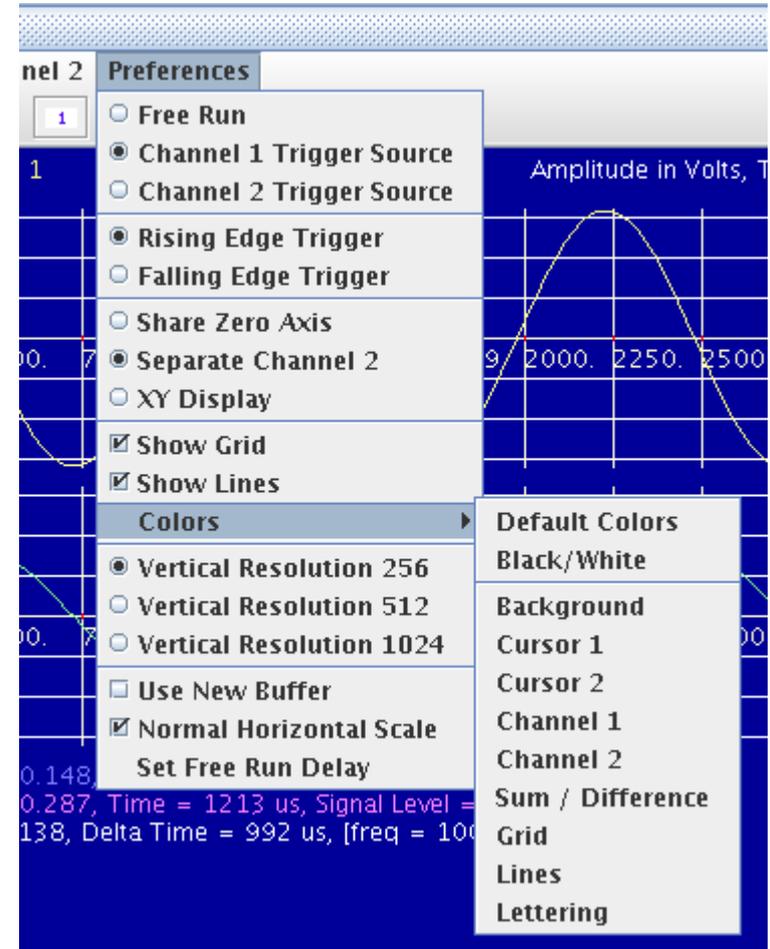
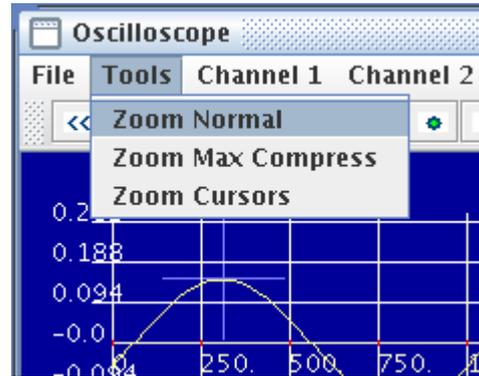
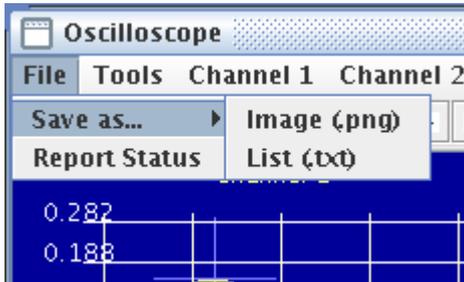
Double left click for Cursor 1

Double right click for Cursor 2

Shown with Ch 2 having -90 degree phase shift

You can select colors of lines, text, background

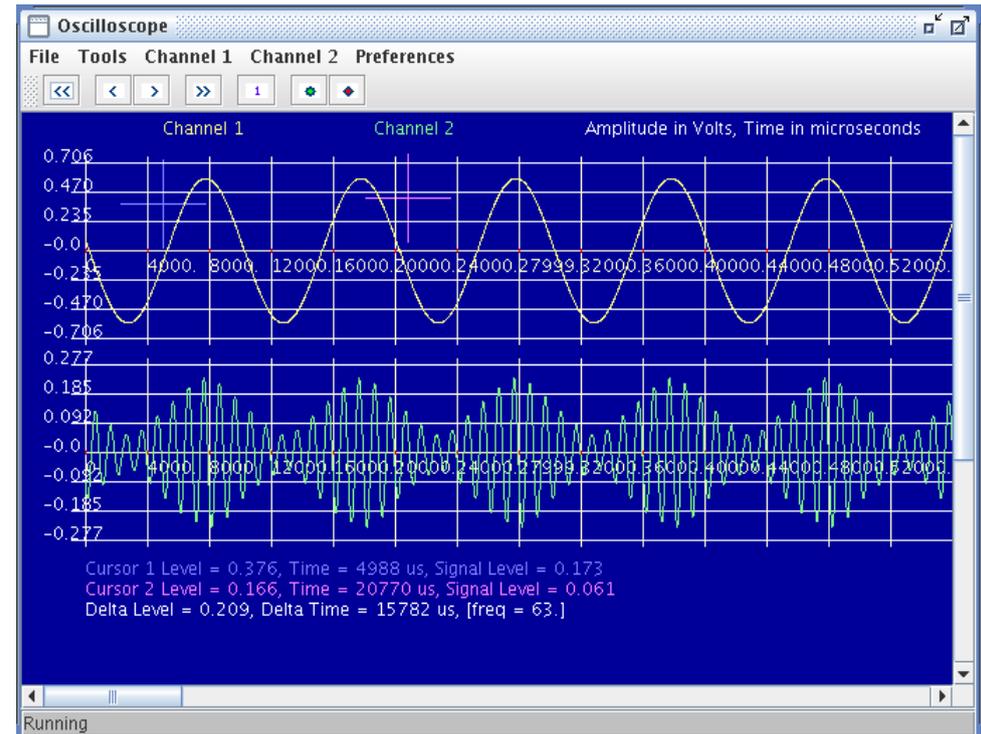
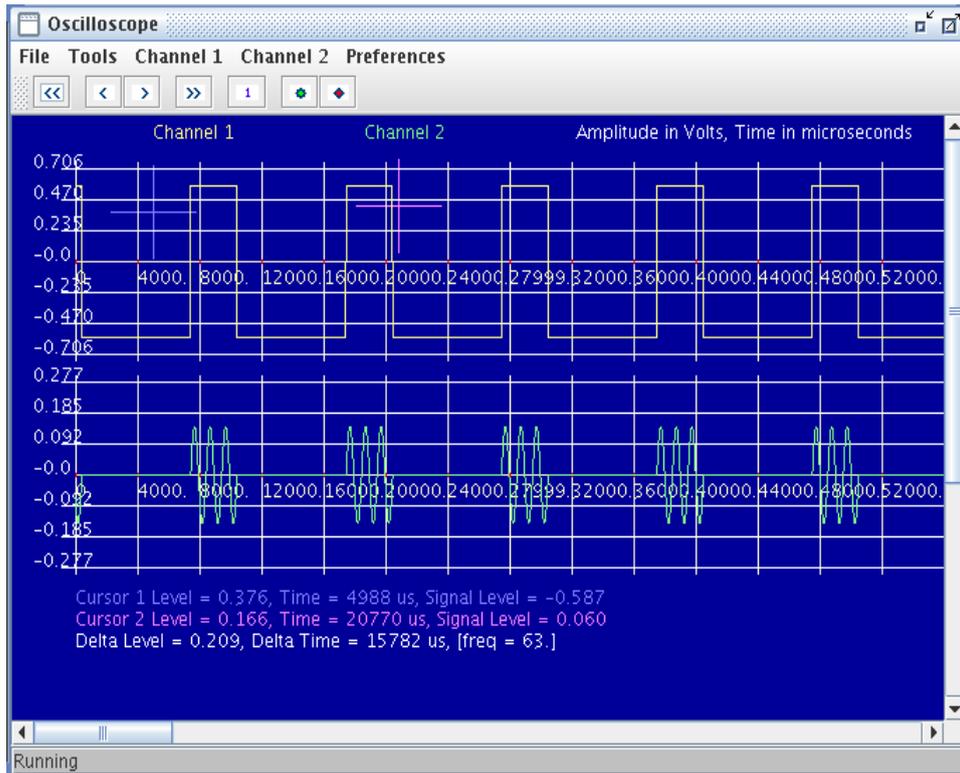
Oscilloscope Menu Options



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

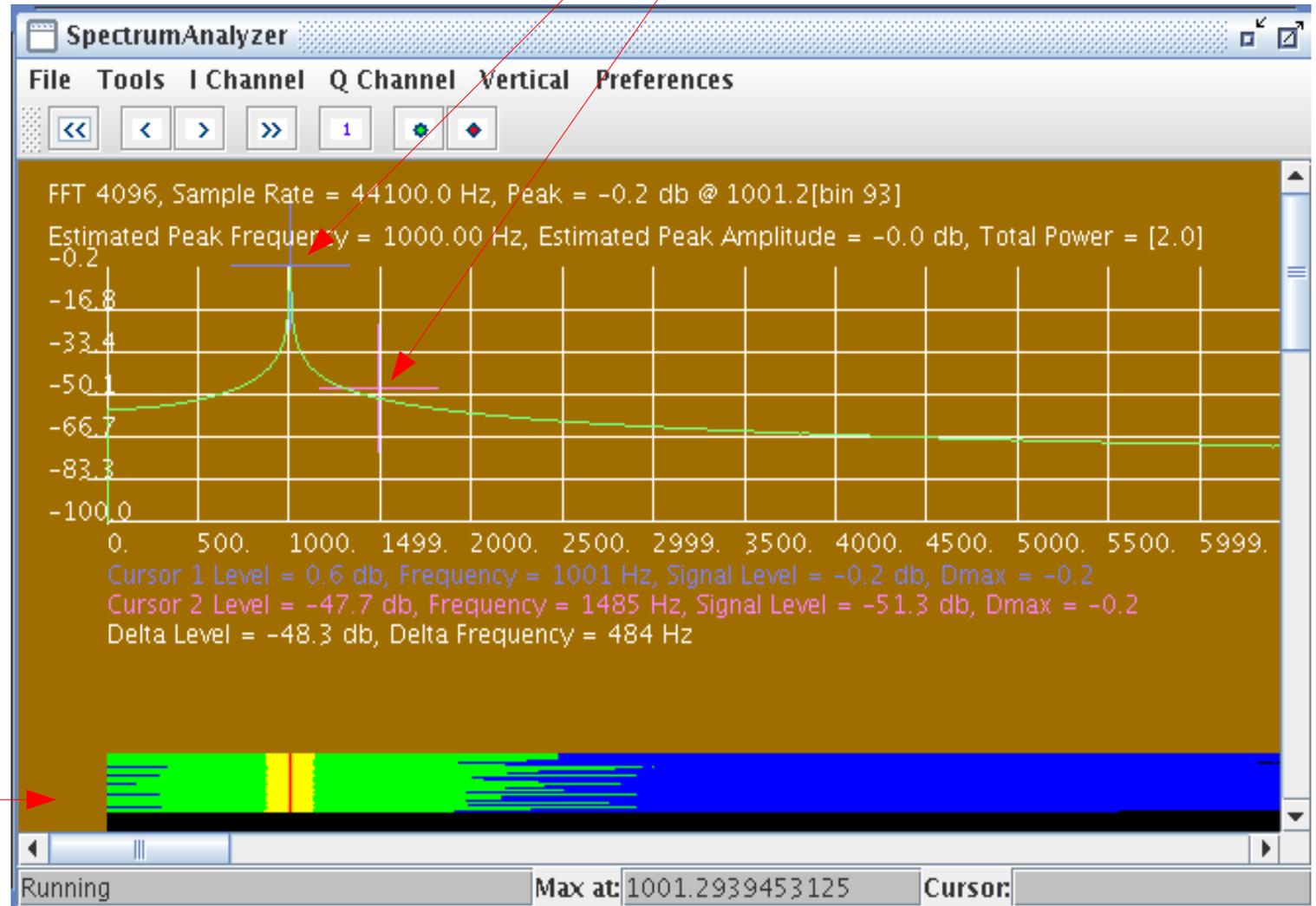
Two Cursors

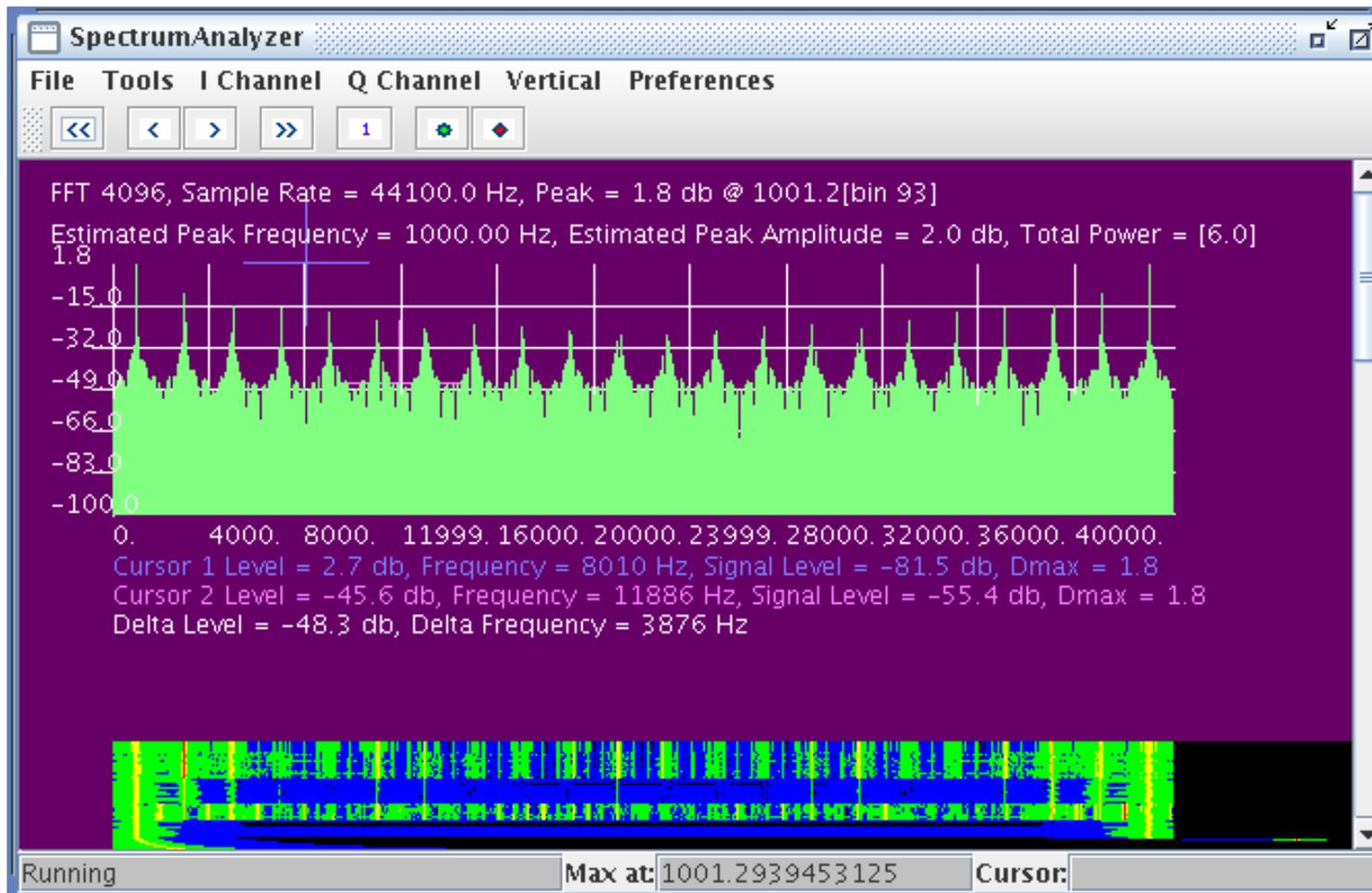
This display is a 1000 Hz sine wave

Vertical is Log

Line Mode Display

Waterfall Display enabled

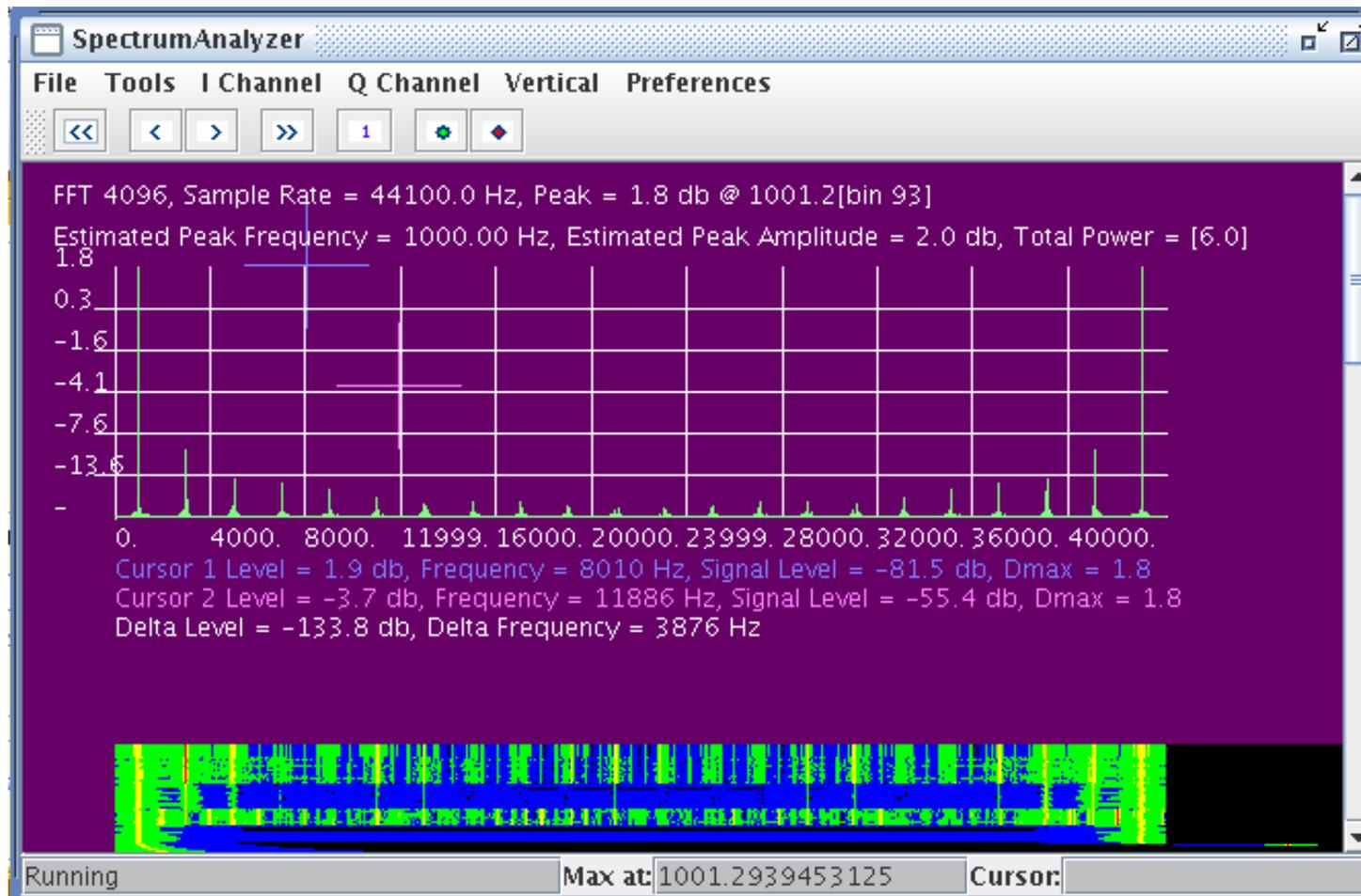




Display shows 1 Khz square wave

Vertical Log Display, Non-line mode, Zoom out

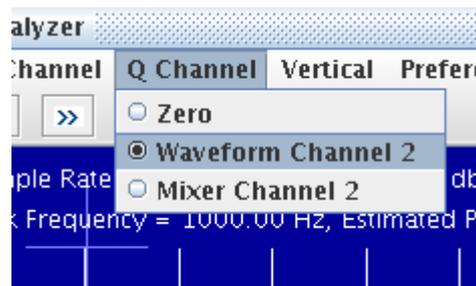
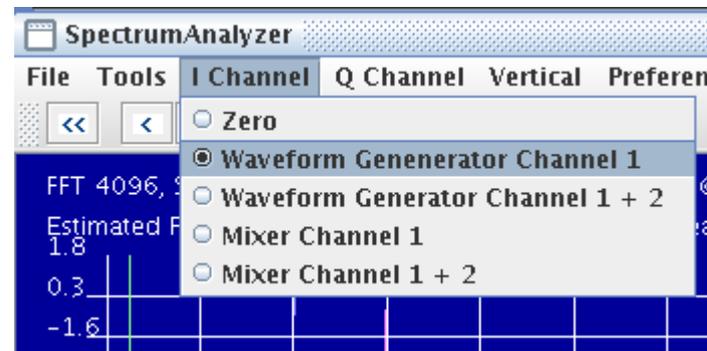
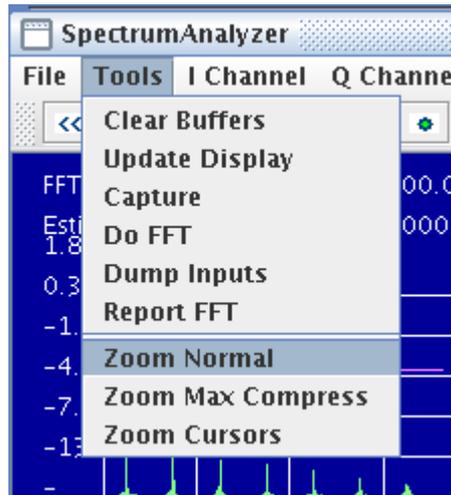
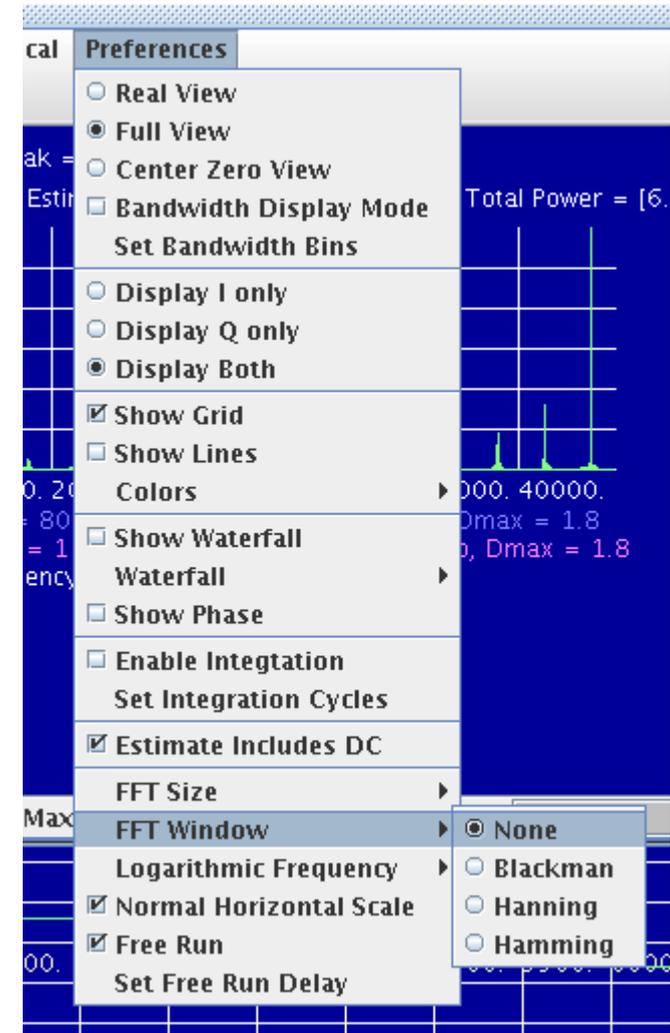
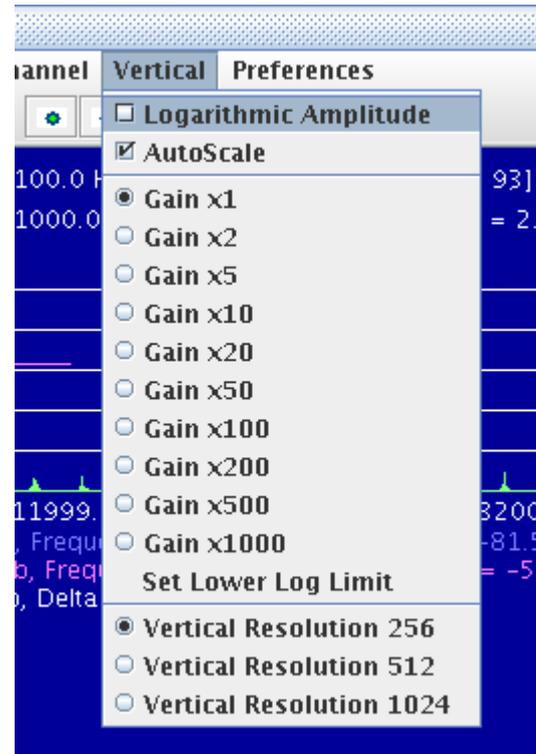
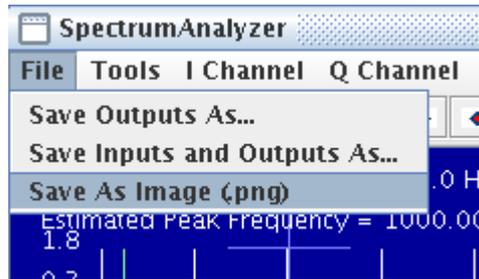
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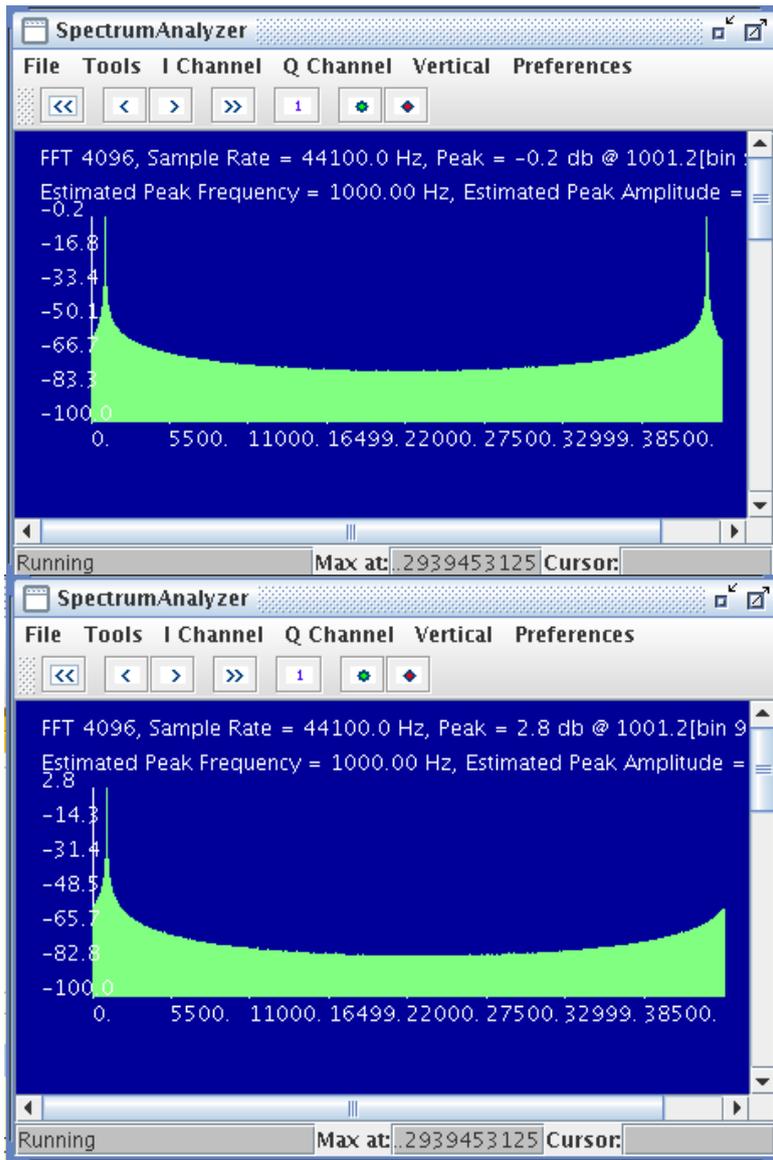
Display shows 1 Khz square wave

Vertical Linear, Non-line mode, Zoom out

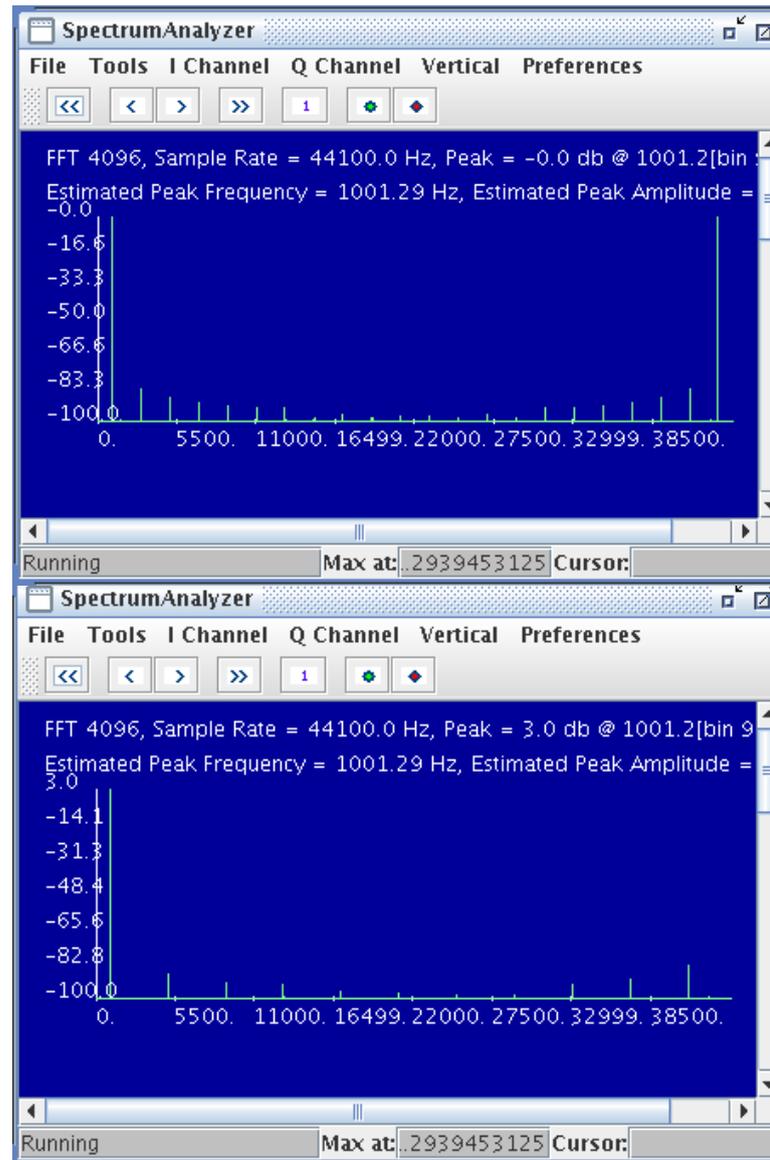
Spectrum Analyzer Menu Options



1000 Hz Sine wave



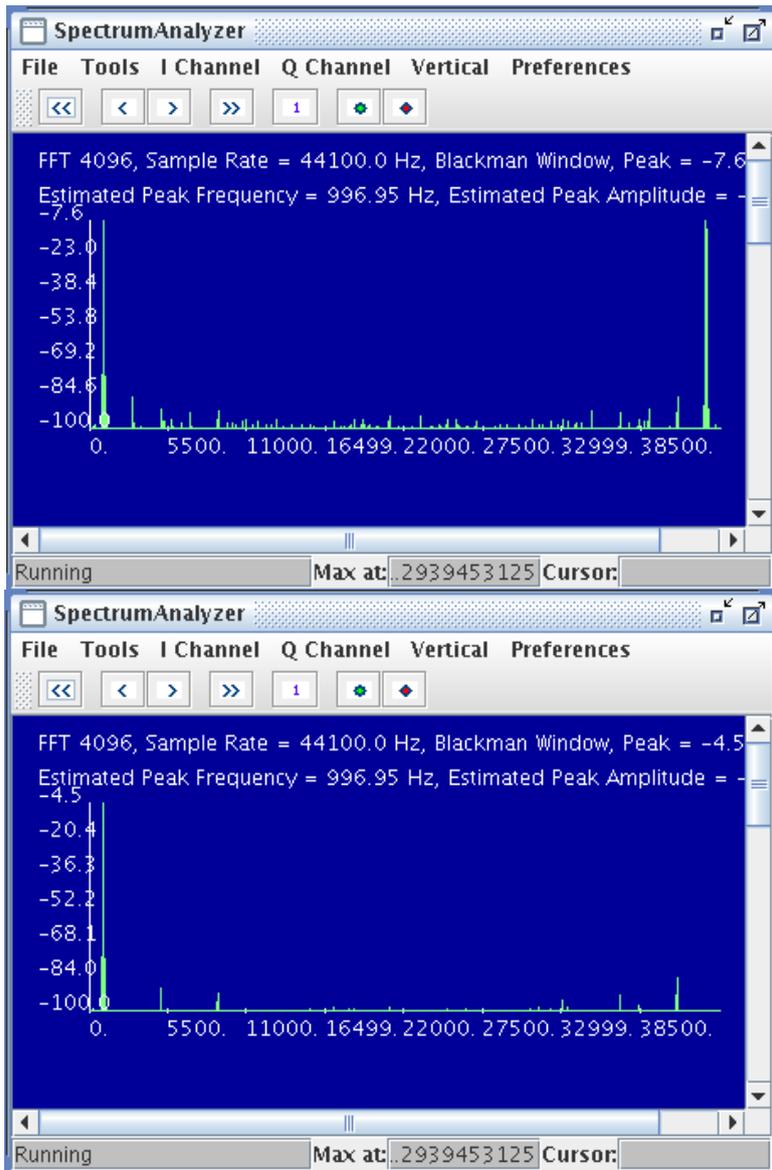
1001.2939453125 Hz (FFT bin 93)



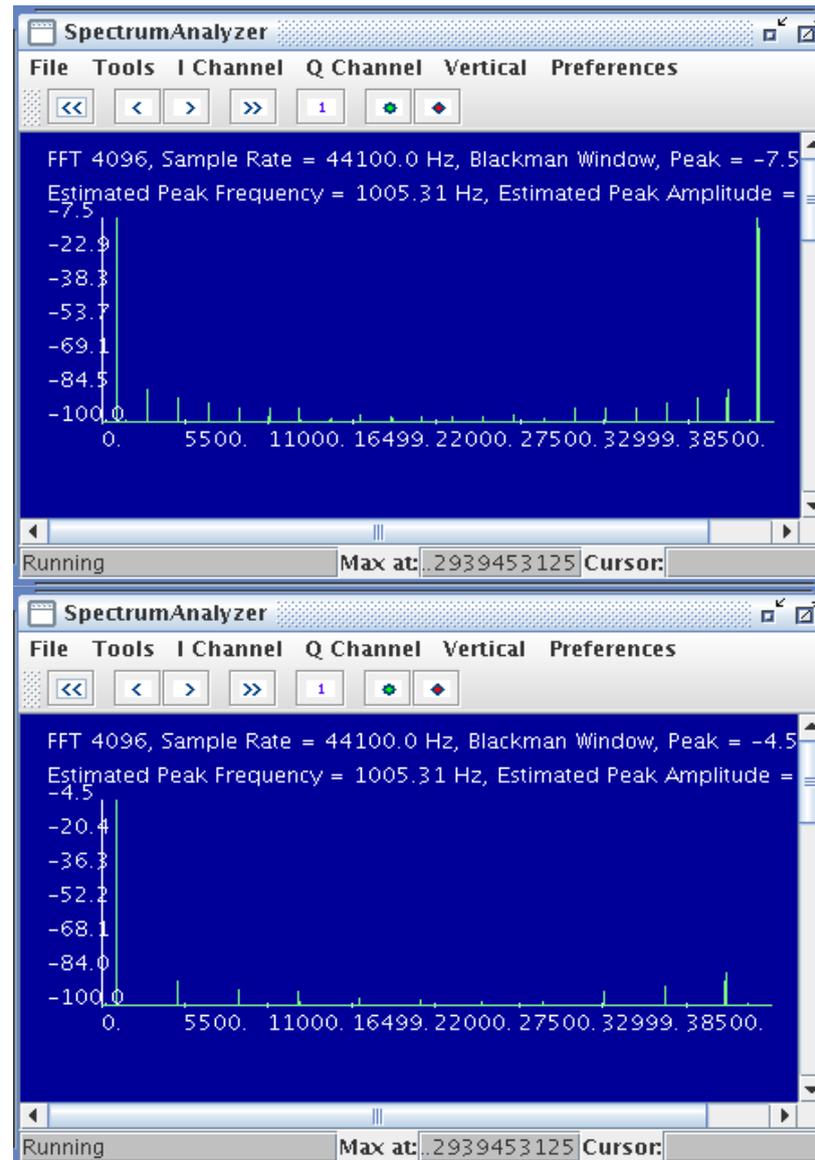
Channel 1 =
Channel 2

Channel 2 =
Channel 1
With -90 degrees

1000 Hz Sine wave



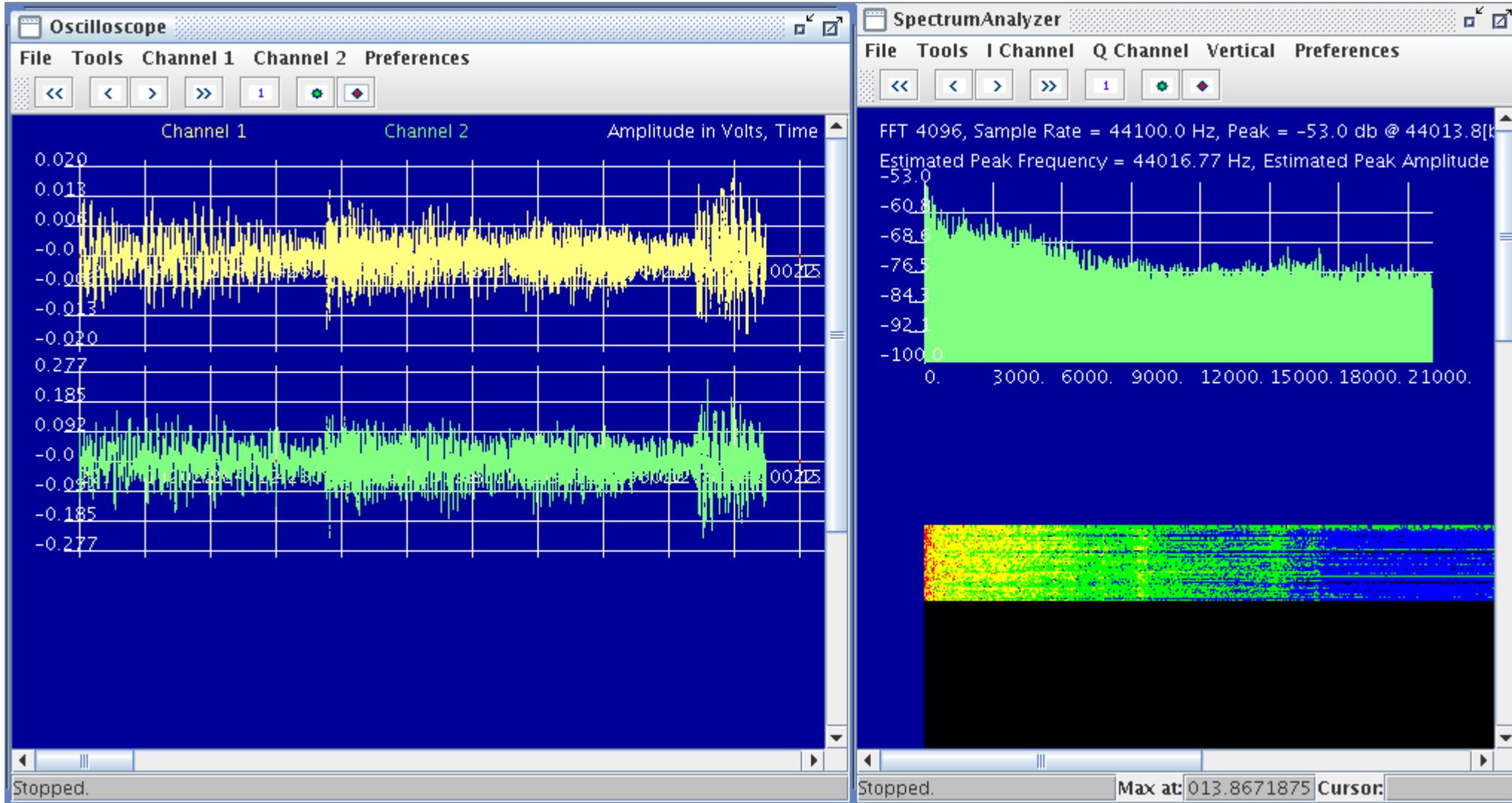
1001.2939453125 Hz (FFT bin 93)



Channel 1 =
Channel 2

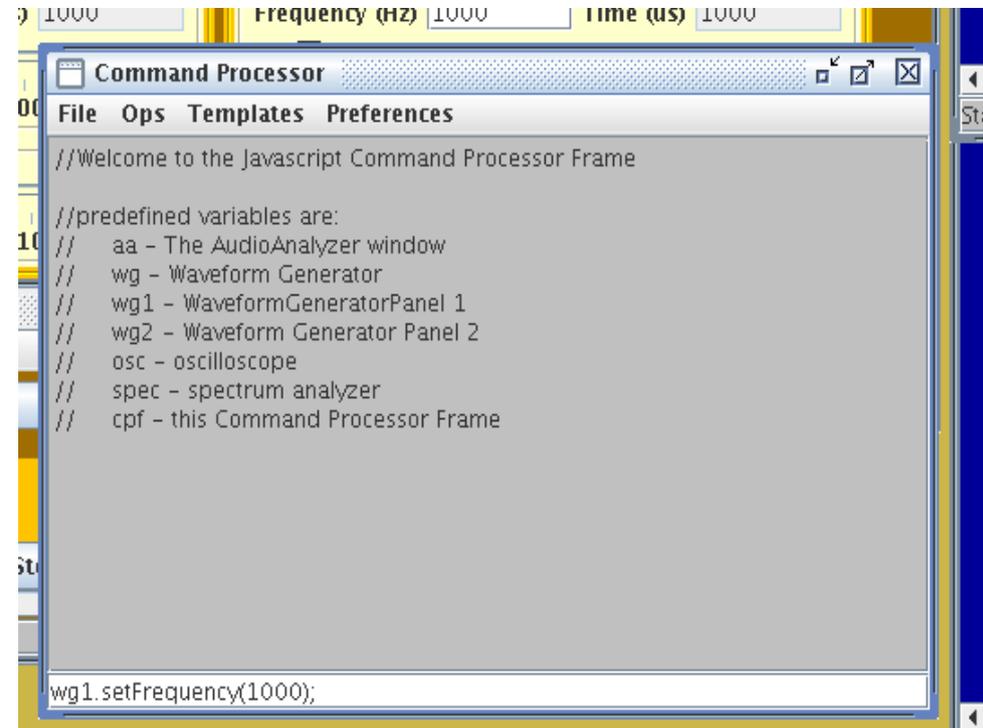
Channel 2 =
Channel 1
With -90 degrees

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



```
//Welcome to the Javascript Command Processor Frame

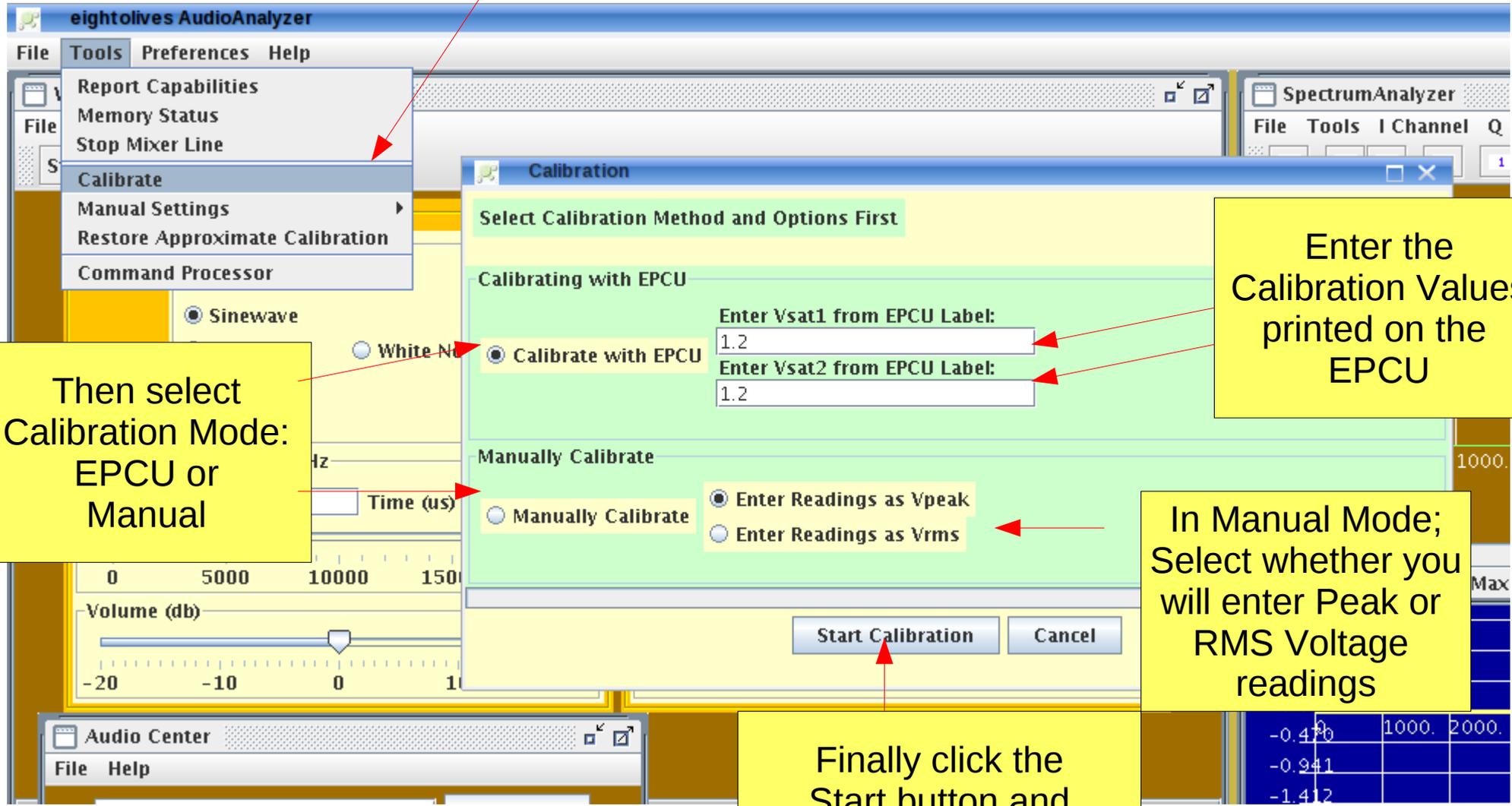
//predefined variables are:
// aa - The AudioAnalyzer window
// wg - Waveform Generator
// wg1 - WaveformGeneratorPanel 1
// wg2 - Waveform Generator Panel 2
// osc - oscilloscope
// spec - spectrum analyzer
// cpf - this Command Processor Frame

wg1.setFrequency(1000);
```

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>