Digital Oscilloscope

Version 1.2.**1**

Introduction

The oscilloscope is an instrument that permits visual examination of various electrical phenomena of interest to the electronic engineer. Instantaneous changes in voltage, current and phase are observable if they take place slowly enough for the eye to follow, or if they are periodic for a long enough time so that the eye can obtain an impression from the screen. In addition, the oscilloscope may be used to study any variable which can be converted into electrical potentials.

This small application enables you to use your Macintosh as an oscilloscope. Although this application cannot be compared with the power of real oscilloscopes, it may be useful for a variety of tasks in the lower frequency domain. All you need for this application to work is a sound input device. Systems software 7.0 or later is required.

Selecting a Sound Input Device

To select from among multiple possible input device, use the Sound control panel that lists all available sound input devices. This application can be used with any available sound input hardware for which there is an appropriate device driver. In addition, the *About* window will inform you about the selected input device.
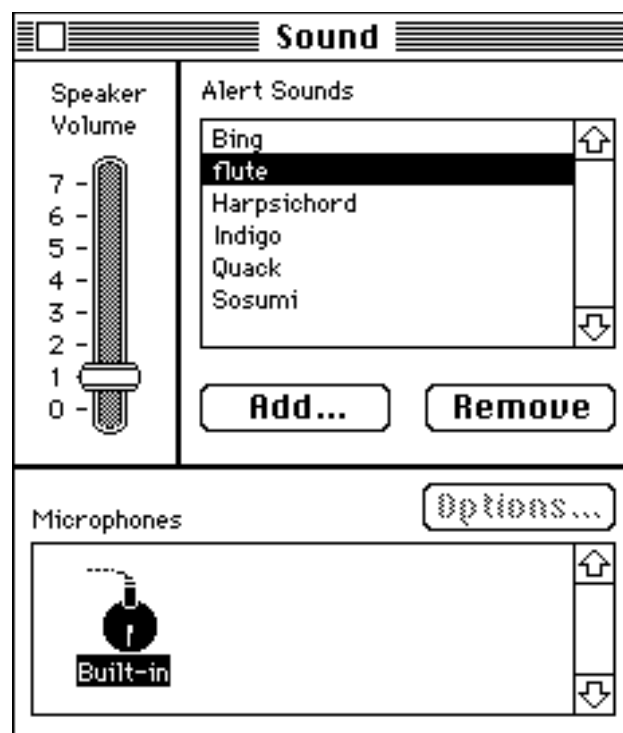
Figure 1. Selecting the input device from the Sound Control Panel

How it Works

Whenever in idle state, a number of bytes are read from the input device. In order to get a stable image, a certain level (the trigger value) on the increasing or decreasing edge of the signal is looked for. If the level of the signal or if the frequency is too low, no matching value can be detected. In this case, drawing starts as well. You will notice that the displayed wave form quickly shifts from one side to the other. To avoid flicker, the wave is first drawn to an offscreen port and copied then to the screen.

Unhappily, there is no chance to control the input level of the signal. When using external sound sources, as for example a sine wave generator, be careful to watch the input characteristics of your input device. In most cases you probably need some sort of attenuator or amplifier.

Features

The *Sampling* panel on the left side controls the sampling rate of the signal. A list of the sampling rates that your input device can handle, will be shown in the *sampling rate* pop-up menu. If your input device handles a continuous range of sampling rates, a text item appears above the pop-up menu. Otherwise, only the sampling rates indicated in the menu are available. The higher the sampling rate you choose, the higher the frequency that can be resolved.

The slider with the arrow on the left side of the screen controls the trigger value. This value determines the level from which the signal starts be traced. If you want to trigger the decreasing edge of the signal, press the *Trigger* button.

The *Display* panel controls the display of the signal. Usually, oscilloscopes are equipped with a slider to focus the spot of the electronic beam and to adjust the intensity of the spot. In this application, focus and intensity are simulated by selectable pen sizes. The *Lines* menu is used draw lines on the screen to help you estimating the level and the frequency of the signal. The number of lines to be drawn is controlled by the values for spacing and divisions. Divisions mean the number of horizontal lines to be drawn. Spacing is given in Hertz and is intended to estimate the frequency. The *Scaling* pop-up menu causes the graph to be stretched or shrinked along the time axis. If you prefer white lines on dark background, press the *Invert* button.

Given a sampling rate of 22 kHz, the highest frequency that can be displayed is less than 10 kHz.

Whenever you move the cursor over the oscilloscope's screen, you will notice that the cursor's shape changes to a *Camera* symbol. Clicking on the screen will copy the screen's image, open a new window, and paste it into the new window. The window is then send behind the oscilloscope. You can write the saved screen to a file by closing the window, or by using the *Save* command.

The *volume* of the sound your signal produces can be set by the slider in the volume panel.

Color has not been implemented, although it would have been nice to show phosphorescent green waves flicker over dark screens. Color would certainly slow down scan speed. To attain best performance, you should set your monitor to black and white.
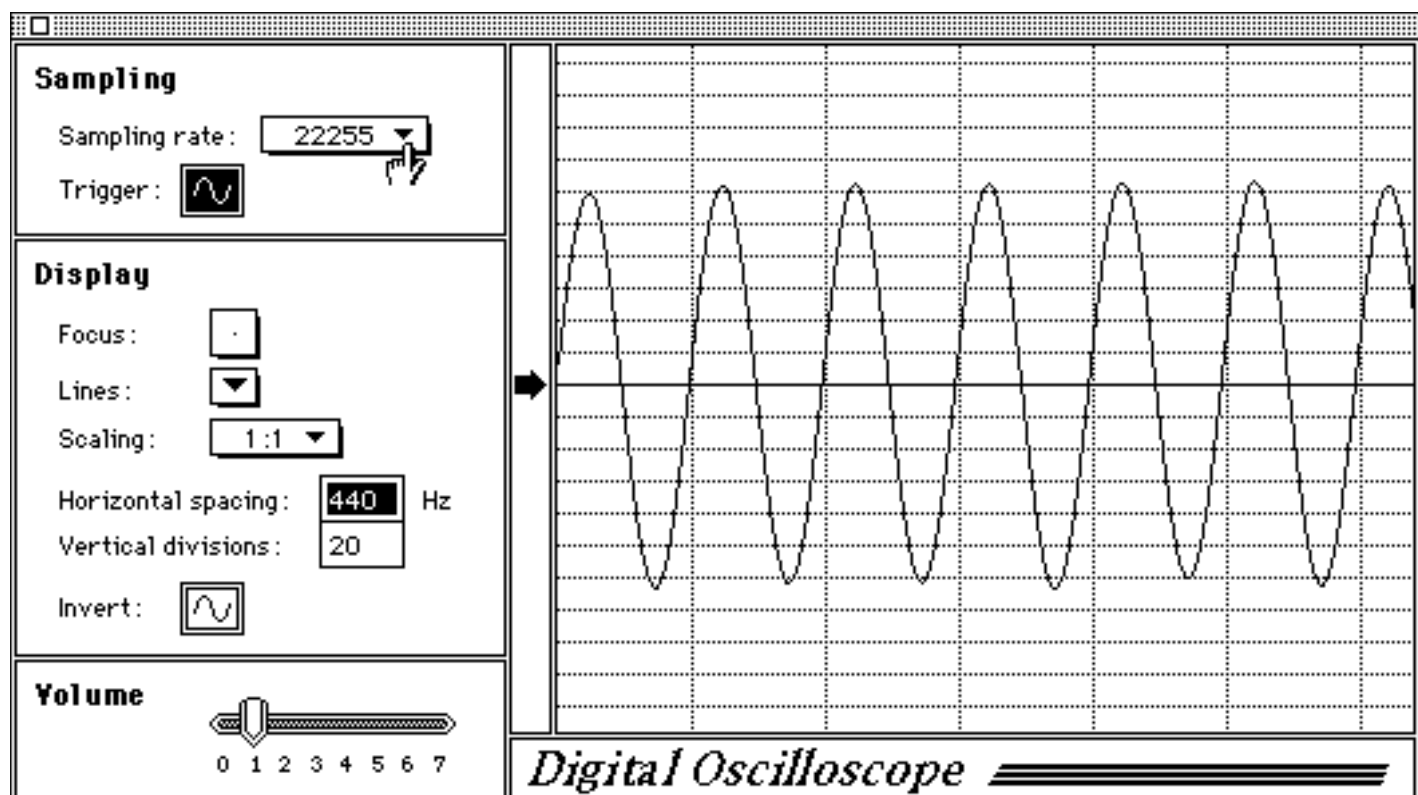

Figure 2. The oscilloscope window

This application is public domain. However, if you use it, don't forget to send me note.

If you have any comments, questions, or suggestions feel free to contact me:

Hansruedi Bär
Department of Geography
University of Zurich
Winterthurerstrasse 190
8057 Zurich

Phone: ++1 257 52 56
E-mail: baer@gis.geogr.unizh.ch