

# NCH Software

# NCH Tone Generator

This user guide has been created for use with  
NCH Tone Generator Version 6.xx

## Technical Support

If you have difficulties using NCH Tone Generator please read the applicable topic before requesting support. If your problem is not covered in this user guide please view the up-to-date NCH Tone Generator Online Technical Support at [www.nch.com.au/tonegen/support.html](http://www.nch.com.au/tonegen/support.html). If that does not solve your problem, you can contact us using the technical support contacts listed on that page.

## Software Suggestions

If you have any suggestions for improvements to NCH Tone Generator, or suggestions for other related software that you might need, please post it on our Suggestions page at [www.nch.com.au/suggestions/index.html](http://www.nch.com.au/suggestions/index.html).

Many of our software projects have been undertaken after suggestions from users like you. You get a free upgrade if we follow your suggestion.

# NCH Tone Generator

## Contents

Introduction.....	2
Working with Tones.....	3
Tone List.....	7
Options.....	8

# Introduction

Thank you for using Tone Generator. Tone Generator lets you create audio test tones, sweeps or noise waveforms using your computer or a PDA handheld.

## Typical Applications

- Generation of test tones in radio and other studios for the alignment of levels
- Calibration and testing of audio equipment or speakers
- As an accurate reference tone for tuning music instruments
- Demonstration of audio principles to students
- Acoustics testing and equalization
- Quality control and testing of sound cards
- White noise generator
- Audio band signaling
- Hearing tests (under suitable medical supervision)

## Features

- Sine wave, square wave, triangular waveform, saw tooth waveform, impulse, white noise, pink noise, brown noise, blue noise, violet noise, and grey noise.
- Supports frequencies from 1Hz to 22kHz bandwidth (subject to sound card)
- Multiple simultaneous tones (1 to 16 tones can be created at the same time). Useful for creating harmonics
- Mono or separate stereo operation (ideal to create dual tones or 'beats')
- Tone Sweeps (Log or Linear)
- Plays tone or saves as .wav file

## Related Audio Software

NCH Software develops many other audio software applications. If Tone Generator is not exactly what you are looking for, please visit [our software page](#) to download many other programs.

# Working with Tones

NCH Tone Generator allows you to create, save and play tones.

A tone can be as simple as a sine wave of a given frequency. It can also be as complex as a stereophonic tone, where each channel consists of a number of simultaneous tones of different frequency settings. Attributes of tones can be changed either via the Tone menu.

Tones can be saved as either a wave file (.wav) or a tone file (.tdf). Note that tones of unspecified durations, or to be played repeatedly, cannot be saved in wave format.

## Step 1. Select the Tone using the Tone menu

-Number of Tones

-

NCH Tone Generator can create up to 16 simultaneous tones. This can be useful for creating harmonics or beats.

Select the number of tones using the "Number of Tones" item of the Tone menu. The default number of tones is 1.

-Constant (Continuous)

-

If you select a "Constant (Continuous)" tone, it does not have a limited duration and will play forever.

-Constant (Specified Duration)

-

Selecting this option means that the tone is constant (does not change frequency), but will only play for a specified duration. The duration is specified in the Tone Details List (see below).

-Sweep (Linear)

-

If you select this option, you will be able to specify the start and end frequency of each tone. The time-frequency movement is linear (e.g., 100Hz per second).

-Sweep (Log)

-

This is also a tone sweep, but the time-frequency movement is exponential (e.g., 1 octave per second).

-Mono / Stereo

-

By default, NCH Tone Generator creates a mono tone. If you select stereo, different tones can be created in the left and right speakers. This can be useful to create 'beats'.

#### -Sine Waveform

-

The Sine/Cosine waveform is the most pure waveform because it contains no harmonics. It is recommended for level calibration (because it is not affected by frequency response).

#### -Square Waveform

-

The square waveform sounds harsh because it contains many higher order odd harmonics. It can be useful when the waveform is viewed after being processed.

#### -Triangular Waveform

-

The triangular waveform is composed by the fundamental and its odd harmonics, which roll off much faster than in the case of the square wave.

#### -Sawtooth Waveform

-

The sawtooth waveform contains a blend of both odd and even harmonics. Sawtooth waves often form the basis for virtual music synthesizers.

#### -Impulse Waveform

-

This waveform can be useful when analyzing the impulse response function of an audio process.

#### -White Noise

-

White noise is the noise created by a random signal. It sounds like an un-tuned television set. It is useful for testing the frequency response of a room or audio process.

White noise has more energy in the higher frequency bands, therefore it sounds brighter than pink noise (see below). Noise does not have a frequency.

#### -Pink Noise

-

Pink noise is similar to white noise except that it has an equal amount of energy in each octave (down to 20Hz). This can be more useful than white noise when analyzing the signal on an octave scale.

Because pink noise has more bass energy than white noise, it sounds muffled.

-Brown Noise

-

Brown noise is very similar to pink noise except that it has a spectrum that falls off at 6 dB per octave, whereas pink noise is 3 dB per octave. This results in a very similar noise with a lower tone.

-Blue Noise

-

Blue noise emphasizes higher frequency components, increasing in strength by 3 dB per octave.

-Violet Noise

-

Violet noise is just like blue noise with an increase of 6 dB per octave yielding noise of a higher tone.

-Grey Noise

-

Grey noise has a power spectrum that is designed to align with the human psychoacoustic equal loudness contour, such that the noise sounds equally loud at all frequencies.

## Step 2. Set the Tone Details (Frequencies / Duration/ Amplitude)

The details of a tone (each frequency and duration) are displayed and edited using the Tone Data list on the main window of NCH Tone Generator. To edit the value of an item, select it and tap the Edit button in toolbar.

-Frequency

-

This is the frequency of the tone in Hz. This can be between 1Hz and 22000Hz (if supported by your sound card).

For musicians, the reference "concert" is 440Hz.

You can increment or decrement by a frequency of your choice in the Tone Interval section of the Options dialog.

The Note Selector allows you to quickly choose the exact musical note you want. Expand or collapse the Note Selector by tapping on its title. It will only expand when it makes sense for it to be used. For example, White Noise does not have a frequency, and so the Note Selector is disabled when White Noise is selected.

The Note Selector consists of a table of note buttons, ranging from C0 to B8, and a frequency slider. Tapping a note button will change the selected frequency to the frequency of that note. Some notes of interest are:

- Concert A:
- A4
- Middle C:
- C4
- Lowest note on most pianos:
- A0
- Highest note on most pianos:
- C8
- Notes of the strings on a standard-tuned guitar (lowest to highest):
- E2, A2, D3, G3, B3, E4

At the bottom of the Note Selector is the Frequency Slider. Tap and drag the red bar on the Frequency Slider to adjust the current frequency.

- Duration

-

Unless you have selected the "Constant (Continuous)" tone, the duration of play can also be specified in ms (milliseconds).

- Variable Amplitudes

-

When the Variable Amplitudes menu item has been enabled from the Tone menu, you may enter relative amplitudes for all the tones in your list. The amplitude can be entered for each separate tone in decibels in the range from 0 dB (full volume) to -127 dB.

### Step 3. Play the Tone

To start the tone, press the Play button on the Tone Generator toolbar. To stop, press it again.

You can set the NCH Tone Generator software to automatically start tone playback whenever it runs by ticking the "Automatically start tone playback when Tone Generator runs"

# Tone List

You can also create a list of tones with which a sequence of tones can be played one after another.

A list can be created by selecting New List in the File menu.

A tone list accepts tone files (.tdf), wave files (.wav), other tone lists (.tdl), or silences of specific durations as its components. To add a tone or a sequence of tones to the tone list, tap the Add Tone button in the Tone List dialog. Only tones of finite duration can be added to a list. To add a session of silence, tap the Add Silence button and specify the duration of the silence in milliseconds.

A component in a tone list can be removed from the list by selecting the component and tapping the Remove button.

Upon tapping the OK button in the Tone List dialog, if the list contains unsaved modifications the modified list is saved to a temporary list, and this temporary tone list is loaded in the main dialog as an unsaved list.

# Options

The Options dialog can be brought up by selecting Options in the File menu.

## General

Automatically start tone playback when Tone Generator runs

Check it if you want Tone Generator to play the last tone loaded from the previous run.

## Sample Rate

The sample rate of the tone which you can choose from the drop-down list.

## Tone Interval

From the Tone Interval section you can specify the step the frequency of the tone should increase or decrease when you chose to increase/decrease from either the menu or the small toolbar, or when you press +/- on your keyboard. The step can be specified in Hz or in integer multiples of semitones (up to 12 semitones per step).