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## **Release Notes**

**08/06/2010 Version 3.1**

**Analyzer2Go** is a program running on Symbian S60 5th generation smart phones like NOKIA 5800 XpressMusic (complete list see next chapter).

It contains three modes to analyze audio captured by the microphone:

- Oscilloscope with adjustable trigger level
- FFT spectrum analyzer including sonagram display
- Guitar tuner with included high precision frequency estimation

All modes can be used with both display orientations.

## **Supported devices**

S60 5th Edition (Version 3.0), using Symbian OS Version 9.4, also known as "Symbian^2"

(Touch screen mobiles with a screen resolution of 640x360 pixels)

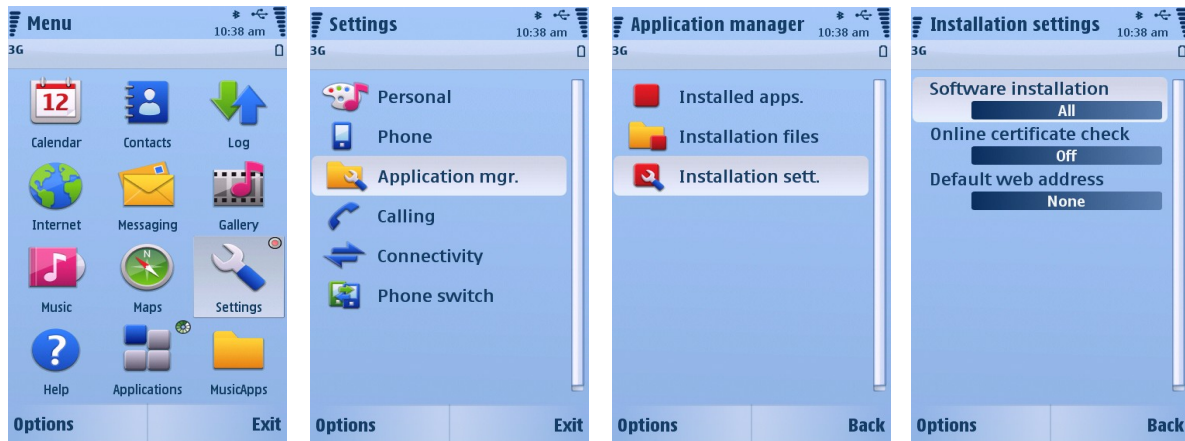
- Nokia 5530 XpressMusic, Nokia 5230 XpressMusic, Nokia 5800 XpressMusic
- Nokia N97, Nokia N97 mini
- Nokia X6
- Samsung i8910 HD[5]
- Sony Ericsson Satio (Idou)
- Sony Ericsson Vivaz (pro)

## **Installation**

Step1: In your Application manager, set "Software installation" to "All"

Example using an English NOKIA 5800XM:

(after installation this setting can be switched back to "signed only")



At PC side NOKIA Suite or NOKIA Ovi Suite must be installed (use CD from shipping package or download from [www.nokia.com](http://www.nokia.com))


Step 2: Connect phone to PC using the USB cable (or Bluetooth)

Step 3: At the phone, select "PC Suite"

Step 4: Wait a few seconds until all drivers have been loaded

Step 5: Double click the sixx-file

Step 6: Confirm all (3 or 4) messages popping up

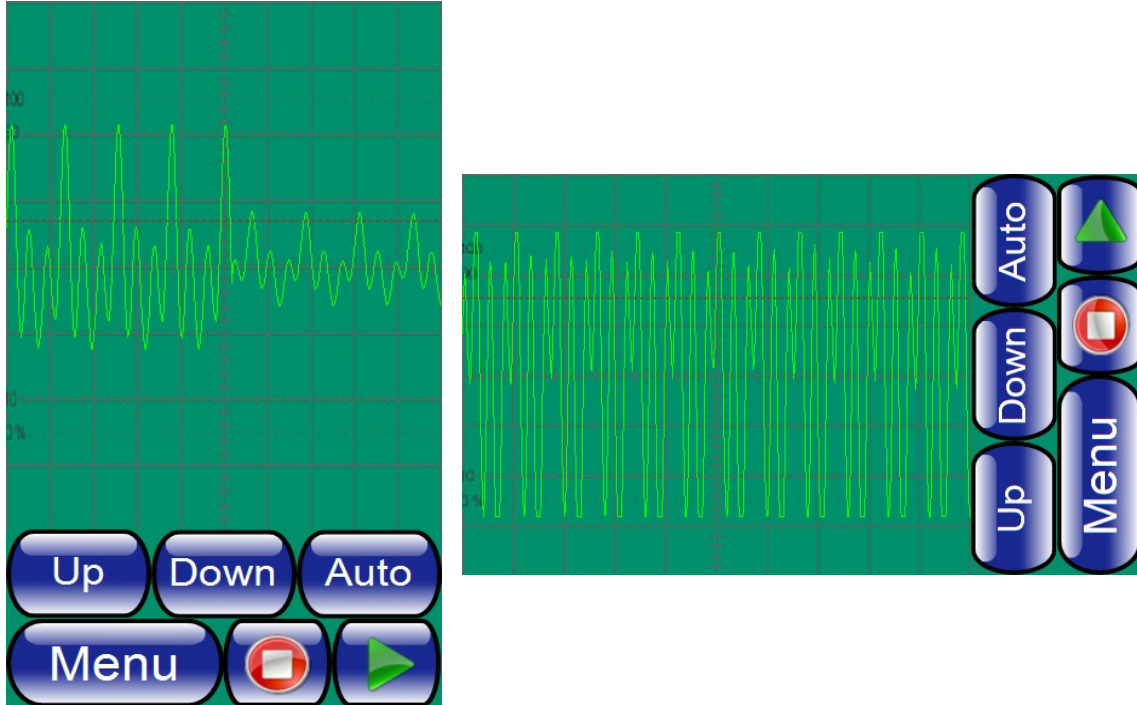
**AnalyzerToGo**  is located by default in the Applications Folder at the last position, so normally you have to scroll down.

## Specification

Frequency Range	10 Hz to 8000 Hz (sampling rate 16 kHz)
Sound feed	using the internal microphone or a sound source (like an E-Guitar) connected to the headset connector.
Display orientation	portrait and landscape (autodetect) depending on smart phone and firmware release
Operation Modes	FFT Analyzer : Spectrum and Sonagram Oscilloscope : Waveform (Time Domain) Guitar Tuner : including frequency and level display
FFT Analyzer Spec	X-Axis : 0 .. 7.2 kHz Y-Axis : 0 .. -80 dBfs Traces: Write, Peakhold, Reference Trigger : Auto/Stop Cursor : Level Riding, Peak Tracking Sonagram : Color Map Rainbow, History typically 5 seconds
Oscilloscope Spec	Timebases : 3 ms/div, 2ms/div (depending on display orientation) Gain : x1, x2, x4, x8, x16, x32 ... x1024 Auto-Scale Trigger : Norm/Stop Trigger slope : positive Trigger level : full Y axis
Guitar Tuner Modes	chromatic (finding all notes)  FFT (standard, resolution 0.25 Hz) ACF (enhanced precision for bass strings)
Guitar Tuner and Frequency Estimation Uncertainty	Bass B string (30.87 Hz), ACF mode : < 5 cent Guitar E string (329 Hz), FFT mode : < 2 cent
Tuning	430 Hz to 450 Hz for A

# Operation

## Oscilloscope



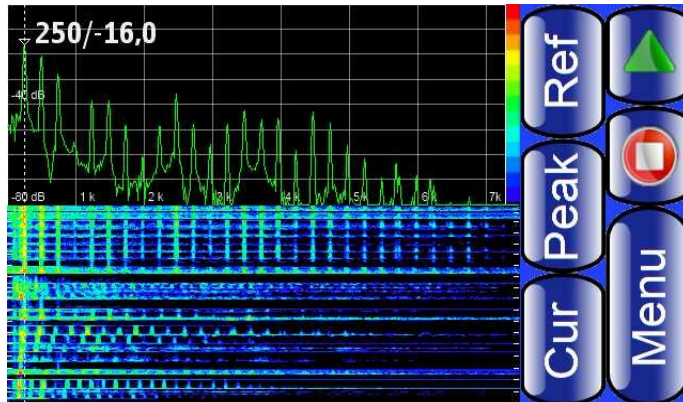
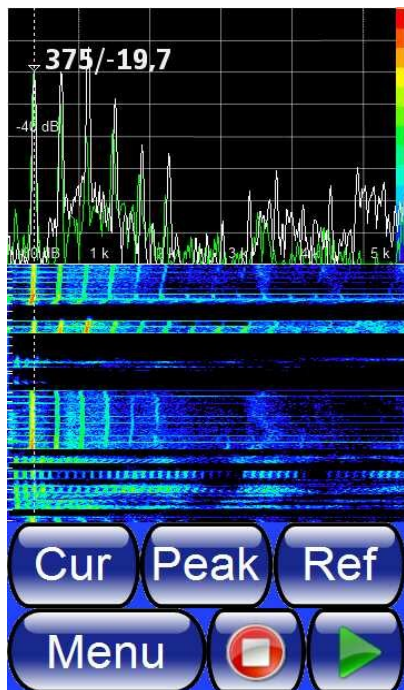
The following operations are supported:

<Up> and <Down> : change gain

<Auto> : set gain to optimal value

<Touch other positions> : move trigger level

## FFT Analyzer

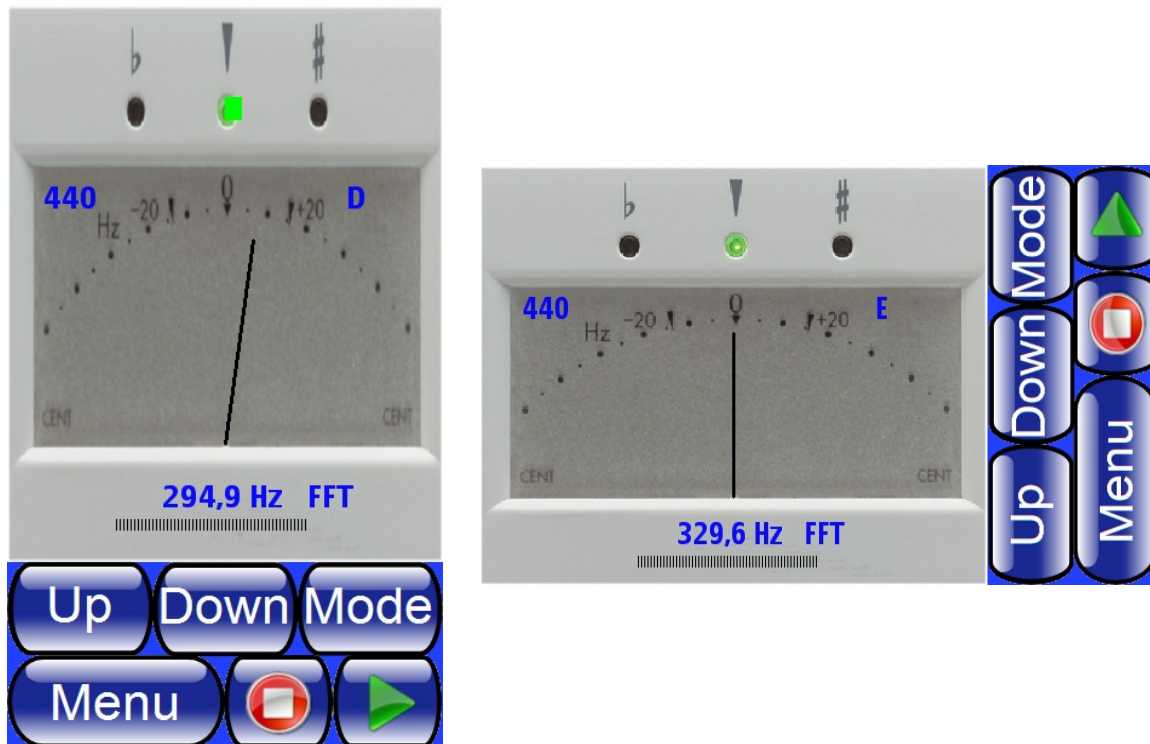


The upper half shows the instantaneous spectrum of the audio signal. This trace is coded with every new sweep into colors using the rainbow map at the right border. High levels are shown in red, low levels in blue. This results in a sonagram sometimes also called waterfall display.

The following keys are supported:

- <Cur>** : toggle marker between off, on, peak track
- <Peak>** : toggle peak hold trace (light blue) between off, peak and aging
- <Ref>** : activate reference trace (white)
- <Touch other positions>** : move marker

## Guitar Tuner



Like a standalone instrument tuner it is able to analyze a tone of a guitar (or nearly every other instrument) and show the note and the mistuning using a pointer and bar display. In addition (which not standard for other tuners) this software shows the input level.

## Specifications

The operation is quite easy and intuitive and well known from other instrument tuners. The guitar tuner is chromatic which means that not only the six guitar strings are detected but all other notes from the deepest bass up to the highest piano key.

(In addition also non musical tones can be analyzed for examples mechanical vibrations of engines)

The display depends on the orientation, which is detected automatically.

Below is the tuning display where green means well tuned and red mistuned.

The graphics display shows the tuning reference (normally 440 Hz), which be changed by pressing the keys **<Up>** and **<Down>**. Please be aware, that tuning will always start at 440 Hz after restarting the program.

At the right side you will find the detected note. Due to the harmonics characteristic of a swinging guitar (3rd and 5th order) string sometimes this display is not perfectly stable, but the right note is always dominant.

The pointer shows the current tuning like the bar graph above but analogue.

The two lowest lines are not really important for the tuning but are nice additional info:

- frequency
- tuning mode (FFT = fast fourier transformation, ACF = autocorrelation function)
- driving (if the driving is too low, "No signal" is displayed, if it's too high, "overdriven")

The standard tuning mode is "FFT" which means, that the spectrum is searched for the highest peak and some smart post processing is performed in order to find the right tone with the best possible accuracy.

Due to the fact that sampling time is limited, the standard mode is ok for all six strings of a standard guitar but turns a little bit rough for bass guitars or other sound sources emitting frequencies of 100 Hz and below.

In this case use the key **<Mode>** to switch to ACF mode (**<Mode>** switches back to FFT)

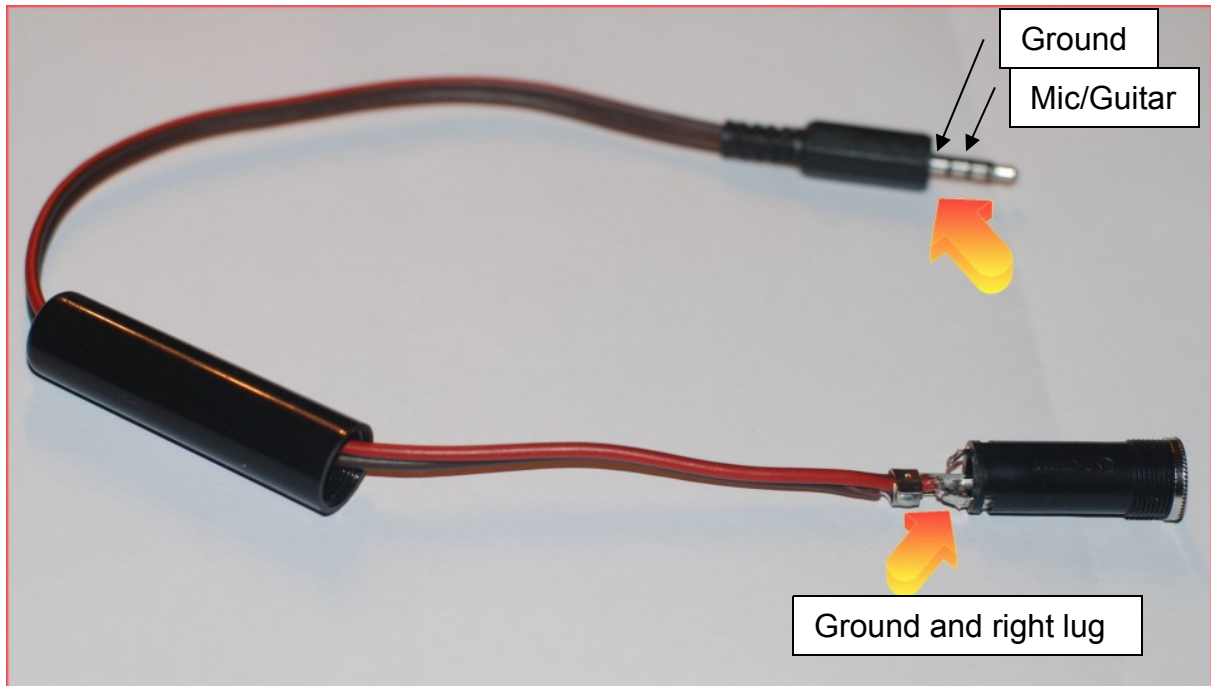
**Happy Tuning !**

## How to connect an electric guitar

(First of all, you can tune your E-Guitar over the air – try it, often this works!)

The only thing you have to do is to manufacture a simple adapter cable from the 6.3 mm connector for the guitar to the connector equivalent to your headset (3.5 or 2.5 mm depending on model)

Buy the two plugs and a short two-wire-cable. Solder the connections shown in following figure:



When connecting to the phone, select “Headset” from the menu.

## Calibration of GuitarTuner

GuitarTuner is high-precision analyzer due to its dsp based algorithm. But it may be the case for some smart phone models that the sampling clock of the internal ADC is not exactly 4 kHz which is expected. This synthesis error is caused by a limited register length of the fractional divider which is used in a PLL to divide the crystal clock down to the sampling clock.

Most smart phones (like the N95) have a very precise clock rate, so no calibration is needed at all. Others (like the E71) may have a small error of 3-4 cent). This is not really much and not a problem when you’re playing alone but may be a problem when playing in a group.

To calibrate, generate a tone with a tuning fork, another guitar tuner, a tuned string or a PC software like Analyzer2000 which can be downloaded from [www.brownbear.de](http://www.brownbear.de).

Use **<Up>** and **<Down>** to change the reference until the pointer is in the middle – now, it’s calibrated!