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Release Notes

29. March 2010 Version 2.0

Analyzer2Go is a program running on Symbian S60 3rd generation smart phones like NOKIA N95 (complete list see at the bottom of the page). It contains several 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
- CW decoder with envelope and ticker display

All modes can be used with both display orientations.

Supported devices

S60 3rd Edition (Version 3.0), using Symbian OS Version 9.1

- Nokia 3250
- Nokia 5500
- Nokia E50
- Nokia E60
- Nokia E61
- Nokia E61i
- Nokia E62
- Nokia E65
- Nokia E70
- Nokia N71
- Nokia N73
- Nokia N75
- Nokia N77
- Nokia N80
- Nokia N80 Internet Edition
- Nokia N91
- Nokia N92
- Nokia N93
- Nokia N93i

S60 3rd Edition, Feature Pack 1 (Version 3.1), using Symbian OS Version 9.2

- LG KS10 "JoY"
- Nokia 5700 XpressMusic
- Nokia 6110 Navigator
- Nokia 6120 classic
- Nokia 6121 classic
- Nokia 6124 classic
- Nokia 6290
- Nokia E51
- Nokia E63
- Nokia E66
- Nokia E71
- Nokia E90 Communicator
- Nokia N81
- Nokia N81 8GB
- Nokia N82
- Nokia N76
- Nokia N95
- Nokia N95 8GB
- Samsung SGH-G810
- Samsung SGH-i520
- Samsung SGH-i450
- Samsung SGH-i550
- Samsung SGH-i560

S60 3rd Edition, Feature Pack 2 (Version 3.2), using Symbian OS Version 9.3

- LG KT770
- Nokia 5320 XpressMusic
- Nokia 5630 XpressMusic
- Nokia 6220 classic
- Nokia 6210 Navigator
- Nokia 6650 (t-mobile)
- Nokia 6720 classic
- Nokia 6710 Navigator
- Nokia E55
- Nokia E75
- Nokia N78
- Nokia N79
- Nokia N85
- Nokia N86 8MP
- Nokia N96
- Samsung i8510 Innov8

Installation

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

Example using an English NOKIA N95:



(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)


Step 2: Connect phone to PC using the USB cable

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

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

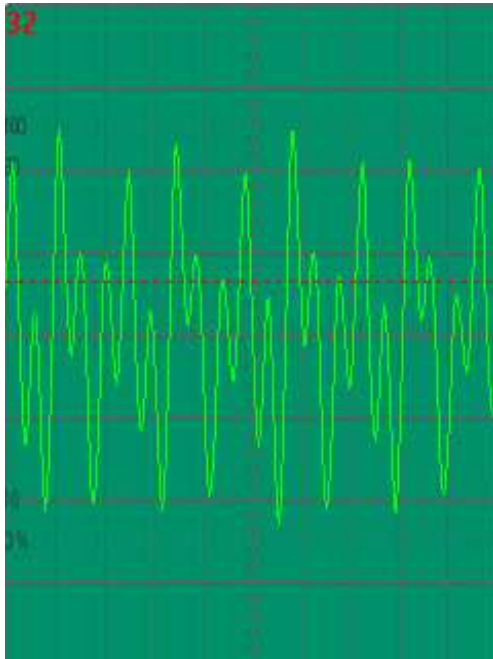
Step 5: Double click the six-file

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.

Operation

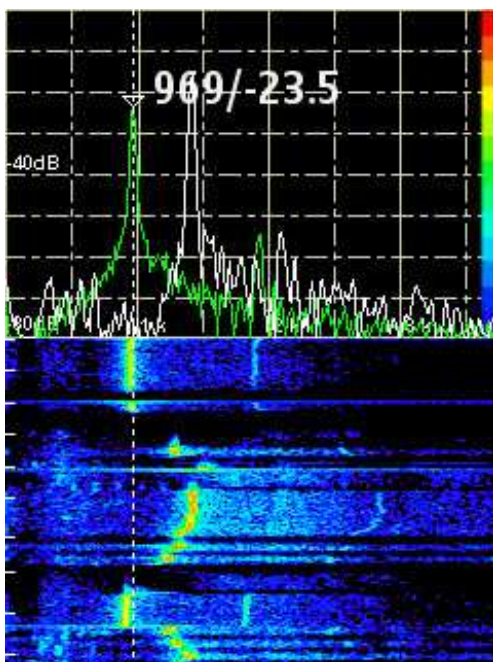
Oscilloscope



The following keys are supported:

- <Cursor Up>** and **<Cursor Down>** : change gain
- <Cursor Left>** and **<Cursor Right>** : move trigger level
- <Enter>** : run/stop

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:

<1> : toggle marker

<2> : toggle peak hold trace (light blue) between off, peak and aging

<3> : activate reference trace (white)

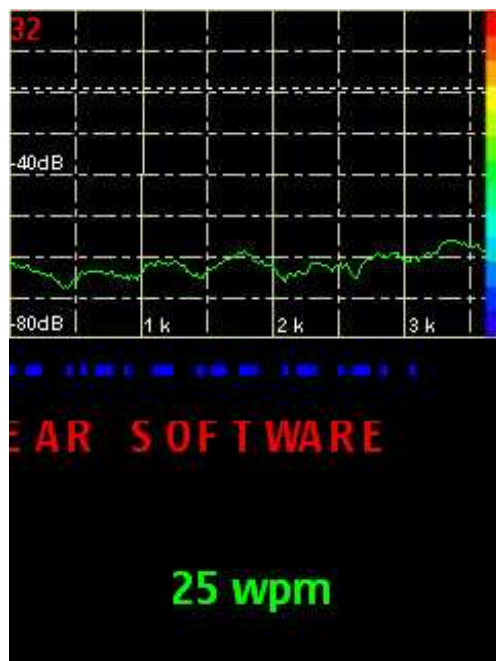
<Cursor Down> : change gain

<Cursor Left> and <Cursor Right> : move marker (fine)

<Cursor Up> and <Cursor Down> : move marker (coarse)

<Enter> : run/stop

CW Decoder



The upper half shows the envelope of the audio signal. Symbols are generated using the threshold (white dotted line), which are shown the blue line below the envelope. These symbols (dih and dah) are then decoded using the famous morse code/alphabet. The text is displayed in red scrolling like a stock market ticker.

The following keys are supported:

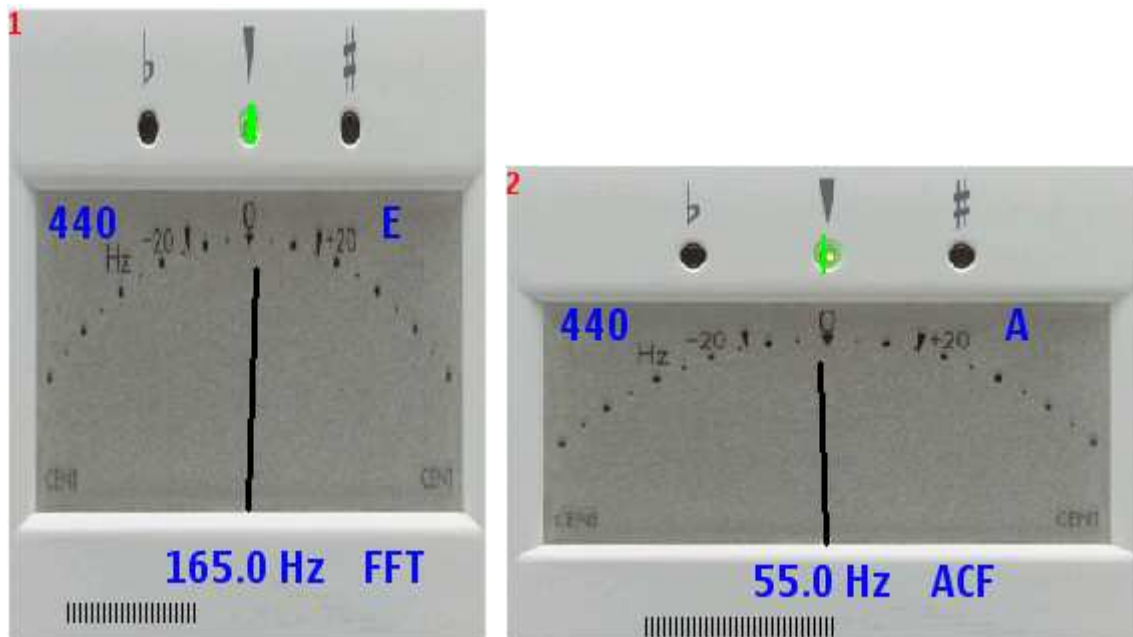
<1> : lock speed estimation

<Cursor Down> and <Cursor Up>: change threshold

<Enter> : run/stop

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

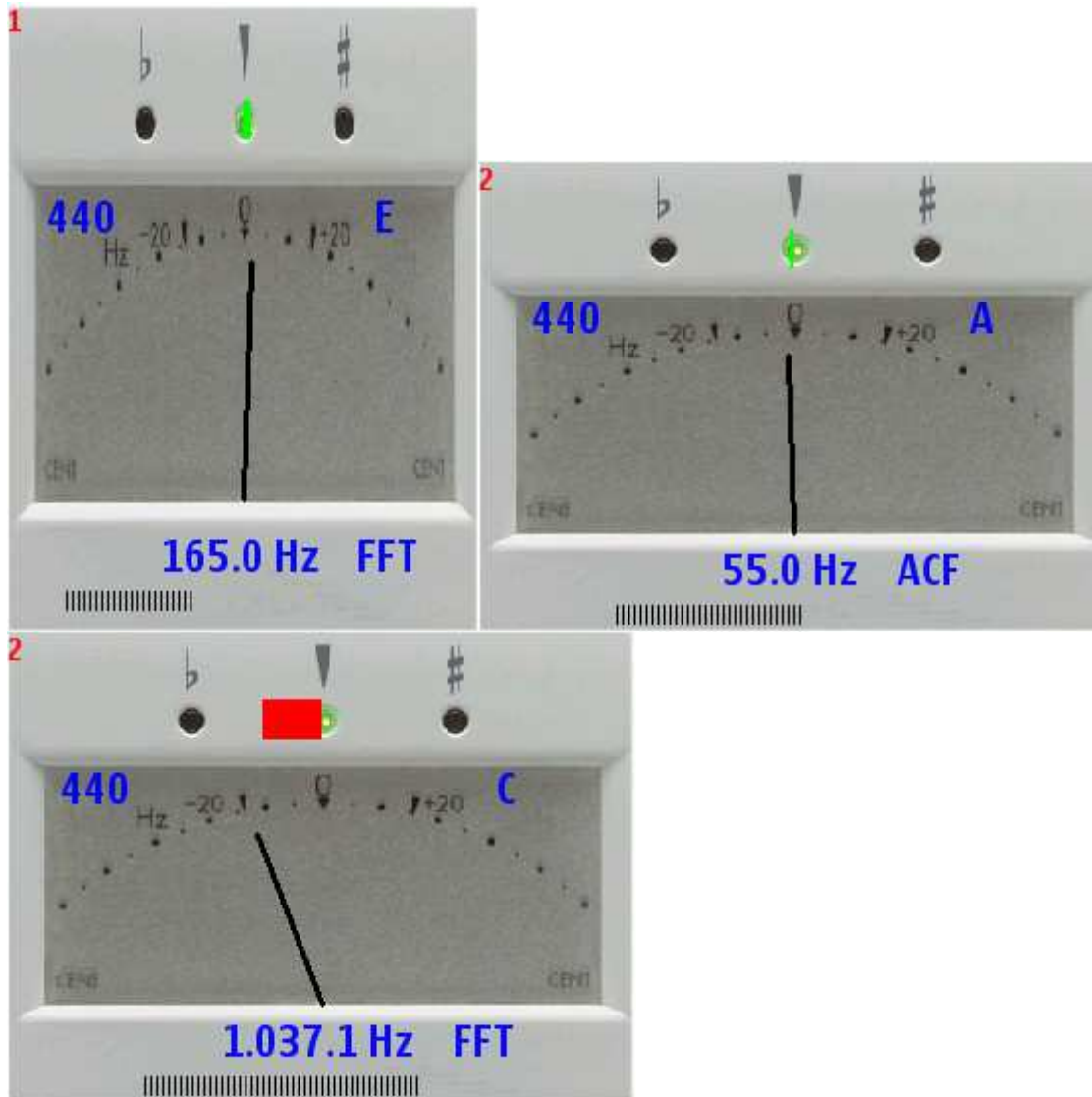
Frequency Range	10 Hz to 3500 Hz (depending on smart phone)
Tuning Modes	chromatic (finding all notes) FFT (standard, resolution 0.25 Hz) ACF (enhanced precision for bass strings)
Uncertainty	Bass B string (30.87 Hz), ACF mode : < 5 cent Guitar E string (329 Hz), FFT mode : < 2 cent these values refer to a calibrated tuner, see last chapter
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
Tuning	430 Hz to 450 Hz for A
Included help	YES

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 :



With the **left softkey**, you can display some help or info about the program. Pressing the **right softkey** will terminate the program.

At the left upper corner is the display refresh rate which should be 1 or 2.

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

The graphics display shows the tuning reference (normally 440 Hz), which can be changed by pressing the keys <1> and <2>. 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 <5> to switch to ACF mode (<4> 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.

Use <1> and <2> to change the reference until the pointer is in the middle – now, it’s calibrated!