WithStrings AudioGenerator Manual

1. Description

AudioGenerator streams data to the audio output (music stream) of an Android
device using the user selected function, frequency, and amplitude. Waveforms
available are sine, square, and noise. Frequency is selected by buttons arranged
in two rows. The top row permits digital entry of the frequency. The bottom row
permits entry by musical note names and octaves. Audio output amplitude can be
adjusted from 0-100% with the amplitude slider. A numeric readout shows frequency,
period, and nearest musical note (based on A=440Hz) for sine and square signals
(noise contains an assortment of frequencies). Figure 1 shows the controls and
readouts.

Warning. It can be loud.

Digital Select

Pitch Select

Function Select

Numeric Readout

Amplitude Adjust

On/Off Button

Figure 1. AudioGenerator User Interface

2. Operation

Launch the AudioGenerator application. The initial settings are for a sine wave at 440Hz with a 50% amplitude. The On/Off button can be pressed and a 440Hz tone will be generated. Pressing the On/Off button again will stop the output. Playing or paused, any button can be pressed to change the frequency, waveform, or amplitude.   There are two rows that allow frequency selection: the top row allows selection by a numeric frequency. The resolution of this row is 0.1 Hz. The lower rows selects musical pitch by Octave (1-8) and Note (A-G#). These rows do not interact. Row selection is done by the first key press on a given row. The direction button is valid for both rows and permits either incrementing or decrementing the value on a given button. Note that audio outputs are AC coupled. The output creates a network with external devices such as ear-buds or amplifiers. The interaction with the devices and internal coupling is evident when a square wave is selected. There are several oscilloscope images in section four that show the square wave output at various frequencies. The test setup is shown as well.

3. Characteristics (device dependent)

Operating System: Android: Minimum API 22
Permissions: None
Audio Output Rate: Varies with frequency
Audio Mode: Monophonic
Frequency Resolution: 0.1 Hz
Output Amplitude: (Amplitude slider 100%) 150mv pp (frequency dependent)
     These are device and terminating circuit dependent.
Settings:
     Frequency: 20Hz to 20KHz (Square wave to 4Khz)
     Functions: Sine, Square, Nose
     Amplitude: 0 to 100% on Music Stream
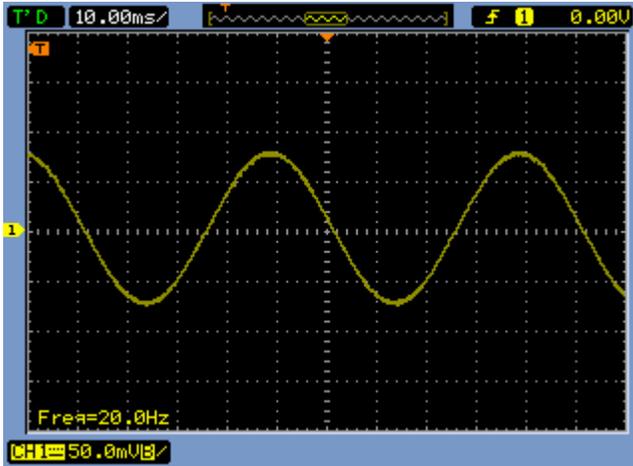   Play/Pause
Note Display Range: C = 16.4Hz to B = 7902Hz
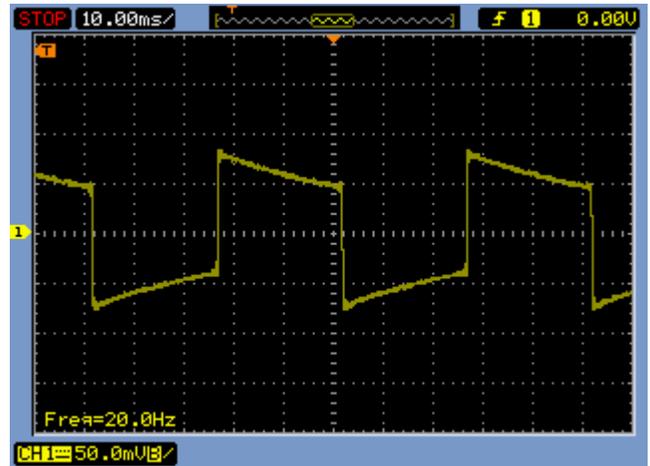Devices Tested: Samsung S7, Samsung S6, Google Nexus 7 (2013)
Identity: $\sin(u)\sin(v) = 1/2[\sin(u-v) + \sin(u+v)]$
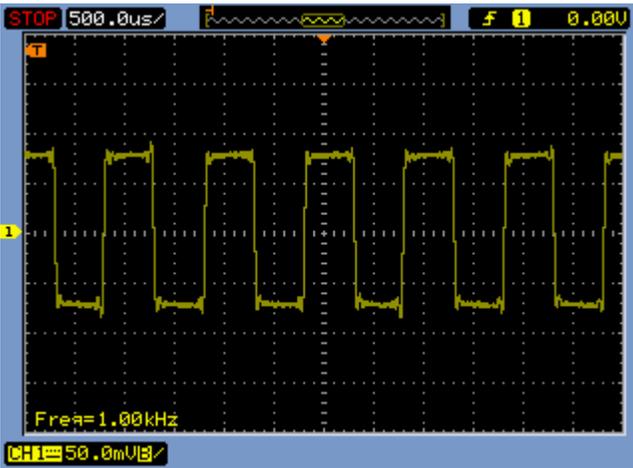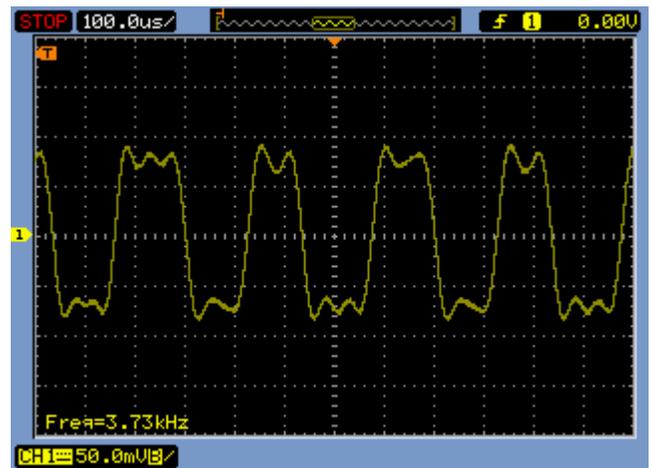Graphics Design: N. Dynamite

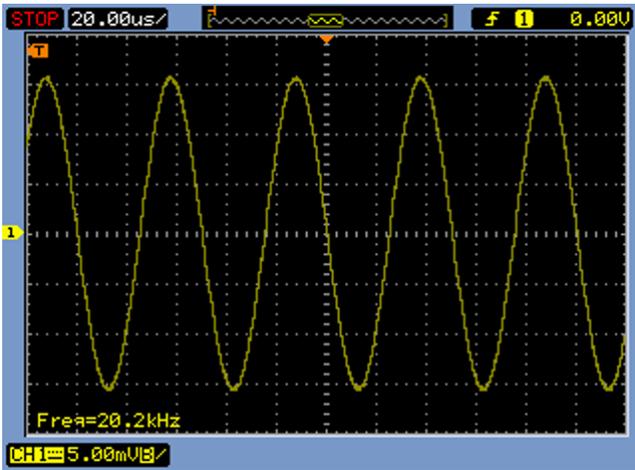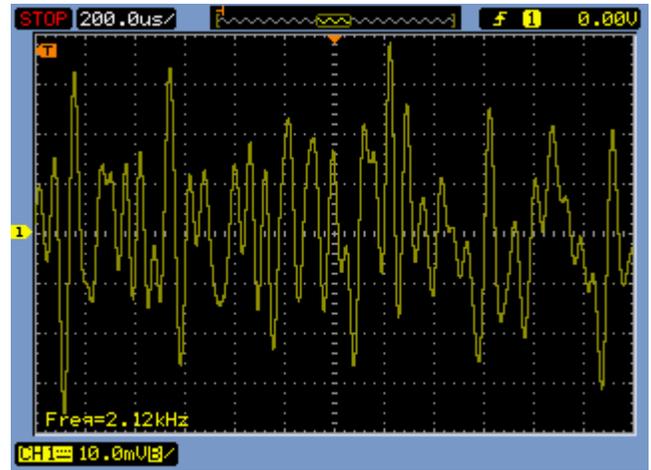## 4. Waveforms and Test Setup

Sine Wave 20Hz
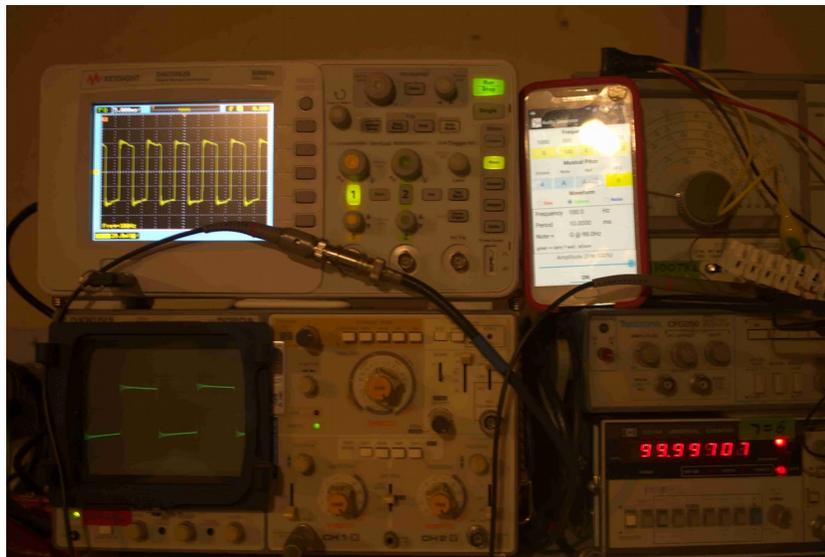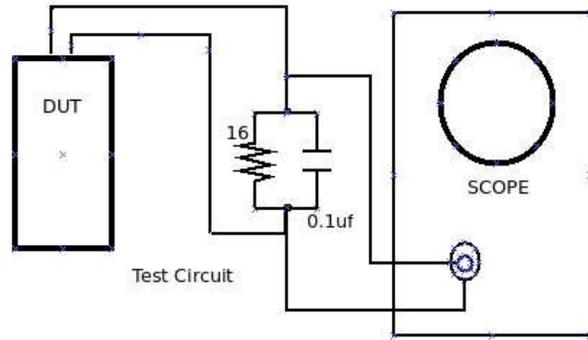

Square Wave 20Hz

Square Wave 1000Hz

Square Wave 3.73KHz

Sine 20KHz

Noise

Test Circuit

Test Setup