

## Material:

Item Code	Qty	Description
DE751-3A	1	Oscilloscope, two-channel, 30 MHz, with VGA
DG500-4A	1	BNC to 4-mm socket adapter
P3120-1G	1	Function generator with digital display "inno"
P3120-1B	1	Rechargeable battery, "inno", 6V/10 Ah
P3120-4A	1	L-shaped assembly platform
DS085-1R	1	Round base with stand tube, uni
MB240-1LS	1	MBC Loudspeaker with nose
DS617-1H	1	Holder for MBCs "compact"
	4	Connecting lead

## Additionally recommended:

- 1 VGA – Connecting cable
- 1 TV or data projector

## Goal:

Which frequencies are audible to us humans?

## Setup:

- The BNC junction is plugged into the socket of channel 1 of the oscilloscope.
- The "inno" function generator is plugged together with the battery and this unit is attached to the installation plate.
- The loudspeaker is fixed in the round base with the holder.
- The loudspeaker is connected to the function generator with two cables.
- With two more cables we connect the loudspeaker and the oscilloscope.
- Settings on the function generator:

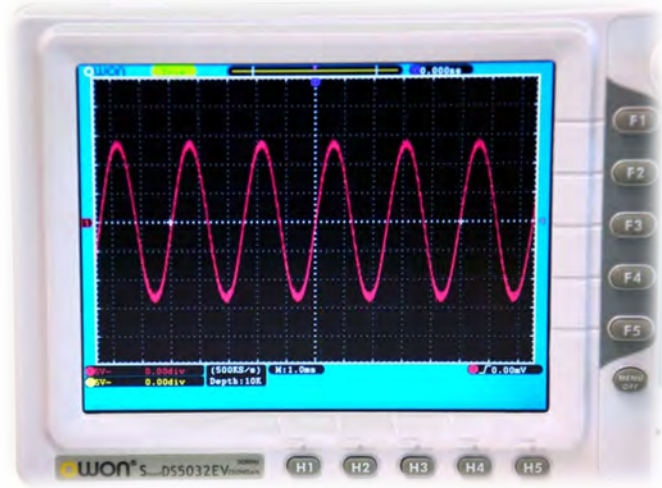
Frequency fine:	very low (left)
Frequency rough:	100 Hz
Waveform:	Sine
Amplitude:	maximum (right)

## Experiment 1:

We switch on the oscilloscope and the function generator. The measuring range of the oscilloscope is 1 V, 1 ms.

Starting with a frequency of 10 Hz, we slowly increase it while observing the screen. At what frequency does a sound become audible?

We increase the frequency further, but decrease the amplitude (volume), because otherwise the sound becomes unnecessarily loud. Up to what frequency can we still hear the sound?



## Result:

The oscilloscope makes the oscillations generated by the function generator visible. By continuously changing the frequency, the individual hearing range can be approximately determined.

The following can be assumed as guide values:

Lower hearing limit: 15 - 20 Hz  
Upper hearing limit: 16 - 18 kHz (age-dependent)

Animals: Dog up to about 40 kHz  
Bats - orientation - up to about 200 kHz

## Note:

If the specified reference values are not exactly achieved, it is because both the function generator and the loudspeaker are not devices that have been optimized for this experiment. The theoretical values can be better achieved with professional devices.