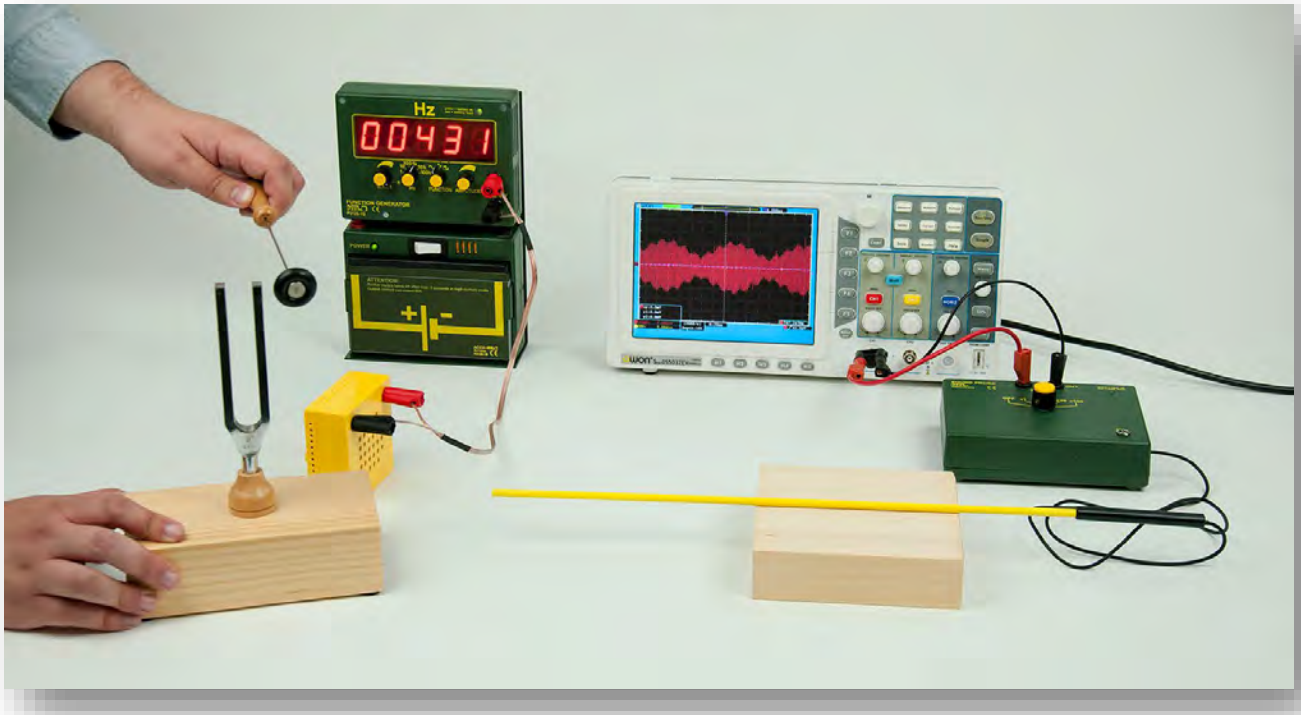
INTERFERENCE – BEAT - II

AKD 06.04



Material:

Item Code	Qty	Description
DE751-3A	1	Oscilloscope, two-channel, 30 MHz, with VGA
DG500-4A	1	BNC to 4-mm socket adapter
DW340-2M	1	Measuring microphone "inno"
DW100-1A	1	Tuning fork, 440 Hz, with resonance box
DW110-1A	1	Tuning fork mallet
P3120-4A	1	L-shaped assembly platform
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
MB240-1LS	1	MBC Loudspeaker with nose
DG520-1C	1	Connecting lead, double, 50 cm
	2	Connecting Lead

Additionally recommended:

1	VGA – Connecting cable
1	TV or data projector

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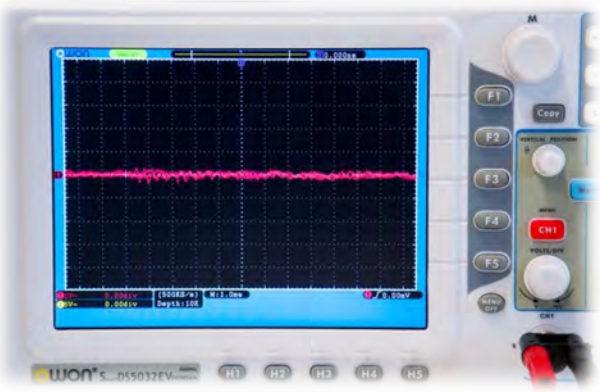
Goal:

What happens when two tones with slightly different frequencies are mixed?

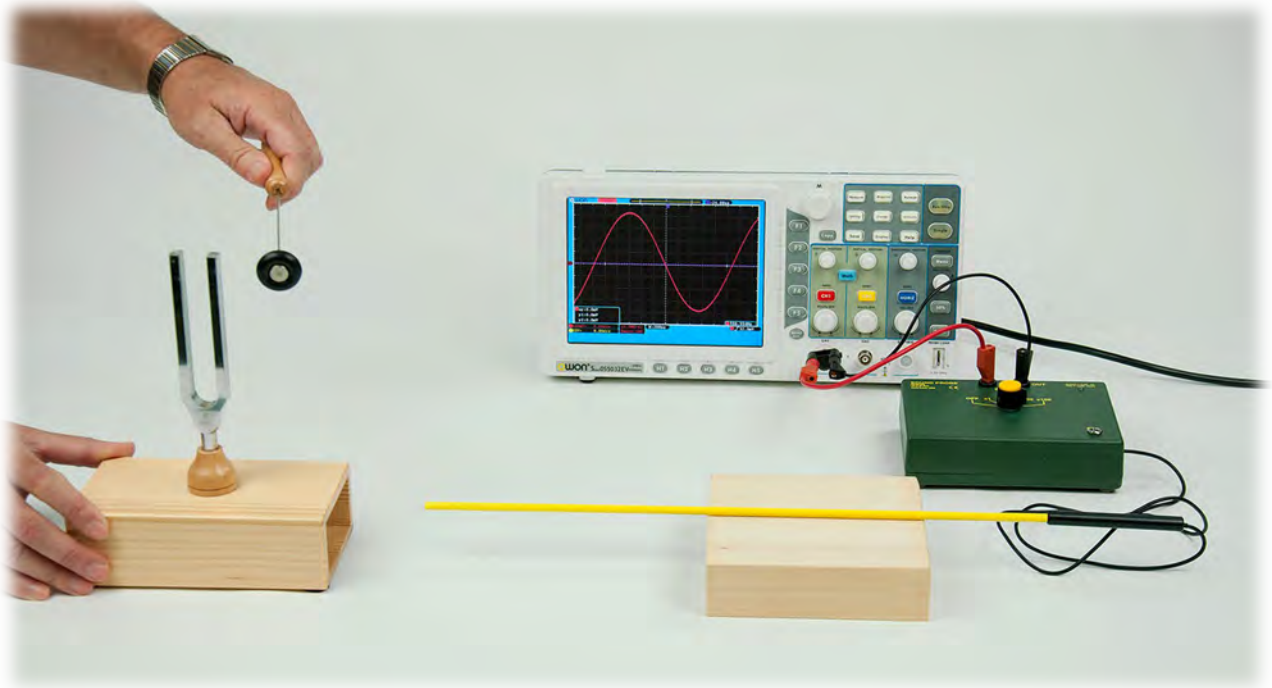
Setup:

The BNC junction is plugged into the socket of channel 1 of the oscilloscope.
The amplifier of the measuring microphone is connected to the oscilloscope with two cables.



Experiment 1:

We switch on the oscilloscope.
We switch the microphone amplifier to "10 x".
The measuring microphone is positioned at a distance of about 10 cm in front of the opening of the resonance box.
The tuning fork is struck while watching the oscilloscope screen.



Result:

With optimal settings on the oscilloscope, we get a nice sine wave. We pay special attention to the height of the waves.

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Setup 2:

- The "inno" function generator is plugged together with the battery and this unit is attached to the assembly platform.
- The loudspeaker is connected to the function generator with two cables and placed next to the resonance box of the tuning fork.
- Settings on the function generator:

Frequency fine:	very low (left)
Frequency rough:	1000 Hz
Waveform:	Sine
Amplitude:	very low (left)

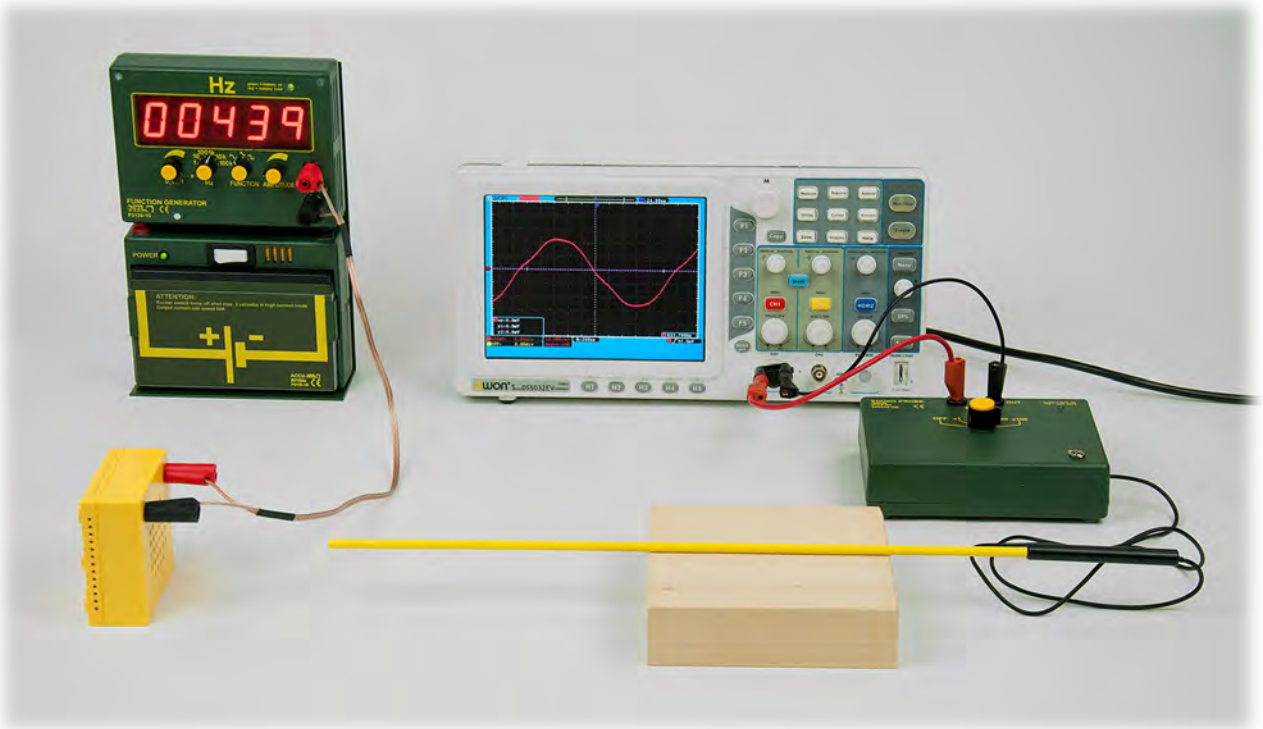
Experiment 2:

The function generator is switched on and the frequency is set to 430 Hz.
The volume is adjusted so that it corresponds approximately to the volume of the tuning fork.

The tones (or the waves on the display) of the tuning fork and the loudspeaker are compared.

Result:

The wavelength of the sound from the loudspeaker should be slightly longer.



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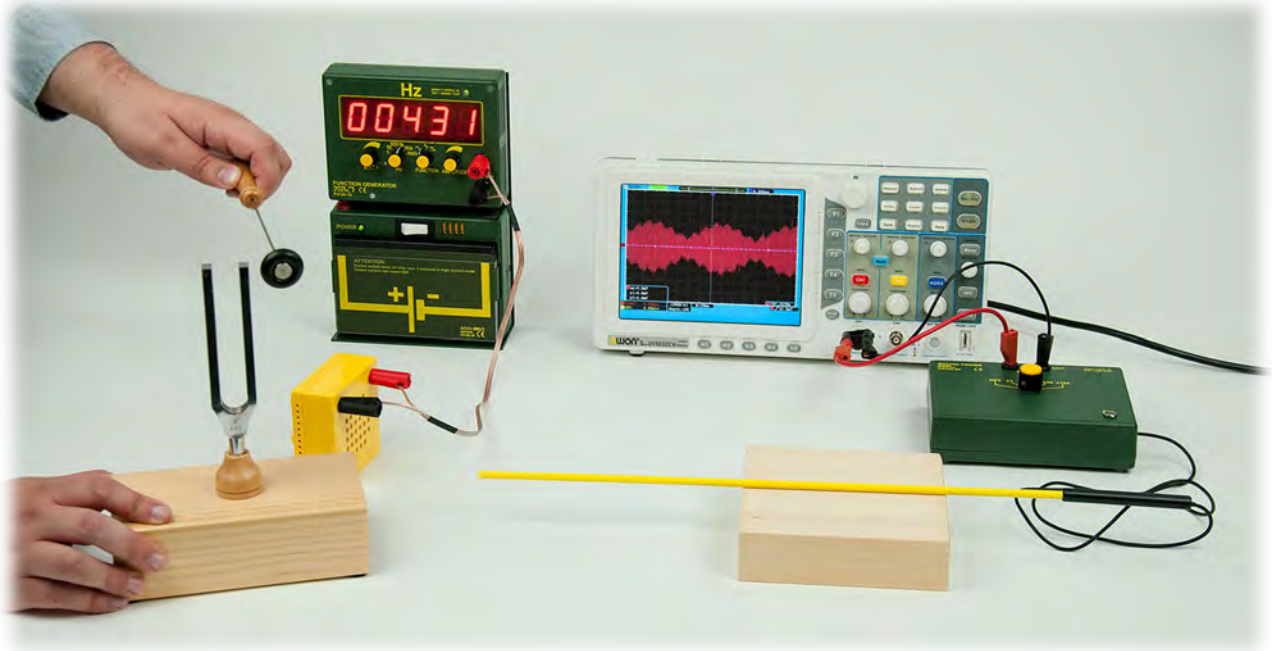
Experiment 3:

We change the settings on the oscillator by increasing the time base.
While a signal of 430 Hz is emitted via the function generator and loudspeaker, the tuning fork is struck.



Result:
The overlapping of the two signals leads to intensity variations in volume - a beat.
The frequency of the intensity changes (beat frequencies) corresponds to the difference of the two frequencies.
The display on the oscilloscope shows the beat in the form of amplitude changes.