SOUND – A HARMONIC OSCILLATION

AKD 01.06

Material:

Item Code	Qty	Description
DS101-1G	1	Support base, large, L=500 mm
P7240-1G	1	Support rod, round, L=500 mm, D=10 mm
DS095-3K	1	Bosshead cross-pattern, demo 03
DS203-1S	1	Support with hook
P1810-1S	1	Coil spring 5 N/m, D= approx. 16 mm
DM121-4A	1	Weight on hook 50 g, profi
DS093-04	1	Sliding saddle "Sepp", H=40 mm
DS402-2N	1	Crank pin, L=50 mm
DS403-1G	1	Geared motor
P3112-1B	1	Battery supply, 0 - 9 V
P3250-1M	1	Multimeter digital “BT”, True RMS
DG507-25	4	Safety connecting lead, 25 cm, yellow

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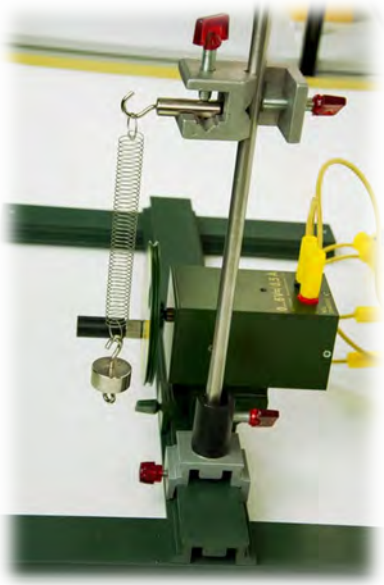
Goal:
We want to show a way to show the vibrations of the tuning fork "in slow motion".

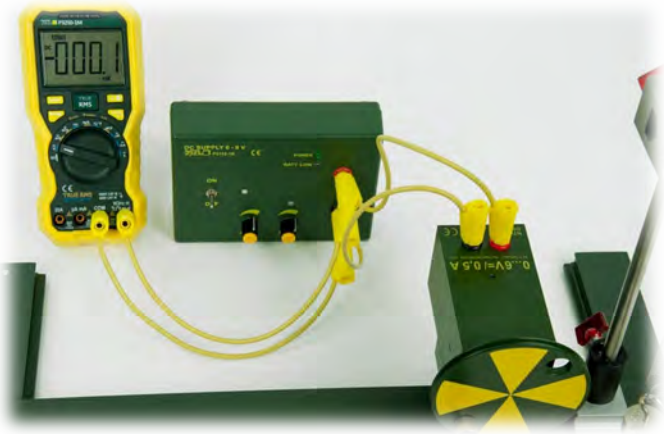


Setup:
The sliding saddle is attached to one end of the support base. The support rod is inserted into the saddle and the cross-pattern bosshead is attached to it.

The handle with hook is inserted into the cross-pattern bosshead and tightened. The coil spring with the hook weight is hung on it.

Next to it, the gear motor is attached with the crank pin in place.

The gear motor is connected to the battery supply and the voltmeter (digital multimeter).



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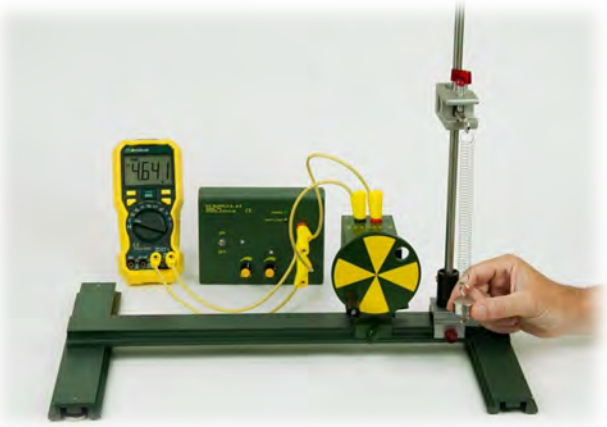
Experiment:
The battery supply is switched on and set to about 4.57 V. The spring pendulum is set in oscillation.



The movement of the pendulum ball is compared with the rotating crank pin on the circular disc.

Conclusion:
The harmonic oscillation of the spring pendulum can be understood as a projection of a circular motion.

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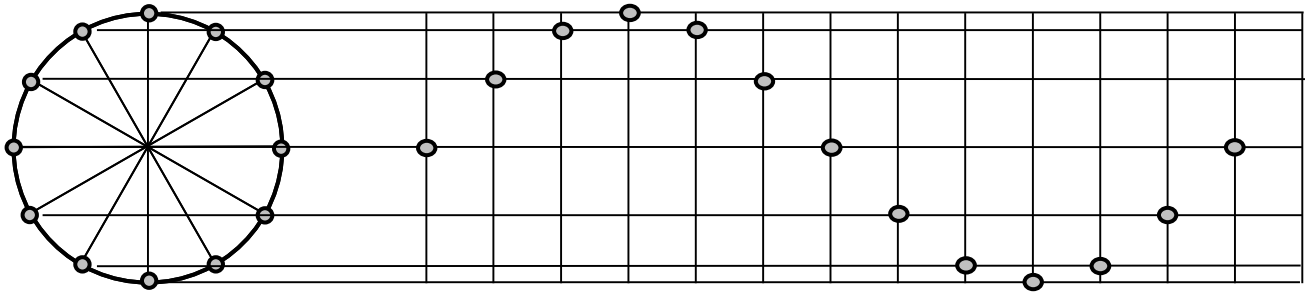
The displacement-time diagram of such an oscillation results in a sinusoidal line



The largest deflection from the rest position is called AMPLITUDE.
Any other deflection from the rest position is called ELONGATION.
The amplitude determines the loudness of the sound.
If the amplitude becomes smaller, it is called a damped oscillation.
If the amplitude remains the same, it is called an undamped oscillation.
The number of oscillations per second is called the frequency.
The frequency determines the pitch.