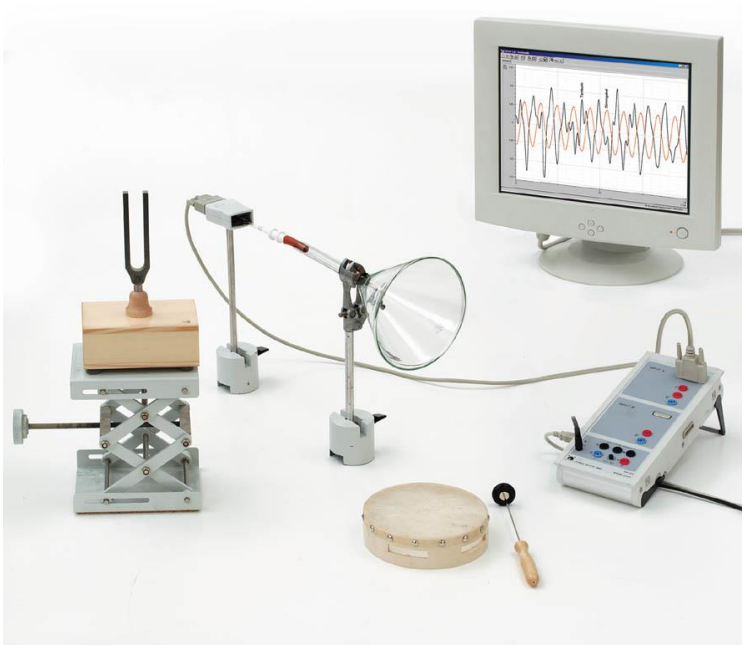
Propagation of sound in the form of fluctuations in pressure

Sensor-CASSY, pressure sensor S ±70 hPa

Object of the experiment

1. Investigate the Propagation of sound in the form of fluctuations in air pressure.

Setup



Preparation of Sensor-CASSY:

- Connect the Sensor-CASSY module to a USB port of a computer.
- Run the CASSY-Lab software.
- Configure the following settings in the “Sensor input settings” window.
  - Measuring range: -0.7.....+0.7 hPa
  - Measurements: Average values
  - Use the → 0 ← button to determine the zero point
- Configure the following settings in the “Measurement parameters” window.
  - Add new set of measurements
  - Interval: 50 µs
  - Time for measurement: 20 ms
  - Trigger: *p*A1, 0.100 hPa, rising edge

Apparatus

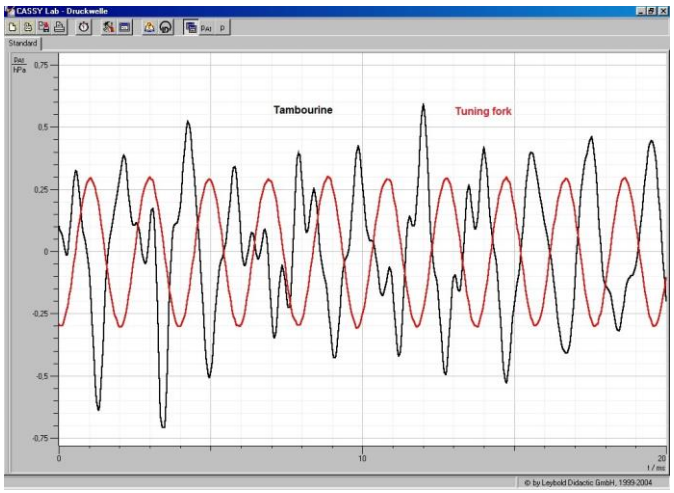
1 Resonance tuning fork	414 42
1 Tambourine	414 32
1 Pressure sensor S, ±70 hPa	524 066
1 Sensor-CASSY 2	524 013
1 CASSY-Lab 2	524 220
1 Extension cable, 15-pin	501 11
1 Funnel, Boro 3.3, 150 mm diam.	602 671
1 Rubber tube, 8 mm diam., conforming to DIN 128 65	667 183
2 Saddle bases	300 11
1 Stand rod, 223 mm, 10 mm diam., M6	688 808
1 Universal clamp, 0...80 mm	666 555
1 Laboratory stand II	300 76

Additionally required:
1 PC with Windows XP or higher

Procedure

- Start measuring by pressing the F9 key.
- Hold the tambourine about 1 m from the funnel beat it gently and observe the change in pressure on the screen.
- Remove the trigger via the “Measuring parameters” window.
- Set up the tuning fork about 30 cm in front of the funnel, strike it and start measuring by pressing the F9 key.
- Observe the changes in pressure again.

Observation



Evaluation

After the tambourine is beaten, its skin initially moves in one direction. Molecules of air behind it get squeezed together. This means for a short time there is a space where there are particularly many air molecules (compression of air).

If the membrane then moves in the opposite direction, then behind it there will be a space with particularly few molecules (rarefaction of air).

Sound propagates due to a sequence of compressions and rarefactions (pressure fluctuations) in the air.

Such propagating pressure fluctuations in air are called sound waves.

When a tuning fork is struck, similar pressure fluctuations occur due to the vibration of the tines.

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