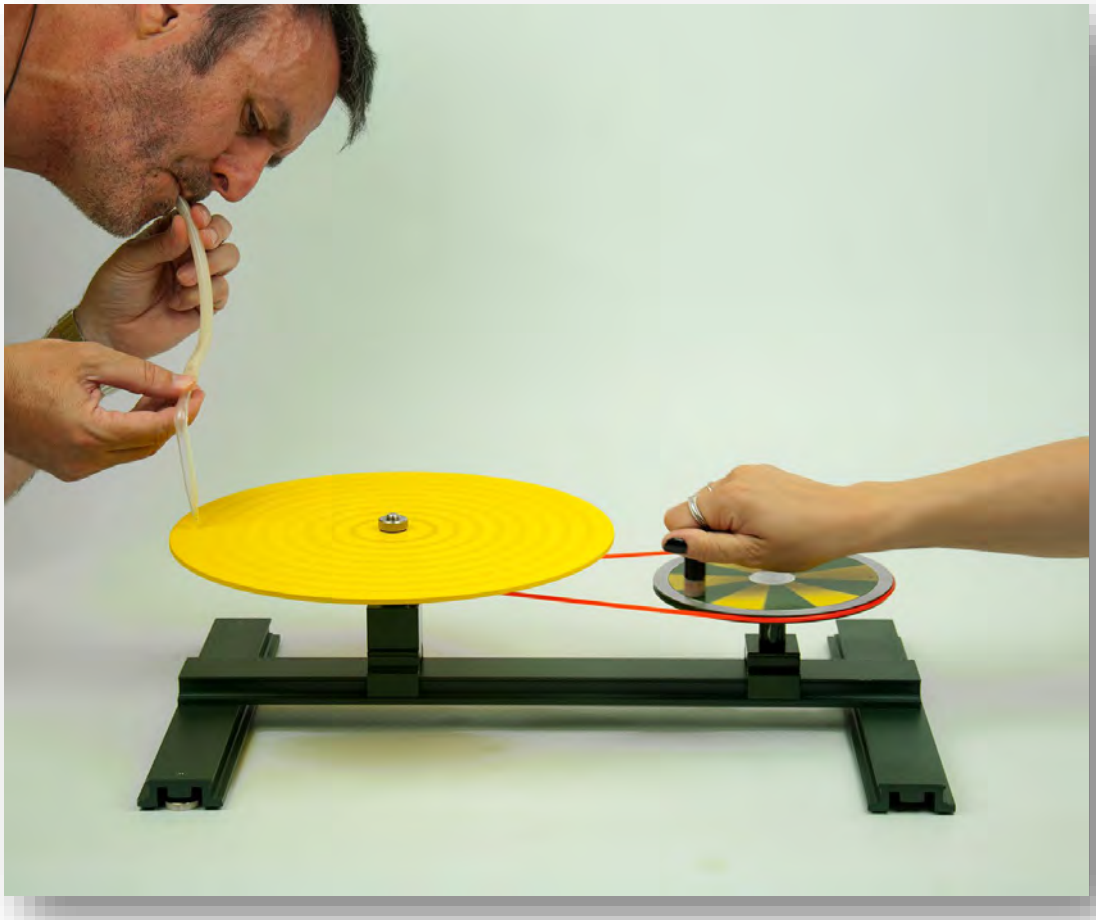
SOUND GENERATION USING THE PERFORATED DISC

AKD 01.07



Material:

Item Code	Qty	Description
DS101-1G	1	Support base, large, L=500 mm
DS093-04	1	Sliding saddle "Sepp", H=40 mm
DS402-3B	1	Pivot bearing with transverse hole, on saddle
DS402-3S	1	Drive pulley demo, with ball bearing
DS402-2N	1	Crank pin, L=50 mm
DS401-1A	1	Drive belts, set of 2
DW220-1L	1	Perforated disc
DW220-1H	1	Disc spindle
C6030-1G	1	Glass tube 7, right-angled with tip, 50+50 mm
C7445-7S	1	Hose, silicone, D=7/9 mm, L=100cm

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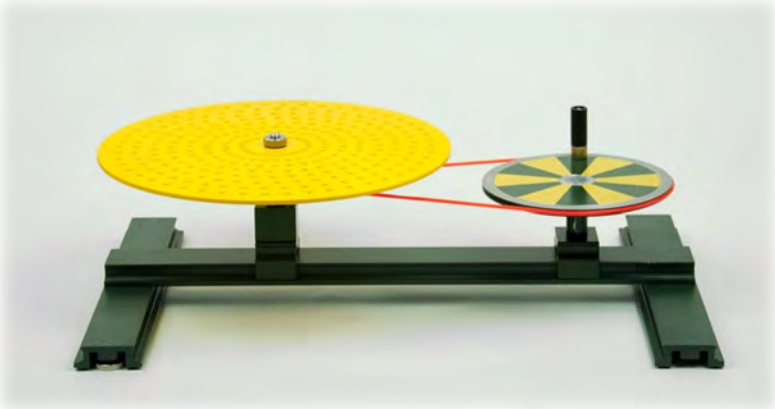
Goal:

By blowing air through the holes of a spinning disk, we can also produce sounds. We investigate how this works.

Setup:



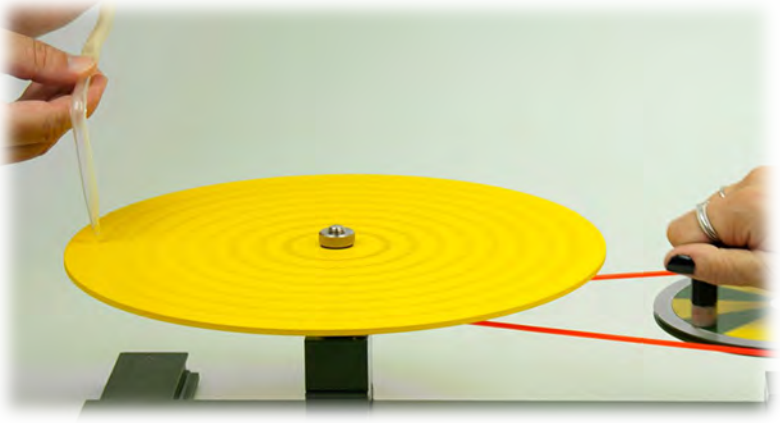
- The pivot bearing and the sliding saddle are placed on the support base.
- The crank pin is screwed into the drive pulley.
- This unit is clamped into the sliding saddle.
- The perforated disc is fixed in the disc spindle.
- This unit is screwed tight in the pivot bearing.
- As shown in the figure, the long drive belt is inserted and tensioned with one of the sliders. Not much tension is needed.

Experiment 1:

We drive the perforated disc and try to keep the speed of rotation constant.
The glass tube is held against the outermost row of holes at a distance of about 5 mm.
Now we blow air through the tube into the rotating row of holes.

Result:

A sound is produced by blowing air into the row of holes.



Experiment 2:

We now turn faster and compare the sound to the pre-test.

Result:

At higher rotation speed the sound becomes higher.

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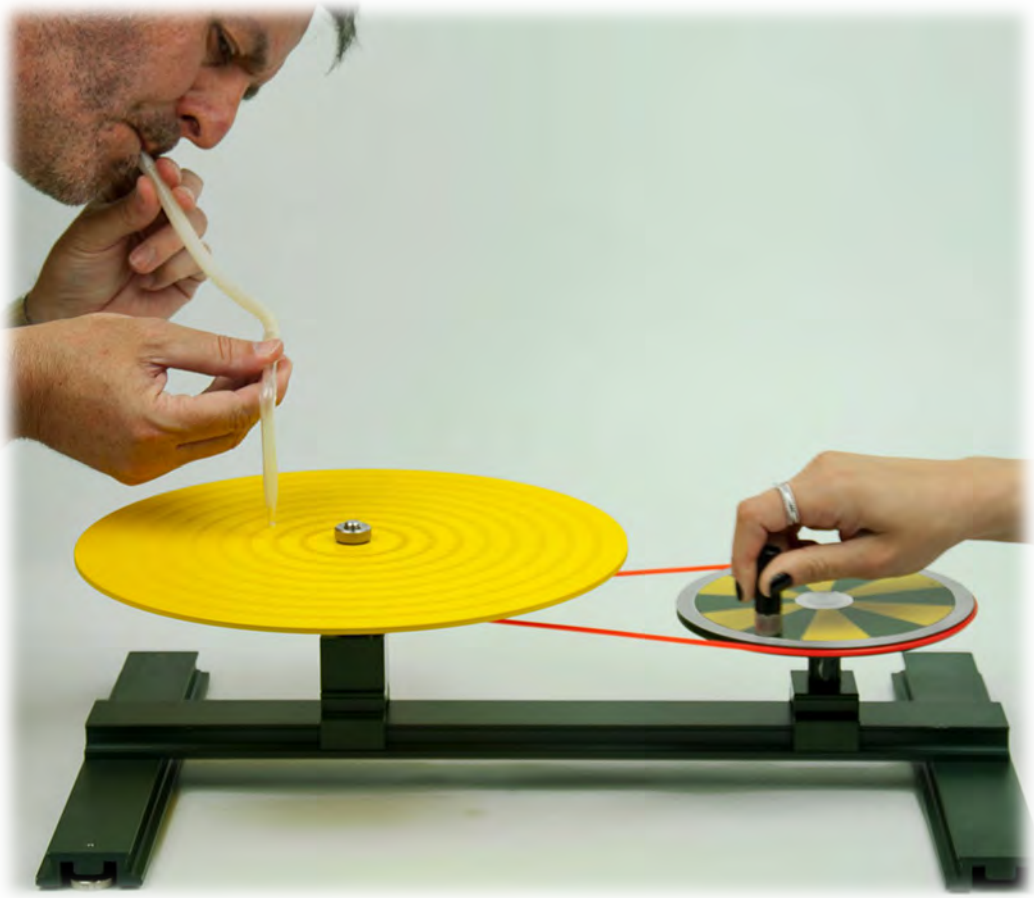
Experiment 3:

We turn the perforated disc again at a constant speed.
First, the outermost row of holes is blown with our blowpipe.
Then we blow on the other rows of holes on our perforated disc. We pay attention to the pitches.



Result:

Each row of holes produces a different tone.
The pitch also depends on the distance between the holes.

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More data on the experiment:

Number of holes	24	27	30	32	36	40	45	48
Interval	1	9/8	5/4	4/3	3/2	5/3	15/8	2
Tone step		9/8	10/9	16/15	9/8	10/9	9/8	16/15

Interval	Ratio to the lowest frequency
T	large whole step
T´	small whole step
t	Halftone step

If the perforated siren rotates with n = 11 U/s, the C major scale is obtained.
If the angular velocity of the disc is increased, all other tones also increase because of the greater frequency, but the tone sequence remains in major. The respective scale depends on the rotational speed.

Further information:

Via a light gate with downstream amplifier and loudspeaker, the hole siren can also be used to generate sound.

Compare the number of holes with the measurement results of AK 03.02 Monochord - string length and frequency.

The number of rotations can be measured with a stroboscope. For this purpose, a mark is made on the disc. The disc is flashed with the stroboscope and its flash sequence is varied. As soon as the mark appears to stand still, the flash frequency is identical to the number of revolutions.