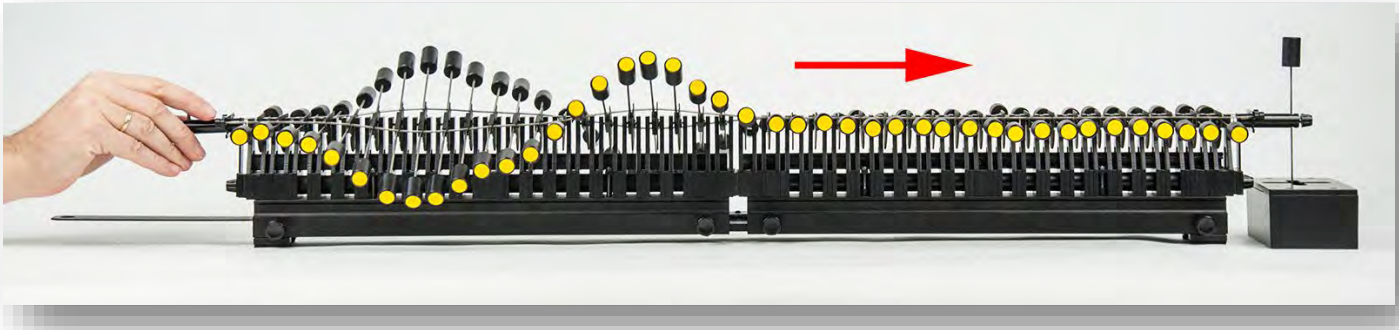
PROPAGATION OF TRANSVERSE WAVES

SWD 03.01



Material:

Item Code	Qty	Description
DW405-1A	**1**	**Oscillation module 1 – set consisting of**
DW405-1A1	1	Oscillation module 1 with brake
P5312-1A	2	Little base with damping
DW405-3P	1	Pendulum bearing for wave demonstrator
P7230-4E	1	Bearing pin
DG205-1G	1	Hook metal, with handle
DW405-1E	**1**	**Wave demonstrator - Module II consisting of**
DW405-1E1	1	Oscillation module 2a with brake
P5310-1S	1	Rail bond SE, universal
DW405-3SL	2	Coupling spring 80 cm, for wave demonstrator
DW405-2D	**1**	**Wave demonstrator - Mechanical damping unit consisting of**
DW405-3P	1	Pendulum bearing for wave demonstrator
DW405-2DP	1	Pendulum for damping unit
DW405-2DW	1	Water trough for damping unit

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Purpose

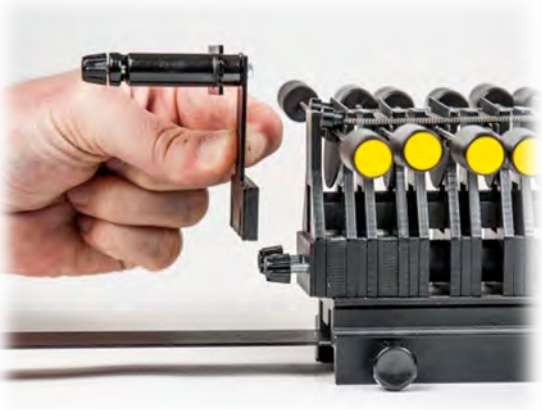
To demonstrate the creation and propagation of transverse waves.

Setup

The two oscillation modules are coupled with the rail connector, thus we get a "wave machine" with a length of 80 cm.

It should be noted that the two brake springs must also be coupled.
The pin of one spring must snap into the hole in the second spring.

The little bases are inserted and screwed tight at the outer ends of the wave machine.



The pendulum bearing is mounted at the end with the long brake spring.

The bearing pin is screwed tight in the vertical slot of the pendulum bearing.

At the end with the short brake spring, the second pendulum bearing (part of the damping unit) is mounted.

The two 80 cm long coupling springs are hooked into the upper slit of the pendulum.

The two pendulum bearings are also included.

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The water trough of the damping unit is filled almost to the brim with water (filling volume approx. 260 ml).

The lid of the water trough is put on and the water trough is pushed directly to the end of the oscillation module 2a.

The pendulum of the damping unit is inserted into the pendulum bearing.

The pendulum plate is lowered into the trough so that it is completely under water.

Then the pendulum is screwed to the axis of the pendulum bearing.

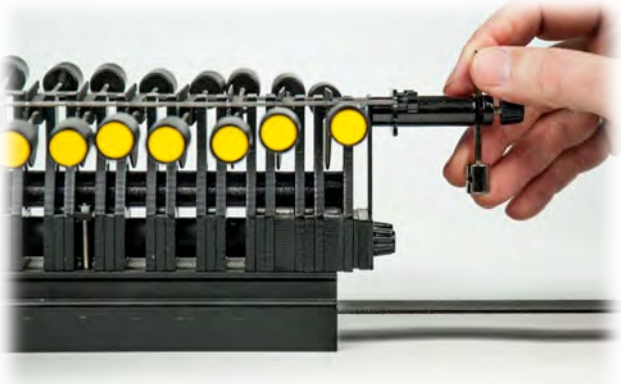
Make sure that the pendulum can swing freely,
if necessary the water trough must be moved accordingly.

Experiment 1:

The bearing pin is deflected by hand about 20 - 30 °
and then turned back to the starting position.

This movement should be done quickly.

Observe the movements of the pendulums!



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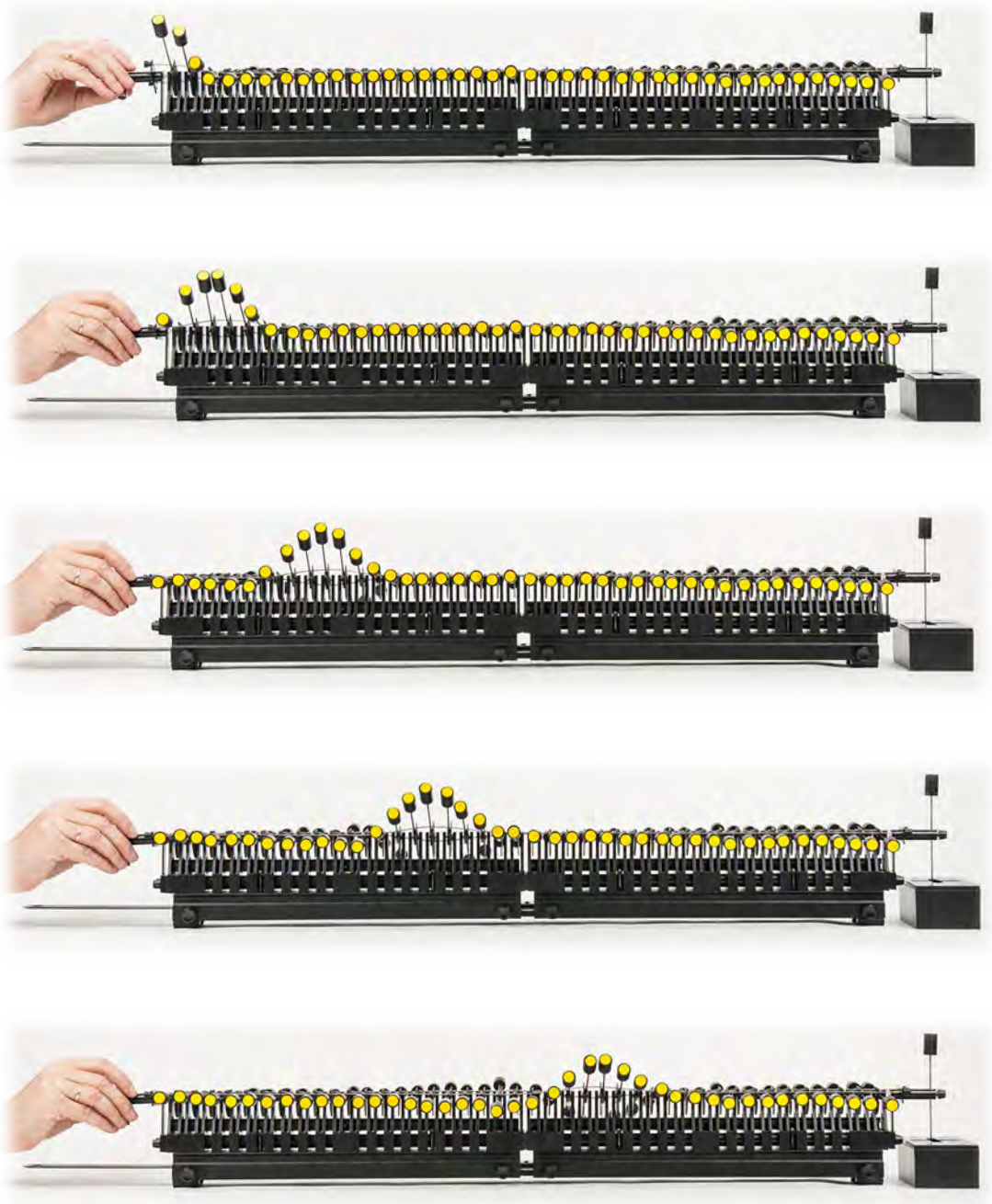

Result:

The pendulums, which are coupled to one another, move in waves.

The triggered wave pulse runs through the module and is deleted at the end by the damping module.

If the first pendulum is excited "upwards", we create a wave crest.

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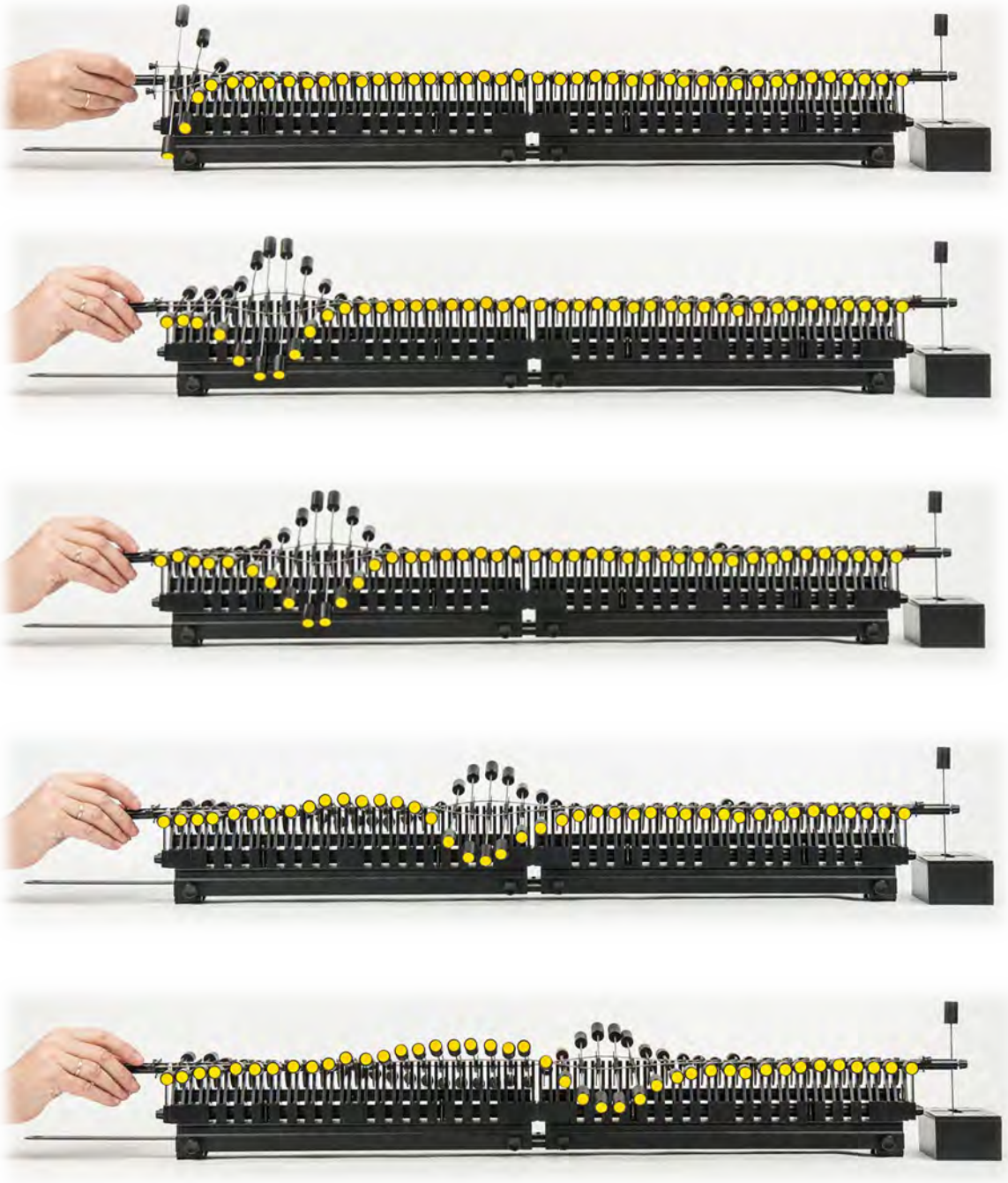
Experiment 2:

The bearing pin is now deflected in the other direction and then rotated back into the starting position. This movement should be carried out quickly.



Result:

If the first pendulum is excited "downwards", we create a “valley” of waves.

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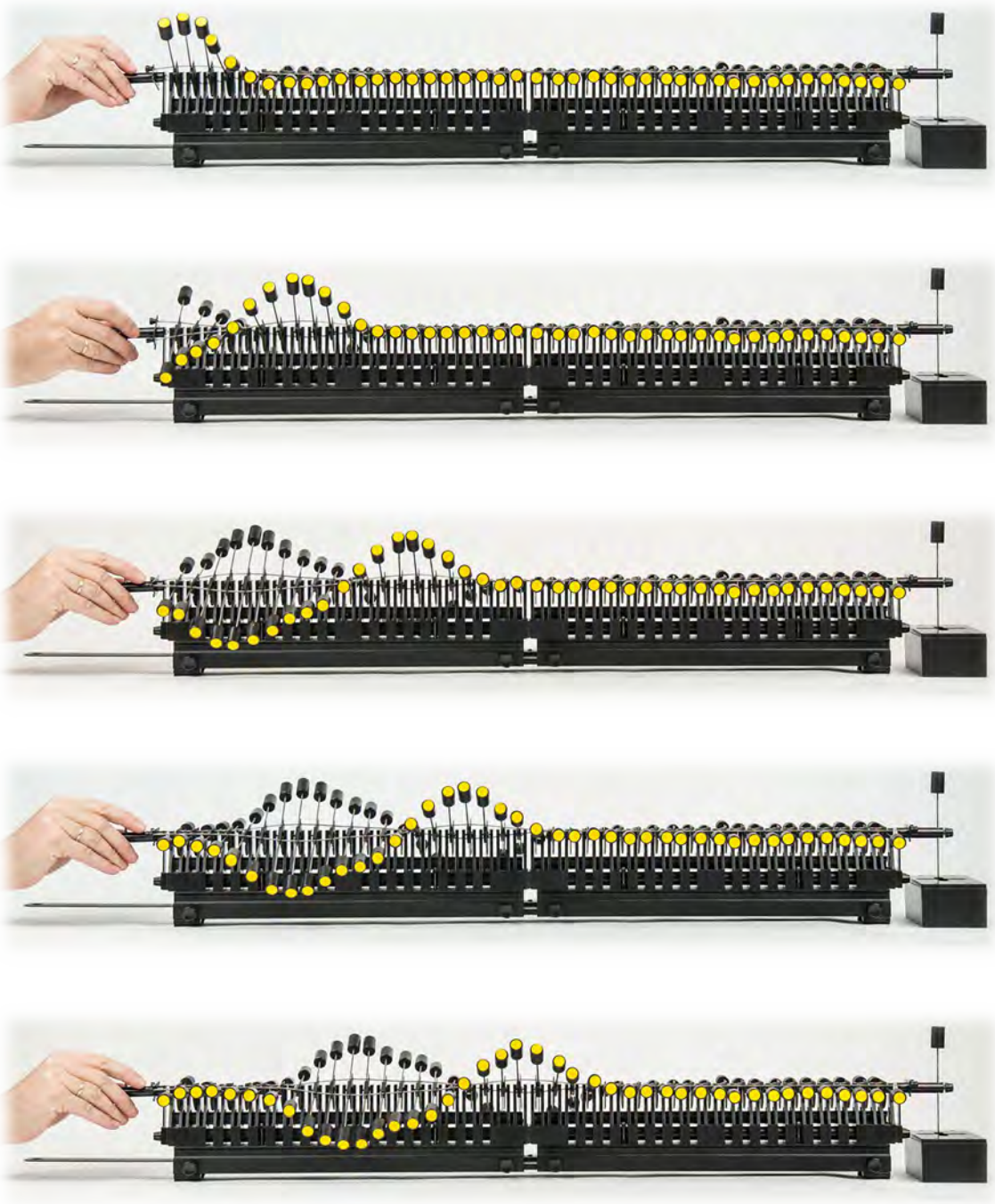
Experiment 3:

The bearing pin is first deflected in one direction, then in the opposite direction and then rotated back into the starting position. Again this movement should be carried out quickly.



Result:

Through the successive pendulum movement up and down we generate a “complete” transverse wave.

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Conclusion:

If we excite a pendulum of our oscillation module we generate a wave.
Since the pendulums are coupled to each other, the wave motion spreads.

If the pendulums are deflected perpendicular to the direction of propagation, we speak of a transverse wave. A wave transmits energy, but not matter.

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Annotations:

The assembly of the damping unit is important because otherwise the wave would be reflected at the end of the wave machine.

Reflections are not desired in this experiment; "only" the propagation of the wave in one direction should be shown.

A moment observation is possible by manually pulling the brake spring. For this purpose, the hook with the handle is hooked into the hole on the long brake spring. At the desired moment, the spring must be pulled out briefly and forcefully with the handle, the oscillation module is held with the other hand so that it does not slip.

If available, you can record the process with a camera or a mobile phone in slow motion mode. This locomotion becomes more visible when playing.