VIBRATION GENERATOR

Catalogue No. 1043004

The Vibration Generator is designed to operate from a signal generator and produces mechanical oscillations which by connection of the accessory springs allows observation of standing waves of longitudinal, transverse and two dimensional in nature.
It can also be powered by connection to a standard 12 volt power supply however this restricts the ranges of frequency response as these supplies are generally stepped consequently a good quality signal generator gives maximum versatility in the range of 0 to 5kHz.
Simply connect the unit to the outputs of the signal generator using 4mm leads and connect either the spring unit or the unequal transverse spring to the central pillar (ensuring the diaphragm is locked to prevent damage to the
vibration membrane) .
Attach the spring in an extended position to a secure pillar such as a retort rod with base clamped to the bench and slowly increase the frequency and observe the points where standing waves and fundamental frequencies start.
A Chladni's Plate accessory can also be attached to the central pillar as above and gently sprinkle the special sand across the plate…….avoid using excess sand as a light covering is all that is required.
Gently increase the frequency and observe the changing patterns across the plate as the frequencies are altered…..you can also see nodal lines which are areas of no vibration on the surface and modes of vibration.
Avoid long periods of sustained rapid vibration and keep dry as moisture will damage the mechanism.

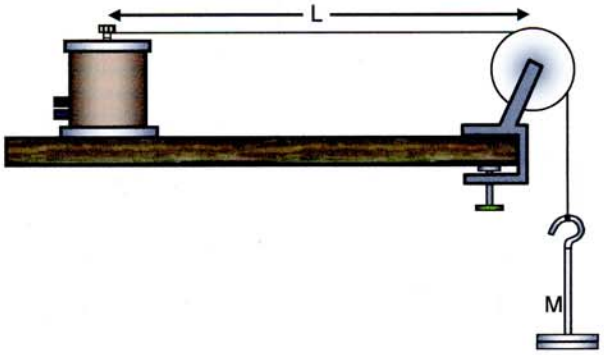
Specifications are:

Peak to peak displacement:	10mm
Frequency Range:	0 – 8kHz
Coil Impedance:	3 ohms
Size:	100 x 100 x 90mm high
Weight:	900 grams

Refer to page 2 for instructions on how to set up and perform Melde's experiment.
Certain other pieces of apparatus are needed but are commonly found in all school laboratories and to minimise cost these are not included as accessories.

MELDE'S EXPERIMENT

The aim of this experiment is to investigate the standing waves on a stretched elastic cord. It forms the basis of all musical notes produced on a stringed instrument.



YOU WILL NEED

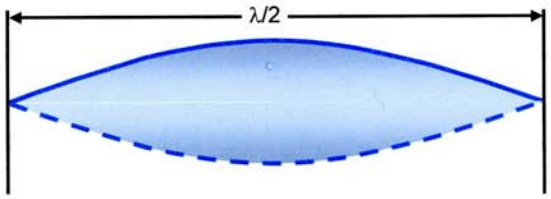
Vibration generator Elastic cord (white) Set of slotted masses (10x10 g) Signal generator (1 Hz – 20 Hz range) Leads Bench pulley G clamp to hold the vibration generator steady (This may not be needed for small tensions and a heavy vibration generator).

WHAT TO DO

Set up the apparatus as shown in the diagram with the vibration generator connected to a signal generator. The length (L) of the cord should be about 70 cm and the mass (m) on the end a few tens of grams.

The idea is to obtain resonance conditions and hence standing waves for the cord in two experiments:
(i) vary the length of the cord keeping the mass constant
(ii) vary the mass on the cord keeping the length constant

For each value of tension and length adjust the frequency of the vibration generator until the cord oscillates in its fundamental mode – that is one 'loop' (see below). In this condition the length of the cord between the vibration generator and the bench pulley is half a wavelength.
The frequencies will probably be in the range 0.5 – 10 Hz.



Plot two graphs:
(i) frequency against 1/L and (ii) frequency against T = mg.

DO NOT TURN UP THE SIGNAL GENERATOR VOLTAGE TOO HIGH