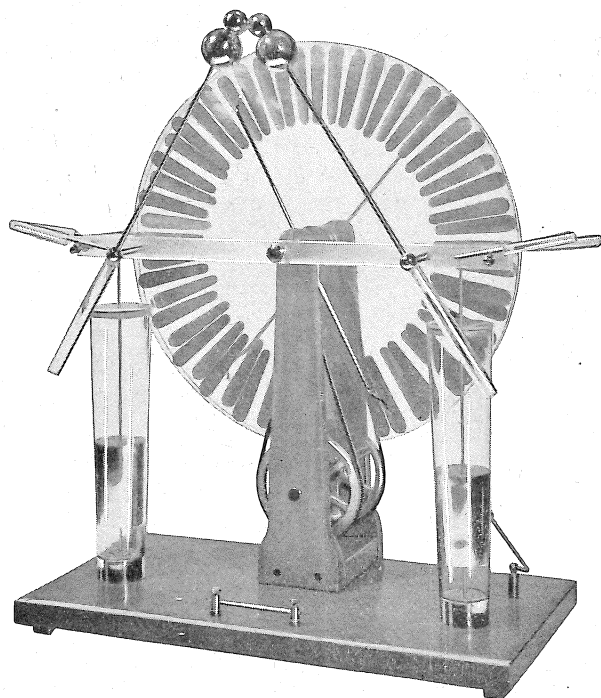


# Operating instructions

for the

*Voltana Wimshurst machines*

*Voltana experimental sets*



A = Disks

B = Electrodes

C = Knurled screw

D = Interrupter

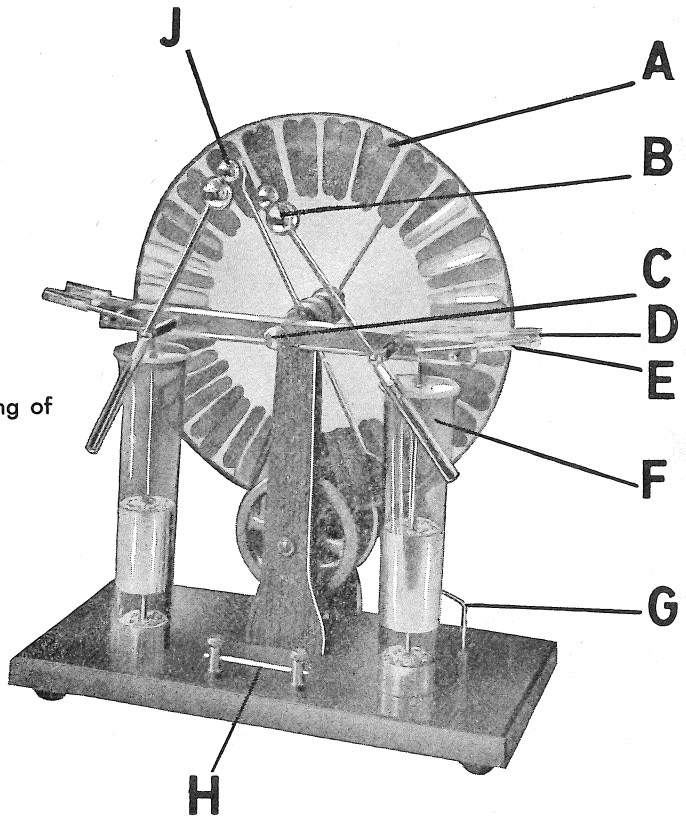
E = Leyden jar switch

F = Leyden jar

G = Switch for upper lining of  
Leyden jar

H = Alternating current  
terminals

J = Brush carriers  
(compensators)



Instructions for using the

## *Voltana Wimshurst machine*

VOLTANA Wimshurst machines are supplied ready for use, except for the electrode rods, which must be placed on the small tubes of the plastics bar. See also the illustration of the machine.

The Wimshurst machine is supplied in a cardboard box which can also be used for storing the instrument when it is not in use.

### *Faulty operation*

The position of the brush-arms is reversed so that the machine operates only when rotated in the anti-clockwise direction.

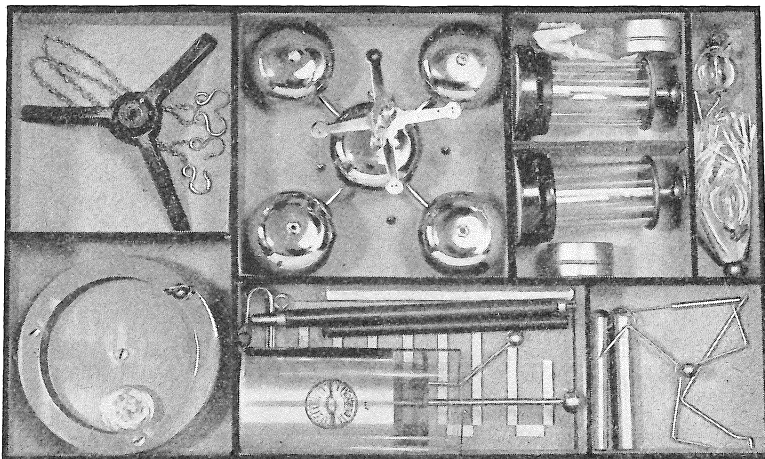
If the leather cords are incorrectly placed on the pulleys, the machine will also operate when rotated in the anti-clockwise direction.

The brushes are badly worn. If possible they should be trimmed with scissors so that a clean metal surface is exposed.

Only the brushes of the compensators should be allowed to touch the disk. The other brushes should be set close to the disk without actually touching it.

One of the Leyden jars may be cracked. Each jar should be checked separately to test its charging performance. A jar in good condition should emit a small spark.

Failure of a new machine or machine in good condition can only be due to failure to observe the operating instructions.



Size of box: 47×28×10 cm

Weight net 2 kos, gross 3 kos

## *Directions for using the experimental sets*

To improve the insulation, all experimental sets should be mounted on the universal stand. The upper metal section of the stand is directly connected to the apparatus. Depending on the polarity of the electricity required for any experiment, either both or only one terminal of the Wimshurst machine should be connected to the experimental apparatus. In the last-mentioned case, the other terminal should be connected to earth. The connections are made by chains which are simply hung on the hooks of the stand and of the experimental apparatus.

The paper strip bunch

is connected with only one chain. The individual strips repel each other in accordance with the law "like charges repel each other".

Chiming bells („Glockenspiel“)

The electricity is again conducted by chains. The four bells on the side are charged. These bells act as distributors by conducting the charge to the metal spheres suspended from the insulating silk threads. The metal spheres strike the centre bell which is connected to earth. The charge is therefore dissipated and the entire process is repeated. The experiment can also be carried out quite successfully if both terminals of the Wimshurst machine are connected to the chiming bells.

The electric impeller

is rapidly rotated by the recoil effect of the electricity flowing from the points.

The Geissler tube

This tube is highly evacuated. Owing to the high conductivity of the gas residue in the Geissler tube, the Wimshurst machine is not able to supply the maximum voltage.

The spark gap is therefore included in the circuit by means of the interrupter D. The machine can then operate at a higher voltage and a larger quantity of electricity is compensated with every spark. The intensity of the illumination of the tube is greatly increased. This experiment should be carried out in a darkened room to enable the best results to be achieved.

#### The lightning board

consists of a strip of tin foil pasted on to a plastics plate. The tin foil is interrupted at several points. The chains connect the terminals of the machine to the hooks of the stand and of the plate. The spark bridges all the gaps simultaneously at each interruption, thus giving the impression of a streak of lightning passing over the tin foil.

#### Use of the handles

The handles are connected to the electrodes by means of the chains. The spark gap is inserted into the circuit by means of the interrupter D. The shocks will be the more powerful, the greater the gap distance of the spark gap.

#### The dancing balls

The hook of the stand and the ring of the apparatus are connected to the terminals of the machine. The elder-berry pith balls resting on the bottom of the apparatus are charged at the same polarity and are therefore repelled. They are then attracted by the upper electrode, discharged, charged and again repelled. The pith balls thus continue to dance up and down. The interior and exterior of the glass bell are lacquered and should always be kept clean and dry.

#### Air cleaning apparatus

A previously lighted smoking candle is placed in the bottom of the apparatus, and covered by the glass bell. The bell is filled with dense smoke. The hook of the stand and the ring of the apparatus are then connected to the terminals of the machine. On starting the machine the smoke rapidly disappears: it precipitates on the electrodes or on the glass walls.

#### The rolling glass marble

The apparatus is connected as for the pith ball experiment. The glass marble must be completely clean and dry. Wherever the marble touches one of the metal plates it is charged at the same polarity and therefore repelled. This causes the marble to roll rapidly.

#### The Leyden jar

To charge the Leyden jar, its charging sphere is simply held against one of the electrodes of the machine while the other electrode is connected to earth. This causes the internal tin foil lining to be directly charged while the outer covering is charged by induction. If it is not possible to hold the jar in one's hand, it should be placed on a table, thus connecting the outer covering with earth. The charging sphere connected with the internal lining of the jar should then be coupled to one terminal of the machine while the other terminal is again connected to earth.

The jars can be discharged with the discharging bar. First, the discharging bar should touch the outer covering of the jar and its sphere should be brought near the charging sphere of the jar. Since the outer covering is at a negative potential and the inner lining is at a positive potential a large potential difference exists between them, and a powerful spark will result.