Magnetic Levitation 1





The picture above shows two circular magnets, the top one is being repelled by the bottom magnet. The circular magnets were liberated from the magnetron from a microwave cooker that had failed.

The magnetron is the device within a microwave cooker which generates the microwaves. A typical magnetron is shown on the next page. The magnets create a strong magnetic field which makes the electrons emitted from a hot wire inside the magnetron rotate in a circle. The rotating electrons are accelerating (because they are constantly changing direction) and so emit the microwave radiation.

The microwaves are emitted from the metal cap at the very top of the magnetron.

The cooling fins remove the heat generated within the magnetron and the thermal switch disconnects the magnetron if it becomes too hot.

Power is supplied between the case and the metal terminals on the bottom right - the supply voltage being between 2500 and 5000V. These voltages will be lethal and should be avoided at all costs!



The magnets can usually be liberated by:-

prising up the brass braid at the top of the magnetron with a small screw driver, prising off the top of the metal frame with a larger screwdriver (this can be quite hard), the top magnet should now slide off the body of the magnetron, the aluminium cooling fins should now slide off the body of the magnetron,

the bottom magnet should now slide off from the body of the magnetron.

The magnets are very brittle and will chip/break if dropped!

The wooden frame was made from a $9 \text{cm} \times 9 \text{cm} \times 1 \text{cm}$ piece of wood and a 12cm by 1.8cm wooden dowel, though a piece of plastic and an old marker pen body would work equally well.

The magnets are placed so that they repel each other, making the top magnet will 'hover' above the bottom magnet.

The magnets can be left hovering, though over a period of years it may be found that the magnetism becomes weaker and the height of 'hovering' becomes less.

It can be entertaining to discuss with non-physicists where the energy comes from to keep the top magnet levitated.

(Remember that Energy/work done = force × distance moved in the direction of the force)