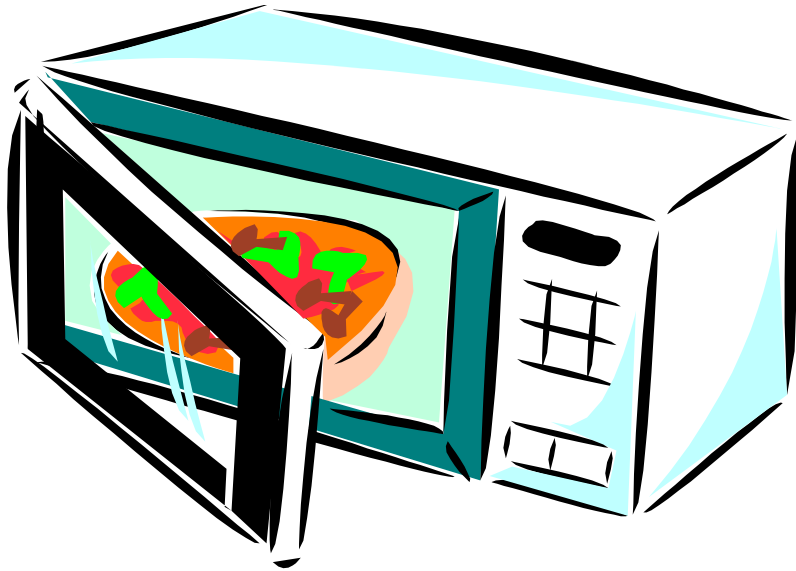




Block diagram of microwave oven

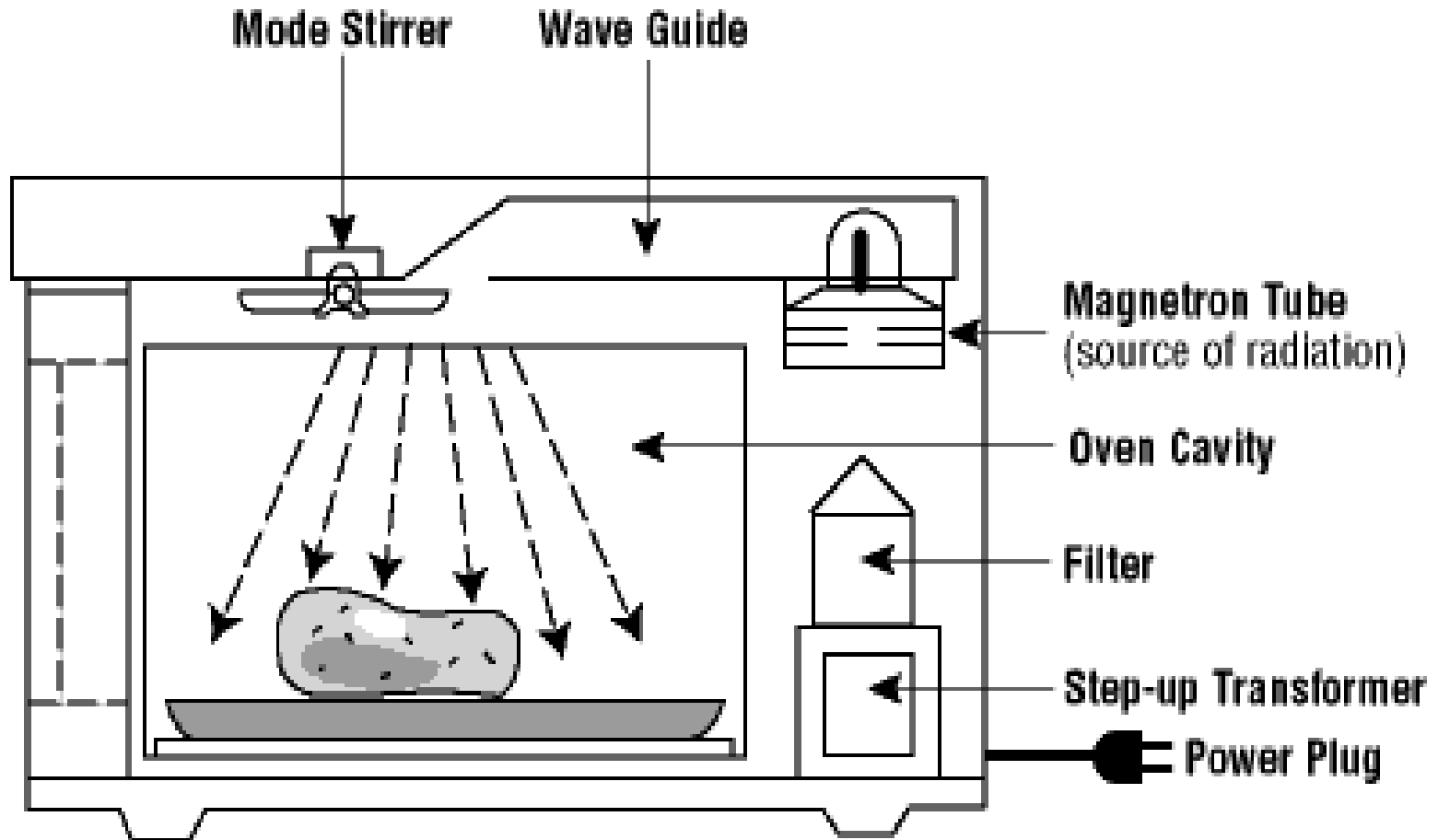


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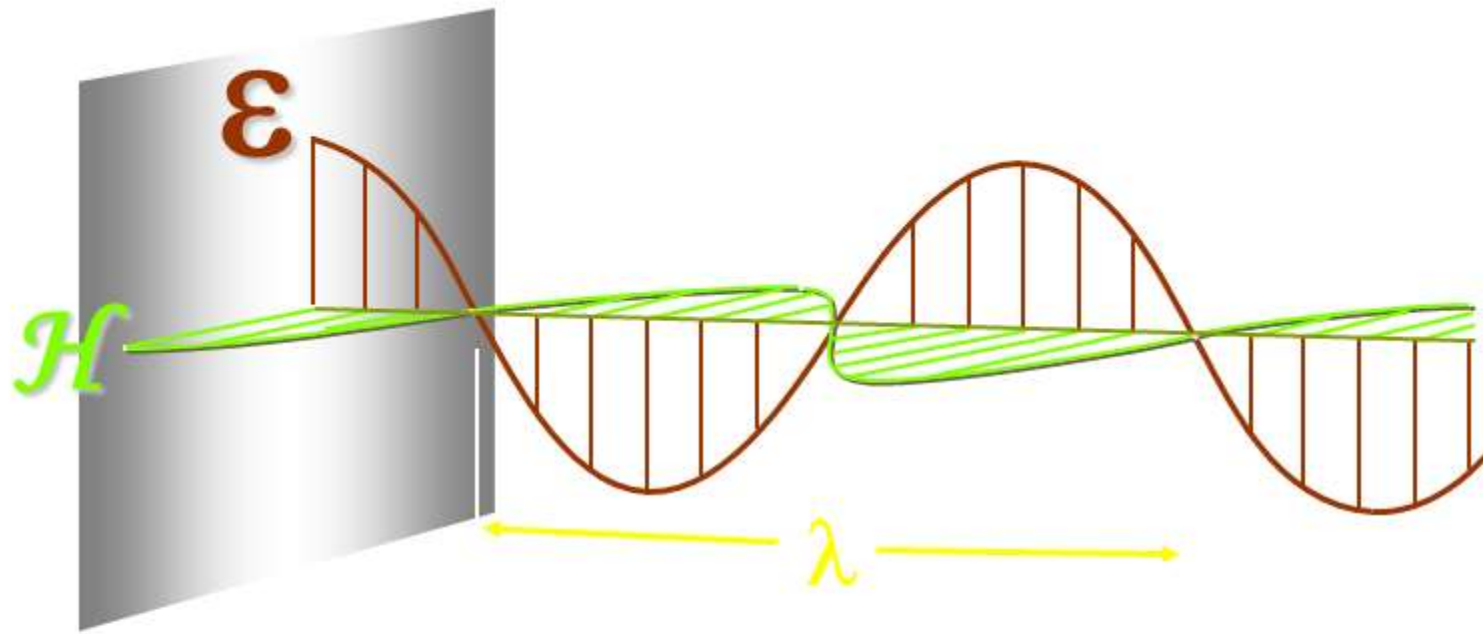
Outline

- What is a microwave?
- Nature of microwave heating
- Goals of the project
- Model description
- Results
- Conclusions and recommendations

Scheme of a microwave oven



What is a microwave?



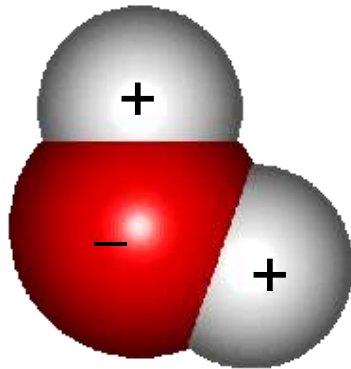
ϵ — electric field

\mathcal{H} — magnetic field

λ — wavelength (12.2 cm for 2.45 GHz)

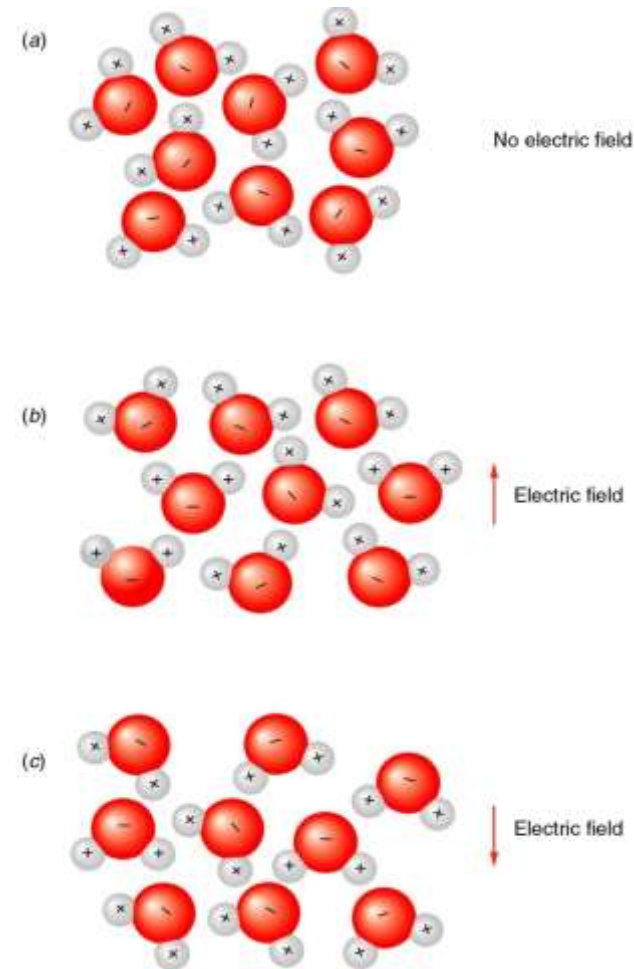
Microwave cooking principle

- ▶ Microwaves act on
 - 1) **salt ions** to accelerate them;
 - 2) **water molecules** to rapidly change their polar direction



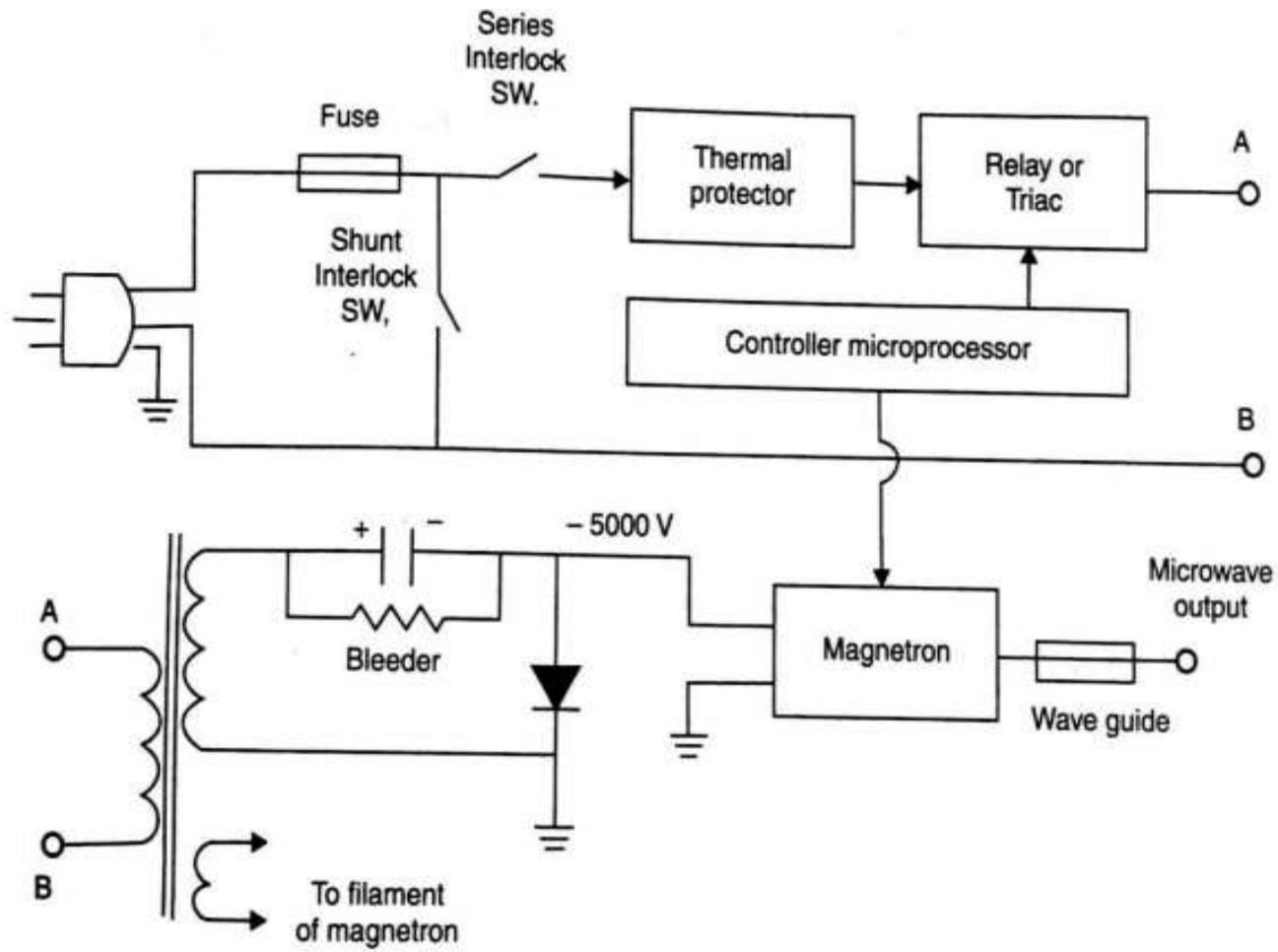
Microwave cooking principle

- ▶ Microwaves act on
 - 1) **salt ions** to accelerate them;
 - 2) **water molecules** to rapidly change their polar direction
- ▶ Food's water content heats the food due to molecular "friction"



BASIC PRINCIPLE AND BLOCK DIAGRAM OF MICROWAVE OVEN

- ▶ The block diagram of a microwave oven is given in the figure. The mains plug and sockets are three-pin earthing type. The fast blow ceramic fuse is of 15A, 250V. Interlock switches are linked with the oven door.
- ▶ Power will be applied to the mains transformer only when the oven door is closed. At least one interlock switch is in series with the transformer primary, hence even a spot of dirt in the relay or contact cannot turn the oven on when the door is open.



- ▶ There is yet another interlock across the power supply line. It normally remains open. If the door alignment is not correct it will be activated, putting a short circuit (crowbar) across the line and making the fuse to melt. Thus, the microwave oven is a fail – safe device.
- ▶ The voltage induced in the secondary winding is about 2000v (rms) at 250 mA for normal domestic ovens. The transformer also has a tertiary winding for the magnetron filament.
- ▶ The high voltage return circuit is fastened directly to the chassis through the transformer frame. A half-wave doubler configuration is used for the rectifier; with a peak inverse voltage of about 12000 V. one end of the diode is connected to the chassis.

MCQ

1. The in phase combining of power at the coupled port is achieved by means of a _____
 - a) Matching network
 - b) A small slot
 - c) Quarter Wave transformer
 - d) None of the mentioned

2. Riblet–short slot coupler allows only:
 - a) TE₁₀ mode of propagation
 - b) TE₂₀ mode of propagation
 - c) Both a and b
 - d) None of the mentioned

3. _____ is a key component in the scalar or vector network analyzer.

- a) Reflectometer
- b) Radiometer
- c) Frequency meter
- d) None of the mentioned

4. A basic Reflectometer circuit can be used to measure the _____ magnitude of the unknown load.

- a) Reflection coefficient
- b) Standing wave ratio
- c) Transmission coefficient
- d) None of the mentioned