# SNS COLLEGE OF TECHNOLOGY

**Coimbatore-35**
**An Autonomous Institution**

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A+' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

## DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

## OPTICAL AND MICROWAVE ENGINEERING

III YEAR/ VI SEMESTER

1

## UNIT 1 – MICROWAVE PASSIVE DEVICES

## TOPIC – ATTENUATORS

# ATTENUATORS

**DEFINITION:**

An attenuator is an electronic device that reduces the power of a signal without appreciably distorting its waveform.

•An attenuator is effectively the opposite of an amplifier, though the two work by different methods. While an amplifier provides gain, an attenuator provides loss, or gain less than 1.

**CHARACTERISTICS:**

Attenuators are usually passive devices made from simple voltage divider networks used to control the amount of microwave power transferred from one point to another point.

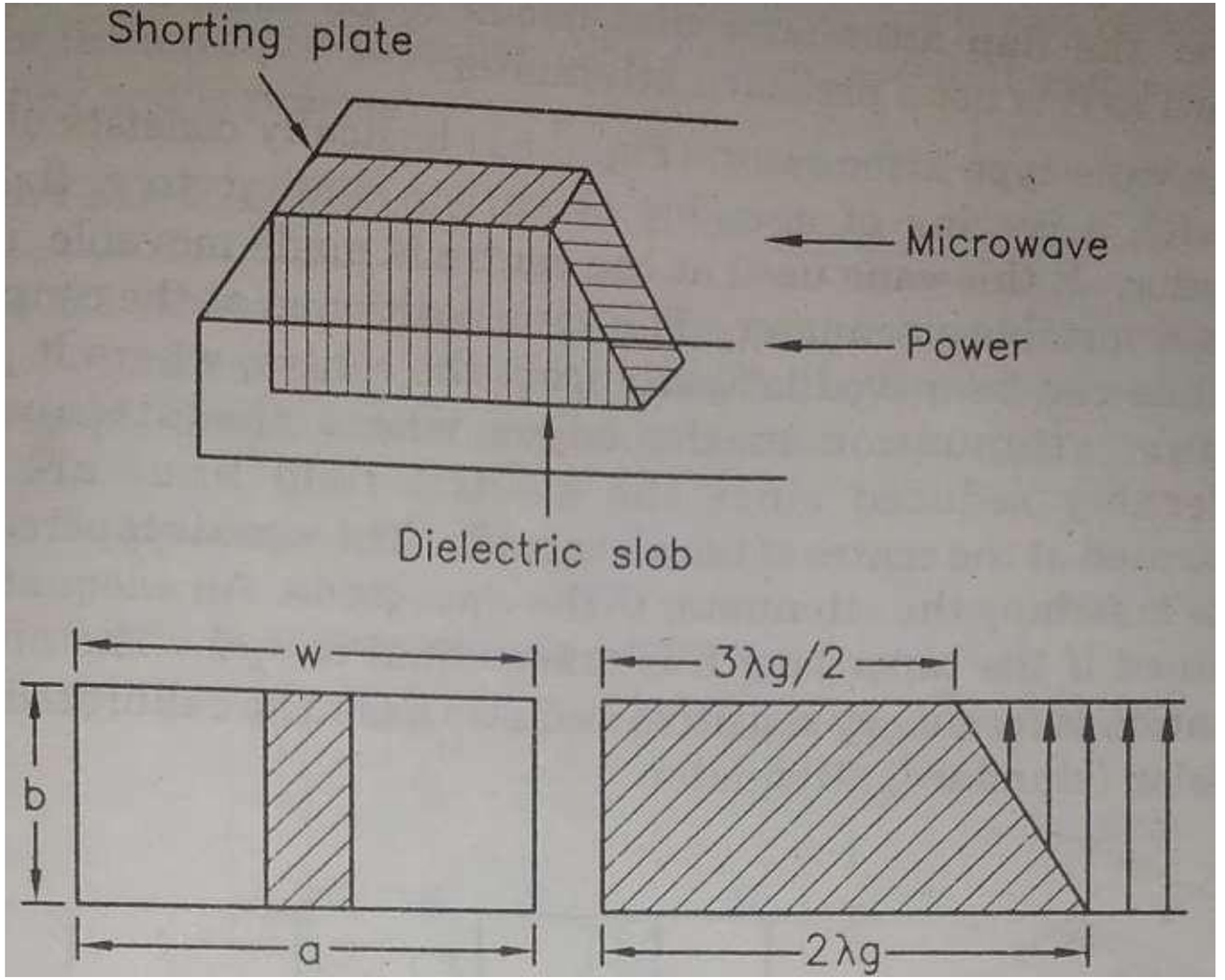
- Reflects and absorbs the energy in some of dissipative elements.
- Attenuation is a function of frequency.

# FIXED ATTENUATORS

Fixed attenuators in circuits are used to lower voltage, dissipate power, and to improve impedance matching.

- Fixed type of attenuators are commonly used where a fixed amount of power is to be provided. If such type of attenuator absorbs all the energy entering into it, we call it as waveguide terminator.
- This normally consists of a short section of waveguide with a tapered plug of absorbing material at the end.
- The tapering is done for providing a gradual transition from the wave guide medium to the absorbing medium thus reducing the reflection occurring at the media interface.
- Dielectric used is glass.
- Attenuators are also used to 'match' impedance by lowering apparent SWR.

# FIXED ATTENUATORS



# FIXED ATTENUATORS

The performance characteristics of a fixed attenuator are:

1) Input and output impedances
2) Flatness with frequency
3) Average and peak power handling capability
4) Temperature dependence

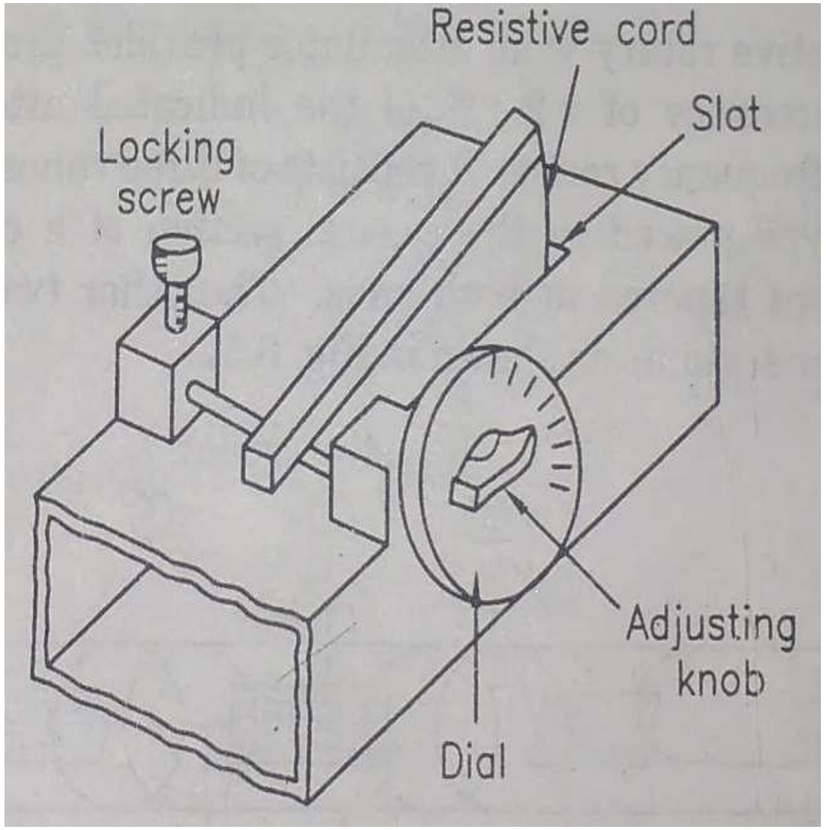
# VARIABLE ATTENUATORS

Variable attenuators provide continuous or step wise variable attenuation.

- For rectangular waveguides, these attenuators can be flap type or vane type.
- For circular waveguide rotary type is used.

# FLAP ATTENUATORS

Flap type attenuator consists of a resistive element or disc inserted into a longitudinal slot cut along the center of the wider dimension of the guide. Flap is mounted on the hinged arm allowing it to descent into the center of waveguide. • Degree of attenuation can be determined by depth if assertion.



# MOVABLE VANE ATTENUATORS

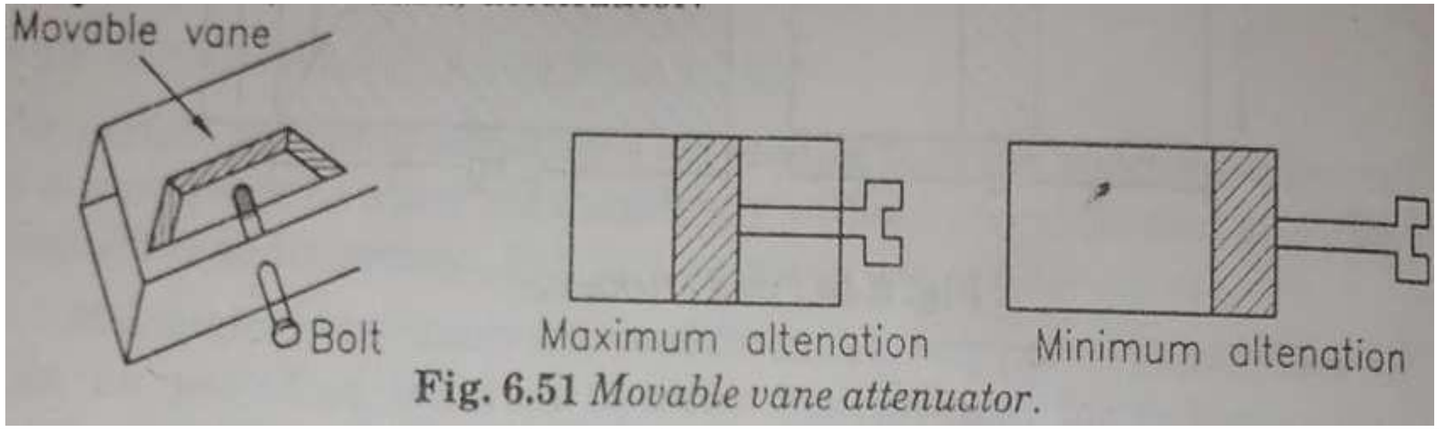
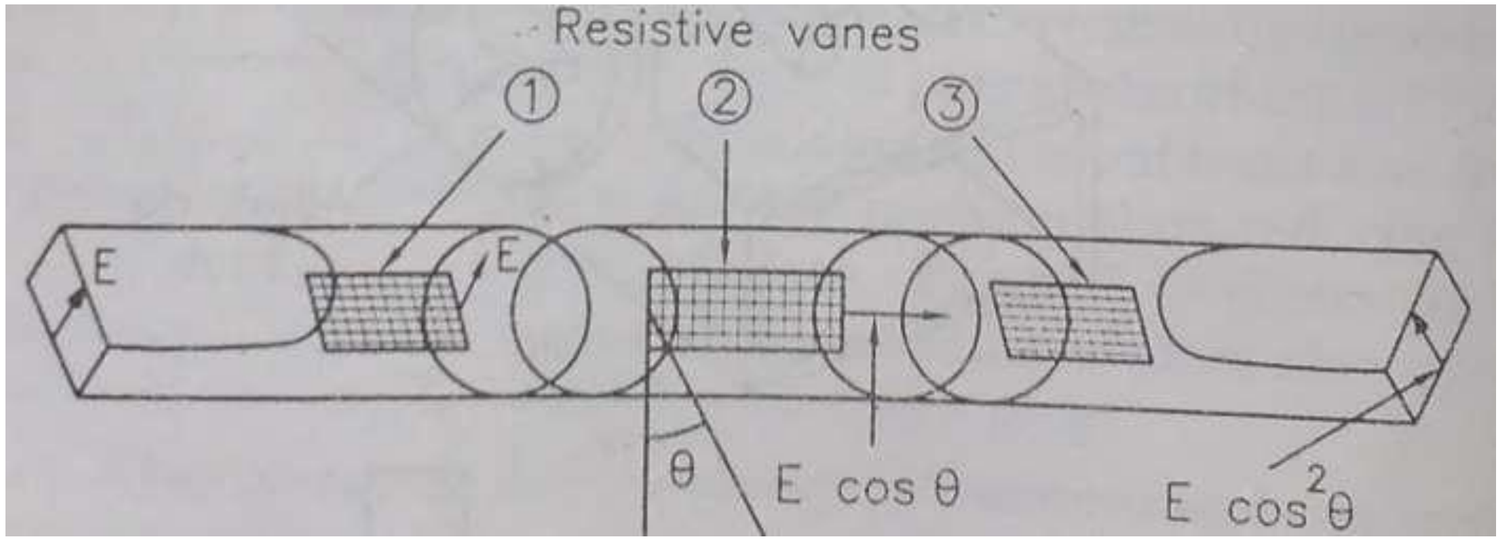



**Fig. 6.51** *Movable vane attenuator.*




The vane positioned at center of guide can be moved laterally from center, where it provides maximum attenuation to the edges where the attenuation is considerably reduced since E lines are always concentrated at the center of waveguide.

# THANK YOU