

## Experiment - 6: Characteristics of Reflex Klystron

**1. Aim:** To study the characteristics of Reflex Klystron tube.

### 2. Requirements

- Klystron Power Supply.
- Klystron Tube with Klystron Mount
- Isolator
- Frequency Meter
- Variable Attenuator
- Detector Mount
- VSWR meter or CRO
- Waveguide Stand and BNC cable.

### 3. Pre-experiment Exercise

#### Brief Theory

The Reflex Klystron makes use of velocity modulation to transform a continuous electron beam into microwave power. It contains a reflector plate refer to as the repeller, instead of the output cavity used in other types Klystrons. The electron beam is modulated by passing it through an oscillating resonant cavity. The feedback required to maintain oscillations within the cavity is obtained by reversing the beam and sending it back through the cavity. The electrons in the beam are velocity modulated before the beam passes through the cavity the second time and will give up the energy required to maintain oscillations.

The electron beam is turned around by the negatively charged electrode that repels the beam. This negative element is the repeller mentioned earlier. This type of Klystron oscillator is called a Reflex Klystron because of the reflex action of electron beam.

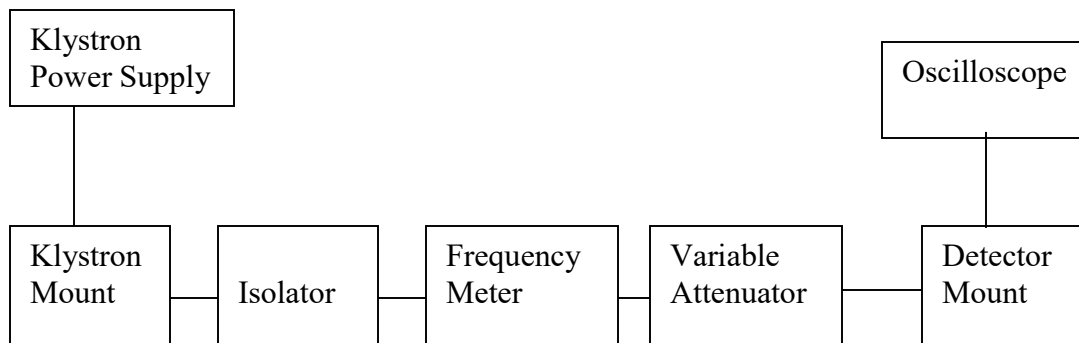
The frequency is primarily determined by the dimensions by the resonant cavity. Hence by the changing volume of resonator, mechanical tuning of Klystron is possible.

Also, a small frequency change can, be obtained by adjusting the reflector voltage. This is called electronic tuning range.

#### 4. Laboratory Exercise

**Procedure:**

1. Set up the components and equipments as shown in Fig.2
2. Keep position of variable attenuator at minimum attenuation position
3. Set mode selector switch to AM –MOD position.
4. 'ON' the Klystron Power Supply and Oscilloscope
5. 'ON' beam voltage switch and set beam voltage to 300 V on beam voltage control knob.
6. By changing the reflector voltage and amplitude of FM modulation any mode of Klystron tube can be seen on Oscilloscope



**Fig.1. SET UP FOR STUDY OF KLYSTRON TUBE**

**4.2 Observations:****1. Power Supply Settings:**

**Beam Voltage** = \_\_\_\_\_

**Beam Current** = \_\_\_\_\_

**Initial Reflector Voltage** = \_\_\_\_\_

**Assume R = 1 ohm**

## 2. Characteristics of Reflex Klystron

Mode No.	Repeller voltage (V)	Voltage Amplitude (mV)	Power (mW)
1			
2			
3			

## 5. Post Experiment Exercise:

### 5.1 Results:

1. Plot Repeller voltage v/s Power on a graph paper.

### 5.2 Conclusion/Comments

---



---



---



---



---



---

### 5.3 Questions:

1. Describe basic principle of O type and M type devices in brief.
2. Explain the principle of operation of Reflex Klystron with a labelled diagram.
3. Explain the bunching process in Reflex Klystron.