INTRODUCTION TO MICROWAVE TEST BENCH

EEEN 566 – MICROWAVE ENGINEERING

Friday, 31 January 2025

MICROWAVE TEST BENCH

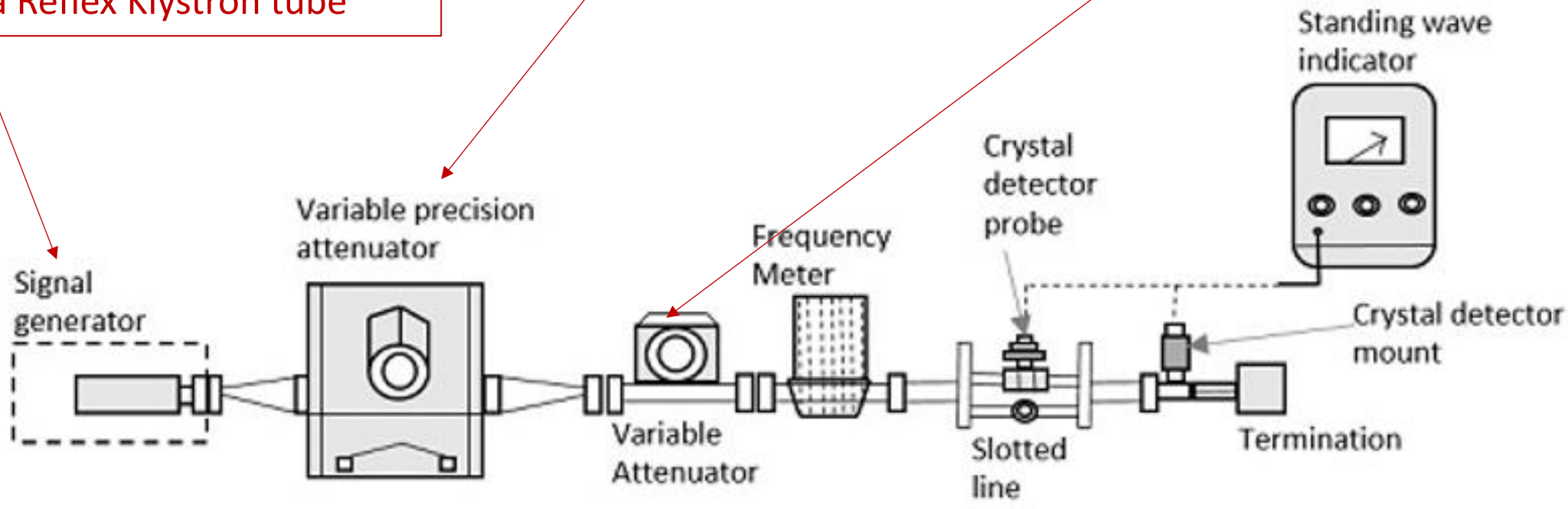
1. **A microwave test bench** is a specialized laboratory setup used to measure and analyze the characteristics of microwave components, like power, frequency, impedance, and reflection coefficient.
2. The bench measures many values such as:
   a) Guide wavelength
   b) Free space wavelength
   c) Cut-off wavelength
   d) Impedance
   e) frequency
   f) VSWR
   g) Klystron characteristics
   h) Gunn diode characteristics
   i) Power measurements

TYPICAL ELEMENTS OF A MICROWAVE TEST BENCH

Signal Generator
Generates a microwave signal, in the order of a few milliwatts. Uses velocity modulation technique to transfer continuous wave beam into microwave power.
Common generators are Gunn diode oscillator or a Reflex Klystron tube

Precision Attenuator
This is the attenuator which selects the desired frequency and confines the output around 0 to 50dB.

Variable Attenuator
Sets the amount of attenuation. It does fine adjustment of values by checking them against the values of Precision Attenuator.



TYPICAL ELEMENTS OF A MICROWAVE TEST BENCH

Frequency Meter

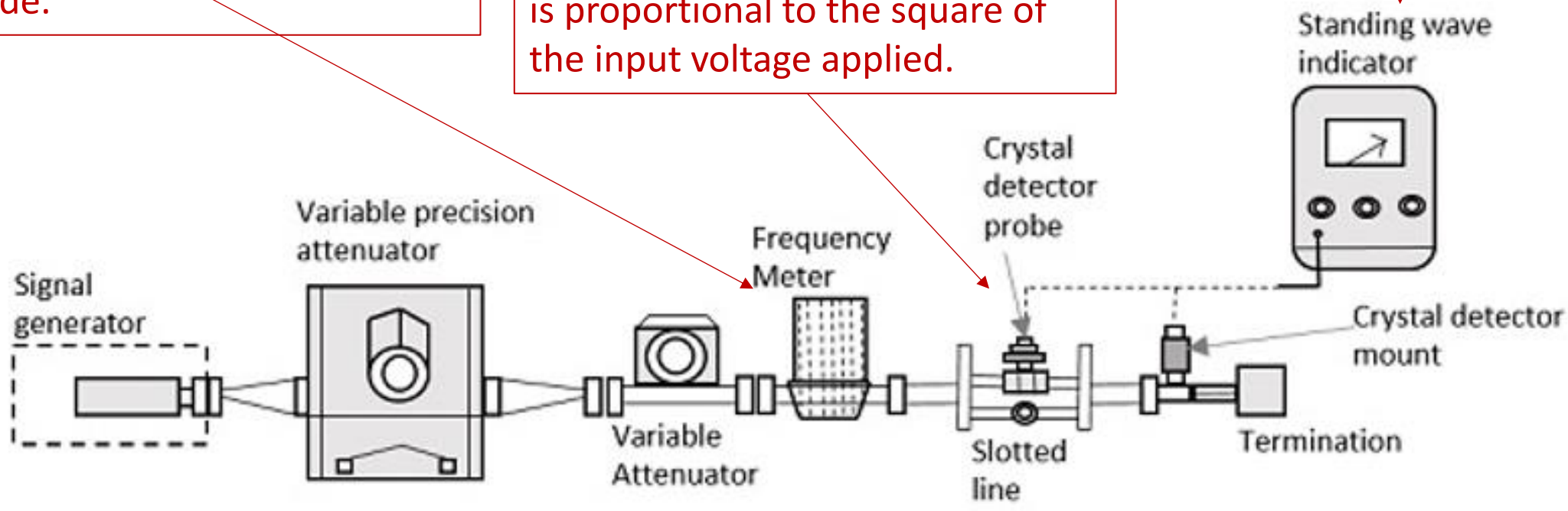
1. Measures the frequency of the signal.
2. Can be used to adjust the resonance frequency.
3. Has provision to couple the signal to waveguide.

Crystal Detector

The detector is connected through a probe to the mount. This is used to demodulate the signals.
The output of the crystal detector is proportional to the square of the input voltage applied.

Standing Wave Indicator

The standing wave voltmeter provides the reading of standing wave ratio in dB.



Slotted line

Consists of a precision transmission line, usually co-axial but waveguide implementations are also used, with a movable insulated probe inserted into a longitudinal slot cut into the line.