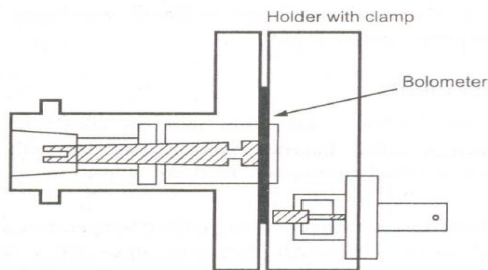


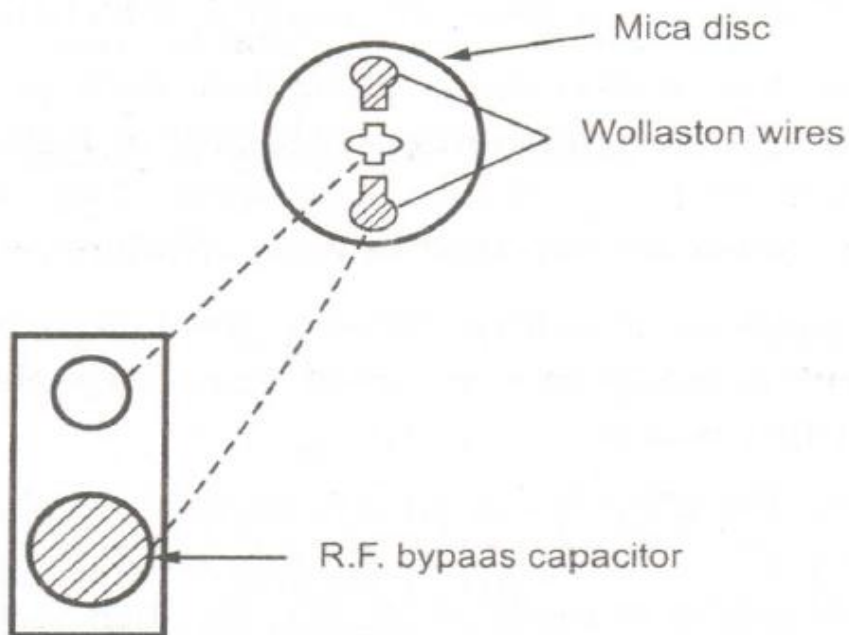
BOLOMETER MOUNT AND POWER MEASUREMENT

Bolometer Mount

It consists of a thin mica disc. It consists sprayed silver electrodes. There are through silver plated holes which enables the contact of outer electrode with circular electrode on opposite side. Two depleted Wollaston wires of diameter equal to 1 micron are mounted between centre and outer electrode. These wires are very short and typically of length 1 - 2 mm. With normal bias power, for d.c. conditions, the resistance of both the wires is about 100 Ω . The holder is used to clamp the mica disc which makes contact of upper electrode with the metal case and other electrodes are insulated from co-axial line as shown in the Fig. The circuit is completed through the thin mica sheet which provides bypass capacitance.



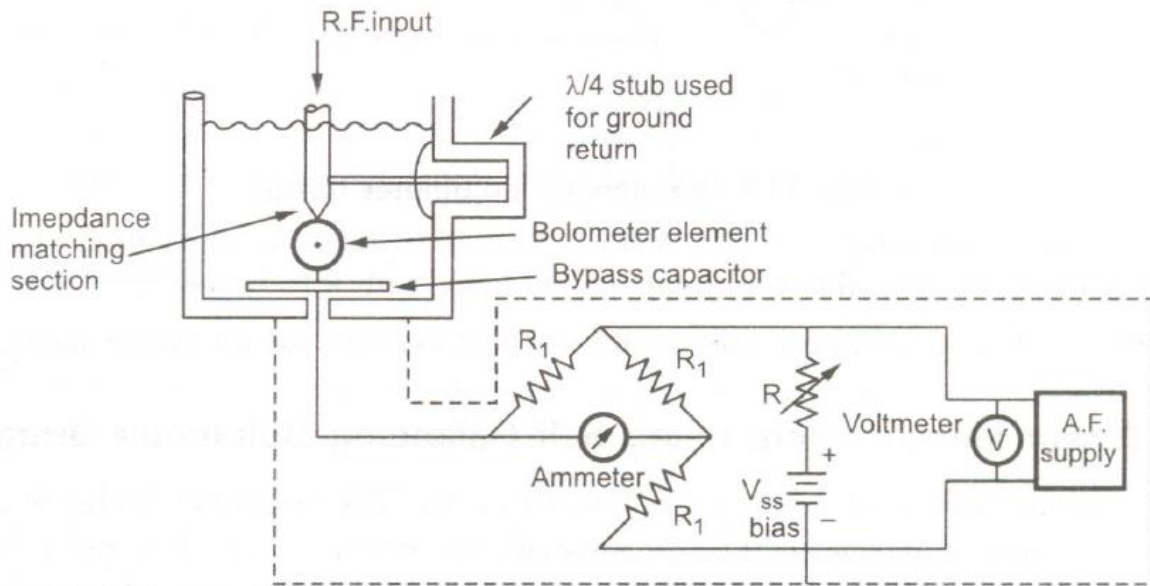
(a) Bolometer mount



(b) Bolometer element

Bolometer Bridge for Measurement of Power

The measurement of unknown RF. power is done by using bolometer bridge in which a known A.F. power is superimposed on unknown RF. power. The schematic of power measurement using bolometer bridge is as shown in the Fig.

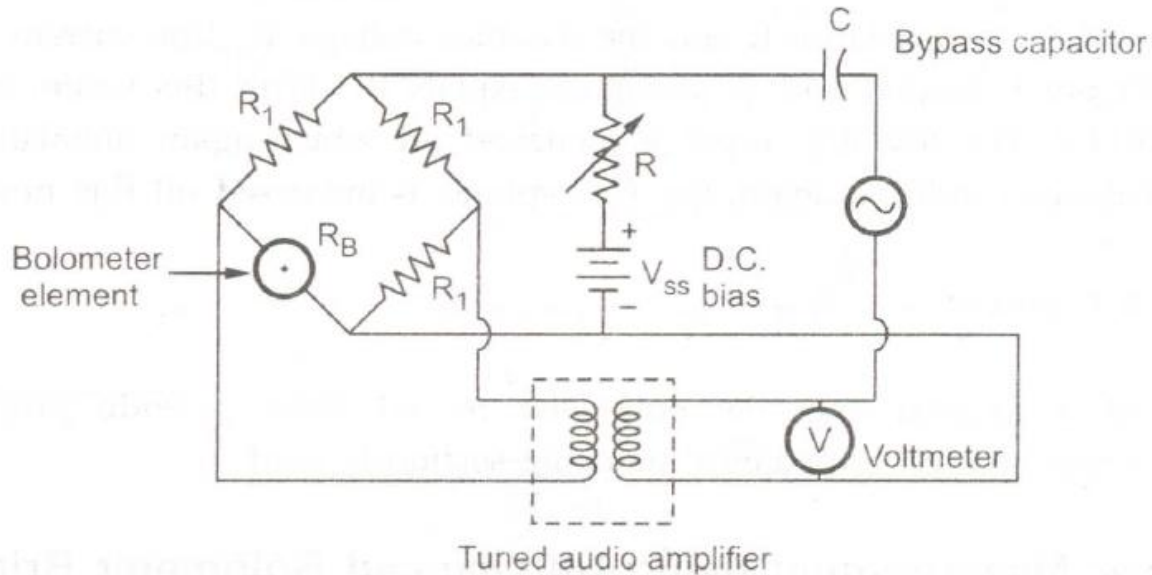


Using the variable resistance R and the d.c. bias voltage V_{ss} , the current is adjusted till bolometer element is heated and its resistance equals R_1 . With this value, bridge achieves balance condition. The test RF. input is switched off which again unbalances bridge. To achieve the balance condition again, the A.F. voltage is increased till RF. power equals

$$\text{R.F. power} = \frac{V_2^2 - V_1^2}{4 R_1}$$

Power measurement using self balancing bolometer

This method uses a self balancing bolometer bridge. The bolometer bridge is called self balancing because it rebalances bridge automatically whenever the bolometer element is supplied with unknown K.F. power. A typical circuit diagram for self balancing bolometer bridge is as shown in the Fig.



This method uses an audio amplifier which is high gain frequency selective amplifier. The input and output terminals of the amplifier are coupled through bolometer bridge. The feedback used in amplifier produces sustained A.F. oscillations and also maintains the resistance of the bolometer at a fixed value required for balanced condition.

When the supply is switched ON, the bolometer bridge becomes unbalance. But due to the oscillations produced with a proper phase, the bridge becomes almost balanced. The gain of the tuned audio amplifier plays important role. That means if the gain of the amplifier is higher then the bolometer bridge balances closely.

When the K.F. power is dissipated in the bolometer element, the bridge again becomes unbalanced. But again the output voltage of amplifier readjusts the balancing condition automatically by restoring the value of bolometer resistance. Note that the amount of A.F. power level reduces in the bolometer is equal to the unknown applied K.F. power. The voltmeter V measures A.F. voltage and it is calibrated in such a way that the magnitude of the K.F. power is read directly. A typical self balancing bolometer bridge circuit can be used for measurement of several power ranges from 0.1 mW to 100 mW. In such circuit, the bolometer used has a resistance with five selected values from 50 Ω to 250 Ω within + 10 % range.