

POWER METER

Aim: To learn the principle of operation, and applications of Power Meter.

Objective: To study the construction of power meter

* Designed to process the output of bolometer and to represent the power level on a calibrated scale.

* constructed from a balanced bridge ckt - one of the arms is the bolometer.

Single Bridge Power Meter:

microwave power applied to the arm will change the bolometer's resistance causing an unbalance of the bridge from

its initial balance condition under zero incident power

(thermistor)

* Heating effect causes the bolometer's resistance to decrease and unbalances the bridge in proportion to the power applied.

* Non-zero OIP \Rightarrow on a voltmeter calibrated to read the level of the i/p microwave power.

disadvantages of single bridge \rightarrow

* change of res due to mismatch at the ^{port} i/p results in the incorrect reading

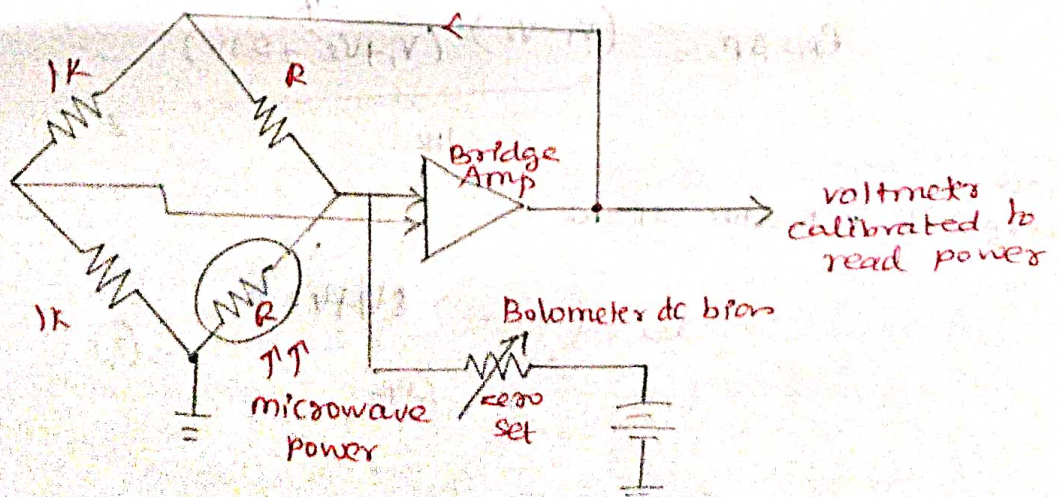
* Thermistor is sensitive to changes in the ambient temperature,

\rightarrow false reading.

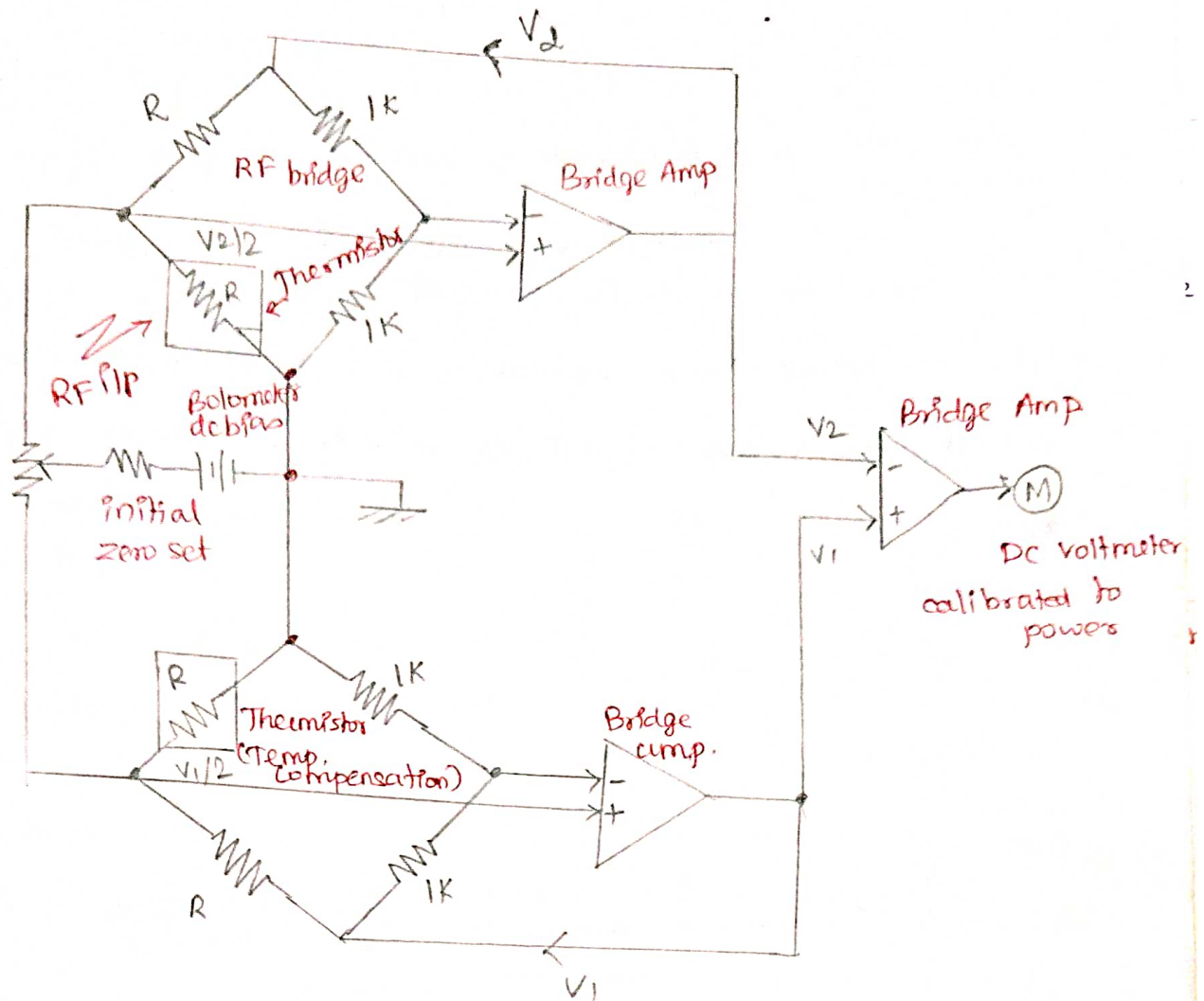
Double Bridge Power meter

* upper bridge circuit measures the microwave power and the lower bridge circuit compensates the effect of ambient temperature variation.

* microwave power due to mismatch is compensated automatically thro' a self-balancing ckt by decreasing the dc power $\frac{1}{2}$ carried by the RF sensing thermistor until bridge balance is restored or a net change in the thermistor res is zero due to negative dc feedback.



Power meter - single bridge



Power meter using double bridge for compensation

* Power meter - report the power in dBm (decibels relative to 1 milliwatt)

Applications:

- used to measure the electrical power at microwave freq. range 100 MHz to 40 GHz

(V₁-V₂)
 - Average power meter & Peak and Avg. power meters
 - Laboratory measurements

Outcome:

Able to understand the working principle of power meters and its applications.

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