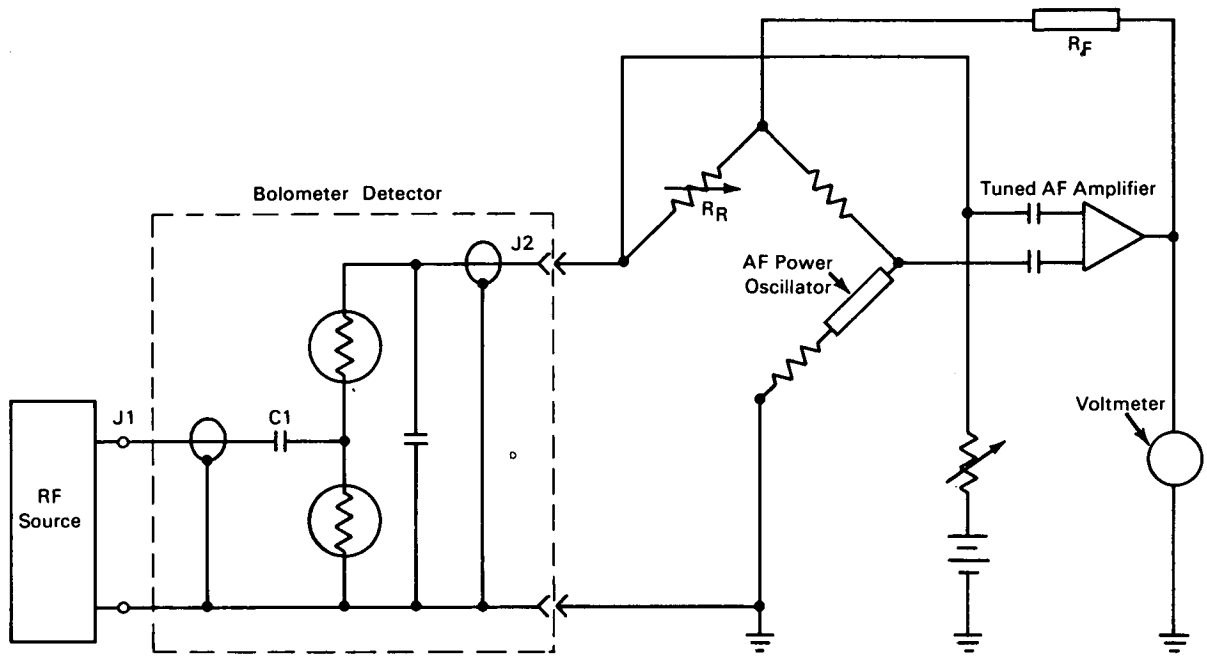
NASA TECH BRIEF

Simplified Method for Measuring the Impedance of RF Power Sources: A Concept



The problem:

The transfer of output power from an rf source is maximized when the rf-source output impedance matches the characteristic impedance of its load. A simple method is required to measure the rf-source output impedance so that maximum power transfer is achieved.

The solution:

A conventional bolometer detector and bridge circuit were used to measure the rf power. A bridge reference resistor was varied to achieve the condition of maximum power transfer; when this condition was reached, the output impedance of the rf source was determined from the known circuit parameters.

How it's done:

The figure illustrates a bolometer detector connected as one leg of a typical power bridge. With no rf power introduced into the bolometer detector, proper amounts of dc and af power cause the bolometer elements to be driven to the resistance which is equal to the bridge reference resistor, R_R. The dc bias is adjusted so that the af power from the oscillator causes the voltmeter to read zero with no rf introduced into the bolometer.

With the dc bias maintained constant (to zero the meter), the rf power to be measured is applied to J1; the resistance change of the bolometer element, caused by the heating effect produced by the rf power, un-

(continued overleaf)

balances the power bridge. The feedback causes the af oscillator to reduce power by an amount equivalent to the rf power that has been added.

The concept allows for the adjustment of the bridge reference resistor (R_R) which varies the load resistance that is presented to the rf source. The dc bias power is then introduced into J1, and R_R is varied until the indicated power reaches maximum. The rf source resistance can be derived from the value of R_R and the relationship of the measured power and frequency.

Note:

This development is in conceptual stage only, and as of date of publication of this Tech Brief, neither a model nor prototype has been constructed. No additional documentation is available.

Patent status:

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