voltage across an impedance to measure low temperatures but they do not propose any practical scheme for a thermometer of this kind and no serious attempt has been reported which indicates that such an experiment has been performed at low temperature.

In 1946 Dicke *et al.* reported a radiometer which measures thermal radiation at microwave frequencies. This method is essentially a commutation comparison technique which compares the unknown noise with that of a standard source. The radiometer has been used for observations of microwave radiation from the sun and the moon and for the measurement of atmospheric absorption at several microwave frequencies. Garrison and Lawson (1949) developed an absolute noise thermometer of the Dicke type to measure high temperatures. A chopper at the input of the amplifier is used to connect alternately the thermometer resistor and a resistor at ambient temperature (standard noise source). The principal limitation of such a switching device for comparison of noise voltages is the variation in contact potential of the chopper. Also the ultimate sensitivity of such a thermometer depends upon the noise-signal-to-amplifier-noise ratio. Aumont and Romand (1954) attempted an improvement of Garrison's and Lawson's thermometer, but the final results have not yet been reported. The National Physical Laboratory (1957) reports also an improved noise thermometer for high temperatures ($\sim$1100° C) based on the switching technique which is capable of comparing noise voltages to 0.05%. Cade (1958) uses an electronic switch instead of a chopper.

To avoid any switching device at the inputs of the amplifier and to make noise measurements virtually independent of the amplifier noise, one can arrange three resistors, which are kept at different temperatures, in form of a π network; and if now two of the thermal noise voltages appearing across the network are multiplied together and averaged with respect to time, then under certain conditions the correlation between those voltages can be made zero. From this condition one can calculate the temperature of one noise source,

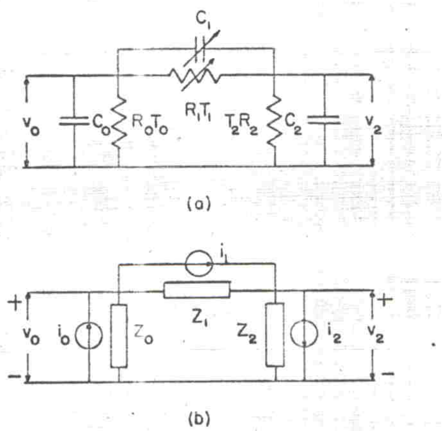

FIG. 1. (*a*) The π network as used to correlate noise between R_0 and R_2 via R_1.
(*b*) The block diagram and the equivalent noise current sources of the π network.