MONSANTO CHEMICAL COMPANY OF ALABAMA
INSPECTION DEPARTMENT

DETERMINATION OF POWER FACTOR OF LIQUID DIELECTRICS AT 100° C., 1000 FREQUENCY

A. Circuit Arrangement for Power Factor Measurement.

Power Source: 6 volt plate battery with Audio Oscillator, General Radio Type 213B giving frequency of 1000 cps.

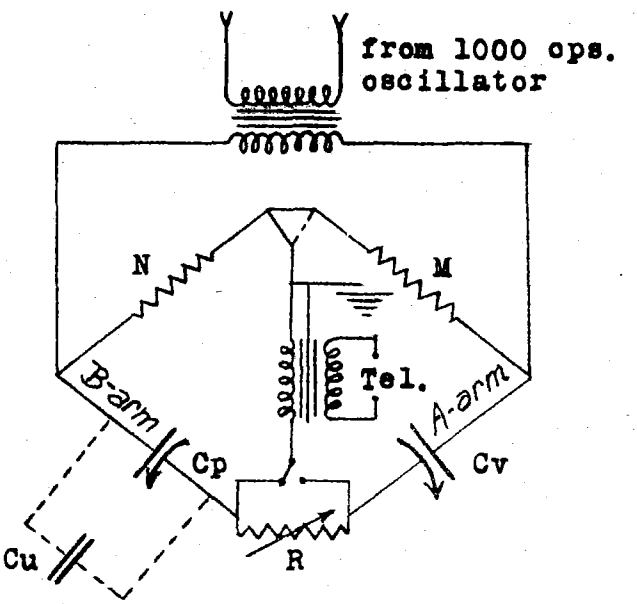
Capacity Bridge: General Radio Type 216. (M equal to N)

Telephone: Head phones with two stage amplification.

Cv : Variable Air Condenser, 1500 MMF capacity, G.R. Type 246-L.

Cp : Precision Condenser (variable air), 1500 MMF capacity, G.R. Type 222-L

Cu : The "unknown" Condenser with liquid under test as dielectric. Plates of this condenser must be exceptionally well insulated to avoid introduction of errors.



Bridge balance is obtained by simultaneous adjustment of Cp or Cv and the resistor R.

B. Procedure for Measurements.

1. Power factor is obtained from measurements of the capacity and the equivalent series resistance of a condenser (Cu) which has the substance under test as dielectric.

2. To secure these measurements, balance Cu and Cp (in parallel) against Cv. Record the capacitance reading (Cpa) of Condenser Cp and the resistance reading (Ra) on resistor R.

3. Disconnect Condenser Cu and again obtain balance, leaving Cv undisturbed. Record the capacitance reading (Cpb) of Condenser Cp and the resistance reading (Rb) on resistor R.

4. The capacitance (Ccu) in MMF of the Condenser Cu is Cpb minus Cpa. The equivalent series resistance (Ru) in ohms of the Condenser Cu is calculated from the equation $Ru = (Ra - Rb)\frac{(Cpb)^2}{(Ccu)^2}$.

5. Calculate power factor from the following equation where f is frequency in cps. PF in % = $(6.28f) \times Ru \times Ccu \times 10^{-10}$.

6. Corrections for equivalent resistances of Cp and Cu with air dielectric must be made if these are not negligible.

7. During measurements, Condenser Cu and its dielectric under test are maintained at 100° C.

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