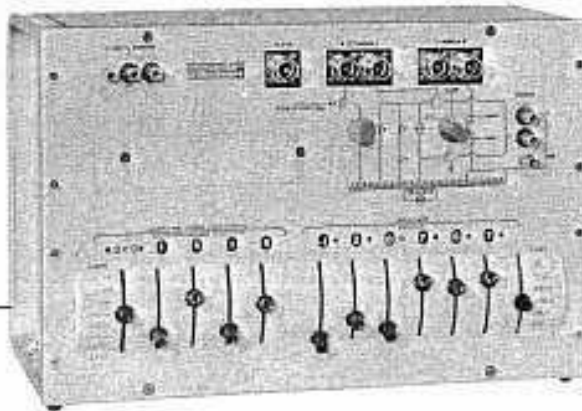




CAPACITANCE BRIDGE

Type 1615-A



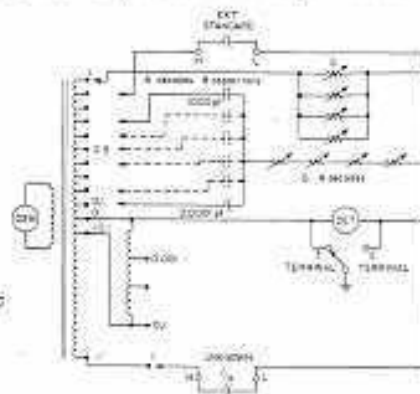
The 1615-A is an accurate, high-precision bridge for the measurement and intercomparison of standard capacitors, circuit component capacitors, or dielectric materials. It is available with oscillator and detector in the 1620 assembly listed on the previous page. Or, to take full advantage of its wide frequency range, the bridge can

be ordered separately for use with oscillator and detector especially selected for the purpose or already in hand.

1615-P1



1615-P2



Elementary schematic diagram of the capacitance bridge.

specifications

RANGES OF MEASUREMENT

Capacitance, C, 10 aF to 11.11110 pF (10^{-17} to 10^{-14} farad) in 6 ranges, direct-reading, 6-figure resolution; least count 10^{-7} F (10 aF). With Range-Extension Capacitor, upper limit is 11.11110 pF.

Dissipation Factor, D, At 1 kHz, 0.000001 to 1, 4-figure resolution; least count, 0.000001; range varies directly with frequency.

Conductance, G, 10^{-10} to 100 μ S, 2 ranges +, 2 ranges -, 4-figure resolution, least count 10^{-10} μ S independent of frequency; range varies with C range.

FREQUENCY: Approx 50 Hz to 10 kHz. Useful with reduced accuracy to 100 kHz. Below 100 Hz, resolution beyond 0.01% or 0.01 pF requires preamplifier or special detector.

GENERAL

Standards: 1000, 100, 10, 1, 0.1, 0.01, 0.001, 0.0001 pF. Temperature coefficient of capacitance is less than 5 ppm/°C for the 1000-, 100-, and 10-pF standards, slightly greater for the smaller units.

Generator: Type 1310-A or 1311-A oscillator recommended. Max safe generator voltage 30 x f_{Hz} volts, 300 V max. If generator and detector connections are interchanged, 150 to 500 V can be applied, depending on switch settings.

Detector: Type 1232-A Tuned Amplifier and Null Detector recommended. For increased sensitivity needed to measure low-loss small capacitors (on lowest C and D ranges simultaneously) at frequencies below 1 kHz, use 1232-AP.

Accessories Supplied: 874-WD Open-Circuit Termination, 874-R22A Patch Cord, 274-NL Patch Cord.

Accessories Available: Type 1615-P1 Range-Extension Capacitor,

ACCURACY

At 1 kHz, $\pm(0.01\% + 0.00003 \text{ pF})$. At higher frequencies and with high capacitance, additional error is

$$\pm[3 \times 10^{-4}\% + 2 \times 10^{-4}\% (C_{tr}) + 3 \times 10^{-4}\% (f_{Hz}) \times f_{Hz}]$$

At lower frequencies and with low capacitance, accuracy may be limited by bridge sensitivity.

Comparison, accuracy, unknown to external standard, 1 ppm.

$$\pm[0.1\% \text{ of measured value} + 1 \times 10^{-7} (1 + f_{Hz} + 5 \text{ } f_{Hz} C_{tr})]$$

$$\pm[1\% \text{ of measured value} + 1 \times 10^{-7} \mu\text{S} + 6 \times 10^{-4}\% C_{tr} \times (1 + f_{Hz} + 5 \text{ } f_{Hz} C_{tr}) \mu\text{S}]$$

1615-P2 Coaxial Adaptor converts 2-terminal binding-post connection on 1615 bridge to GR500 Precision Coaxial Connector for highly repeatable connections; enables measurements with adaptor to be direct-reading by compensating for terminal capacitance.
Mounting: Rack-Bench Cabinet.

Dimensions (width x height x depth): Bench model, 19 x 12 $\frac{1}{2}$ x 10 $\frac{1}{2}$ in. (485 x 325 x 270 mm); rack model, 19 x 12 $\frac{1}{2}$ x 8 $\frac{1}{2}$ in. (485 x 315 x 220 mm); 1615-P1, 3-1/16 in. dia. x 4 $\frac{1}{2}$ in. (78 x 125 mm).

Weight: Net, 38 $\frac{1}{2}$ lb (17.5 kg); shipping, 58 lb (27 kg).

Catalog Number	Description
1615-9801	1615-A Capacitance Bridge Bench Model
1615-9811	1615-A Capacitance Bridge Rack Model
1615-9501	1615-P1 Range-Extension Capacitor
1615-9502	1615-P2 Coaxial Adaptor, GR500 to binding posts

Oscillators
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1232 Detector
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