



1617-A Capacitance Bridge

- 1 pF to 1.1 farads
- 20 Hz to 1 kHz
- 1% accuracy
- 2-, 3-, or 4-terminal connections

Self-Contained bridge The 1617-A was specifically designed for measuring capacitance, dissipation factor, and leakage current of electrolytic capacitors, but it will also find considerable use as a general-purpose 1% bridge. It is completely self-contained, including a 120-Hz generator, null detector, dc polarizing-voltage supply, and metering for bias voltage and leakage current. At frequencies other than 120 Hz, use an external oscillator.

Multiterminal connections An unknown capacitor can be connected to the bridge by means of three- or four-terminal connections, as well as the usual two-terminal. The four-terminal connection permits accurate measure-

ment of large capacitance by reducing the effect of the resistance and inductance of leads and connections. Correct measurements of small capacitances are assured by the three-terminal connection, which reduces the effect of stray lead capacitance. A multiterminal configuration is necessary for accurate measurement of capacitors connected by long cables leading, for instance, from the bridge on a nearby bench into an environmental test chamber.

This bridge includes an Orthonull® balance finder, which speeds up measurements of high-dissipation-factor capacitors by eliminating troublesome sliding balance. The operator's safety is enhanced by warning lights indicating the presence of voltage on the bridge terminals.

Electrolytics The 1617 Capacitance Bridge is designed especially for measuring large-valued capacitors like those in table, as well as other electrolytic types, most of which require the special measurement conditions prescribed by MIL or EIA specifications:

Specification and Capacitor Type	Frequency	AC Level	C	Accuracy Loss	DC Polarizing Voltage
MIL C-3965-C MIL C-39006-A Tantalum Foil and Sintered Slug Capacitors	120 ± 5 Hz	Less than 30% of DCWV or 1 V, pk, whichever is smaller (Less than 1V rms for 39006A)	2%	R or P.F. 2% (P.F. 2% for -39006A)	C—Sufficient for no reversal of polarity. D—"Polarized Capacitance Bridge" Sum of ac and dc shall not exceed DCWV (Less than 2.2 V for 39006A)
MIL C-26655-B MIL C-39003 Solid Tantalum Capacitors MIL C-39018 Aluminum Oxide Capacitors	120 ± 5 Hz	Limited to 1V, rms	2%	D, 10% (2% for -39003 and -39018)	C—Max bias 2.2 V. D—"Polarized Bridge", 2.2-V dc max.
RS 228 Tantalum Electrolytic Capacitors	120 Hz	Small enough not to change value	±2½%	D, 5%	Optional
MIL C-62 B Polarized Aluminum Capacitors	120 ± 5 Hz	Limited to 30% of DCWV or 4 V, whichever is smaller	2%	D, 2%	No bias required if ac voltage less than 1 V. However, if bias causes differences, measurements with bias shall govern.
RS 154 B Dry Aluminum Electrolytic Capacitors	120 Hz	Small enough not to change value	±2½%	R or RC	Optional, but if substantial difference occurs, rated dc should be used.
RS 205 Electrolytic Capacitors for use in Electronic Instruments	120 Hz	Small enough not to change value	±2½%	D	Optional

SPECIFICATIONS

Quantity	Frequency	Range	Accuracy *
Capacitance	120 Hz internal	0 to 0.11 F	±1% ±1 pF, smallest division 2 pF; residual ("zero") capacitance approx 4 pF
		0.11 F to 1.1 F	±2%
	40 Hz to 120 Hz external (useful down to 20 Hz with reduced accuracy)	0 to 1.1 F	Same as above with suitable generator
	120 Hz to 1 kHz external	0 to $\left(\frac{100}{f_{Hz}}\right)^2$ F	±1% ±1 pF with suitable generator and precautions
Dissipation Factor	120 Hz internal or 40 Hz to 120 Hz	0 to $10 \frac{f_{Hz}}{120}$	±0.001 ±0.01 C ±2% †
	120 Hz to 1 kHz	0 to 10	(±0.001 ±0.01 C) $\frac{f_{Hz}}{120}$ ±2% †

†Additional error (due to lead resistance) for 4-terminal measurements: For C < 1%, for D < 0.01, if each lead has < 1 Ω of resistance, except on the highest measurement range the corresponding lead resistance is 0.1 Ω.

* C is expressed in farads.

Frequency: INTERNAL TEST SIGNAL: 120 Hz (synchronized to power line) for 60-Hz model; 100 Hz for 50-Hz model. Phase reversible. Amplitude selected by switch to be 0.2, 0.5, or 2 V max. EXTERNAL TEST SIGNAL: 20 Hz to 1 kHz. (See table for C range.)

Dc Bias Voltage: Internal power supply and meter: 0 to 600 V in 6 ranges. Meter accuracy: ±3% of full scale. External bias limit: 800 V max.

Bias Current (from internal source): ≈ 15 mA max. **METER:** Range, 0 to 20 mA in 6 ranges; resolution, 0.5 μA (first range); accuracy, ±3% of full scale.

Required, for measurements at frequencies other than twice the line: An oscillator such as the 1311 for spot frequencies or the 1310 for continuous coverage.

Supplied: 4-lead and shielded 2-lead cable assemblies.

Power: 105 to 125 V or 210 to 250 V, 18 W. Both 50 and 60-Hz models.

Mechanical: Flip-Tilt case and rack mount. **DIMENSIONS** (wxhxd): Portable, 16.25x15x9 in. (413x381x229 mm); rack, 19x14x6.13 in. (483x356x155 mm). **WEIGHT:** Portable: 26 lb (12 kg) net, 34 lb (16 kg) shipping; rack, 28 lb (13 kg) net, 43 lb (20 kg) shipping.

Description	Catalog Number
1617 Capacitance Bridge	
Portable Model (115 V, 60 Hz)	1617-9701
Portable Model (230 V, 60 Hz)	1617-9286
Portable Model (115 V, 50 Hz)	1617-9206
Portable Model (230 V, 50 Hz)	1617-9266
Rack Model (115 V, 60 Hz)	1617-9820
Rack Model (230 V, 60 Hz)	1617-9296
Rack Model (115 V, 50 Hz)	1617-9216
Rack Model (230 V, 50 Hz)	1617-9276
Patent Number 2,872,639.	