



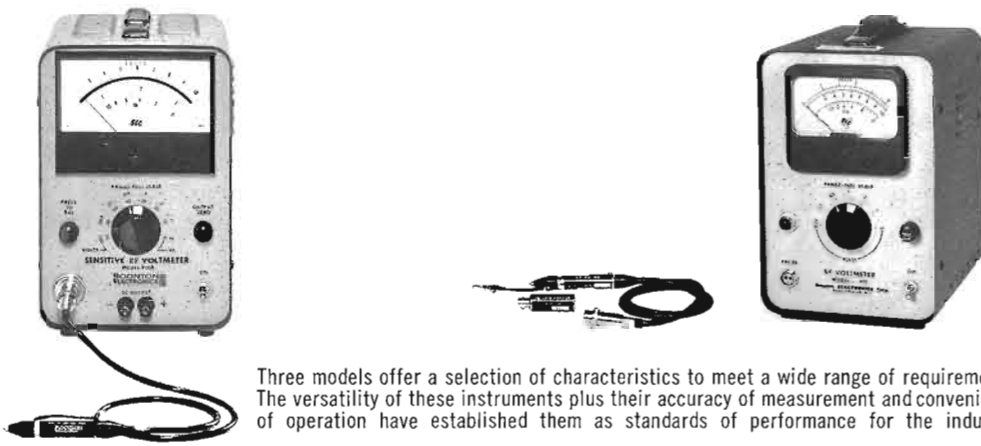
BOONTON
ELECTRONICS
CORPORATION

CONDENSED CATALOG CC-8

ELECTRONIC INSTRUMENTS for LABORATORY and PRODUCTION

Sensitive RF Voltmeters ■ Sensitive DC Voltmeters & Null Detectors ■ RF Admittance Bridges
Capacitance & Inductance Bridges ■ RF Distortion Meters ■ Automatic Test Equipment

Sensitive Broad-Band RF Voltmeters



Three models offer a selection of characteristics to meet a wide range of requirements. The versatility of these instruments plus their accuracy of measurement and convenience of operation have established them as standards of performance for the industry.

| | Model 91DA | Model 91H | Model 91C |
|--------------------|---|----------------------------------|--------------------------------|
| Voltage Range: | 300 μ V to 300 V* | 100 μ V to 300 V* | 1 mV to 300 V* |
| Frequency Range: | 20 Kc/s to 1200 Mc/s*, with uncalibrated response for relative measurements to beyond 4000 Mc/s | | |
| Basic Accuracy: | $\pm 2\%$ fs | $\pm 3\%$ fs | $\pm 5\%$ fs |
| VSWR: | Less than 1.2 up to 1200 Mc/s for all models | | |
| dB Range: | 80 | 80 | 70 |
| Waveform Response: | True rms up to 0.03 V (to 3 V with accessory 100:1 Voltage Divider) gradually approaching peak reading (calibrated in rms) above this level | | |
| Power Sensitivity: | 0.0018 μ watt (50 Ω) | 0.0002 μ watt (50 Ω) | 0.02 μ watt (50 Ω) |
| Linear DC Output: | yes | yes | no |
| Price: | \$650.00 | \$550.00 | \$450.00 |

(Rack mounted versions of all RF Voltmeters \$25.00 extra)

*Using appropriate accessory

Accessories for RF Voltmeters

| | | | | | |
|---------|--|------|----------|---|------|
| 91-4C | 1 Kc/s to 250 Mc/s Probe for 91C, 91H | \$60 | 91-12E† | 20 Kc/s to 1200 Mc/s Probe for 91C, H | \$45 |
| 91-6C | Unterminated BNC Adapter | \$15 | 91-13B** | RF Probe Tip | \$ 3 |
| 91-7C | 100:1 Voltage Divider (50 Kc/s to 700 Mc/s) | \$30 | 91-14A | Type N "Tee" Adapter (20 Kc/s to 1200 Mc/s) | \$25 |
| 91-8B† | 50 Ω BNC Adapter (other impedances available) | \$20 | 91-15A | 50 Ω Type N Termination (20 Kc/s to 1200 Mc/s) | \$25 |
| 91-12D* | 20 Kc/s to 1200 Mc/s Probe for 91DA | \$50 | 91-17D | 1 Kc/s to 250 Mc/s Probe for 91DA | \$60 |

*Supplied with Model 91DA, and included in price. †Supplied with Models 91C, 91H, and included in price.



Inductance Bridges Models 63H, 63L, and 63M

Maxwell type bridges provide direct reading measurements of inductance and series resistance. All three completely self-contained, including test signal oscillator and detector. Exceptional stability. Measure inductance and Q over wide ranges and down to extremely low values. Particularly well suited for determination of temperature coefficient, and for measuring permeability and loss of magnetic materials.

Model 63H
Inductance Measurement: 0.0002 μ H to 110 mH; accuracy, $\pm 0.25\%$; resolution, 0.01 μ H
Series Resistance Measurement: 0.0002 Ω to 11,000 Ω ; accuracy, $\pm 3\%$
Test Signal: Internal oscillator-detector continuously adjustable from 5 Kc/s to 500 Kc/s; max. open-circuit level, 3 V

Model 63L
Inductance Measurement: 0.02 μ H to 11 H; accuracy, $\pm 0.25\%$; resolution, 0.01 μ H
Series Resistance Measurement: 0.002 Ω to 110,000 Ω ; accuracy, $\pm 3\%$
Test Signal: Internal oscillator-detector continuously adjustable from 400 c/s to 20 Kc/s; max. open-circuit level 5.5 V

Model 63M
Inductance Measurement: 0.002 μ H to 1.1 H; accuracy, $\pm 0.25\%$; resolution, 0.01 μ H
Series Resistance Measurement: 0.002 Ω to 110,000 Ω ; accuracy, $\pm 3\%$
Test Signal: Internal oscillator-detector continuously adjustable from 1 Kc/s to 100 Kc/s; max. open-circuit level 5.5 V
Prices: Models 63H, 63L, and 63M, \$1,850.00

Precision Impedance Instrumentation



1 Mc/s Capacitance/Inductance Meter Model 71A

Quick, convenient, direct reading, 3-terminal (direct) measurements of capacitance and 2-terminal (grounded) measurements of inductance. Internally supplied 1 Mc/s test signal. Operates with low test signal level for semiconductor measurements. Linear meter scales. Linear dc output proportional to capacitance or inductance reading for digital display, data logging, or for actuation of materials handling equipment. Extremely valuable for go/no-go capacitance or inductance testing.

Capacitance Measurements: 0 to 1000 pF in 7 ranges; accuracy, $\pm 1\%$ fs; Resolution, 0.01 pF
Inductance Measurement: 0 to 1000 μ H in 7 ranges; accuracy, $\pm 1\%$ fs; Resolution, 0.01 μ H
Test Signal: Frequency, 1 Mc/s, crystal controlled; level: 15 mV for capacitance measurements; less than 1 mV for inductance measurements

Q Range: Specified accuracies apply for test specimens having Q's of 3 or more; slightly reduced accuracy for Q's of lower value
DC Output Voltage: 0 to 100 mV or 0 to 300 mV, depending on numerics of full scale. Also 1 V fs for loads > 10 M Ω
Price: \$675.00



100 Kc/s Capacitance Bridge Model 74D

Completely self-contained 3-terminal bridge for precision measurement of capacitance and conductance over very broad ranges; excellent stability with negligible warm-up drift. "Linear" mode for limit operation for go/no-go testing. Provision for use as comparison bridge. Test signal level adjustable to low values for semiconductor testing. 3-terminal arrangement permits use of remote test jig without lead capacitance problems; 2-terminal operation also provided. Balancing simple and convenient, with no false or sliding nulls. Internally supplied dc bias. Vernier capacitance dial provides scale effectively 15 feet long.

Capacitance Measurement: 0.0002 pF to 110,000 pF; accuracy, $\pm 0.1\%$; resolution, 0.0002 pF
Conductance Measurement: 0.001 μ mho to 1000 μ mhos; accuracy, $\pm 5\%$
Test Signal: Internally supplied; 100 Kc/s; level continuously adjustable from 1 mV to 4 V
DC Bias: Internal, -5 V to +110 V; External, up to ± 400 V
Price: \$1,350.00



1 Mc/s Capacitance Bridges Models 75A and 75B

These precision capacitance bridges having test frequency of 1 Mc/s as required by many MIL SPECS have become the standard of the semiconductor and capacitor industries. 3-terminal (direct) arrangement eliminates errors resulting from lead capacitance to ground. High stability permits differential capacitance measurements. Main C balance control is zero-back lash vernier providing scale effectively 15 feet long. DC bias supply available in —S8 versions.

Model 75A
Capacitance Measurement: 0.0002 pF to 1000 pF; accuracy, $\pm 0.25\%$; resolution, 0.0002 pF
Conductance Measurement: 0.01 μ mho to 1000 μ mhos; accuracy, $\pm 5\%$
Operating Mode: 3-terminal (direct), or 2-terminal (grounded)

Test Signal: Built-in 1 Mc/s test oscillator-detector; level adjustable from 20 mV to 3 V
DC Bias: (—S8 version only); internal, continuously adjustable from -5 to +125 V; external, to ± 400 V, 100 mA, max.

Prices: Model 75A, \$1,250.00. Model 75A-S8, \$1,325.00

Model 75B
Capacitance Measurement: 0.00002 pF to 1000 pF; accuracy, $\pm 0.25\%$; resolution, 0.00002 pF
Conductance Measurement: 0.01 μ mho to 1000 μ mhos; accuracy, $\pm 5\%$
Operating Mode: 3-terminal (direct) only

Test Signal: Built-in 1 Mc/s test oscillator-detector; level adjustable from 1 mV to 3 V
DC Bias: (—S8 version only); internal, continuously adjustable from -5 to +125 V; external, to ± 400 V, 100 mA, max.

Price: Model 75B, \$1,500.00. Model 75B-S8, \$1,575.00



Variable Frequency Capacitance Bridge Model 75C

Versatile 3-terminal bridge having test frequency continuously adjustable from 5 Kc/s to 500 Kc/s. Permits determination of effects of frequency upon test. Includes built-in dc bias supply. Provides performance characteristics and convenience of operation similar to Model 75A 1 Mc/s bridge (see above).

Capacitance Measurement: 0.0002 pF to 1000 pF; accuracy, $\pm 0.25\%$; resolution, 0.0002 pF
Conductance Measurement: 0.001 μ mho to 1000 μ mhos; accuracy, $\pm 5\%$
Test Signal: Internally supplied; continuously adjustable in frequency from 5 Kc/s to 500 Kc/s; level adjustable from below 1 mV to 3 V
DC Bias: Internal only; continuously adjustable from -5 V to +100 V
Price: \$1,900.00



1 Mc/s Capacitance Limit Bridge Model 77B

True dual-limit capacitance tests over a wide range of nominal values and tolerances. Issues test decision outputs visually as well as in form for actuation of materials handling equipment or data logging. With tolerance limits adjusted to $\pm 0\%$, Model 77B is useful as extremely high resolution laboratory type capacitance bridge. Inductance measurements also possible. 3-terminal (direct) operation. Built-in dc bias supply.

Capacitance Measurement: 0.0001 pF to 1000 pF (1200 pF with max. limit); accuracy, $\pm 0.25\%$; resolution, 0.0001 pF

Conductance Measurement: Manual only; range, 0 to 1000 μ mhos; accuracy, $\pm 5\%$

Tolerance Range: Continuously adjustable from ± 0.0005 pF to ± 200 pF; limit resolution, 1% of setting.

Test Signal: Internally supplied; 1 Mc/s, crystal controlled; level adjustable from 1 mV to 250 mV

Test Time: Approximately 0.05 second.

Decision Output: Green, red, and amber panel lamps indicating "Go", "High", and "Low", respectively; continuity contacts at rear panel in conformance with test decisions; sample of indicator-lamp filament voltages at rear panel
DC Bias: Internal, continuously adjustable from -5 V to +125 V; external, to ± 400 V, 100 mA max.

Price: \$2,000.00



RF Admittance Bridge Model 33A

Precise, high resolution measurement of capacitance and loss at high frequencies and with low test signal levels. Shunt inductance, series and shunt resistance, dissipation factor, and Q may also be readily determined. Built-in dc bias supply with provision for external bias. Particularly useful for semiconductors and integrated circuits.

Capacitance Measurement: 0 to 150 pF; to 30 pF at 100 Mc/s; accuracy, $\pm 1\%$; resolution, 0.02 pF
Conductance Measurement: 0 to 25,000 μ mhos; accuracy, $\pm 2\%$; resolution, 0.5 μ mho

Test Signal: 7 internally supplied crystal controlled frequencies of 1, 5, 10, 20, 30, 50, and 100 Mc/s; level continuously adjustable from 0.1 V down to as low as 1 mV

DC Bias: Internal, continuously adjustable from -5 to +100 V; external, to ± 250 V
Price: \$2,000.00

Ultra High Resolution RF Admittance Bridge Model 33A-S7

Capacitance measurements with resolution of 0.002 pF over capacitance range of 0 to 15 pF for applications where the utmost resolution of small values of capacitance is required. Otherwise identical to Model 33A.

Price: \$2,134.00

Sensitive DC Instruments



Sensitive DC Null Detector Model 56A

Electronic galvanometer providing exceptionally high sensitivity and high input impedance. Especially valuable as indicator in conjunction with Wheatstone Bridge. Zero center scale. 60 dB scale compression in HUNT mode virtually eliminates range switching when measuring specimens of unknown value. Provision for remote mode switching. Amplifier output available at front panel terminals. Either floating or grounded operation.

Voltage Sensitivity: 1 μ V to 100 V in 8 ranges
Current Sensitivity: 0.1 pA to 10 μ A

Input Resistance: 10 meg Ω , all ranges

Operating Modes: HUNT (60 dB meter scale compression); CALIBRATE (linear meter scale)
Amplifier Output Capability: ± 1 mA into 1000 Ω

Amplifier Gain: -40 to +100 dB
Price: \$450.00 (rack mounted Model 56AR, \$475.00)



Sensitive DC Microvolt/Microammeter Model 95A

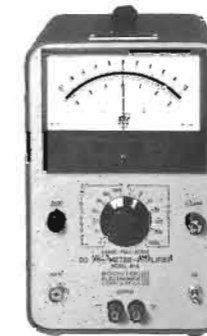
Unusually broad range of dc voltage and current measurements covered in 42 ranges. Front panel range and function switching uniquely simple and convenient. Zero center meter. Fast response. Amplifier output available at front panel. Amplifier output gain and reference level adjustable without interaction with meter. Either floating or grounded operation.

Voltage Measurements: 10 μ V to 1000 V fs; Accuracy, $\pm 3\%$
Current Measurements: 1 pA to 1 A fs; Accuracy, $\pm 4\%$

Voltmeter Input Resistance: 10 meg Ω , all ranges
Amplifier Output: 1 V (fs) across 1000 Ω

Amplifier Gain: 100,000, max.
Price: \$550.00 (rack mounted Model 95A-R, \$575.00)

Want more information? Full technical details on any of these instruments are available on request. For your convenience, postage-free request cards are attached at right. If you would like our Sales Engineering Representative to call please check box on reply card.



DC Voltmeter/Amplifier Model 97A

Versatile, general purpose dc voltmeter providing high input impedance, good sensitivity, and high stability at moderate cost. Zero center meter. Amplifier output available at front panel and usable simultaneously with meter without interaction.

Voltage Measurement: 300 μ V to 1000 V fs in 14 ranges; accuracy, $\pm 3\%$

Input Resistance: 10 meg Ω to 100 meg Ω , depending on range

Amplifier Output: ± 0.5 mA into 1500 Ω , or ± 1 V, unloaded

Amplifier Gain: 70 dB
Price: \$375.00 (rack mounted Model 97A-R, \$400.00)



Differential DC Voltmeter/Amplifier Model 98A

A 3-terminal dc voltmeter capable of many measurements impossible with 2-terminal instruments, including measuring small differences between relatively large dc voltages, comparing a voltage to a known source such as a standard cell, or where grounding problems exist. Also usable in 2-terminal mode. Amplifier output available at front panel and usable simultaneously with meter without interaction.

Voltage Measurement: 300 μ V to 1000 V fs in 14 ranges; accuracy $\pm 3\%$

Input Resistance: 10 meg Ω to 100 meg Ω , depending on range

DC Common Mode Rejection: Greater than 80 dB

Amplifier Output Capability: 0.5 mA into 1500 Ω , or 1.5 V, unloaded

Amplifier Gain: 70 dB
Price: \$450.00 (rack mounted Model 98A-R, \$475.00)

CS-8

CS-8

Gentlemen: Please send me technical information on: _____

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General interest only

Please have your Sales Engineering Representative phone for an appointment.

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RF Distortion Meters Models 85B and 85C

Convenient, simple means for measuring total harmonic content of rf signals. Particularly valuable in development and production testing of rf signal generators, oscillators, amplifiers, etc. Also usable as sensitive rf voltmeter, providing same characteristics as the Model 91C. Models 85B and 85C are identical except for fundamental frequency ranges.

Fundamental Frequency Range: 85B, 1 Mc/s to 100 Mc/s; 85C, 0.1 Mc/s to 6 Mc/s

Distortion Measurements: Sensitivity, 60 dB below 1 V; frequency range to approximately 300 Mc/s; Accuracy, ± 2 dB

Input Impedance: Approximately 50 Ω

RF Voltmeter Characteristics: Identical to those of 91C

Included Accessories: 91-12E RF Probe; 91-13B Probe Tip; 91-8B 50 Ω Adapter

Price: \$825.00



UHF Grid Dip Meter Model 101B

A compact, versatile instrument for a broad range of uhf measurements, including determining resonant frequencies of passive networks or oscillators and making relative power level or field strength measurements. Also useful as a calibrated variable uhf signal source with either modulated or cw output.

Frequency Range: 300 Mc/s to 1000 Mc/s

Frequency Accuracy: $\pm 2\%$; scale hand calibrated

Modulation: Internally supplied 120 c/s am to approximately 30%; or external

Output Capability: At least 0.5 V into 50 Ω over entire range

Price: \$350.00

Automation Products

In addition to the laboratory instruments shown here, Boonton Electronics Corporation also produces a line of instruments for automatic measurement and control functions in high speed production.

For information on "Automation Products", please use the attached postage-free reply card.

SALES ENGINEERING REPRESENTATIVES

For skilled consultation on instrumentation, call your nearest Boonton Electronics Sales Engineering Representative (see addresses at left).

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