

WIDEBAND TRUE RMS AC VOLTMETERS SERIES 323



VOLTAGE RANGES: 100 μ V to 330V
FREQUENCY RANGES: 2Hz to 20MHz
TRUE RMS RESPONSE

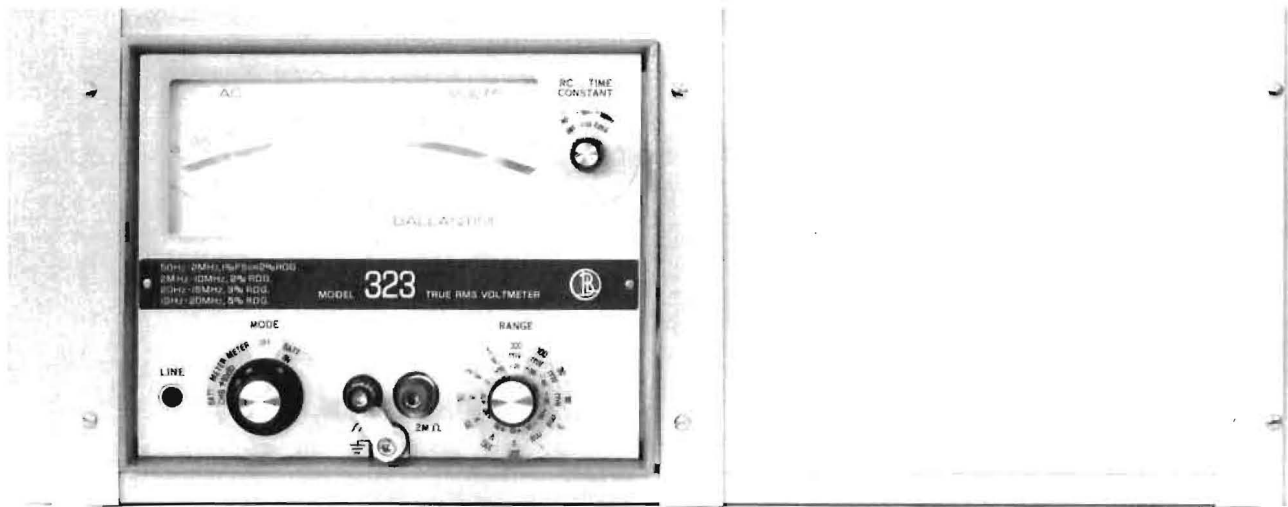
- Meaningful True-RMS Measurements — Including Harmonics and Crest Factors to 15.
- True Portability — Line/Rechargeable Battery Operation.
- Highest Readability — Logarithmic Voltage Scales for Consistently High Resolution; Linearized dB Scales; Mirror-backed.
- High Reliability — 500V Overload Protection, All Ranges; No Easily Damaged Thermocouples; Fully Solid State.
- Greatest Versatility — 2Hz to 20MHz, usable beyond 50MHz, 100 μ V Sensitivity, 1% Basic Accuracy. DC Output for Recorders.
- Rapid Response — No Thermal Lag.
- Measure TRUE Power in Industrial Control Systems, in SCR circuitry, wherever pulses and non-sinusoidal periodic waveforms occur.



BALLANTINE LABORATORIES, INC.

FOUR DECADES OF INNOVATION IN ELECTRONIC INSTRUMENTATION

TRUE RMS AC VOLTMETER/AMPLIFIERS



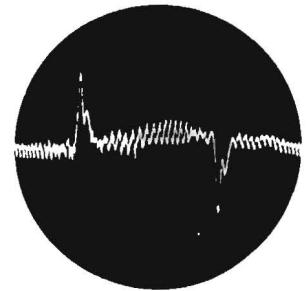
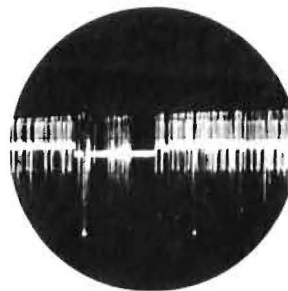
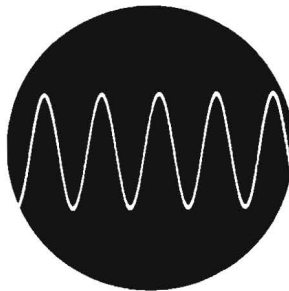
Series 323 True-RMS Wideband analog AC voltmeters are the *most sophisticated, most accurate, widest bandwidth* instruments of their kind. They feature the world-famous Ballantine logarithmic voltage scale providing constant reading accuracy end to end, and they employ the most advanced broadband, high-crest-factor, true-RMS measurement circuit ever provided in this class of instrumentation. This circuit actually *measures* the RMS value, and is not to be confused with average-responding devices, "calibrated in RMS." In AC measurements, **only** a meter True RMS sensing detector can yield accurate reading for pure sine or non-sinusoidal waveforms.

The all-solid-state Series 323 Voltmeter/Amplifiers have a bandwidth of 10Hz to 20MHz (Model 323L, 2Hz to 20Hz) — widest in the field, and are usable to beyond 50MHz at reduced accuracy. The accuracy from 50Hz to 2MHz is $\pm 1\%$ f.s. or $\pm 2\%$ rdg, with gradually broadened tolerances above and below that band. Its high sensitivity and logarithmic scale permits readings as low as $100\mu\text{V}$ to *full accuracy*! The wide bandwidth and high crest-factor ratio ensures valid RMS readings even for noise waveforms, pulses, and other signals rich in harmonics.

Models 323, 323-06, 323L, and 323L-06 may be operated from line power or rechargeable battery; Models 323-01, 323-07, 323L-01, and 323L-07 from line only. Models 323-06 and -07 and 323L-06 and -07 provide dBm scales, referenced to 1 milliwatt into 600 Ohms as 0 dBm.

Optional accessories include the Model 1301 High-voltage, 80dB Attenuator Probe for measurement to 10,000 Volts (up to 1MHz); Model 600 plug-in Shunt Resistor Assemblies for current measurement; and the Model 800 rack mounting kit for installing one (or two) 323 voltmeters in a 19" rack. (See page 4.)

Other features include: rechargeable battery option; DC output for recorders; adjustable time constant; isolated signal ground; and positive overload protection to 500 Volts peak on all ranges. None of the series employs easily damaged thermocouples; square law response is from silicon backward diodes. The Series 323 are the *instruments of choice* for modern laboratory, production, and field measurements of true-RMS AC . . . acknowledged standards of the industry. Series 323 Voltmeters measure a wide range of waveforms — sine, distorted sine, square, complex, pulse, noise and others rich in harmonics.



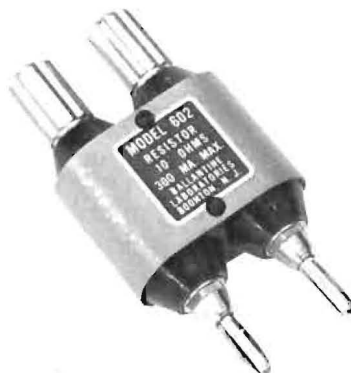
MODELS	323 & 323-01	323-06 & 323-07	323L Series
Voltage Range	300 μ V to 330V, 12 ranges	100 μ V to 330V, 12 ranges plus "METER +10dB" mode	300 μ V to 330V
Decibel Range	-70dB to +50dB, referred to 1V	-78dBm to +52dBm; 0dBm = 1mW/600 Ω	323L & 323L-01: same as 323/323-01. 323L-06/07: same as 323-06/07
Frequency Range	10Hz to 20MHz (-3dB: < 4Hz and > 50MHz)		2Hz to 20MHz
Accuracy	50Hz-2MHz: $\pm 1\%$ f.s. or $\pm 2\%$ rdg, whichever is better, increasing to $\pm 5\%$ at ends of range ($\pm 10\%$ above 100V on upper ranges).		10Hz-2MHz: $\pm 1\%$ f.s. or $\pm 2\%$ rdg, whichever is more accurate, increasing to $\pm 3\%$ at 2Hz and 10MHz and $\pm 5\%$ at 20MHz.
Response	True RMS for wide range of waveforms.		
Input Impedance	2 megohms shunted by 15pF (25pF, 1-30mV f.s. ranges)		
Crest Factor	5:1 at full scale, increasing to 15:1 at 1/3 full scale. Overload protection: 500V peak on all ranges.		
Scales: Logarithmic Decibels	1-3 and 3-10V 0-10dB	0.095-0.33 and 0.3-1.06V -8.2 to +2.6dBm	323L & 323L-01: same as 323/323-01. 323L-06/07: same as 323-06/07
CMRR	> 120 dB, DC to 1kHz; > 80dB at 1MHz		
Output	Rear BNC connector. 0.1V to 1.0V average for each range simultaneously with meter reading, proportional to square of input voltage. Accuracy $\pm 1\%$ F.S.		
Power Requirements	105-135/210-270, 50 to 420Hz, 6W, Models 323-01, 323-07, 323L-01, 323L-07 line only. Optional internal rechargeable nickel-cadmium battery (in Models 323, 323-06, 323L, 323L-06).		
Dimensions	6.1" high x 7.8" wide x 10.2" deep. (15.5 cm x 19.6 cm x 25.9 cm.)		
Weight	Battery: 9.5 lbs. (4.3 kg), 14 lbs. (6.3 kg) shipping. Line: 7.5 lbs. (3.4 kg), 12 lbs. (5.4 kg) shipping.		
Rack Mounting	Model 800 Rack Mounting Kit accommodates one or two Series 323 instruments in 19" x 7" rack.		
Prices	Battery/Line: 323: \$675 323-06: \$695 323L: \$705 323L-06: \$725 Line Only: 323-01: 575 323-07: 595 323L-01: 605 323L-07: 625		

ACCESSORIES



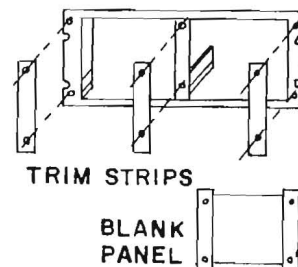
Model 1301 High Voltage 80dB Attenuator Probe for measurements to 10,000 Volts at frequencies to 1MHz. Input impedance is greater than 10,000 megohms shunted by less than 4.5 picofarads. \$90.

Model 618 Adapter to convert BNC female to single binding post (one supplied). \$6.50



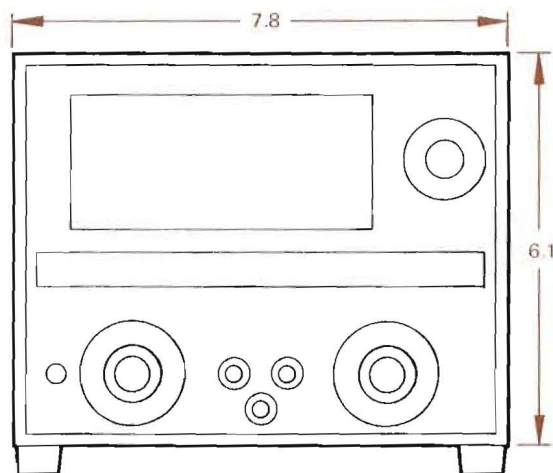
Series 600 Shunt Resistor Assemblies plug into input of Series 323 for measurement of current over a range of 0.1 microamperes to 10 amperes. Resistor values are in six decade steps from 0.01 ohm to 1000 ohms, thus making it possible to read current from the voltage scales.

Models 601 to 604 (1, 10, 100, and 1000 Ω), \$30 each. Model 605 (0.1 Ω), \$50. Model 606 (0.01 Ω), \$65.

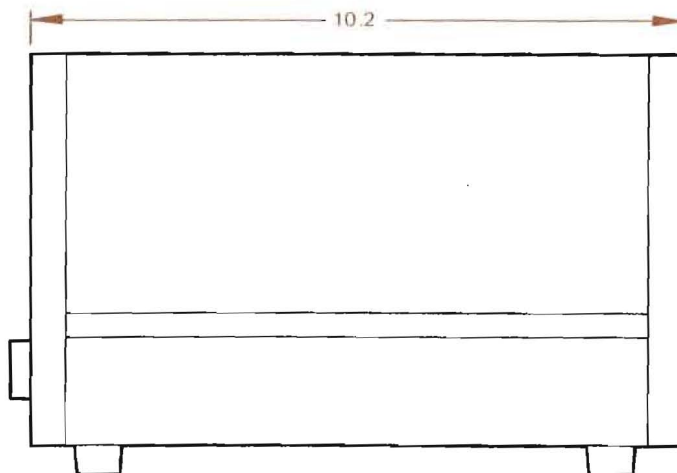


Model 800 Rack Mounting Kit for adapting one (or two) Series 323 voltmeters to a 7" x 19" rack, without modification of the voltmeters. \$50.

DIMENSIONS



FRONT



SIDE



BALLANTINE LABORATORIES, INC.

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Four Decades of Innovation in Electronic Instrumentation