

SPECIFICATIONS ARE CONSIDERABLY AMPLIFIED
IN A TECHNICAL BULLETIN FOR EACH INSTRUMENT.
THESE WILL BE SENT PROMPTLY ON REQUEST

IF YOU HAVE SPECIAL REQUIREMENTS PLEASE
CHECK WITH US

1965
CATALOG



BALLANTINE

ELECTRONIC MEASURING INSTRUMENTS

VOLTMETERS, AC and DC
DC/AC VOLT/OHMMETERS
DECADE AMPLIFIERS
CALIBRATORS
CAPACITANCE METERS
CONVERTERS, AC/DC LINEAR
LABORATORY VOLTAGE
STANDARDS TO 1000 MC

BALLANTINE'S LOGARITHMIC SCALES PROVIDE UNIFORM ACCURACY AND RESOLUTION OVER THEIR ENTIRE LENGTH.



CONVENTIONAL LINEAR METER SCALE

In a conventional linear meter movement, a small angular deviation, which may represent only an error of $x\%$ at the 10 volt full scale indication, becomes a $2x\%$ error at midpoint and a $5x\%$ error at the 2 volt mark. The lower third of such a meter is practically useless despite the fact that the meter may be rated at better than $x\%$ accuracy fsd (full scale deflection).



THE BALLANTINE LOGARITHMIC SCALE

In a logarithmic meter, pioneered and used by Ballantine since 1936, the same angular deviation produces a constant $x\%$ error in indication at any point of the scale. The meter readings are uniformly accurate throughout its range. At the low end of the scale the constant angular error represents the same % of the reading as it does at any other point on the scale.



CONTENTS

	TYPE	MODEL	PAGE
DECADE AMPLIFIER (battery-operated), gain of 10 or 100, 10 cps—150 kc, low noise, no hum.....			
		220C	2
VACUUM TUBE VOLTMETERS			
Average-responding			
	Basic sensitive vtvm.....	300	2
	Isolated chassis "system" vtvm.....	300E	2
	High Accuracy, long life vtvm.....	300G	2
	Compact, long life, sensitive vtvm.....	300H	3
	Outdoor, "militarized" vtvm.....	300M	3
	Battery-powered, low frequency vtvm.....	302C	3
	Video, 10 cps to 6 Mc vtvm.....	310B	3
	Video, linear scale vtvm.....	311	4
NEW!	Video, linear scale vtvm, 1% accuracy.....	311G	4
	Video, vtvm with high voltage probe.....	314A	4
	Wideband vtvm, cathode follower probe.....	317	4-5
Peak, or peak-to-peak (P or P-P)			
	Microsecond pulse vtvm.....	305A	4-5
	Infrasonic frequency vtvm.....	316	4-5
True RMS			
NEW!	Wideband, high crest factor vtvm.....	320A	5
	RAP (Rms—Average—Peak) vtvm.....	321	5
	High resolution UHF millivoltmeter.....	340	5
	Highest accuracy, digital readout vtvm.....	350	6
NEW!	DC/AC voltmeter/ohmmeter.....	345	6
	DC volt/ammeter, widest range, highest accuracy.....	365	6
Battery-Operated			
	Low noise level, low frequency vtvm.....	302C	3
Highest accuracy, meter indication			
	1% accuracy.....	300G	2
Highest accuracy, digital read-out			
	¼% accuracy 100 cps—10 kc up to 250 V.....	350	6
Outdoor, all weather			
	Militarized, completely sealed.....	300M	3
DC meters			
NEW!	DC/AC voltmeter/ohmmeter, high accuracy, resolution.....	345	6
	DC volt/ammeter, widest range, highest accuracy.....	365	6
CALIBRATORS			
	DC/AC Voltage Calibrator, 0—10V, ¼% accuracy.....	420	7
NEW!	DC/AC Precision Calibrator, 0—111 V, 0.15% accuracy.....	421	7
CAPACITANCE METER			
	Direct reading, 0.01 pF—12 µF.....	520	7
CONVERTER, LINEAR, AC to DC			
	¼% accuracy.....	710	7
LABORATORY REFERENCE AC VOLTAGE STANDARDS			
	A-T Voltmeter, 0.5 V—300 V, 1000 Mc to 10 Mc.....	390	8
	HF Transfer voltmeter, 1 V—100 V, 25 cps—30 Mc.....	393	8
	Micropotentiometer, 15 µV—1.5 V, 0-900 Mc.....	440	8
VTVM ACCESSORIES			
	Increase versatility of instruments listed above.....		9

PRICES

Prices are fob Boonton, N. J., and are subject to change without notice. Prices shown are for the portable version of instruments as shown. Quotations will be given promptly for special versions.

DECADE AMPLIFIER, Model 220C*Battery Operated*

Designed primarily as a wide band preamplifier for use with a vtvm or an oscilloscope, when a hum-free stable voltage gain of 10 or 100 is required. Stable at a wide range of ambient temperature. Not subject to damage by accidental high transients as are some transistor devices. *Price \$150.*
Relay Rack Version, Model 220C-S2 Price \$170.

SPECIFICATIONS

Voltage Range	25 μ V—50 mV
Frequency Range	10 cps—150 kc
Accuracy	2%
Input Impedance	5 M Ω shunted by 15 pF
Output Impedance	2 μ F in series with 900 Ω
Noise Referred to Input	for gain of 10; 7000 μ V for gain of 100 8 μ V short circuit and 25 μ V open circuit

**BASIC SENSITIVE VTVM Model 300***10 cps to 150 kc*

Forerunner of all sensitive, wide band vtvms. A single logarithmic voltage scale plus a linear db scale provide accurate, rapid measurements with minimum of range switching. Useful as a wide band amplifier or to feed a recorder. *Price \$250.*

Relay Rack Version, Model 300-S2 Price \$270.

SPECIFICATIONS

Voltage Range	1 mV to 100 V
Frequency Range	10 cps to 150 kc
Accuracy	2% of Reading
Input Impedance	0.5 M Ω shunted by 30 pF
Scales	Logarithmic voltage scale from 1-10; linear decibel scale from 0 to 20

**ISOLATED CHASSIS VTVM Model 300E***For "systems" use*

Specially designed for building into large test equipments. Front panel isolated from chassis for connection to system ground. Rear range switch permits automatic programming. *Price \$280.*

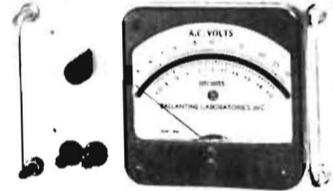
19 Inch Relay Rack Version, with one Model 300E-S2

Price \$300.

SPECIFICATIONS

Voltage Range	300 μ V—300 V
Frequency Range	30 cps—100 kc
Accuracy	2% of Reading
Input Impedance	2 M Ω shunted by 20 pF or 30 pF
Scales	Logarithmic voltage scale from 3 to 30; linear decibel scale from 0-20

(Two of these units may be ordered on a 19 inch rack.)

**HIGH ACCURACY VTVM Model 300G***Accuracy is 1% of reading*

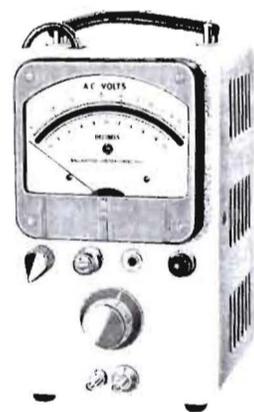
Combines Ballantine's best electrical and mechanical features with highest accuracy of calibration and long term stability. Voltage and db scales separated by mirror for precise reading. May be used as an amplifier up to 60 db with response variation of only ± 1 db from 10 cps to 250 kc *Price \$315.*

Relay Rack Version, Model 300G-S2

Price \$335.

SPECIFICATIONS

Voltage Range	1 mV—1000 V
Frequency Range	10 cps—250 kc
Accuracy	1% of reading, 20 cps to 20 kc and 1 mV to 250 V; 2% of reading elsewhere
Input Impedance	2 M Ω shunted by 15 pF or 25 pF
Scales	Logarithmic voltage scale from 1-10; linear decibel scale from 0 to 20



COMPACT, LONG LIFE VTVM, Model 300H*10 cps to 1 Mc*

Compact, sturdy instrument designed for high accuracy, low maintenance, long life, stability, and simplicity of operation. Expected calibration stability 5000 hours. Sensitivity of $30 \mu\text{V}$ in the null detector mode. A versatile laboratory and production line tool.

Price \$250.
Relay Rack Version, Model 300H-S2 Price \$270.

SPECIFICATIONS

Voltage Range 300 μV to 330 V (30 μV to 300 μV in "SENS x 10" mode)
 Frequency Range 10 cps to 1 Mc
 Accuracy above 300 μV , in % of reading, 2%, 10 cps—700 kc.
 3%, 700 kc—1 Mc
 Input Impedance 2 M Ω shunted by 15 pF or 25 pF
 Scales Logarithmic voltage scale from 3 to 33; linear decibel scale from -10 to +10

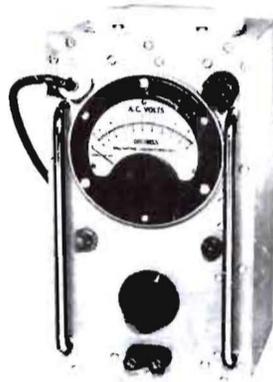
**OUTDOOR, MILITARIZED VTVM, Model 300M***Sensitive, sealed, ruggedized*

Designed for rugged field use to withstand military shock and vibration tests. Resistant to water, fumes, dust, extremes of temperature and rough handling.

Price \$420.

SPECIFICATIONS

Voltage Range 500 μV — 500 V
 Frequency Range 10 cps — 500 kc
 Accuracy, % of Reading, 2%, 10 cps—250 kc; 4%, 250 kc—500 kc
 Input Impedance 2 M Ω shunted by 15 pF or 30 pF
 Scales Logarithmic voltage scale from 0.48 to 5.0 V; linear db scale, -4 db to +16 db; 0 db reference is 1 mW into 600 ohms
 Power Supply 115/230 V, 50-420 cps 38 watts

**BATTERY-POWERED VTVM, Model 302C**

High accuracy, battery operated instrument provides complete freedom from powerline hum and complete isolation from any powerline. Has lower input noise level (less than 10 microvolts) than a comparable transistorized unit. Also eliminates problem of peak overloads that might exceed transistor characteristics. Usable as hum-free amplifier with maximum gain of 60 db, high input impedance.

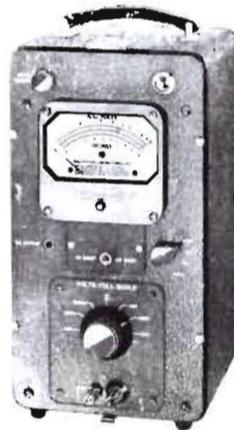
Price \$290.

Relay Rack Version, Model 302C-S2

Price \$310.

SPECIFICATIONS

Voltage Range 100 μV —1000 V
 Frequency Range 2 cps—150 kc
 Accuracy 3% of Reading 5 cps-100 kc and 5% elsewhere
 Input Impedance 2 M Ω shunted by 10 pF or 25 pF
 Noise Level Less than 10 μV referred to shorted input circuit
 Scales Logarithmic voltage scale from 1-10; linear decibel scale from 0 to 20

**VIDEO VTVM, Model 310B***10 cps to 6 Mc*

Designed to provide uniformly accurate and precise voltage and db readings over the entire 5-inch scale. Co-axial connector and binding post signal inputs. Expected calibration life exceeds 3000 hours. May be used as 60 db gain amplifier over total frequency range. Power input, choice 115/230 V, 50-420 cps.

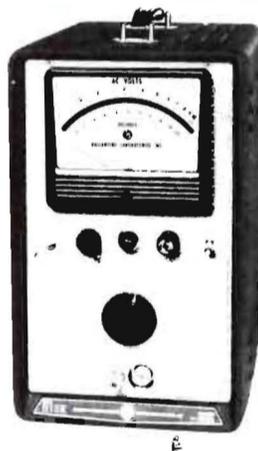
Price \$295.

Relay Rack Version, Model 310B-S2

Price \$315.

SPECIFICATIONS

Voltage Range 30 μV —300 μV in "DET" (Null Detector) mode
 100 μV — 100 V
 Frequency Range 10 cps to 6 Mc
 (3 db bandwidth is 3 cps to 11 Mc)
 Accuracy in % of Reading, ANY VOLTAGE 2%, 20 cps—2 Mc;
 3%, 10 cps—4 Mc; 5%, 10 cps—6 Mc
 Input Impedance 2 M Ω shunted by 15 pF or 25 pF
 Scales Logarithmic voltage, 0.9—11; Linear decibel, 0—20



VIDEO LINEAR SCALE VTVM, Model 311

10 cps to 6 Mc

Designed for flat response to 6 Mc, low power consumption, 3000 hours between calibrations. Mirrored 5-inch scale provides precise readings. Changing tubes at random has negligible effect on accuracy over entire band. Provided with binding posts, convertible to coaxial input for eliminating spurious input signals.

Price \$295.

Relay Rack Version, Model 311-S2

Price \$315.

SPECIFICATIONS

Voltage Range 1 mV—320 V full scale, 12 ranges
 Frequency Range 10 cps—6 Mc
 Accuracy (f.s.d.) 2% at 20 cps—2 Mc;
 3% at 10 cps—4 Mc; 5% at 10 cps—6 Mc.
 Input Impedance 2 M Ω shunted by 15 pF to 25 pF
 Scales Linear voltage scales 0—1 V, 0—3 V
 Decibel scale —10 to +2

**VIDEO LINEAR SCALE, "1%" VTVM, Model 311G**

Accuracy of 1%, 40 cps to 1 Mc

Hermetically sealed resistors used in the attenuator circuit are matched for both resistance and temperature coefficient, providing highest accuracy and long term stability. Also provided with binding posts, convertible to co-axial input for eliminating spurious input signals.

Price \$340.

Relay Rack Version, Model 311G-S2

Price \$360.

SPECIFICATIONS

Voltage Range 1 mV—320 V full scale, 12 ranges
 Frequency Range 10 cps—6 Mc
 Accuracy (f.s.d.) 1% at 40 cps—1 Mc;
 2% at 20 cps—2 Mc; 3% at 10 cps—4 Mc;
 5% at 10 cps—6 Mc
 Input Impedance 2 M Ω shunted by 15 pF to 25 pF
 Scales Linear voltage scales 0—1 V, 0—3 V;
 Decibel scale —10 to +2

**VIDEO WIDEBAND VTVM, Model 314A**

With high voltage probe, Model 5314

Designed for precise, accurate measurements to 1000 V with Model 5314 probe. Logarithmic scale uniformly accurate over entire 5-inch length. May be used as sensitive indicator to 10 Mc or as a 60 db amplifier ± 1 db to 6 Mc. Power input, choice 115/230 V, 50-420 cps.

Price \$350.

Relay Rack Version, Model 314A-S2

Price \$370.

SPECIFICATIONS

Voltage Range with Model 5314 probe,
 1 mV—1000 V; without probe, 100 μ V—100 V
 (30 μ V to 300 μ V in "DET" Null Detector)
 Frequency Range 10 cps to 6 Mc
 (3 db bandwidth is 3 cps to 11 Mc)
 Accuracy in % of reading, ANY VOLTAGE
 2%, 20 cps—2 Mc; 3%, 10 cps—4 Mc;
 5%, 10 cps—6 Mc
 Input Impedance 10 M Ω shunted by 7.5 pF
 with probe, 2 M Ω shunted by 25 pF without probe
 Scales Logarithmic voltage, 0.9—11 V;
 Linear decibel, 0—20

**WIDE-BAND VTVM, Model 317**

With Cathode Follower Probe, Model 2317A

Exceptionally wide-band instrument embodying a stable multi-loop feedback amplifier which feeds an average-responding rectifier circuit. High impedance cathode follower probe Model 2317A, using a rugged Nuvistor tube, has a 3-foot connecting cable and provides 300 μ V to 300 mV range.

Price with probe #2317A \$495.

Model 3317 60 db attenuator adapter extends cathode follower probe range from 300 mV to 300V

Price \$37.

Relay Rack Version, with probe #2317A Model 317-S2

Price \$515.

SPECIFICATIONS

Voltage Range 300 μ V to 300 V
 Frequency Range 10 cps to 11 Mc
 (Useful as a null detector 5 cps to 30 Mc)
 Accuracy, % of reading 2%, 20 cps to 2 Mc;
 3%, 10 cps to 6 Mc; 5%, 10 cps to 11 Mc
 Input Impedance With probe, 10 M Ω
 shunted by 7 pF; without probe, 2 M Ω shunted
 by 11 pF to 24 pF
 Amplifier Max gain 60 db; max output
 voltage 2.5 V

**INFRASONIC FREQUENCY VTVM, Model 316**

Peak-to-peak reading, 0.01 cps to 30 kc

Designed for such applications as automatic control systems involving low frequency servomechanisms and other fields where infrasonic frequencies down to 0.01 cps are encountered. Will measure square waves with stated accuracy to 0.5 cps. Flutter very small at 0.01 cps, virtually eliminated at 0.05 cps. Unaffected by power line transients.

Price \$365.

Relay Rack Version, Model 316-S2

Price \$385.

SPECIFICATIONS

Voltage Range 20 mV—200 V peak-to-peak
 Frequency Range 0.05 cps—30 kc
 (Down to .01 cps with correction)
 Accuracy 3% of reading
 Input Impedance 10 M Ω shunted by
 17 pF or 40 pF
 Scales Logarithmic voltage scale, 2—20 V;
 Linear decibel scale 0—20



MICROSECOND PULSE VTVM, Model 305A

Peak Reading, 5 cps to 500 kc

Designed to measure peak-to-peak or either positive or negative peak values of repetitive pulses and distorted or non-distorted wave forms. Has 5-inch mirror backed scale for easy reading to high precision.

Price \$460.

Relay Rack Version, Model 305A-S2
Price \$480.

SPECIFICATIONS

Voltage Range	1 mV—1000 V, p or p-p
Accuracy and Range	
Sine wave	±2% from 20 cps to 200 kc; ±4% from 5 cps to 500 kc
Pulses	±3% above 3 μ sec and 100 pps; ±5% above 1 μ sec and 100 pps; ±5% above 0.5 μ sec and 5 pps with correction
Input Impedance	2 MΩ shunted by 10 pF or 25 pF
Scales	Logarithmic voltage scales, 1—3 and 3—10 V; Linear decibel scale, 0—10



WIDE-BAND, TRUE RMS VTVM,

Model 320A (5 cps to 4 Mc)

With DC output for recording purposes

One of the most useful of Ballantine instruments: measures true-rms voltage of a wide range of waveforms including noise, pulse, square or sinusoidal, whose peaks may be 5—15 times the measured rms. Can measure voltages below 5 cps. Has dc output proportional to mean square of input ac voltage, for recording purposes. May be used as 90 db amplifier with single-ended or balanced outputs.

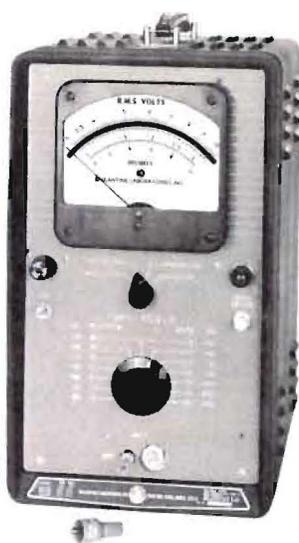
Price \$485.

Relay Rack Version, Model 320A-S2

Price \$505.

SPECIFICATIONS

Voltage Range	100 μV to 330 V (10 μV to 100 μV in "DET" null detector mode)
Frequency Range	5 cps to 4 Mc (3 db bandwidth is 2 cps to 7 Mc)
Accuracy, in % of reading	2%, 20 cps to 400 kc; 3%, 10 cps to 2 Mc; 4%, 5 cps to 4 Mc
Input Impedance	10 MΩ shunted by 11 pF or 27 pF
Scales	Logarithmic voltage, 0.95 to 3.3 and 3 to 10.6; Linear db, 0—10



NEW



RAP (True Rms - Average - Peak) VTVM, Model 321

This instrument combines all the features of Model 320A True-rms Voltmeter, plus those of average-reading and peak-reading voltmeters. It is three fine instruments in one.

Price \$560.

SPECIFICATIONS

	RMS	AVG.	PEAK
Voltage Range	100 μV—330 V	300 μV—330 V	300 μV—330 V
(As null detector)	10 μV—100 μV		
Frequency Range	5 cps—4 Mc	10 cps—1 Mc	10 cps—1 Mc
(3 db bandwidth)	2 cps—7 Mc		
Accuracy above 300 μV			
20 cps - 0.4 Mc	2% of reading	2% of reading	3% full scale
10 cps - 1 Mc		5%	5%
10 cps - 2 Mc	3%		
5 cps - 4 Mc	4%		
Accuracy below 300 μV			
20 cps - 0.4 Mc	3%		
10 cps - 2 Mc	4%		
5 cps - 4 Mc	10%		
Input Impedance	10 MΩ shunted by 11 pF or 27 pF		
Scales	Voltage, logarithmic, 0.95—3.3, 3.0—10.6; decibels, linear, 0—10		

HIGH RESOLUTION UHF MILLIVOLTMETER,

Model 340

True-RMS, 300 μV to 3 V

Designed to measure true-rms regardless of voltage or waveform of source. Logarithmic 5-inch scale provides the same high resolution and accuracy throughout the scale. DC output available for application to a recorder.

Price \$760.

Relay Rack Version, Model 340-S2

Price \$780.

SPECIFICATIONS

Voltage Range	300 μV to 3 V
Frequency Range	0.1 Mc to > 1000 Mc; calibrated to 700 Mc
Indication	TRUE-RMS on all ranges, all voltages
Accuracy, % of reading, regardless of waveform...	4%, 0.1 Mc—100 Mc; 10%, 100 Mc—700 Mc; useful as sensitive indicator above 700 Mc
Crest Factor	100 to 3 depending on voltage range
Scales	Two logarithmic voltage scales, 0.95 to 3.3 and 3.0 to 10.6 One decibel scale, 0 to 10
Mean Square DC Output	0.1 to 1.0 Vdc
Internal resistance	20 kΩ (for applications to dc recorder)



NEW



DC/AC VOLTMETER-OHMMETER,
Model 345

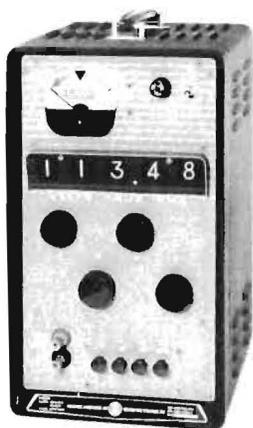
With built-in voltage reference

Five inch logarithmic scale for dc or ac voltages and for resistance provides uniform accuracy and resolution over the entire scale as "percent of actual reading." Has built-in dc voltage reference of 0.1 V, 1.0 V, and 5.0 V. Price \$350.

SPECIFICATIONS

DC Voltage Range	0—1100 V
AC Voltage Range	0—350 V (to 3000 V with optional accessory)
Ohms Range	0.025 Ω to 5000 M Ω
Frequency Range	20 cps to 1000 Mc
Accuracy % of reading	dc, 1%, 1 V—1100 V; ac, 2%, 1 V—350 V, 50 cps—100 Mc; ohms, 3%, 1 Ω —100 M Ω
Input Impedance	dc, 112 M Ω ; ac, 10 M Ω , 1.2 pF
Power Requirements	115/230 V, 60 cps, 25 W; 50 cps units on special order.
Dimensions (inches)	7 $\frac{3}{4}$ W x 6 $\frac{1}{8}$ H x 9 $\frac{3}{4}$ D (1/2 rack modular case)

Specifications are considerably amplified in a technical bulletin which will be sent on request.



HIGHEST ACCURACY TRUE-RMS
(50 cps to 20 kc),
Model 350

With digital readout

Rugged, reliable, 1/4% accurate, true rms-responding instrument that can be used to calibrate other vtvm's. Uses bridge-type method of measurement: four knobs are set for minimum indication; the unknown voltage is read directly from a NIXIE* in-line read-out. Precision exceeds stated accuracy by 5 to 10 times. Price \$720.

Relay Rack Version, Model 350-S2

Price \$740.

SPECIFICATIONS

Voltage Range	0.1 V to 1199.9 V
Frequency Range	50 cps to 20 kc
Accuracy	1/4% of reading, 100 cps to 10 kc, 0.1 V to 300 V; 1/2% of reading outside these limits
Max Crest Factor	2
Input Impedance	2 M Ω shunted by 15 pF to 45 pF

DC-AC DIGITAL VOLTMETER

1000 V dc
1000 V ac, 30 cps—250 kc

Model 355

This space reserved for

Model 355 DC-AC Digital Voltmeter

Availability: Summer 1965

Price \$590.

Technical data sheet on request



DC WIDE RANGE
VOLTMETER/AMMETER,
Model 365

1 μ V to 1000 V and 0.001 μ A to 1 A

Capable of precision measurements of dc voltage and current over the widest ranges possible with any available instrument. Logarithmic scale provides identical resolution and accuracy throughout the scale. Equipped with a built-in calibrator. May be used as a dc amplifier up to 100 db gain which may be read directly on db scale. Amplifier output may be fed into digital voltmeter for measurement of extremely low voltage and current. Expected life of calibrations exceeds 2000 hours. Price \$650.

Relay Rack Version, Model 365-S2

Price \$670.

PARTIAL SPECIFICATIONS

Voltage Range	1 μ V to 1000 V
Current Range	0.001 μ A to 1 A
Accuracy, over most ranges	1% of reading as voltmeter; 2% as ammeter. (Equivalent to better than 1/2% f.s.d. and better than 1% of f.s.d. respectively over the lower half of the scale.)
DC Amplifier	Up to 100 db. DC output 0.1 V to 1.0 V for each decade from a source resistance of 1667 ohms. Suitable for direct application to dc digital vm for reading very low voltages or currents.

¼% Accurate

Provides an accurate high stability output at any desired voltage from 0 to 10 volts whether rms of pure 1000 cps signal, peak-to-peak of the same signal, or dc. Its output can be connected to a vtvm or an oscilloscope for direct reading.

Price \$395.

Relay Rack Version, Model 420-S2

Price \$415.

SPECIFICATIONS

Voltage Range	0—10 V rms, peak-to-peak, or dc
Frequency	1 kc
Accuracy (with cal. chart)	0.25%
Accuracy (without cal. chart)	Better than 0.5%
Distortion and Hum	Less than 0.25%
Setting Resolution	Approaches 0.01% above 10 mV
AC Output Impedance	2—20 Ω depending on range setting
DC Output Impedance	0—4000 Ω depending on dial setting



DC/AC PRECISION CALIBRATOR,
Model 420

With digital in-line readout of output

Provides dc and two ac voltage output frequencies, 0.15% accuracy, and an in-line digital presentation of output voltage. Stabilized against wide variations in ambient temperature and line voltage variations. May be installed in a major system to check a wide range of voltage sensitive instruments.

Price \$600.

Relay Rack Version, Model 421-S2

Price \$620.

SPECIFICATIONS

Voltage Range	0 to 111 V rms, p-p, or dc	
Frequencies	400 cps, 1000 cps, dc	
Accuracy of output EMF	0.15% all modes, all ranges	
Stability	Line Voltage 10% from 115/230 V	0.05%
	Temperature 25°C ±10°C	0.005%/°C
	Short time (1 hour)	0.01%
	Calibration period	1000 hrs.
Distortion hum and noise	Less than 0.1%	
Source Resistance		
AC Output	0.2—40 Ω	
DC Output	0.1—1000 Ω	



NEW

DC/AC PRECISION CALIBRATOR,
Model 421

Direct reading, 0.01 picofarads to 12 microfarads

Provides rapid, direct, accurate measurements over a wide range of capacitance. Features mirror-backed logarithmic scale meter, adjustable go-no-go pointers, high stability, internal calibration. Includes a set of three test adapters. Ideal for laboratory and inspection department use. Price \$425.

SPECIFICATIONS

Capacitance Range	0.01 pF to 12 μ F
Accuracy, as % of reading	2% from 0.1 pF to 12 μ F and 5% from 0.01 pF to 0.1 pF
Test Frequency	1 kc
Meter	Logarithmic, reading from 1 to 12
Maximum Capacitance Dissipation Factor	0.05



CAPACITANCE METER,
Model 520

30 cps to 250 kc

Will make your existing dc instruments such as Digital Voltmeters, Type K Potentiometers and DC Recorders useful for ac measurements accurate to ¼% (see specs). Output is 0.1 V to 1.0 V linearly over each of six decades of ac input. Instrument is average-responding type for distortions as much as 30%.

Portable Version

Price \$510.

Relay Rack Version, Model 710-S2, as shown

Price \$530.

SPECIFICATIONS

Voltage Range	1 mV to 1000 V
Frequency Range	30 cps—250 kc
Accuracy	0.25%, 50 cps—10 kc; 0.5%, 30—50 cps, 10—50 kc; 1.0%, above 50 kc
Output Source Impedance	10,000 Ω
Input Impedance	2 M Ω shunted by 15 pF to 25 pF



AC-TO-DC LINEAR CONVERTER,
Model 710



A-T VOLTMETER (Attenuator-Thermocouple), Model 390

10 Mc to 1000 Mc, 0.5 V to 300 V

A laboratory reference standard designed for calibration of ac voltmeters above 0.5 volt, at frequencies from 10 Mc to 1000 Mc. Consists of a stable, adjustable waveguide-below-cut-off attenuator feeding a UHF thermocouple. Micrometer setting for standard dc output of the thermocouple is determined by NBS calibration for various frequencies and voltages. Calibration by NBS is required, but not included in the price. Design is based on that of Myron C. Selby and L. F. Behrent of NBS.

Price \$2250.



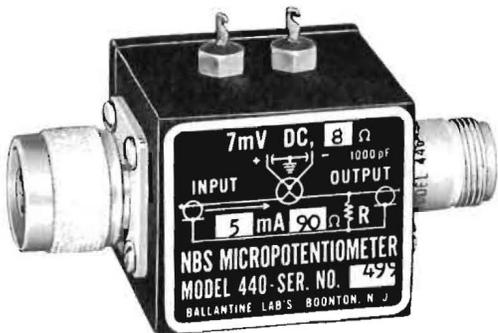
HF TRANSFER VOLTMETER, Model 393

25 cps to 30 Mc, 1 V to 100 V

An accurate instrument by means of which an unknown ac voltage may be measured in terms of an accurately measurable dc voltage. Used to calibrate ac voltmeters and sources of ac, or to measure frequency response of devices at frequencies up to 30 Mc. Has a range from 1 volt to 100 volts covered by six probes. Design is based on one by F. L. Hermach of the National Bureau of Standards and is known as the "Type C Transfer Standard."

Price \$1270 (with 6 probes).

Price of each probe \$120.



MICROPOTENTIOMETER, Model 440

0 to 900 Mc, 15 μ V to 1 V

Designed as a low impedance source of accurately known voltage at frequencies from 0 to 900 Mc. Consists of a UHF thermocouple in series with a special radial resistor. When connected to an external signal source, the voltage drop across the resistor can be held to a known value over the entire range of frequencies by monitoring the dc output of the thermocouple. Each thermocouple-resistor combination can be operated over a voltage range of 4 to 1 selected between the limits of 15 microvolts and 1 volt. Ideal for calibration of ac voltmeters and oscilloscopes. Calibration to 500 Mc is included in the price. Based on designs by Myron C. Selby of the NBS.

Model 440, with one radial resistor and one thermocouple housing.

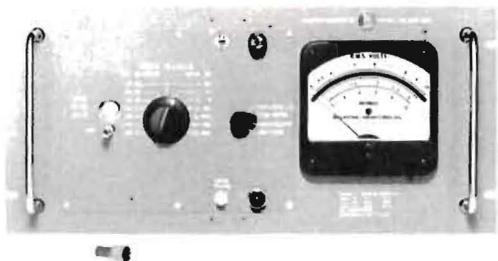
Price \$250.

Additional Radial Resistors

Price \$175 each

Additional Thermocouple Housings

Price \$75 each



RACK VERSIONS:

The suffix S2 after any model number indicates a 19" rack version. All Ballantine Instruments are available in standard Ballantine gray, or to meet your own color specification at slightly higher prices than those shown. Model 320A-S2 is illustrated.

SPECIAL SCALE VERSIONS:

Different scales may be ordered as special versions of models 300H, 300G, 310B, 314A and 317. The scales are available with the decibel scale as the top scale; or where 0 db is referenced as 1 mW into 600 Ω (0.774 V). For complete information on special scales send for descriptive literature.

MANY ACCESSORIES ARE AVAILABLE TO INCREASE THE VERSATILITY OF BALLANTINE VTVM'S. SEND FOR DESCRIPTIVE BROCHURES.

VOLTAGE MULTIPLIERS — Series 1300 Voltage Multipliers are compensated attenuator assemblies that plug into the input terminals of vtvm's. These increase the voltage range of Ballantine Voltmeter Models 300, 302B, 302C, 310A, 314, and 320 up to 10,000 volts, and the input impedance to as high as 40 megohms. **Price: \$55 each**

HIGH VOLTAGE PROBES — Model 1301 High Voltage Probe is a 10,000 to 1 capacitive attenuator designed for measurements of voltages up to 10,000 rms or 28,000 peak to peak when connected to the **binding post input** of any Ballantine vtvm's. **Price: \$62**

Model 1311 is a probe similar to Model 1301 designed to connect into the **co-axial input** receptacle of Ballantine Models 310B, 311, 314A, 317, and 320A. **Price: \$62**

Model 5314 Probe is normally supplied with Model 314A Voltmeter. It is a 10 megohm probe with 20 db attenuation this making possible accurate measurements from 1 mV to 1000 V when connected to Model 314A. **Price: \$62**

CATHODE FOLLOWER PROBE — Model 2317A Cathode Follower Probe is normally supplied with Model 317 voltmeter for measurements from 300 μ V to 300 mV. Its input impedance is equivalent to 10 megohms shunted by

7 pF. Length of cable is 3 feet. (To measure higher voltages use Model 3317 Adapter, see below). **Price: \$87**

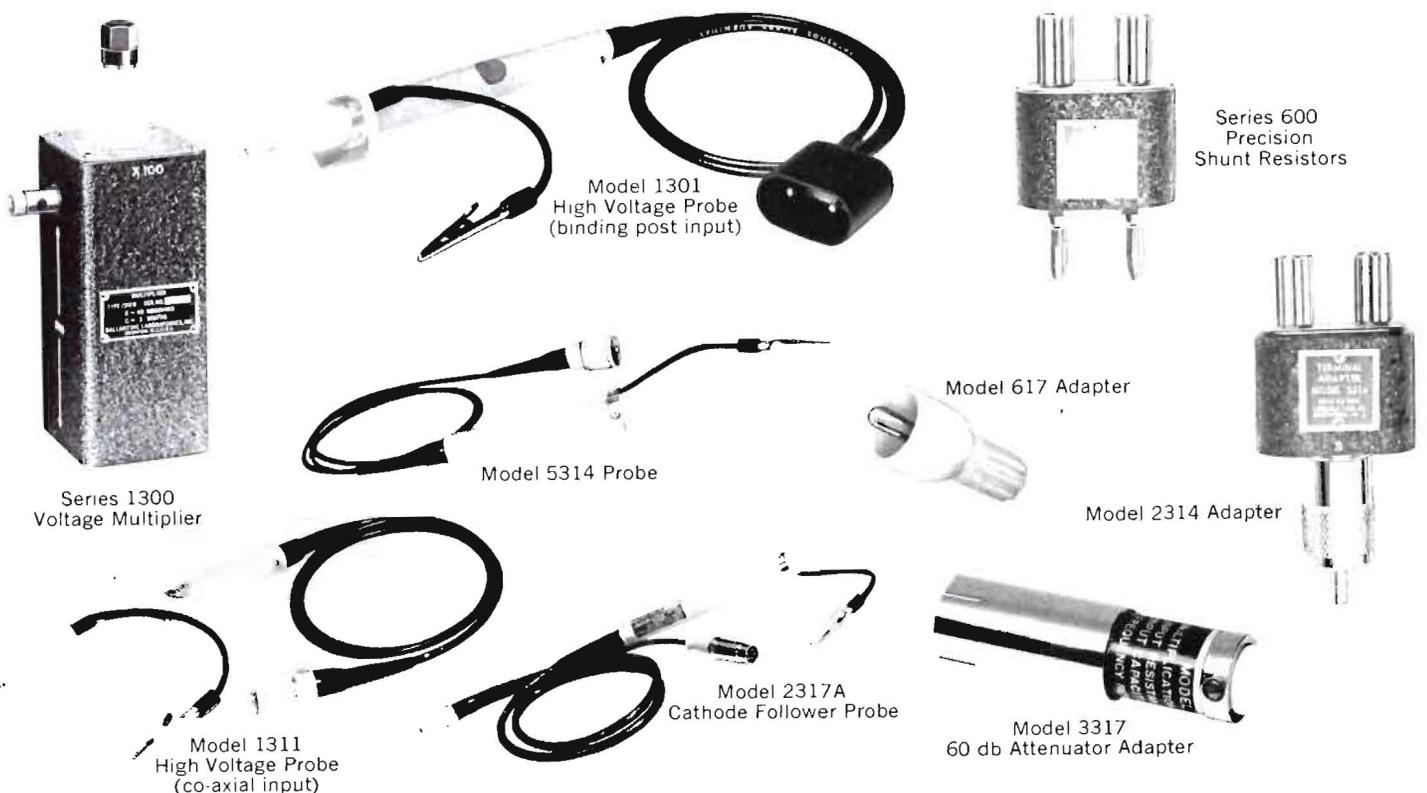
PRECISION SHUNT RESISTORS — Series 600 Precision Shunt Resistors having values of 0.01, 0.1, 1.0, 10, 100, 1000 ohms may be connected across the binding post input terminals of Ballantine vtvm's for measurement of current from 0.1 microamperes to 10 amperes.

Price each, 1, 10, 100, 1000 ohms: \$20. 0.1 ohms: \$25. 0.01 ohms: \$35.

ADAPTERS — Model 617 Adapter is a single binding post to single banana plug adapter which may be plugged into the UHF co-axial receptacle on Ballantine Models 310B, 314A, 320A vtvm's to provide a binding post instead of a co-axial input connection. **Price: \$2.50**

Model 2314 Adapter is a UHF co-axial to twin binding post adapter which may be connected into the UHF co-axial receptacle on Ballantine Model 314 vtvm to provide a twin binding post input connection. **Price: \$15**

Model 3317 Adapter is a 60 db attenuator attachment for use on the Model 2317A Cathode Follower Probe to extend the range of voltage measurements of the Model 317 Voltmeter. Voltage range with Model 3317 Adapter is 300 mV to 300 V. **Price: \$37.**





A Few of the Many Sales Engineers Who Represent Ballantine

Member Scientific Apparatus Makers Association

BALLANTINE LABORATORIES INC.

P.O. BOX 97 • BOONTON, NEW JERSEY 07005

TWX: 201-334-8961 • TEL: 201-334-1432

