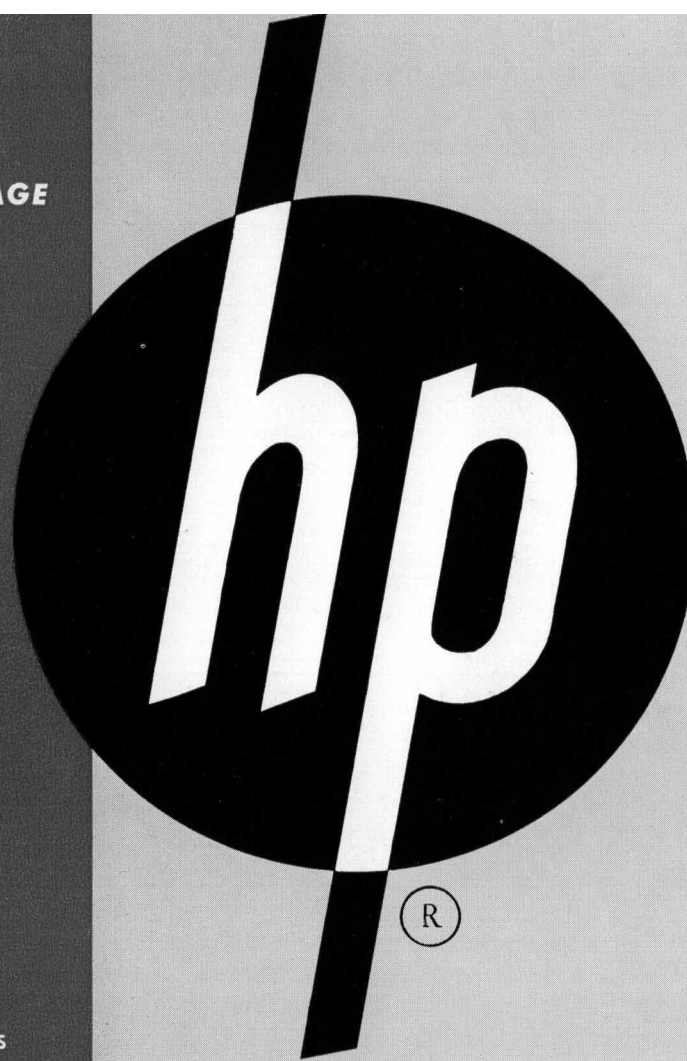


## COMPLETE COVERAGE

Amplifiers  
Attenuators  
Bolometer Mounts  
Carrier Oscillators  
Coaxial Instruments  
Detectors  
Directional Couplers  
Distortion Analyzers  
Electronic Counters  
Electronic Tachometers  
FM Monitors  
Frequency Counters  
Frequency Converters  
Frequency Meters  
Frequency Standards  
Function Generators  
Interpolation Oscillators  
Low Pass Filters  
Microwave Test Equipment  
Nuclear Scalers  
Oscillators  
Power Meters  
Power Supplies  
Pulse Generators  
Signal Generators  
Slotted Sections  
Square Wave Generators  
Standing Wave Indicators  
Time Interval Meters  
TV Monitors  
Vacuum Tube Voltmeters  
VHF Bridge  
Video Test Oscillators  
Waveform Analyzers  
Waveguide Equipment



# SHORT FORM CATALOG

Hewlett-Packard offers over 250 measuring instruments for manufacturing, industrial and scientific research, equipment maintenance, communications and military use.

Each *-hp-* instrument gives you the economies of fast, accurate performance, broad usefulness, and dependable service. Each has the familiar *-hp-* characteristics of simple operation, minimum adjustment, independence of line voltage or tube changes, generous overload protection and highest quality design and construction.

This catalog gives brief details of major *-hp-* instruments. For complete information, see your *-hp-* representative, or write direct.

# -hp- Oscillators — Signal Generators .01 to 10,000,000 cps

## -hp- 200 SERIES AUDIO OSCILLATORS



Four widely used *-hp-* oscillators have been redesigned into two compact, lightweight instruments offering wider frequency range, more operating simplicity, highest accuracy and stability. New Models 200AB and 200CD replace Models 200A through 200D, retain the time-tested RC circuits that insure

constant output, low distortion; require no zero set. *-hp-* also offers Model 202D for sub-audio, audio, supersonic and carrier tests; and Model 200I, a spread-scale oscillator for interpolation or where frequency must be known precisely.

## -hp- 650A TEST OSCILLATOR



Highly stable, wide band (10 cps to 10 mc) multi-purpose test oscillator for audio, supersonic, video, and rf measurements. Output variable 30  $\mu$ v to 3 v. Frequency response flat

$\pm 1$  db. Output impedance 600 ohms, or 6 ohms with voltage divider. \$490.00 $\Delta$ .

Instrument	Primary Uses	Frequency Range	Output	Price
-hp- 200AB	Audio tests	20 cps to 40 kc	1 watt/24.5 v	\$120.00
-hp- 200CD	Audio, ultrasonic tests	5 cps to 600 kc	160 mw/20 v *	150.00
-hp- 200I	Interpolation and frequency measurements	6 cps to 6 kc	100 mw/10 v	225.00
-hp- 200T	Telemetry, carrier current tests	250 cps to 100 kc	160 mw/20 v *	350.00
-hp- 201B	High quality audio tests	20 cps to 20 kc	3 w/42.5 v	250.00
-hp- 202A	Low frequency measurements	.01 cps to 1 kc	20 mw/10 v	465.00 $\Delta$
-hp- 202B	Low frequency measurements	1/2 cps to 50 kc	100 mw/10 v	365.00 $\Delta$
-hp- 202D	Low frequency measurements	2 cps to 70 kc	100 mw/10 v	275.00
-hp- 204A	Portable, battery operated	2 cps to 20 kc	2.5 mw/5 v	175.00
-hp- 205A	High power audio tests	20 cps to 20 kc	5 watts	405.00 $\Delta$
-hp- 205AG	High power tests, gain measurements	20 cps to 20 kc	5 watts	440.00 $\Delta$
-hp- 205AH	High power supersonic tests	1 kc to 100 kc	5 watts	565.00 $\Delta$
-hp- 206A	High quality, high accuracy audio tests	20 cps to 20 kc	+15 dbm	565.00 $\Delta$
-hp- 230A	Carrier test oscillator	35 cps to 35 kc	+14 dbm/600 ohms	275.00
-hp- 233A	Carrier test oscillator	50 cps to 500 kc	3w/600 ohms	475.00
-hp- 234A	Carrier test oscillator	160 cps to 160 kc	+14 dbm/600 ohms	300.00
-hp- 650A	Wide range video tests	10 cps to 10 mc	15 mw/3 v	490.00 $\Delta$

\*Open circuit. Internal impedance 600 ohms.

# -hp- Distortion, Wave Form Analyzers — 20 cps to 20 kc

## -hp- 330B DISTORTION ANALYZER



Measures distortion as low as 0.1%, 20 cps to 20 kc. Measures noise voltages as low as 100  $\mu$ v. High sensitivity, high stability, broad applicability for broadcast, laboratory or production.

Wide band 20 db gain input amplifier. Built-in VTVM usable separately. \$410.00 $\Delta$ .

## FM, AM-FM MODELS

*-hp- 330C*, for FM broadcasters, includes VU meter meeting F.C.C. requirements. *-hp- 330D*, for AM-FM broadcasters, includes AM detector to rectify AM carrier, plus VU meter employed in model 330C. Model 330C, \$440.00 $\Delta$ . Model 330D, \$455.00 $\Delta$ .

Instrument	Primary Uses	Frequency Range	Characteristics	Price
-hp- 300A	Wave form analyzer	30 cps to 16 kc	Variable selectivity; measuring range 1 mv to 500 v	\$625.00
-hp- 330B	Measures total audio distortion	20 cps to 20 kc	Includes input amplifier, VTVM	410.00 $\Delta$
-hp- 330C	For FM broadcast measurements	20 cps to 20 kc	Special VU meter to meet F.C.C. requirements	440.00 $\Delta$
-hp- 330D	For AM-FM broadcast measurements	20 cps to 20 kc	AM detector and VU meter to meet F.C.C. requirements	455.00 $\Delta$
<b>SQUARE WAVE GENERATOR</b>				
-hp- 210A	Transient and frequency response	20 cps to 10 kc	Output 50 v peak-to-peak 1,000 ohm impedance	150.00

# -hp- Vacuum Tube Voltmeters — 2 to 700,000,000 cps

## -hp- 400D VACUUM TUBE VOLTMETER



Best *-hp-* voltmeter ever built! Covers all frequencies 10 cps to 4 mc. Extremely sensitive, wide range, accurate within 2% to 1 mc, measures 0.1 mv to 300 v. Direct reading in dbm. 10 megohm input impedance insures negligible loading on circuits

under test. New amplifier circuit with 56 db mid-range feedback assures utmost stability, freedom from change due to external conditions. \$225.00.

Instrument	Primary Uses	Frequency Range	Voltage Range	Input Impedance	Price
-hp- 400A	General purpose ac measurements	10 cps to 1 mc	.005 to 300 v 9 ranges	1 megohm 24 $\mu$ mfd shunt	\$185.00
-hp- 400B	Low frequency ac measurements	2 cps to 100 kc	.005 to 300 v 9 ranges	10 megohms 24 $\mu$ mfd shunt	195.00
-hp- 400D	Wide range ac measurements. High sensitivity	10 cps to 4 mc	.0001 to 300 v 12 ranges	10 megohms 14 $\mu$ mfd shunt	225.00
-hp- 404A	Portable, battery operated	2 cps to 50 kc	.0005 to 300 v 11 ranges	10 megohms 20 $\mu$ mfd shunt	185.00
-hp- 410B	Audio, rf, VHF measurements; dc voltages; resistances	20 cps to 700 mc	.1 to 300 v 7 ranges	10 megohms 1.5 $\mu$ mfd shunt	245.00

*-hp-* Voltmeter Accessories (not listed) include voltage dividers, connectors, shunts and multipliers to extend the useful range of your equipment.

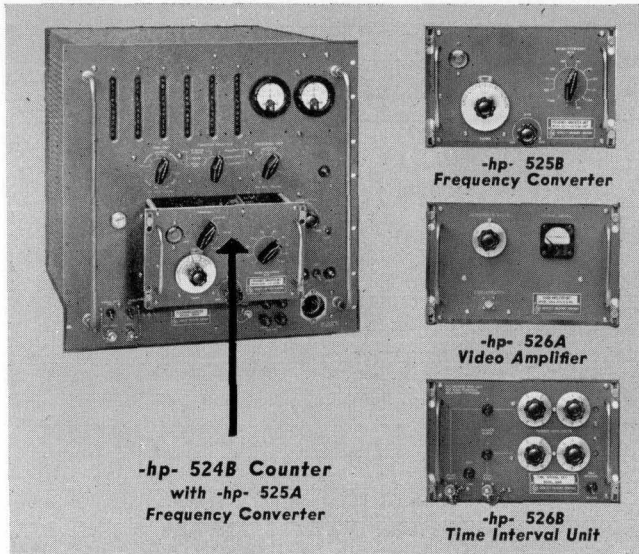
$\Delta$  Includes new lightweight all-metal cabinet with carrying handles. Also available for rack mounting at slightly lower prices.



# NEW!

## hp 524B ELECTRONIC COUNTER

with plug-in units to fit your exact measuring need



Frequency 10 cps to 220 mc, interval 1  $\mu$ sec to 100 days and period 0 cps to 10 kc—all are measured instantly, automatically, directly by the revolutionary new *-hp-* 524B. You buy just the instrumentation you need; later add inexpensive plug-in units to double, triple versatility of this complete coverage instrument. Operation requires no calculations or technical training. Counter has high impedance, sensitivity, accuracy, quality construction. \$1,915.00 $\Delta$ .

**-hp- 525A Frequency Converter** extends Counter's basic 10 cps to 10 mc range to 100 mc; increases video sensitivity to 0.1 v, 10 cps to 10 mc. \$225.00.

**-hp- 525B Frequency Converter** gives Counter range from 100 to 220 mc at 0.25 v sensitivity. \$225.00.

**-hp- 526A Video Amplifier** increases Counter's sensitivity between 10 cps and 10 mc to 10 millivolts for low level work. \$125.00.

**-hp- 526B Time Interval Unit** measures interval 1  $\mu$ sec to 100 days with accuracy of 0.1  $\mu$ sec  $\pm$  0.001%. Reads direct in seconds, milliseconds, microseconds. \$150.00

(Plug-in units supplied in aluminum storage cases)

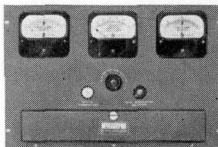
## Other -hp- Frequency Measuring and Monitoring Equipment

### -hp- 100D SECONDARY FREQUENCY STANDARD



Swift, sure frequency comparison, new convenience in standardizing with minimum external equipment. 100  $\mu$ sec time markers, built-in oscilloscope, sine or rectangular waves. Low output impedance; short-time stability 1/1,000,000. Performs most functions of primary standards in audio, rf or supersonic ranges. \$615.00 $\Delta$ .

### -hp- 335E TV MONITOR



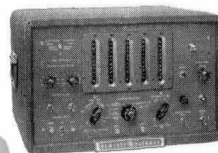
Channels 2 through 83. Exceeds F.C.C. requirements. Compact, only 12 $\frac{1}{4}$ " high, rack mounted. Low cost, all purpose, for visual and aural frequency monitoring, percentage aural modulation. Long-term dependability, precise accuracy, highest stability, no adjustment during operation. Forced ventilation, remote indication features. \$1,950.00.

### -hp- 512A/B FREQUENCY CONVERTERS



Two new *-hp-* Frequency Converters extend range of *-hp-* 524A Electronic Counter without loss of accuracy and with increased sensitivity. *-hp-* 512A covers frequencies 10 to 100 mc, 512B covers 100 to 220 mc. Complex setups eliminated, are easily used by non-technical personnel. *-hp-* 512A, 512B, \$350.00.

### -hp- 522B ELECTRONIC COUNTER



Compact, low cost, versatile instrument for frequency, period or time measurements. Range 10 cps to 100 kc. Reads direct in cps, kc, seconds or milliseconds. Count automatically reset, action repetitive. Stability of time base 5/1,000,000. Display length variable. Easily used by untrained personnel. \$915.00 $\Delta$ .

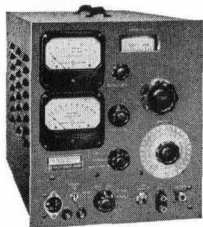
Instrument	Primary Uses	Frequency Range	Characteristics	Price
-hp- 100C Secondary Standard	Audio, supersonic calibration	100 kc, 10 kc, 1 kc, 100 cps	Accurate within $\pm$ .001% Sine waves only	\$ 465.00 $\Delta$
-hp- 100D Secondary Standard	Frequency, time measurements	100 kc, 10 kc, 1 kc, 100 cps, 10 cps	Stability 1/1,000,000 (short-time) Sine or rectangular output. Marker pips	615.00 $\Delta$
-hp- 335B Frequency Monitor	FM broadcast station monitor	88 to 108 mc	Frequency deviation $\pm$ 3 kc; accuracy $\pm$ .001%; modulation 0 to 100 kc	935.00
-hp- 335E TV Monitor	TV visual, aural and % mod. monitor	Channels 2 through 83	Indicates visual, aural carrier frequency deviation, % modulation aural carrier	1,950.00
-hp- 500A Frequency Meter	Rapid frequency measurements	10 cps to 50 kc	10 ranges $\pm$ 2% accuracy. Input 0.5 to 200 volts	210.00
-hp- 505A Electronic Tachometer	Measurements of high speed machinery	600 to 3,000,000 rpm	10 ranges $\pm$ 2% accuracy	220.00
-hp- 505B Electronic Tachometer	Same as 505A	10 to 50,000 rps	Same as 505A except calibrated in rps	220.00
-hp- 510A Mixer	Measure frequency continuously with <i>-hp-</i> 500A and 100 D/C	20 cps to 200,000 cps	Mixes two frequencies, delivers difference to <i>-hp-</i> 500A	200.00
-hp- 512A Frequency Converter	Extends <i>-hp-</i> 524A range to 100 mc	100 kc to 100 mc	Fast, direct readings of signals to 100 mc with 524A. No charts, interpolation. Min. input 0.01 v	350.00
-hp- 512B Frequency Converter	Gives <i>-hp-</i> 524A range 100 to 220 mc	100 mc to 220 mc	Same as 512A except for frequency coverage and input 0.14 v RMS min.	350.00
-hp- 520A Nuclear Scaler	For counting high-rate pulses	Capacity 100 counts in 2 decades. 10,000,000 pps counting rate	100:1 divider for operation of low speed scalars	615.00 $\Delta$
-hp- 522A Electronic Counter	Wide-range frequency, period measurements	10 cps to 100 kc	Frequency measuring gate time is 1 sec. or multiples; standard frequency counted for period measurement 100 kc	790.00 $\Delta$
-hp- 522B Electronic Counter	Wide-range frequency, period, time interval measurements	10 cps to 100 kc	Measures rate of occurrences 0.00001 to 100,000/sec.; time interval 10 $\mu$ sec to 27.8 hrs.; periods of frequency count 1/1,000, 1/100, 1/10, 1, 10 sec. and multiples. Direct readings in cps, kc, sec. and millisec.	915.00 $\Delta$

$\Delta$  Includes new lightweight all-metal cabinet with carrying handles. Also available for rack mounting at slightly lower prices.

Data subject to change without notice. Prices f.o.b. factory.

# -hp- Signal Generators—10 to 11,000 mc

## -hp- 612A UHF-TV SIGNAL GENERATOR



450 to 1,200 mc. Master oscillator-power amplifier generator for UHF-TV measurements including gain, selectivity, sensitivity, image rejection. Directly set and read; no charts, no interpolation. Low incidental fm, high-quality broad band video modulation to 5 mc. May be mod-

ulated internally or externally, amplitude modulated or pulse modulated. (Good rf pulses 0.2  $\mu$ sec or longer.) \$1,200.00.

Instrument	Frequency Range	Characteristics	Price
-hp- 608A	10 to 500 mc	Output 0.1 $\mu$ v to 1 v into 50 ohm load. Pulse or CW modulation. Direct calibration.	\$ 850.00
-hp- 612A	450 to 1,200 mc	Output 0.1 $\mu$ v to 0.5 v into 50 ohm load. Pulse, CW or amplitude modulation to 5 mc. Direct calibration.	1,200.00
-hp- 614A	800 to 2,100 mc	Output 0.1 $\mu$ v to 0.223 v into 50 ohm load. Pulse, CW or FM modulation. Direct calibration.	1,950.00
-hp- 616A	1,800 to 4,000 mc	Output 0.1 $\mu$ v to 0.223 v into 50 ohm load. Pulse, CW or FM modulation. Direct calibration.	1,950.00
-hp- 618B	3,800 to 7,600 mc	Output 0.1 $\mu$ v to 0.223 v into 50 ohm load. Pulse, CW, FM or square wave modulation. Direct calibration.	2,250.00
-hp- 620A	7,000 to 11,000 mc	Output 0.1 $\mu$ v to 0.071 v into 50 ohm load. Pulse, CW, FM or square wave modulation. Direct calibration.	2,250.00
-hp- 623B	5,925 to 7,725 mc	Output 70 $\mu$ v to 0.223 v into 50 ohm load. FM or square wave modulation. Separate power meter and wave meter section.	1,750.00
-hp- 624B	8,500 to 10,000 mc	Output 3.0 $\mu$ v to 0.223 v into 50 ohm load. Pulse, FM or square wave modulation. Separate power meter and wave meter section.	2,265.00 $\Delta$

## -hp- Waveguide Test Equipment—2.6 to 18 kmc

Basic, low-cost elements offer utmost flexibility for assembly of exact instrumentation required. Each unit covers entire range of its waveguide size.

Simple, sturdy mechanical design; accurate, multi-purpose operation.

Instrument	Coaxial Type N Conn.	"S" 3" x 1 1/2" 2.6-3.95 kmc.	"G" 2" x 1" 3.95-5.85 kmc.	"J" 1 1/2" x 3/4" 5.85-8.2 kmc.	"H" 1 1/4" x 5/8" 7.05-10.0 kmc.	"X" 1" x 1/2" 8.2-12.4 kmc.	"P" .702" x .391" 12.4-18.0 kmc.
Adapter, Waveguide to Coax		S281A \$75.00	G281A \$55.00	J281A \$50.00	H281A \$45.00	X281A \$35.00	
Cover to choke flange		S290A \$65.00	G290A \$50.00	J290A \$35.00	H290A \$25.00	X290A \$15.00	P290A \$20.00
Attenuators, Fixed 6, 10, 20 db		S370 \$75.00	G370 \$65.00	J370 \$65.00	H370 \$60.00	X370 \$55.00	P370 \$60.00
Flap, 25 db max.		S375A \$110.00	G375A \$100.00	J375A \$90.00	H375A \$80.00	X375A \$50.00	P375A \$65.00
Calibrated, precision		S380A \$260.00		J382A \$300.00	H382A \$300.00	X382A \$250.00	P382A \$250.00
Detector Mounts	420A \$50.00					X421A \$75.00	
	440A† \$85.00	S485A‡ \$125.00	G485B† \$95.00	J485B† \$90.00	H485B† \$85.00	X485B† \$75.00	P485C■ \$110.00
Thermistor Mounts (Fixed tuned) ■	477A \$75.00		G487A \$95.00	J487A \$90.00	H487A \$80.00	X487A \$75.00	
Frequency Meters, Reaction				J530A \$120.00	H530A \$120.00	X530A \$120.00	P530A \$150.00
Directional Couplers, Cross Guide: 20, 30 db		S750 \$100.00	G750 \$85.00	J750 \$70.00	H750 \$60.00	X750 \$50.00	
Directional Couplers, Multi Hole: 3, 10, 20 db		S752 \$260.00	G752 \$170.00	J752 \$140.00	H752 \$120.00	X752 \$100.00	P752A \$135.00
Universal Waveguide Carriage		809B for frequencies 3,000 to 18,000 mc \$160.00					
Slotted Sections, Waveguide		S810A* \$450.00	G810B§ \$90.00	J810B§ \$90.00	H810B§ \$90.00	X810B§ \$90.00	P810B§ \$90.00
Waveguide Tees, Series		S840A \$100.00	G840A \$85.00	J840A \$65.00	H840A \$50.00	X840A \$35.00	P840A \$40.00
Shunt		S841A \$100.00	G841A \$85.00	J841A \$65.00	H841A \$50.00	X841A \$35.00	P841A \$40.00
Hybrid		S845A \$130.00	G845A \$115.00	J845A \$100.00	H845A \$75.00	X845A \$50.00	P845A \$55.00
Transformers, Slide Screw		S870A \$170.00	G870A \$140.00	J870A \$135.00	H870A \$130.00	X870A \$125.00	P870A \$130.00
E-H		S880A \$225.00	G880A \$155.00	J880A \$145.00	H880A \$135.00	X880A \$130.00	P880A \$135.00
Waveguide Phase Shifter						X885A \$250.00	
Terminations, Low Power		S910A \$45.00	G910A \$40.00	J910A \$35.00	H910A \$30.00	X910A \$25.00	P910A \$30.00
Terminations, High Power		S912A \$125.00				X912A \$75.00	
Moving Load		S914A \$100.00	G914A \$75.00	J914A \$70.00	H914A \$60.00	X914A \$50.00	P914A \$55.00
Adjustable Shorts		S920A \$80.00	G920A \$70.00	J920A \$65.00	H920A \$60.00	X920A \$50.00	P920A \$55.00
Broad Band Probe	442B \$35.00	All Frequencies					
Broad Band Probe, Untuned	444A \$50.00	All Frequencies					

†For use with bolometer or crystal. ‡For use with bolometer only. \*Complete assembly including carriage. §Mounts in 809B Carriage—See next page.  
■ Includes Thermistor, installed. See page 6.

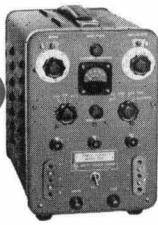
$\Delta$  Includes new lightweight all-metal cabinet with carrying handles. Also available for rack mounting at slightly lower prices.

Data subject to change without notice. Prices f.o.b. factory.



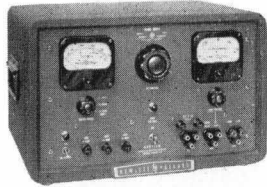
# -hp- Regulated Power Supplies

## -hp- 715A POWER SUPPLY



*-hp- 715A* is a versatile source of regulated beam and reflector voltage for operating most test bench klystron tubes. Beam voltage 250 to 400 v; reflector voltage 0 to 900 v; 6.3 v filament. Internal, 1,000 cps square wave modulation, also 60 cps fm modulation, both on reflector voltage. \$300.00.

## -hp- 712B POWER SUPPLY



This new *-hp-* instrument features high regulation of 0.01%, 0.1 millisecond transient response, internal impedance 0.1 ohms in series with 25  $\mu$ H; full-load maximum

hum less than 500  $\mu$ v, sealed transformers, chokes and condensers. 0 to 500 v, 200 ma supply and fixed —300 v tap providing a 50 ma, 300 to 800 v variable supply for klystron operation. \$365.00 $\Delta$ .

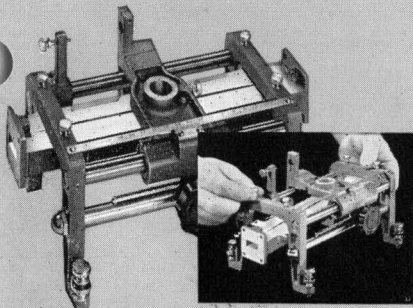
Instrument	Primary Uses	Characteristics	Price
<i>-hp- 710A</i> Power Supply	General purpose regulated plate and filament supply for lab and field use	180 to 360 volts at 75 milliamperes	\$ 85.00
<i>-hp- 710B</i> Power Supply	Same as 710A	100 to 360 volts at 75 milliamperes	100.00
<i>-hp- 712B</i> Power Supply	Similar to 710A/B. Meets requirements for heavy duty field and lab work	0 to 500 volts at 200 milliamperes 0.01% regulation	365.00 $\Delta$
<i>-hp- 715A</i> Klystron Power Supply	Regulated beam, reflector source for low power klystrons	250 to 400 volts at 50 milliamperes	300.00
<i>-hp- 717A</i> Klystron Power Supply	Regulated beam, reflector source for Type 5721 klystrons	800 to 1,000 volts at 25 milliamperes	375.00

## Equipment below available for most waveguide frequencies

See table at left for data, prices.

### -hp- 809B UNIVERSAL PROBE CARRIAGE

### -hp- 810 WAVEGUIDE SLOTTED SECTIONS



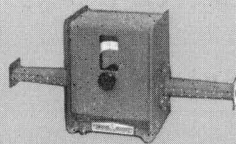
Convenient, all-purpose *-hp- 809B* carriage operates with six different *-hp-* slotted sections, waveguide and coaxial. Mounts sections covering frequencies 3,000 to 18,000 mc—sections interchange in 30 seconds! Precision-built carriage calibrated in mm to 0.1 mm; dial gauge may be mounted. Operates with *-hp- 442B* Broad Band Probe and *-hp- 440A* Coaxial Detector in combination; or with *-hp- 444A* Untuned Probe.

*-hp- 810A/B* Slotted Sections. *-hp- 810B*, for mounting in 809B carriage, is a flanged waveguide section with accurately machined slot tapered at ends to minimize reflection. Available in 5 waveguide bands, 3.95 thru 18.0 kmc. *-hp- S810A*, complete slotted section assembly including probe carriage. Available for 2.6 to 3.95 kmc band only.

### -hp- 420A CRYSTAL DETECTOR

Employs a silicon crystal to detect rf signals in Type N coaxial line. Covers frequencies 10 mc to 12.5 kmc. Flat frequency response, excellent conversion efficiency. Uses modified 1N21 crystal.

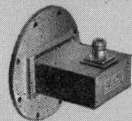
### -hp- X382A PRECISION ATTENUATOR



Precision broad band attenuation to 50 db. Completely independent of frequency; phase shift constant all attenuations.

Calibrated range 0 to 50 db, maximum error  $\pm 2\%$  of db reading. 8,200 to 12,400 mc. VSWR less than 1.15 full range. Radical new design with rotating attenuator films.

### -hp- 281A WAVEGUIDE-COAX ADAPTERS



For convenient transition between waveguide and coax systems. Each unit covers a full waveguide range with VSWR less than 1.25. Equipped with Type N connectors.

### -hp- 444A UNTUNED PROBE



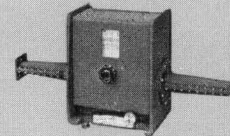
A 1N26 crystal plus small antenna in a convenient, easy-to-use housing. Variable penetration depth, no tuning required. Sensitivity equal to single- or double-tuned probes. Frequency range: 2.6 to 18.0 kmc. Mounts in 809B Carriage.

### -hp- 487A THERMISTOR MOUNT



For fast, accurate waveguide power measurements. Each mount covers full range of its waveguide frequency. No tuning required, VSWR less than 1.5. Rugged construction, high temperature coefficient permanent thermistors virtually eliminate delays due to detector element burn-out.

### -hp- X885A PHASE SHIFTER



For accurate, precisely controlled phase variation throughout X-Band frequencies. Ideal for microwave im-

pedance, transmission measurements, antenna and system design. Direct reading, low power absorption, 360° (electrical) range.

### -hp- 752 MULTI-HOLE COUPLER



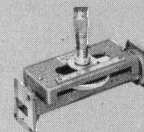
Directional couplers available in 2 models with coupling factors of 10 and 20 db  $\pm 0.7$  db over full range of a waveguide. VSWR better than 1.05. Directivity 40 db or better over entire range. Available as a 3-terminal network.

### -hp- 485B DETECTOR MOUNTS



To measure power over complete waveguide range in conjunction with *-hp- 430B* Power Meter and barretter. Also measures relative level, or detects rf energy using 1N21 or 1N23 crystal. Semi-tuned by movable short to VSWR 1.25.

### -hp- 870A SLIDE SCREW TUNERS



For flattening waveguide systems. The position and penetration of a probe is adjusted to set up a VSWR which is used to cancel existing VSWR in system. VSWR values up to 20 can be corrected with accuracy of 1.02 VSWR.

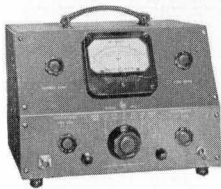
$\Delta$  Includes new lightweight all-metal cabinet with carrying handles. Also available for rack mounting at slightly lower prices.

Data subject to change without notice. Prices f.o.b. factory.

5

# Microwave Power Measuring Equipment

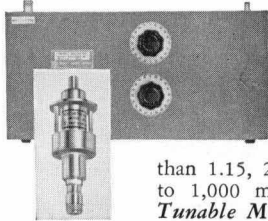
## -hp- 430B MICROWAVE POWER METER



No computations! Provides instantaneous, automatic power readings *direct* in db or mw at all frequencies for which there are suitable bolometer mounts. For CW measurements, uses either 1/100 amp. fuse or Sperry

821 barretter. Also measures CW or pulsed power with negative coefficient thermistor. Operates with all mounts in adjacent table. \$250.00.

## -hp- 475B/476A BOLOMETER MOUNTS



**-hp- 476A Universal Bolometer Mount** measures rf power 10 to 1,000 mc. No tuning or adjustment. VSWR less than 1.15, 20 to 500 mc; 1.25, 10 to 1,000 mc. \$85.00 **-hp- 475B Tunable Mount** (upper), continuous 1,000 to 4,000 mc. \$200.00.

Instrument	Primary Uses	Frequency Range	Characteristics	Price
-hp- 430B Microwave Power Meter	Measurement of rf power	Depends on Bolometer mount	.01 to 10 mw $\pm$ 5% accuracy	\$250.00
-hp- 475B Tunable Bolometer Mount	Measurement of rf power	1,000 to 4,000 mc	Matches 50-ohm line to 100 or 200 ohms	200.00
-hp- 476A Universal Bolometer Mount	Measurement of rf power	10 to 1,000 mc	No tuning required VSWR less than 1.25	85.00
-hp- 477A Coaxial Thermistor Mount	Measurement of rf power	10 to 10,000 mc	Broad band, low VSWR, no tuning	75.00
-hp- 485 Waveguide Detector Mount	Measurement of rf power	2,600 to 18,000 mc	Full coverage of waveguide band	See Table page 4
-hp- 487A Waveguide Thermistor Mount	Measurement of rf power	4,000 to 12,000 mc	Full coverage, no tuning, 1.5 VSWR	See Table page 4

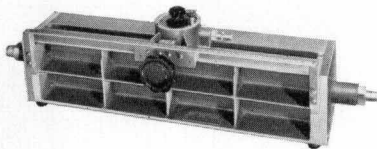
## -hp- 477A COAXIAL THERMISTOR MOUNT



For frequency range 10 mc to 10 kmc. VSWR less than 1.5. Thermistor element is 200 ohm negative. Input connector type N, output Type BNC. \$75.00.

# Microwave Impedance Measuring Equipment

## -hp- 805A/B COAXIAL SLOTTED SECTION

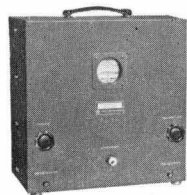


Range 500 to 4,000 mc. High accuracy, high stability, negligible slope, minimum leakage. Exclusive parallel plane design, VSWR of basic section and connectors, 1.04. **-hp- 805A**, 50 ohms, Type N coaxial connector. **-hp- 805B**, 46.3 ohms, for 7/8" rigid transmission lines. \$475.00.

## -hp- 806B COAXIAL SLOTTED SECTION

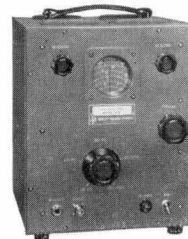
For continuous coverage at all frequencies from 3,000 to 12,000 mc. For use with **-hp- 809B** carriage. Section and connector VSWR 1.04 to 8,000 mc. 50 ohm impedance, negligible slope. Type N connectors, \$200.00.

Instrument	Primary Uses	Frequency Range	Characteristics	Price
-hp- 360A-D Low Pass Filters	Eliminates harmonic voltages from UHF systems	Cutoff frequencies A-700 mc B-1,200 mc C-2,200 mc D-4,100 mc	50 db rejection at 1.2 cutoff freq.	\$ 40.00
-hp- 415A Standing Wave Indicator	VSWR indicator or null indicator	300 to 2,000 cps Normal freq. 1,000 cps	0 to 60 db. attn. Max. sensitivity 0.3 $\mu$ v	200.00
-hp- 416A Ratio Meter	Measure reflection coefficient, VSWR	1,000 cps $\pm$ 40 cps	Min. 3 millivolts or 0.3 $\mu$ v; accuracy $\pm$ 2%	365.00 $\Delta$
-hp- 417A VHF Detector	VHF bridge detector (for <b>-hp- 803A</b> )	10 to 500 mc	Approx. 5 $\mu$ v sensitivity	250.00
-hp- 803A VHF Bridge	Measurement of VHF impedance, VSWR	50 to 500 mc	2 to 2,000 ohms impedance $-90^\circ$ to $+90^\circ$ phase angle	495.00
-hp- 805A Coaxial Slotted Section	Measurement of VSWR	500 to 4,000 mc	For Type N Connectors, flexible cables	475.00
-hp- 805B Coaxial Slotted Section	Same as above	Same as above	For rigid 7/8" RG44/U line	475.00
-hp- 806B Coaxial Slotted Section	Same as above (Mounts in 809B)	3,000 to 12,000 mc	For Type N Connectors, flexible cables	200.00
hp- 809B Universal Probe Carriage	Supports 806B section, also G, J, H, X and P 810 Waveguide sections		Accepts 442B and 444A probes	160.00



## -hp- 803A VHF BRIDGE

Gives fast, direct readings of any impedance between 50 and 500 mc. Measures by sampling electric and magnetic fields in transmission line. Usable for comparative measurements 5 to 700 mc. Impedance range 2 to 2,000 ohms. Phase angle  $-90^\circ$  to  $+90^\circ$ , at 52 mc and above. Also measures SWR, % reflected power, VHF system flatness. \$495.00.



## -hp- 417A VHF DETECTOR

For use with 803A Bridge; or general laboratory use. Super-regenerative receiver, 10 to 500 mc. 5 bands. Approx. 5  $\mu$ v sensitivity over entire band. Direct reading frequency control, thoroughly shielded. \$250.00.



## -hp- 415A STANDING WAVE INDICATOR

For all waveguide or coaxial slotted sections. Gives readings in VSWR or db. Single frequency operation; 300 to 2,000 cps. Low noise level, 0.3  $\mu$ v sensitivity, 60 db. calib. attenuator. \$200.00.

$\Delta$  Includes new lightweight all-metal cabinet with carrying handles. Also available for rack mounting at slightly lower prices.



# Amplifiers for General Use and Fast-Circuit Work

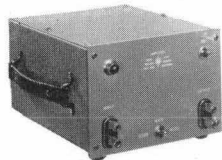
## -hp- 460A/B AMPLIFIERS



Complete instrumentation for distortion-free fast pulse measurement.

-hp- 460A

*Wide Band Amplifiers*, in cascade with *-hp- 460B Fast-Pulse Amplifiers* offer up to 90 db gain, 125 v open circuit output. This permits full deflection of 5XP CRT, or 2-inch deflection of 5CP tubes. Rise time 0.0026  $\mu$ sec; can amplify milli-microsecond pulses; gives over 100 mc bandwidth to your standard oscilloscope. 460A, \$185.00; 460B, \$225.00. Connecting cables, plugs, accessories—prices on request.



## -hp- 450A AMPLIFIER

Time-tested, general purpose instrument, 20 db or 40 db gain, for use wherever wide frequency range and high stability are needed. 10 cps to 1 mc. Negligible phase shift, no spurious responses. \$140.00.

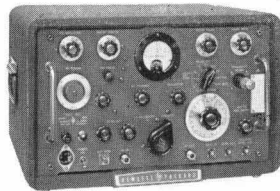


## -hp- 490A/491A TRAVELING-WAVE TUBE AMPLIFIERS

Two new broad band linear instruments providing a new, simple way to amplify, modulate, or increase power to 1 watt. Full S-Band coverage—2 to 4 kmc; 30 and 35 db gain, millimicrosecond pulse modulation, radical new coupled-helix design. High gain, low noise. *-hp- 490A*, \$1,100.00. *-hp- 491A*, \$1,100.00 (Includes capsulated tube).

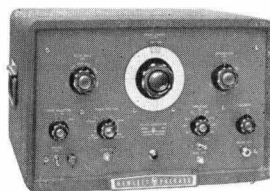
Instrument	Primary Uses	Frequency Range	Characteristics	Price
<i>-hp- 450A</i> Amplifier	General purpose lab amplifier	5 to 1,000,000 cps	20 and 40 db gain, freq. response + 1/2 db	\$ 140.00
<i>-hp- 460A</i> Amplifier	Wide band, pulse amplification	100 kc to 140 mc	20 db gain, rise time 0.0026 $\mu$ sec.	185.00
<i>-hp- 460B</i> Amplifier	Pulse amplification, high output	100 kc to 140 mc	15 db gain, 125 peak volts	225.00
<i>-hp- 490A</i> Traveling-Wave Tube Amplifier	Amplification and pulse modulation	S-Band—2 to 4 kmc	High gain, low noise, broad band 35 db gain	1,100.00
<i>-hp- 491A</i> Traveling-Wave Tube Amplifier	Power gain to 1 watt	S-Band—2 to 4 kmc	30 db gain	1,100.00

## -hp- 624B X-BAND TEST SET



High level, direct reading, *portable* test set simplifies lab or field work at frequencies from 8,500 to 10,000 mc. Rf output .223 v max. High stability attenuator reduces level by 100 db. May be pulsed or fm modulated. Separate section measures external rf power or external frequency. Ideal one-piece unit for measuring sensitivity and selectivity, tuning and power level of radar, gunfire and beacon systems. \$2,265.00 $\Delta$ .

piece unit for measuring sensitivity and selectivity, tuning and power level of radar, gunfire and beacon systems. \$2,265.00 $\Delta$ .



## -hp- 212A PULSE GENERATOR

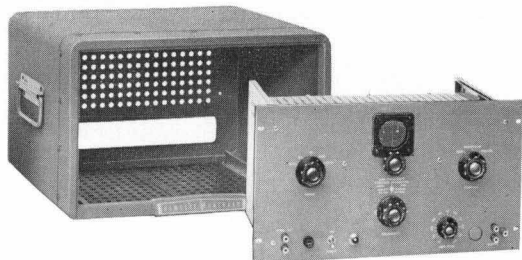
Provides continuously variable, high power "fast pulses" of superior wave form. Combines broad general usefulness with 0.02  $\mu$ sec rise and decay time to meet requirements of radar, TV and nuclear work. Pulse length variable 0.07 to 10  $\mu$ sec; minimum overshoot; 50 watt peak power (50 v to 50 ohms load). Low impedance means accurate pulses can be delivered at a distance from the instrument. Repetition rate variable 50 to 5,000 pps; controlled internally or externally. Synchronizing pulses available in advance of, or following, output pulse. \$565.00 $\Delta$ .

## New Streamlined All-Metal -hp- Cabinets

### 3 mounting options, greater flexibility of use

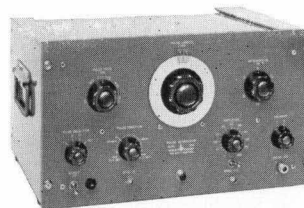
Now you can buy *-hp-* instruments mounted any of three ways, and, later on, change to any other mounting you wish. This new versatility means greater utilization of your *-hp-* instruments, and can also increase the flexibility of your entire instrument setup.

**Cabinets.** *-hp-* instruments having the standard 10 1/2" x 19" panel are now available in standardized *-hp-* AC 44 aluminum-and-steel cabinets. Equipped with sturdy carrying handles, these cabinets give

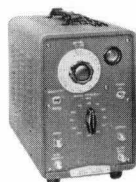


your *-hp-* instruments greater protection, better ventilation, and a clean, rugged, modern appearance. Either the separate back cover or the cabinet itself can be removed quickly and easily. Cabinets are finished in wrinkle grey matching the *-hp-* grey baked enamel panel faces. Cabinet, with instrument, \$15.00; separately, \$25.00.

**End frames.** To increase flexibility and convenience of *-hp-* instruments for bench use, *-hp-* Model 17 End Frames are offered. These frames are of heavy gauge aluminum, equipped with sturdy carrying handles and finished in *-hp-* grey baked enamel. They fit all late model *-hp-* instruments with panel size 10 1/2" x 19", and may be attached in moments. *-hp-* 17 End Frames, \$7.50 set.



**Rack mounting.** Many *-hp-* instruments are basically rack mounting and can be installed directly into 19" relay racks. Many other *-hp-* instruments can be equipped for relay rack mounting at slight additional charge. A complete list of instruments available for rack mounting will be sent on request.



**Smaller -hp- instruments**, too, are now being delivered in new, streamlined cabinets. *-hp-* 512A/B Frequency Converter, illustrated, shows the rugged, lightweight metal cabinet now offered with such instruments as *-hp-* 200AB, 200CD, 410B and 715A.

$\Delta$  Includes new lightweight all-metal cabinet with carrying handles. Also available for rack mounting at slightly lower prices.

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## complete coverage

In electronic test instruments, Hewlett-Packard gives you complete coverage several different ways.

**In development**—*hp* engineer teams are continually at work designing and producing accurate, helpful new instruments that meet and anticipate the demands of electronics.

**In instrumentation**—the *hp* line is the world's largest and most complete. You choose from over 250 instruments the ones that provide exactly the measuring coverage you require.

**In frequency coverage**—*hp* makes nearly every kind of useful electronic test instrument. And, for almost all

useful frequencies, too. For example, *hp* signal generators offer solid frequency coverage from 10 to 11,000 mc; *hp* voltmeters from 2 to 700,000,000 cps, oscillators from 0.01 to 10,000,000 cps.

**In personal service**—*hp* has selected the best independent organizations in America to give you personal help with measuring problems. Electronics specialists—men trained by Hewlett-Packard—save you time by helping select the exact *hp* instrumentation you need—and following through to be sure the equipment is properly utilized to serve you best. These men are located in major business centers—as near as your telephone. Call them when you need personal help, — in your plant, today.

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