

**COMPLETE COVERAGE**

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- Video Test Oscillators
- Waveform Analyzers
- Waveguide Equipment



# SHORT FORM CATALOG

**HEWLETT-PACKARD COMPANY**  
275A Page Mill Road • Palo Alto, California, U.S.A.

# -hp- Oscillators — .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 202A for sub-audio and audio 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	275.00
-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	.008 to 1,200 cps	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- 205AG	High power tests, gain measurements	20 cps to 20 KC	5 watts	440.00 $\Delta$
-hp- 206A	High quality, high accuracy audio tests	20 cps to 20 KC	+15 dbm	565.00 $\Delta$
-hp- 233A	Carrier test oscillator	50 cps to 500 KC	3 w/600 ohms	475.00
-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 $\Delta$ .

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	\$775.00
-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 $\Delta$

# -hp- Vacuum Tube Voltmeters — 10 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- 400AB	General purpose ac measurements	10 cps to 600 KC	.0003 to 300 v 11 ranges	10 megohms 15 $\mu$ mf shunt	\$200.00
-hp- 400D	Wide range ac measurements. High sensitivity	10 cps to 4 MC	.0001 to 300 v 12 ranges	10 megohms 14 $\mu$ mf shunt	225.00
-hp- 410B	Audio, rf, VHF measurements; dc voltages; resistances	20 cps to 700 MC	.1 to 300 v 7 ranges	10 megohms 1.5 $\mu$ mf 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.

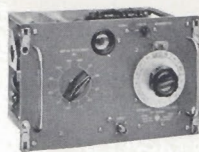
# hp 524B ELECTRONIC COUNTER

with plug-in units to fit your exact measuring need

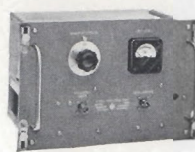


**-hp- 524B COUNTER with -hp- 525A FREQUENCY CONVERTER**

Frequency 10 cps to 220 MC, interval 1  $\mu$ sec to 100 days and period 0 cps to 10 KC—all measured instantly, automatically, directly by the revolutionary new **-hp- 524B** and its plug-in units. You buy just the instrumentation you need; later add inexpensive plug-ins to double, triple the versatility of this complete coverage instrument. For extended coverage to 12,000 MC, see **-hp- 540A Transfer Oscillator** below. **-hp- 524B** without plug-ins. \$2,150.00 $\Delta$



**-hp- 525B**  
Frequency Converter



**-hp- 526A**  
Video Amplifier



**-hp- 526B**  
Time Interval Unit

Instrument	Primary Uses	Frequency Range	Characteristics	Price
<b>-hp- 524B</b> Electronic Counter	Wide range highly accurate frequency, period measurements	10 cps to 10 MC	Without plug-in units measures frequency 10 cps to 10 MC, and period 0 cps to 10 KC, 1 volt rms minimum input	\$2150.00 $\Delta$
<b>-hp- 525A</b> Frequency Converter	Extends <b>-hp- 524B</b> range to 100 MC	10 cps to 100 MC	10 mv rms minimum input 10 MC to 100 MC 0.1 volt from 10 cps to 10 MC	250.00
<b>-hp- 525B</b> Frequency Converter	Extends <b>-hp- 524B</b> range 100 to 220 MC	100 MC to 220 MC	0.2 volt rms minimum input	250.00
<b>-hp- 526A</b> Video Amplifier	Increases sensitivity of <b>-hp- 524B</b>	10 cps to 10 MC	App. 10 millivolt rms minimum input	150.00
<b>-hp- 526B</b> Time Interval Unit	Used with <b>-hp- 524B</b> to measure time interval	Range: 1 $\mu$ sec to 10 <sup>7</sup> seconds Revolution: 0.1 $\mu$ sec	Start and stop channels separately adjustable for triggering from - 192 v to + 192 v	175.00

## 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 $\Delta$ .

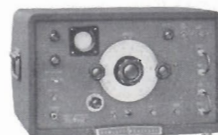


**-hp- 335E TV MONITOR**  
Channels 2 through 83. Exceeds F.C.C. requirements. Compact, only 12 $\frac{1}{4}$ " high, rack mounted. Low cost, all-purpose, for visual and aural frequency monitoring, carrier separation, percentage aural modulation. Long-term dependability, precise accuracy, highest stability, no adjustment during operation. Forced ventilation, remote indication features. \$2,050.00.

### **-hp- 522B ELECTRONIC COUNTER**



Compact, low cost, versatile instrument for frequency, period or time measurements. Range 10 cps to 120 KC. Reads direct in cps, KC, seconds or milli-seconds. Count automatically reset, action repetitive. Stability of time base 5/1,000,000. Display length variable. Easily used by untrained personnel. \$915.00 $\Delta$ .



### **-hp- 540A TRANSFER OSCILLATOR**

Extends frequency counter accuracy to microwave region. With **-hp- 524B** and **-hp- 525B** measures frequency of CW, pulse, or FM'd signals to 5,000 MC. With external detector extends range to 12,000 MC. \$615.00 $\Delta$ .

Instrument	Primary Uses	Frequency Range	Characteristics	Price
<b>-hp- 100D</b> 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 plips	\$ 615.00 $\Delta$
<b>-hp- 335E</b> TV Monitor	TV visual, aural and % mod. monitor	Channels 2 through 83	Indicates visual, aural carrier frequency deviation, carrier separation, % modulation aural carrier	2,050.00
<b>-hp- 500B</b> Frequency Meter	Rapid frequency measurements	1 cps to 100 KC	9 ranges $\pm$ 2% accuracy. Input 0.2 to 200 volts Provides expanded scale.	285.00
<b>-hp- 500C</b> Electronic Tachometer Indicator	Measurements of high speed machinery	60 to 3,000,000 rpm	9 ranges $\pm$ 2% accuracy. Provides expanded scale.	285.00
<b>-hp- 506A</b> Optical Tach. Pickup	Phototube transducer	300 to 300,000 rpm	Utilizes reflected beam of light to permit measurement without loading	100.00
<b>-hp- 508A</b> Tachometer Generator	Low torque transducer	15 to 40,000 rpm	Provides 60 output pulses per rpm of rotating shaft	100.00
<b>-hp- 508B</b> Tachometer Generator	Low torque transducer	15 to 40,000 rpm	Provides 100 output pulses per rpm of rotating shaft	100.00
<b>-hp- 512A</b> Frequency Converter	Extends <b>-hp- 524A</b> 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
<b>-hp- 512B</b> Frequency Converter	Gives <b>-hp- 524A</b> range 100 to 220 MC	100 MC to 220 MC	Same as 512A except for frequency coverage and input 0.2 v RMS min.	350.00
<b>-hp- 520A</b> 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 $\Delta$
<b>-hp- 521A</b> Industrial Counter	Wide-range frequency, speed, time interval measurements	1 cps to 120 KC	Gate time 1/10 or 1 second Input sensitivity control, 60 cycle time base. Crystal plug-in \$100.00	475.00
<b>-hp- 522B</b> Electronic Counter	Wide-range frequency, period, time interval measurements	10 cps to 120 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.	915.00 $\Delta$
<b>-hp- 540A</b> Transfer Oscillator	UHF, SHF frequency measurement	Fundamental frequency 100 MC to 220 MC	With 524B and 525B measures frequencies to 5,000 MC; with ext. detectors to 12 KMC	615.00 $\Delta$

$\Delta$  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.

www.HPARCHIVE.com

# Microwave Impedance Measuring Equipment



**-hp- 415B STANDING WAVE INDICATOR**

For all waveguide or coaxial slotted sections. Gives readings in SWR or db. Single frequency operation; 315 to 3,000 cps. Low noise level, 0.1  $\mu$ v (full scale) sensitivity, 70 db. calib. attenuator. \$200.00.



**-hp- 416A RATIO METER**

Automatically combines forward and reverse signals and displays their ratio directly, irrespective of amplitude variations. Contains rf power monitor indicating proper power level. Rear terminal signal available to operate oscilloscope or recorder. In swept frequency operation, accuracy is within  $\pm 0.015$ . Accuracy for single frequency measurement,  $\pm 0.005$ . \$450.00 $\Delta$ .

Instrument	Primary Uses	Frequency Range	Characteristics	Price
-hp- 360A-D Low Pass Filters	Eliminate 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 1.25 cutoff freq.	\$ 40.00
-hp- 415B Standing Wave Indicator	SWR indicator or null indicator	315 to 3,000 cps Normal freq. 1,000 cps	0 to 60 db. attn. Max. sensitivity 0.1 $\mu$ v full scale	200.00
-hp- 416A Ratio Meter	Measures reflection coefficient, SWR	1,000 cps $\pm$ 40 cps	Min. 3 millivolts and 0.3 $\mu$ v; accuracy $\pm$ 2%	450.00 $\Delta$
-hp- 417A VHF Detector	VHF bridge detector (for -hp- 803A)	10 to 500 MC	Approx. 5 $\mu$ v sensitivity	250.00
-hp- 803A VHF Bridge	Measurement of VHF impedance, SWR	50 to 500 MC	2 to 2,000 ohms impedance — 90° to + 90° phase angle	495.00
-hp- 805A Coaxial Slotted Section	Measurement of SWR	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 P810B Waveguide sections		Accepts 442B and 444A probes	160.00

## -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"	"G"	"J"	"H"	"X"	"P"
		3" x 1 1/2" 2.6-3.95 KMC	2" x 1" 3.95-5.85 KMC	1 1/2" x 3/4" 5.2-8.2 KMC	1 1/4" x 5/8" 7.05-10.0 KMC	1" x 1/2" 8.2-12.4 KMC	.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, 3, 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	G382A \$450.00	J382A \$300.00	H382A \$300.00	X382A \$250.00	P382A \$250.00
Detector Mounts	420A \$50.00	S485D* \$145.00	G485D \$140.00	J485D* \$135.00		X421A \$75.00	P421A \$85.00
	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/B **	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				J885A \$300.00		X885A \$250.00	P885A \$250.00
Waveguide Horn						X890A \$25.00	P890A \$30.00
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
Standard Reflections						X916 \$100.00	
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 barretter or crystal.

‡For use with barretter only.

\*Complete assembly including carriage.

§Mounts in 809B Carriage—See next page.

■ Includes Thermistor, installed. See page 5. \*\* J530A, 5.85 to 8.2 KMC, \$120.00; J530B, 5.30 to 7.05 KMC, \$150.00

†Includes barretter; checked for square law characteristics.

$\Delta$  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.

# Microwave Power Measuring Equipment

## -hp- 430C MICROWAVE POWER METER



No computations! Provides instantaneous, automatic power readings *direct* in dbm 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. Provides up to 16

ma bias current. Operates with all mounts in adjacent table. \$250.00.

## -hp- 767D COAXIAL DIRECTIONAL COUPLER



For "S" Band power measurement and monitoring. Frequency range 2 KMC to 4 KMC. Coupling attenuation 20 db  $\pm$  1 db. Directivity 20 db. \$100.00.

## -hp- 477A COAXIAL THERMISTOR MOUNT



For frequency range 10 MC to 10 KMC. SWR less than 1.5. Thermistor element is 200 ohm negative. \$75.00 (including thermistor).

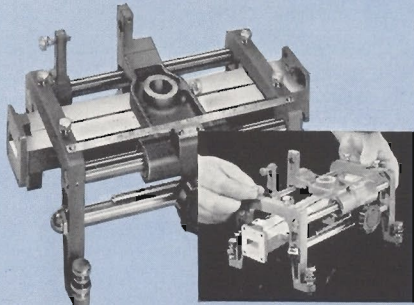
Instrument	Primary Uses	Frequency Range	Characteristics	Price
-hp- 430C Microwave Power Meter	Measurement of rf power	Depends on Bolometer mount	.01 to 10 mw $\pm$ 5% accuracy	\$250.00
-hp- 475B Tunable Bolometer Mount	Measurement of rf power	1,000 to 4,000 MC	Matches 50-ohm line to 100 or 200 ohms	200.00
-hp- 476A Universal Bolometer Mount	Measurement of rf power	10 to 1,000 MC	No tuning required SWR less than 1.25	85.00
-hp- 477A Coaxial Thermistor Mount	Measurement of rf power	10 to 10,000 MC	Broad band, low SWR, 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 SWR	See Table page 4
-hp- 766D Coaxial Directional Coupler	Measurement of rf power	950 to 2,000 MC	Coupling attenuation 20 db, directivity 20 db	100.00
-hp- 767D Coaxial Directional Coupler	Measurement of rf power	2,000 to 4,000 MC	Coupling attenuation 20 db, directivity 20 db	100.00

## 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.

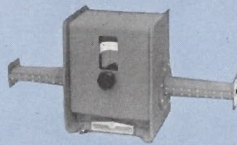
**-hp- 810A/B Slotted Sections.** -hp- 810B, for mounting in 809B carriage, is a flanged waveguide section with accurately machined slot tapered at ends to minimize reflection. Available in 5 waveguide bands, 3.95 thru 18.0 KMC. -hp- S810A, complete slotted section assembly including probe carriage.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

### -hp- 420A CRYSTAL DETECTOR



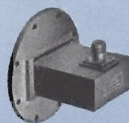
Employs a silicon crystal to detect rf signals in Type N coaxial line. Covers frequencies 10 MC to 12.5 KMC. Flat frequency response, sensitivity 0.1 v/mw. Uses modified 1N26 crystal.

### -hp- 382A 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. G, J, H, X and P bands available covering 3,950 to 18,000 MC. SWR less than 1.15 full range.

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



For convenient transition between waveguide and coax systems. Each unit covers a full waveguide range with SWR 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, SWR less than 1.5. Rugged construction, high temperature coefficient permanent thermistors virtually eliminate delays due to detector element burn-out

### -hp- 885A PHASE SHIFTER



For accurate, precisely controlled phase variation throughout frequency band. Ideal for microwave impedance, 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 3, 10 and 20 db  $\pm$  0.7 db over full range of a waveguide. SWR better than 1.05. Directivity 40 db or better over entire range. Available as a 3-terminal equal power splitting network.

### -hp- 485B DETECTOR MOUNTS



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

### -hp- 870A SLIDE SCREW TUNERS



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

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

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# -hp- Signal Generators — 10 to 21,000 MC

## -hp- 608D vhf SIGNAL GENERATOR

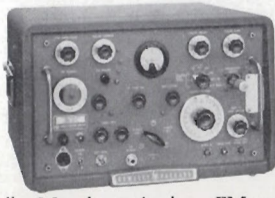


10 to 420 MC. Highest stability. No incidental FM or frequency drift. Calibrated output 0.1  $\mu$ v to 0.5 v throughout range. Built-in crystal calibrator provides frequency check accurate within 0.01% each 5 MC. Master-oscillator, intermediate and output amplifier circuit design. Premium quality

performance, direct calibration, ideal for aircraft communications equipment testing. \$1,050.00.

**-hp- 608C vhf Signal Generator.** High power (1 v max.) stable, accurate generator for lab or field use. 10 to 480 MC. Ideal for testing receivers, amplifiers, driving bridges, slotted lines, antennas, etc. \$950.00.

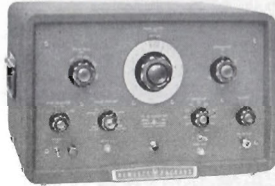
## -hp- 624C X-BAND TEST SET



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. Waveguide switch permits measurement of 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 $\Delta$ .

## -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 $\Delta$ .

Instrument	Frequency Range	Characteristics	Price
-hp- 608C	10—480 MC	Output 0.1 $\mu$ v to 1 v into 50 ohm load. Pulse or CW modulation. Direct calibration.	\$ 950.00
-hp- 608D	10—420 MC	Output 0.1 $\mu$ v to 0.5 v into 50 ohm load. Pulse or CW modulation. Direct calibration and crystal calibrator check	1,050.00
-hp- 612A	450 to 1,220 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 (In three bands)	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- 624C	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- 628A	15,000 to 21,000 MC	Output 1 $\mu$ watt to 10 mw. Internal or external pulse, FM, or square wave modulation. Direct calibration.	3,000.00

### SWEPT FREQUENCY OSCILLATORS

-hp- 670SM	2,600 to 4,000 MC	Output app. 10 mw entire frequency range. Automatic, adjustable, mechanical sweep.	1,000.00
-hp- 670GM	4,000 to 6,000 MC	Output app. 10 mw entire frequency range. Automatic, adjustable, mechanical sweep.	1,000.00
-hp- 670HM	7,000 to 10,000 MC	Output app. 10 mw entire frequency range. Automatic, adjustable, mechanical sweep.	850.00

### SQUARE WAVE GENERATOR

-hp- 211A	1 cps to 1 MC	Output 55 v peak to peak into 600 ohm load. Free running or external sync. .02 $\mu$ sec rise time. Low or high impedance output.	265.00
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### PULSE GENERATOR

-hp- 212A	50 to 5,000 pps	Output 50 v peak into 50 ohm load. Free running or external sync. Variable delay. .02 $\mu$ sec rise time	565.00 $\Delta$
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# -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
-hp- 710B Power Supply	For low power bench and permanent setups	100 to 360 volts at 75 milliamperes	100.00
-hp- 711A Power Supply	For powering experimental bench setups requiring wide voltage range, low power	0 to 500 volts at 100 milliamperes	225.00
-hp- 712B Power Supply	Meets requirements for heavy duty field and lab work	0 to 500 volts at 200 milliamperes 0.01% regulation	365.00 $\Delta$
-hp- 715A Klystron Power Supply	Regulated beam, reflector source for low power klystrons	Beam 250 to 400 volts at 50 milliamperes. Reflector 0-900 volts	300.00
-hp- 717A Klystron Power Supply	Regulated beam, reflector source for Type 5721 klystrons and for -hp- 670 series Swept Frequency Oscillators	800 to 1,000 volts at 25 milliamperes	375.00

$\Delta$  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.

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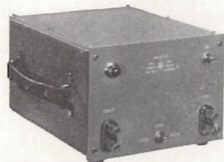
# Amplifiers for General Use and Fast-Circuit Work

## -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. 5 cps to 1 MC. Negligible phase shift, no spurious responses. \$140.00.

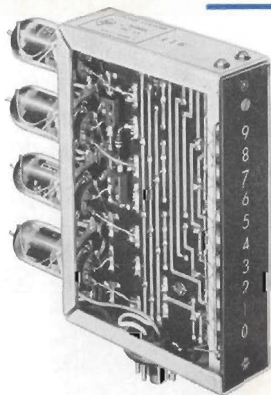
stability are needed. 5 cps to 1 MC. Negligible phase shift, no spurious responses. \$140.00.



## -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 Amplifier</i>	General purpose lab amplifier	5 to 1,000,000 cps	20 and 40 db gain, freq. response $\pm 1/2$ db	\$ 140.00
<i>-hp- 460A Amplifier</i>	Wide band, pulse amplification	100 KC to 140 MC	20 db gain, rise time 0.0026 $\mu$ sec.	185.00
<i>-hp- 460B Amplifier</i>	Pulse amplification, high output	100 KC to 140 MC	15 db gain, 125 peak volts	225.00
<i>-hp- 490A Traveling-Wave Tube Amplifier</i>	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 Traveling-Wave Tube Amplifier</i>	Power gain to 1 watt	S-Band—2 to 4 KMC	30 db gain, can be pulse modulated	1,100.00



## -hp- AC-4A Decade Counter

Unique design enables AC-4A Counters to establish new standards of reliability while providing continuous counting to 120 KC. Low in cost, they fit all standard decade counters as ideal replacement units. A staircase output voltage proportional to count is available to operate recorders or external equipment using coincidence detectors. The exclusive *-hp-* etched circuit means low temperature op-

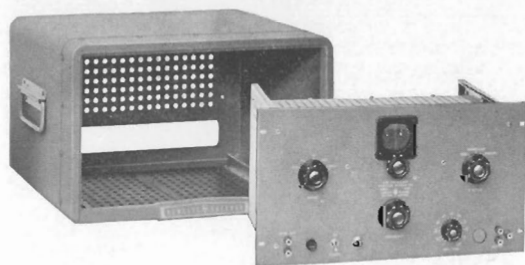
eration, longer life. Optically engineered illuminated numerals are clear, bright, easy to read under all conditions. Double - pulse resolution, 5  $\mu$ sec. Input, approx. 80 v neg.; 1  $\mu$ sec rise time. Output, approx. 80 v neg. to drive succeeding counter. Reset 0 or 9. Staircase output, 135 v at 0, 55 v at 9. Internal resistance 700 K. \$45.00. (Quantity discount prices on request.)

## New Streamlined All-Metal -hp- Cabinets

### 3 mounting options, greater flexibility of use

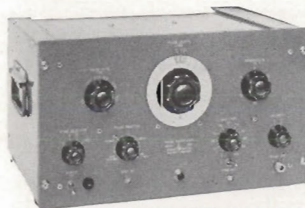
Now you can buy *-hp-* instruments mounted any of three ways, and, later on, change to any other mounting you wish. This new versatility means greater utilization of your *-hp-* instruments, and can also increase the flexibility of your entire instrument setup.

**Cabinets.** *-hp-* instruments having the standard  $10\frac{1}{2}$ " 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  $10\frac{1}{2}$ " 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.

△ 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 21,000 MC; *hp*-voltmeters from 2 to 700,000,000 cps, oscillators from .008 to 10,000,000 cps.

**In personal service** — *hp*-has selected the best independent organizations 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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