

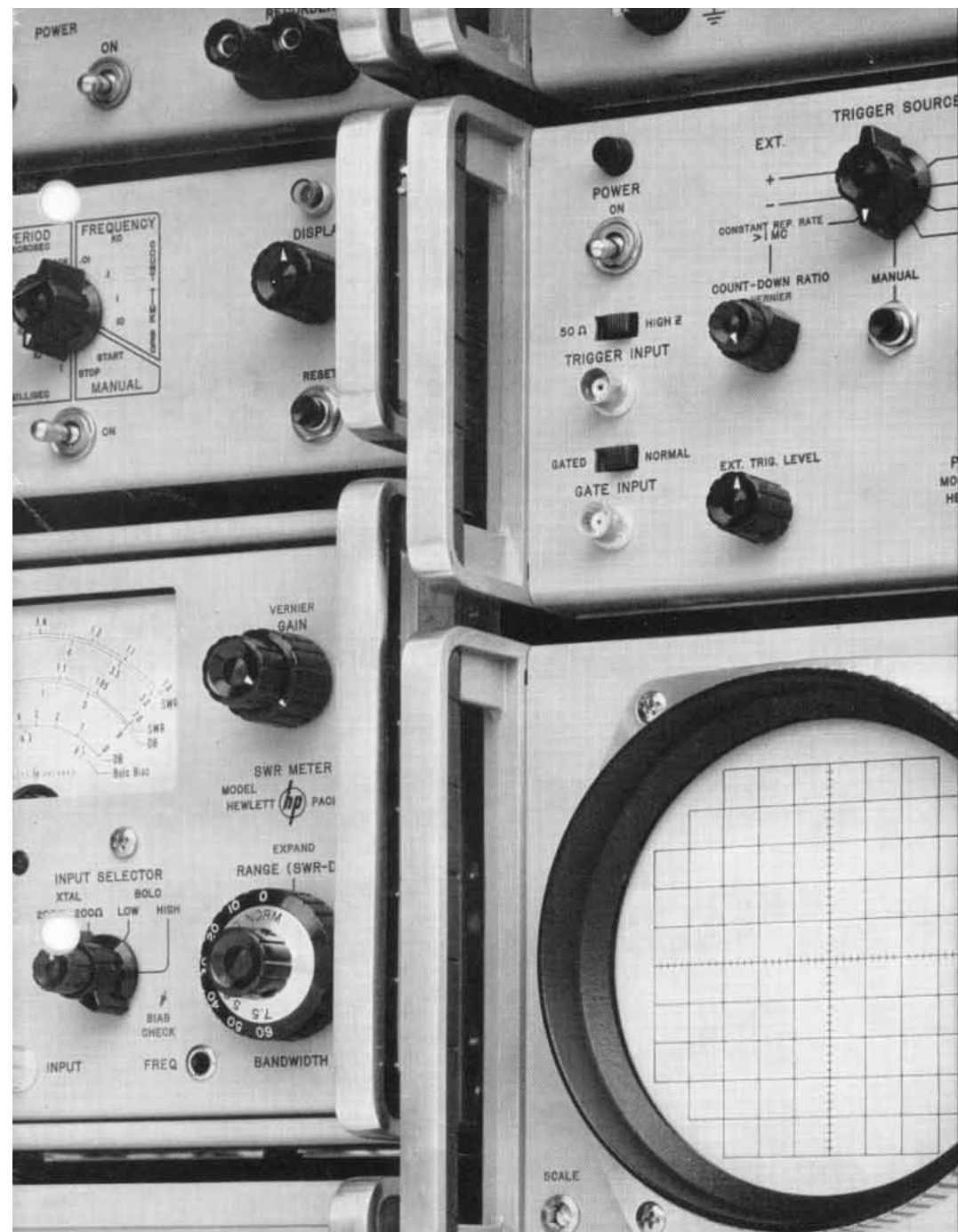
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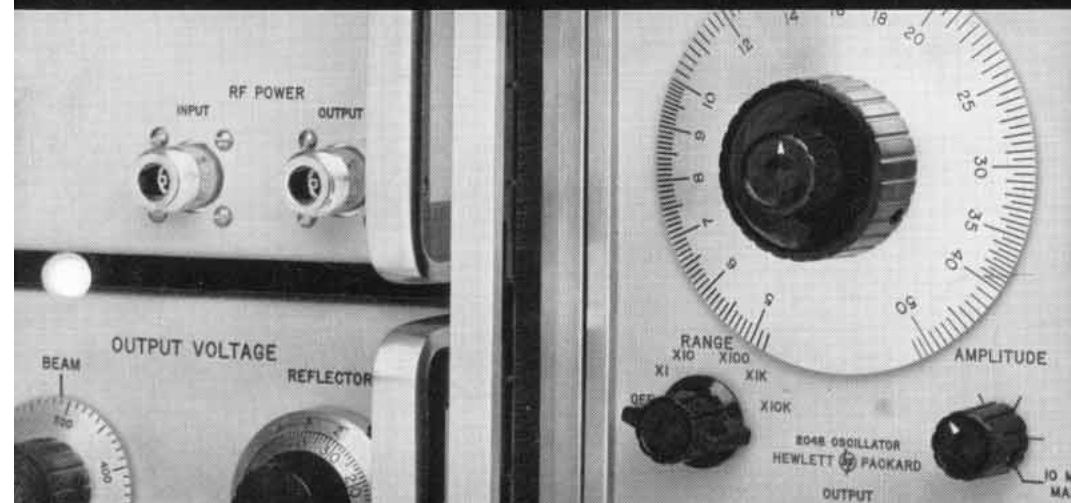
On-line curator: Glenn Robb



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**HEWLETT  
PACKARD  
COMPANY**

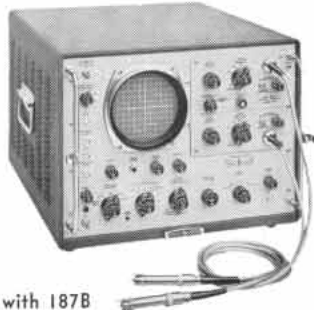
# 1962 • SHORT FORM CATALOG





Complete coverage — easy-to-use, versatile

Parallax error eliminated with new internal graticule; standard on 120B, 175A and 185B, available as optional equipment on other models listed here. Trace and graticule in precisely the same plane! Also available in field modification kits.



185B with 187B

## DC to 1,000 MC, 185B

- Measuring ease for nanosecond region
- Bright, clear 5" scope trace, even at low repetition rates
- Less than 0.4 nanosecond rise time

Here's fatigue-free viewing of repetitive short pulses requiring a bandwidth up to 1,000 MC. With the 185B Sampling Oscilloscope and 187B plug-in amplifier, the 3 db point is beyond 800 MC, rise time less than 0.4 nsec. 187B Dual Trace Amplifier permits comparison of two high-speed phenomena simultaneously for highly accurate time measurements. Vertical sensitivity 10 mv/cm to 200 mv/cm, vernier to 4 mv/cm. Dynamic range, 4 mv to 2 v peak. 100,000 ohm probes minimize circuit loading. Horizontal sweep 0.1 nsec/cm (with expander, 0.04 ns/cm with vernier) to 10 μsec/cm. Delayed sync pulse available on front panel for triggering circuits under test. X-Y recorder output, time and amplitude calibrators, beam finder. 185B, \$2,300.00; 187B, \$1,000.00.

## 185B Oscilloscope Accessories for Maximum Flexibility

Overall versatility of the 185B Oscilloscope and 187B Dual Trace Amplifier is increased with a wide variety of accessories. In addition to the 185B-21A Sync Probe furnished with the scope, 4 resistive divider probes are available: 185A-21C, D, E, and F have division ratios (when terminated by 50 ohms) of 5, 10, 50 and 100 to 1 respectively, \$40.00 each. Two 187A-76A BNC Adapters, furnished with the 187B, permit connection to BNC fittings. 187A-76B Type N Connector is a straight-through connection, \$10.00. 187B-76C 10:1 Divider permits viewing of signals as large as 20 v peak-to-peak, \$40.00. 187A-76D Blocking Capacitor permits observation of signals ± 600 v from ground, \$3.50. 187B-76E 50-ohm T Connector permits scope probe to monitor signal on a 50-ohm transmission line, may be used with a 50-ohm load to terminate the line in its characteristic impedance while observing the signal with the scope, \$40.00. 187B-76G Probe Socket, \$2.00. Model 1100A Delay Line, \$300.00, bandpass 1 GC, delay 120 ns, permits 185B scope to be synchronized from signal to be viewed, includes 1100A Delay Line, 1100A-76A Delay Line Load, 185A-76A Sync Take-off and 1100A-16A Sync Cable.

## New Switching Time Tester



186A Switching Time Tester, really four instruments in one, plugs into 185 oscilloscopes and makes rapid measurements with nanosecond resolution of

transistor, diode and tunnel diode switching characteristics. Also provides convenient means of testing pulse response of high speed circuits. 186A comprises a 1 ns rise time pulse generator, single channel vertical amplifier and two power supplies for biasing components under test. Three plug-in jigs are supplied for testing transistors, diodes, tunnel diodes. Universal jig for testing external networks available. 186A, \$1,500.00.

## Or Meet Your Requirements With These Other



130B, BR  
DC to 300 KC

130B, BR combine big scope performance with 1 mv sensitivity and the convenience of "universal" automatic trigger. Models 130B/BR have similar horizontal and vertical amplifiers with sensitivity 1 mv/cm to 125 v/cm. Input circuits balanced on 6 most sensitive ranges; sweeps 1 μsec/cm to 12.5 sec/cm, triggers from signal, line or external voltage. Includes x5 magnifier for all internal sweeps increasing fastest sweep time to 0.2 μsec/cm. 130B (cabinet) or 130BR (rack mount) \$650.00.



122A, AR  
Dual Trace

Models 122A, AR are dual trace, 200 KC oscilloscopes providing two separate traces for simultaneous study; single trace when desired. Twin vertical amplifiers, alternate and chopped presentation, differential input, automatic syncing and x5 sweep expansion. 15 calibrated sweeps; vernier extends slow sweep to 0.5 sec/cm, expander extends fast sweep to 1 μsec/cm. Sensitivity 10 mv/cm to 100 v/cm. Horizontal amplifier sensitivity 0.1 v/cm to 100 v/cm. 122A (cabinet) or 122AR (rack mount), \$675.00.



120B DC to 450 KC

New 120B incorporates no-parallax internal graticule for greater accuracy, new non-reflecting CRT face. 15 calibrated sweeps, 5 μsec/cm to 200 msec/cm, vernier extends sweep range 1 μsec/cm to 0.5 sec/cm. Times-5 sweep expander, automatic triggering. Today's most convenient, versatile 450 KC scope. 120B, modular cabinet for bench or rack use, \$475.00.

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



## New **hp** 175A Universal Oscilloscope

- 50 MC main vertical amplifier
- Dual trace and high sensitivity plug-ins
- Bright, 6 x 10 cm display with no parallax, reflection or astigmatism
- Horizontal and vertical plug-ins for specific applications
- Easier to calibrate and maintain—no distributed amplifiers
- Preset trigger automatic over entire bandwidth

**hp** 175A Universal Oscilloscope with dual trace vertical amplifier gives bandwidth greater than 40 MC with no sacrifice in sensitivity. Three vertical and four horizontal plug-in units, including sweep delay give the **hp** 175A the greatest versatility ever offered in a general purpose 50 MC scope.

The **hp**-developed 12 Kv CRT provides a 6 cm x 10 cm display area without distortion or defocusing. Phosphor and graticule are on the same plane—thus eliminating parallax error. In addition, **hp** 175A features simpli-

fied circuitry for more reliable performance and easy maintenance. Only 7 tube types and 5 transistor types are used throughout.

**hp** 175A Universal Oscilloscope is housed in the new **hp** modular cabinet . . . a single instrument for both bench and rack mount. Internal sweep: 24 calibrated ranges, 0.1  $\mu$ sec/cm to 5 sec/cm,  $\pm$  3%. Vernier provides continuous adjustment between calibrated ranges and extends slowest sweep to 15 sec/cm. Times-10 magnifier. Horizontal amplifier passband, dc to 500 KC. **hp** 175A, \$1,325.00.



**hp** 175A Universal Oscilloscope with **hp** 1750A Dual Trace Vertical Amplifier and **hp** 1780A Plug-In.

## Vertical and horizontal plug-ins tailor the **hp** 175A to a wide variety of applications



**hp** 1750A 40 MC Dual Trace Vertical Amplifier, \$285.00



**hp** 1753A 40 MC Single Channel Vertical Amplifier, \$155.00



**hp** 1752A 5 mv High Gain Vertical Amplifier, \$225.00



**hp** 1783A Time Mark Generator, \$130.00



**hp** 1781A Delay Generator, \$375.00

Pictured in **hp** 175A above, **hp** 1780A Auxiliary Plug-In for normal or single sweep operation, \$25.00

## Bench-Proven **hp** Oscilloscopes, Accessories



170A with plug-ins

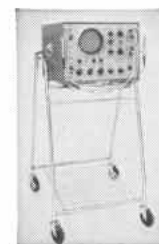
**hp** 160B, **hp** 170A  
DC to 15 MC; DC to 30 MC

**hp** 160B, dc to 15 MC, and **hp** 170A, dc to 30 MC, are militarized oscilloscopes offering rugged dependability under a wide range of environmental conditions. Seven X and Y axis plug-ins (similar to 1750 and 1780 series above) increase versatility. 24 calibrated sweep times, seven step (to x 100) magnifier. **hp** 160B, \$2,050.00 (cabinet or rack mount); **hp** 170A, \$2,150.00 (cabinet or rack mount).



### **hp** 196B Oscilloscope Camera

A black-light within the 196B causes CRT phosphor (except P1) to glow softly, pre-sensitizing film as picture is taken and increasing writing rate. Soft glow also illuminates graticule of **hp** no-parallax internal graticule CRTs.  $f/1.9$  lens, 1/100 to 1 sec shutter (plus T & B), controls accessible with camera mounted. Fixed back, detented moving lens simplifies making multiple exposures. View screen with both eyes while exposing (no parallax with **hp** IG oscilloscopes). Polaroid® Land Camera back. **hp** 196B, \$490.00; **hp** 196A (without black-light source), \$440.00.



**hp** AC-115B Oscilloscope Testmobile for **hp** scopes. 4" rubber tired wheels, heavy chrome tube construction, tilts scope to 30° in 7½° increments, folds for storage, shipping. \$85.00.



**hp** AC-21 series probes available for use with **hp** scopes include AC-21A, 10:1 division, \$30.00; AC-21C, 50:1 division, \$30.00; **hp** AC-21F Current Probe, 1 mv/ma, \$100.00; **hp** AC-21J Low Frequency Probe, \$9.00.

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Hewlett-Packard now offers 14 high quality, fast and accurate oscillators, each an exceptional value and engineered to do a specific job best. Each incorporates the famous resistance-capacity circuit pioneered by  $\Phi$ . This circuit makes possible wide range, compact instruments which are highly stable, instruments that are extremely simple to operate and require no tedious resetting or adjustment during operation.

## New Pushbutton 1 MC Oscillator



$\Phi$  241A with pushbutton frequency control, gives three digit resolution in selection of frequencies, yet provides utmost simplicity of operation. Ideal for situations where several preset frequencies are required quickly and accurately. Frequency coverage is 10 cps to 1 MC with vernier; frequency response is flat within  $\pm 2\%$  into rated load.  $\Phi$  241A, \$425.00.

provides utmost simplicity of operation. Ideal for situations where several preset frequencies are required quickly and accurately. Frequency coverage is 10 cps to 1 MC with vernier; frequency response is flat within  $\pm 2\%$  into rated load.  $\Phi$  241A, \$425.00.



## $\Phi$ 204B Portable Oscillator

Use it on the bench—carry it *anywhere!* This portable oscillator is fully transistorized, battery or optional ac operation. Internal heat is small; warmup drift is negligible. Output is fully floating, isolated from both power line

ground and chassis. Low impedance circuits drive the 600-ohm output, effectively isolating the oscillator stage; 204B maintains excellent frequency stability even with rapidly changing loads. Output is flat within  $\pm 3\%$  at all settings of dial and range switch. Designed in the new  $\Phi$  instrument module packaging,  $\Phi$  204B, with batteries, \$275.00; AC operation in lieu of batteries, add \$25.00.

## $\Phi$ 200CD Audio Oscillator



This wide range oscillator, 5 cps to 600 KC, spans the range from subsonic to radio frequencies, covered in five overlapping decade bands. Accurate frequency setting on the large easy-to-read dial is provided by 85 dial divisions. Distortion rating is less than 0.5% below 500 KC. Output waveform purity is independent of load.  $\Phi$  200CD, \$195.00.

Instrument	Primary Uses	Frequency Range	Output	Price
-hp- 200AB	Audio tests	20 cps to 40 KC	1 watt/24.5 v	\$165.00 ■
-hp- 200CD	Subsonic through ultrasonic audio and ultrasonic tests	5 cps to 600 KC	160 mw or 10 v/600 ohms; 20 v open circuit	195.00 ■
-hp- 200J	Interpolation, frequency measurements	6 cps to 6 KC	160 mw/10 v	350.00 ■
-hp- 200SR	Driving -hp- 739AR Frequency Response Test Set	5 cps to 600 KC	3 v rms into 50 ohms	230.00 ■
-hp- 200T	Telemetry, carrier current tests	250 cps to 100 KC	160 mw or 10 v/600 ohms; 20 v open circuit	500.00 ■
-hp- 201C	High quality audio tests	20 cps to 20 KC	3 w or 42.5 v/600 ohms	250.00 ■
-hp- 202A	Low frequency tests	0.008 to 1200 cps	28 mw or 30 v p-p/4000 ohms	550.00 △
-hp- 202C	Servo equipment tests, measurements	1 cps to 100 KC	160 mw or 10 v/600 ohms	300.00 ■
-hp- 204B	Reliable audio work in lab or field, battery powered	5 cps to 500 KC	10 mw (2.5 v rms) into 600 ohms; 5 v rms open circuit	275.00
-hp- 205AG	High power audio tests, gain measurements	20 cps to 20 KC	5 watts	600.00 △
-hp- 206A	High quality, high accuracy audio tests	20 cps to 20 KC	+ 15 dbm	900.00 △
-hp- 233A	Carrier oscillator—current tests	50 cps to 500 KC	3 w/600 ohms	650.00
-hp- 241A	Fast frequency selection for repetitive/production testing	10 cps to 1 MC	+ 10 dbm/600 ohms; 2.5 v	425.00
-hp- 650A	Wide range video tests	10 cps to 10 MC	15 mw/3 v	550.00 △

△ Rack mounted instruments \$15.00 less. ■ Rack mounted, \$5.00 more.



## $\Phi$ 202A Function Generator

Multi-purpose source of transient-free test voltages from 0.008 cps to 1,200 cps. Continuously variable through 5 bands; offers exceptional stability (within 1%) and distortion less than 1% to 100 cps. Sine, square or triangular waves may be selected by a front panel switch; the 30 volt peak-to-peak output is constant for all wave forms and over full frequency range.  $\Phi$  202A, \$550.00 △.



## $\Phi$ 650A Test Oscillator

Covering 10 cps to 10 MC,  $\Phi$  650A is a highly stable, wide band instrument for audio, ultrasonic, video and rf measurements. Output is flat within 1 db full range; voltage range is 0.00003 to 3 v. In addition to 600-ohm impedance, voltage divider provides a 6-ohm impedance. Distortion less than 1% to 100 KC. \$550.00 △.

## $\Phi$ 200AB Audio Oscillator

Useful for audio tests, the versatile  $\Phi$  200AB Oscillator covers its range, 20 cps to 40 KC, in four overlapping bands. Like the  $\Phi$  200CD it has highest stability and accurate calibration. Low impedance operating levels plus superior insulation guarantee long years of trouble-free dependability. Operation is simple; just three controls; no zero setting necessary.  $\Phi$  200AB, \$165.00.

## $\Phi$ 201C Audio Oscillator

This high power oscillator offers an output of 3 watts or 42.5 v into 600 ohms over the frequency range 20 cps to 20 KC. Response is  $\pm 1$  db full range, attenuator adjusts output 0 to 40 db in 10 db steps, provides either low impedance or constant 600-ohm impedance.  $\Phi$  201C, \$250.00. (cabinet),  $\Phi$  201CR, \$255.00 (rack mount).

## $\Phi$ 202C Low Frequency Oscillator

Providing excellent waveform throughout its broad frequency range, 1 cps to 100 KC, the  $\Phi$  202C is especially convenient for measurements in the subsonic, audio and ultrasonic regions. Distortion less than 0.5%, hum voltage less than 0.1%, short recovery time < 5 sec at 1 cps.  $\Phi$  202C, \$300.00 (cabinet),  $\Phi$  202-CR, \$305.00 (rack mount).

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

## 302A Wave Analyzer



Completely transistorized, advanced instrument provides direct, accurate wave component measurement without calibration or stabilization. Relative or absolute measurements from 20 cps to 50 KC, hum free, needs no warmup, very sharp acceptance circuits plus AFC. May be battery operated (18 to 28 volts). \$1,800.00 $\Delta$ .

Instrument	Primary Uses	Frequency Range	Characteristics	Price
-hp- 302A	Wave form analysis	20 cps to 50 KC	Direct reading, no calibration needed	\$1,800.00 $\Delta$
-hp- 330B	Measures total audio distortion	20 cps to 20 KC	Includes input amplifier, VTVM	500.00 $\Delta$
-hp- 330C	For AM, FM broadcast measurements	20 cps to 20 KC	Special VU meter to meet F.C.C. requirements	525.00 $\Delta$
-hp- 330D	For AM, FM broadcast measurements	20 cps to 20 KC	AM detector and VU meter to meet F.C.C. requirements	575.00 $\Delta$

$\Delta$  Rack mounted instruments \$15.00 less.



## 297A Sweep Drive

297A motor accessory converts 302A to a sweep oscillator-tuned voltmeter for automatic frequency response measurements. Mounts on 302A or adjustable bench stand. Sweeps all or any part of the 302A range automatically; has fast sweep for covering frequency spectrum rapidly, slow sweep for high resolution plot. X-axis output for X-Y plot. 297A \$350.00.

## Pulse, Square Wave and Digital Delay Generators

### 218AR Digital Delay Generator



218AR is ideally suited for pulse simulation and time measurement in radar, loran, pulse code systems, etc. Suitable for military use, it provides two precision time intervals or pulse delays, independently adjustable from 1 to 10,000  $\mu$ sec in 1- $\mu$ sec steps when using the internal 1 MC time base. Intervals may be

initiated either internally, 10 cps to 10 KC, or externally, 0 cps to 10 KC. Accuracy is  $\pm 0.1 \mu$ sec  $\pm 0.001\%$  of the selected value; total jitter does not exceed 0.02  $\mu$ sec. Sync pulse, timing comb output provided. For maximum versatility and simplicity, output pulses are generated in the 219 series plug-in drawer units. 218AR, \$2,000.00.

### Plug-ins Increase Versatility of 218AR

219A Dual Trigger Unit. Supplies positive trigger pulses, 50 volts, 0.1  $\mu$ sec rise time from 50-ohm source. Pulse A at  $T_0$  or  $T_1$  as selected by switch, Pulse B at  $T_2$ . \$125.00.

219B Dual Pulse Unit. Produces two high-power positive or negative pulses, continuously adjustable from 0.2 to 5  $\mu$ sec and from 0 to 50 volts. Leading edge can be set for start or end of selected time interval \$490.

219C Digital Pulse Duration Unit. Produces high-power output pulse with digitally controlled delay and duration. Pulse available in both polarities at once; continually adjustable from 0 to 15 volts from 90-ohm source, 0 to 90 volts from 500-ohm source. \$375.00.

### 211A Square Wave Generator



Here is a versatile, wide-range instrument especially designed for testing video and audio amplifiers, networks and oscilloscopes, for modulating signal generators and measuring time constants, 1 cps to 1 MC. Two separate outputs: 3.5 v peak into 75-ohm impedance circuit for TV measurement, and 27 v peak into 600 ohms for high level work 211A, \$350.00 (cabinet); 211AR, \$355.00 (rack mount).

### 212A Pulse Generator



Popular 212A provides continuously variable, high-power positive or negative "fast pulses" of superior wave form. Pulse lengths continuously variable 0.07 to 10  $\mu$ sec, has direct reading pulse length control, provides pulses of 50 watts peak power. Especially useful in radar, TV and nuclear work. 212A, \$600.00 $\Delta$ .

### 213A Pulse Generator



Ideal for use with 185A/B 1,000 MC scopes, this general purpose generator provides a pulse combining very fast rise time (less than 0.5 ns) with low jitter, high repetition rate (up to 100 KC with positive or negative trigger pulses, higher free run). \$215.00.

### 215A Pulse Generator



Today's only pulse generator combining 1 ns rise and decay time with convenience of calibrated, continuous control over pulse length and delay. Syncs from signals up to 100 MC. Pulse length 2 to 100 ns, attenuation 1 to 12 db. Particularly useful for measuring switching and recovery time, etc. of diodes, transistors, logic circuits and thin-film memory units. Provides at least 10 v pk. into 50 ohms. Price on request.

350C/D Attenuators, 110 db attenuation in 1 db steps, 5 watts power capacity, high accuracy; dc to 1 MC. 350C (500 ohm) or 350D (600 ohm), \$110.00. New modular cabinet, same size as 204B oscillator; rack adapter available.

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



**405BR,CR Automatic DC Digital Voltmeters**



Automatic range and polarity selection give you literally "touch and read" measuring convenience. Covers 0.001 v to 1,000 v, accuracy  $\pm 0.2\%$  of reading  $\pm 1$  count. Unique stability virtually eliminates jitter in the last digit. Floating input, analog-to-digital conversion and, with the 405CR, digital recorder output. Front-panel switch to hold ranges. Just 7" high. 405BR, \$850.00; 405CR, \$925.00.

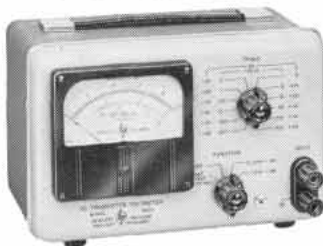
**457A AC-to-DC Converter**



Now you can make high accuracy ac measurements to 500 KC with a dc digital voltmeter. With  $\Phi$  405CR

Digital Voltmeter and an  $\Phi$  560 series Digital Recorder you obtain permanent records in printed digital form. Alternating current measurements may also be made easily and accurately by adding an  $\Phi$  AC-21F Current Probe and an AC-67 Termination. Ranging is accomplished by input attenuation so that the dc output voltage is always between 0 and 1 volt. Covers 0 to 300 v rms in 4 decade ranges, 50 cps to 500 KC. Accuracy  $\pm 0.3\%$  to 50 KC,  $\pm 0.75\%$  to 500 KC,  $\pm 1$  mv. Input impedance 1 megohm.  $\Phi$  457A, \$350.00.

**403A Transistorized AC Voltmeter**



Battery-operated, portable, weighs less than 5 lbs., covers 1 cps to 1 MC, 100  $\mu$ v to 300 v rms (max. full-scale sensitivity 1 mv). Also reads db direct, -72 to +52 db. Noise less than 3% of full scale (6% on lowest range). Accuracy  $\pm 3\%$  to 500 KC,  $\pm 5\%$  to 1 MC. Input impedance 2 megohms. 400 hours battery life, \$275.00.

**400D Vacuum Tube Voltmeter**



Moderately priced precision vacuum tube voltmeter, offering high long-term stability. Covers 1 mv to 300 v full scale, 12 ranges, 10 cps to 4 MC. Accuracy  $\pm 2\%$ , 20 cps to 1 MC, input impedance 10 megohms, \$250.00 $\Delta$ .

Instrument	Primary Uses	Frequency Range	Voltage or Current Range	Input Impedance	Price
-hp- 400D	Wide range ac measurements. High sensitivity	10 cps to 4 MC	0.001 to 300 v 12 ranges	10 megohms 15 pf shunt	\$250.00 $\Delta$
-hp- 400H	High accuracy wide range ac measurements	10 cps to 4 MC	0.001 to 300 v 12 ranges	10 megohms 15 pf shunt	325.00 $\Delta$
-hp- 400L	Log voltages, linear db measurements	10 cps to 4 MC	0.001 to 300 v 12 ranges	10 megohms 15 pf shunt	325.00 $\Delta$
-hp- 403A	Battery-operated portable; fast, accurate, hum-free ac measurements	1 cps to 1 MC	0.001 to 300 v 12 ranges	2 megohms 40, 20 pf shunt	275.00
-hp- 405	Direct voltage measurement. Automatic range, polarity	dc	0.001 v to 1,000 v (accuracy $\pm 0.2\%$ of reading $\pm 1$ count)	11 megohms to dc	See left
-hp- 410B	Audio, rf, VHF measurements; dc voltages; resistances	dc; ac—20 cps to 700 MC	dc - 1 to 1000 v; ac - 1.0 to 300 v	dc—122 megohms; ac—10 megohms/ 1.5 pf	245.00
-hp-411A	Millivolt, db readings to kilomegacycle range	500 KC to 1 GC	10 mv to 10 v, 7 ranges	—	450.00 $\Delta$
-hp- 412A	Precision voltage, current, resistance measurements	dc	1 mv to 1,000 v 1 $\mu$ a to 1 amp	10 to 200 megohms, depending on range	400.00 $\Delta$
-hp- 413A	dc null meter, dc voltmeter, amplifier	dc	1 mv to 1,000 v 13 ranges	10 to 200 megohms, depending on range	350.00 $\Delta$
-hp- 425A	Read $\mu$ v, $\mu$ ma; 100 db amplifier; medical, biological, physical, chemical	dc voltages as 100 db amplifier	10 $\mu$ v to 1 v 11 ranges	1 megohm $\pm 3\%$	500.00 $\Delta$
-hp- 428A	Clip-on milliammeter eliminates direct connection, circuit loading	dc	3 ma to 1 amp, 6 ranges	—	500.00 $\Delta$
-hp- 428B	Similar to 428A, wider range, recorder output for dc to 400 cps	dc on meter, dc to 400 cps on recorder	1 ma to 10 amps, 9 ranges	—	600.00 $\Delta$
-hp- 456A	Current measurements on meters, scopes	60 cps to 4 MC	1 ma to 1 amp rms	—	190.00
-hp- 457A	ac-to-dc converter	50 cps to 500 KC	0 to 300 v rms 4 decade ranges	1 megohm 30 pf shunt	350.00
-hp- 738AR	Voltmeter calibrator	dc pos. or neg. 400 cps sine wave	300 $\mu$ v to 300 v	Works into 3 to 10 megohms	950.00
-hp- 739AR	Frequency response test set	300 KC (5 cps with -hp- 2005R) to 10 MC	3 v output	—	600.00
-hp- 3528A	Current measurements in large conductors	DC (with 428A) DC to 300 cps (with 428B)	3 ma to 1 amp 1 ma to 10 amp	—	350.00
-hp- 3529A	Magnetic field measurements	DC (with 428A) DC to 80 cps (with 428B)	3 mgauss to 1 gauss 1 mgauss to 10 gauss	—	75.00

$\Delta$  Rack mounted instruments \$5.00 more.

**456A AC Current Probe**

Permits measurement of current on indicating meters such as  $\Phi$  400 D/H/L or  $\Phi$  oscilloscopes. This current probe clamps around wire under test, needs no physical connection, does not load circuit. Range 1 ma to 1.5 amps peak, accuracy  $\pm 1\%$  at 1 KC, response  $\pm 2\%$ , 100 cps to 3 MC,  $\pm 5\%$ , 60 cps to 4 MC, -3 db at 25 cps and greater than 20 MC. Battery operated. \$190.00. AC supply in lieu of batteries, add \$20.00.  $\Phi$  456A-21B 100:1 Divider permits measurement of current up to 25 amps when used in conjunction with the ac current probe, \$32.00.

**410B Vacuum Tube Voltmeter**

This all-purpose voltmeter covers 1 to 300 v full scale, 20 cps to 700 MC, input capacity 1.5 pf, input impedance 10 megohms. Also 1 v to 1000 v dc with 122 megohms input resistance, or ohmmeter covering 0.2 ohms to 500 megohms.  $\Phi$  410B \$245.00 (cabinet),  $\Phi$  410BR \$265.00 (rack mount).



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





## 411A 1 GC Millivoltmeter



Here's unique versatility in an rf voltmeter offering millivolt sensitivity and two easy-reading linear voltage scales in 1-to-3 ratio. Range 10 mv to 10 v full scale rms, 500 KC to 1 GC, usable indications to 4 GC! Also, db scale from -42 to +33 db for gain measurements. Five

probe tips increase versatility. Galvanometer recorder output. photo-electric chopper gives noise-free, drift-free low voltage readings. \$450.00Δ.

## 425A DC Microvolt-Ammeter



High sensitivity, high stability microvolt meter; end scale voltages of 10 μv to 1 v in 11 ranges. Also reads currents of 10 μμa to 3 ma in 18 steps, 1-3-10 sequence. Accuracy ± 3% on all ranges. Drift is less than 4 μv per day referred to input terminals. Input impedance 1 megohm ± 3% on all voltage ranges. Also usable as a 100 db amplifier, up to 1 v out from signals as small as 10 μv, ac rejection at least 3 db at 1 cps and 60 db at 60 cps and above. \$500.00Δ.

## 413A DC Null Voltmeter



413A is a null meter, dc voltmeter, amplifier in one versatile instrument. As a voltmeter, measures 1 mv to 1,000 v end scale, 13 ranges, 2% accuracy and virtually drift-free operation. Input impedance 10 to 200 megohms, depending on range. Input isolation allows operation 500 v dc or 130 v ac from ground. As amplifier, gain 0.001 to 1,000 in 13 steps. Low noise, high ac rejection. \$350.00Δ.

## 412A Precision Volt - Ohm - Ammeter



A precision multi-purpose instrument, the Model 412A measures dc voltage, 1 millivolt to 1,000 volts full scale, 13 ranges. Accuracy ± 1% full scale, all ranges. Measures currents 1 microampere to 1 ampere with ± 2% accuracy, full scale (13 ranges). As an ohmmeter, Model 412A measures 0.02 ohms to 5,000 megohms. Extremely low noise and drift. Instrument also provides recorder output. 412A, \$400.00Δ.

## 400H,L Vacuum Tube Voltmeters



You get 1% accuracy with 400H, 1 mv to 300 v full scale, 12 ranges, 10 cps to 4 MC. Big 5" mirror scale. 400L has logarithmic voltage scale, 5" linear db scale, accuracy 2% of reading. Input impedance, both models, 10 megohms. In the 400L range switching in 10 db levels plus the 12 db scale provides the wide overlap desirable in decibel level measurements. 400H/L, \$325.00Δ.

## 428A,B Clip-On DC Milliammeters



Radical approach to current measurements means no breaking leads, no dc connections, no soldering. "Current transformer" probe clamps around wire, measures by sampling magnetic field around the wire. Measures dc current in the presence of strong ac. 428A covers 3 ma to 1 amp, 6 ranges; 428B covers 1 ma to 10 amps, 9 ranges, has recorder output to measure from dc to 400 cps. Accuracy ± 3%. 428A, \$500.00Δ; 428B, \$600.00Δ.

## New Probes for 428A,B DC Current Meters



### 3529A Magnetometer Probe

Measure magnetic fields as low as 1 milligauss, ac fields, Earth's field; place circuit components for minimum magnetic interaction. Connects to 428A/B DC Current Meters, reads mgauss as ma on 428A/B. 3529A, \$75.00.



### 3528A Clip-On Current Probe

Has 2-9/16" aperture for making measurements on large cables, pipes or waveguides. Provides readings 3 ma to 1 amp with 428A, or 1 ma to 10 amps with 428B. 3528A, \$350.00.

## New Frequency/Time Standard Systems, Components



120AR

114BR

103AR

113BR

725AR

5 parts in 10<sup>10</sup>/day aging rate! 1 part in 10<sup>10</sup> typical short term stability!\*  
New standards of spectral purity, accuracy, reliability!

Accuracy and extreme reliability are the outstanding features of these frequency/time standard systems, which include a frequency standard, frequency divider and clock and a standby power supply, in addition to a comparison device. A receiver and an oscilloscope are used to make time comparisons with hf signals broadcast from WWV

and similar stations. A receiver and electronic counter are used for vlf comparisons. Suitable for shipboard, mobile and field as well as laboratory use, the transistorized systems are compact and rugged. They are suitable for satellite navigation systems, missile and satellite timing-tracking and single sideband communications.

\*averaged over 1 sec intervals and under reasonably constant environmental conditions

### 103AR, 104AR Quartz Oscillators

Aging rate, 5 parts in 10<sup>10</sup>/day; typical short term stability, 1 part in 10<sup>10</sup>/day averaged over 1 sec intervals. Provide 1 MC and 100 KC outputs. 104AR also provides 5 MC output of extreme spectral purity. 103AR, \$2,500.00; 104AR, \$3,250.00.

### 114BR Time Comparator

Used in conjunction with 113BR, allows time comparison to be made without changing clock setting, increases speed and flexibility. Time difference between standard time signal and 113BR tick can be resolved to ±10 μsec. 114BR, \$1,200.00.

### 113BR, 115BR Frequency Divider and Clock

Permits accurate comparisons between local standards and hf or vlf broadcasts. 115BR has in-line readout; 24 hours basis, 1248 BCD Time Code optional. 113 BR has clock readout. 113BR, \$2,750.00; 115BR, \$3,000.00.

### 724BR, 725AR Standby Power Supplies

Automatically assume load and warn when ac power fails, assure continuous operation of frequency/time standard system. 724BR, including battery, \$950.00; 725AR, including battery, \$645.00.

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





## New All-Purpose Counter . . . Plug-ins to 500 MC



5243L 20 MC Counter  
with 5262A Time Interval unit

Measures frequency directly (0 to 20 MC); period (average of up to  $10^5$  periods); ratio between two frequencies. With addition of plug-in units counts frequencies of 100 MC to 500 MC and can measure time interval. Time base aging rate  $\pm 2/10^8$ /week; stability  $\pm 3/10^9$ /day. Operates from  $-20^\circ$  to  $+65^\circ$  C.

In addition, 5243L is an excellent secondary frequency standard with outputs from 0.1 cps to 100 KC, 1 MC and 10 MC selectable by rotary switch. All functions can be remotely controlled except for display time and sensitivity. Maximum sensitivity, 100 mv rms (attenuator to 30 v rms); coupling, dc or ac. Input impedance, 100 ohms/volt (10 K ohms at 100 mv). 5243L, \$2,950.00.



- Continuous, non-blinking display
- Faster repetitive counts
- Solid-state dependability
- Wide temperature range
- BCD Output

These counters are solid-state instruments with maximum counting rates of 300 KC, 1.2 MC, or 20 MC and a choice of Nixie or new staggered columnar readouts. Unique display storage gives continuous readout of most recent measurement, even while instrument is gated for new count. Time between counts independent of gate time for higher sampling rate. 0.1 v sensitivity. Measures frequency, period, multiple period average, ratio. Input impedance, 1 megohm.

Instrument	Frequency Range	Registration	Price
5211A	2 cps to 300 KC	4 digits Columnar	\$ 750.00
5211B			825.00
5212A	2 cps to 300 KC	5 digits columnar	975.00
5232A	2 cps to 1.2 MC	6 digits columnar	1,300.00
5233L	dc to 1.2 MC	6 digits Nixie	1,800.00*
5243L	0 cps to 20 MC	8 digits Nixie	2,950.00
5253A	100 cps to 500 MC used with 5243L	9 digits	475.00
5262A	Time interval from 1 $\mu$ sec to $10^6$ sec. used with 5243L	9 digits	300.00
5512A	2 cps to 300 KC	5 digits Nixie	1,175.00
5532A	2 cps to 1.2 MC	6 digits Nixie	1,550.00

\*Tentative Price

## 5253A 500 MC Converter

Measures frequency 100 MC to 500 MC, retains accuracy of counter. Registration, 9 places, first two indicated on converter (as 100, 110, 120 . . . 210), next seven places indicated by counter. Input voltage, 0.1 volt rms; input impedance, 50 ohms. \$475.00.

## 5262A Time Interval Plug-In Unit

Model 5262A, shown installed in Counter at left, measures time interval, 1  $\mu$ sec to  $10^6$  seconds with time base accuracy,  $\pm 1$  count. Input voltage, 0.5 volt peak minimum, dc coupled input; input impedance, 100 K ohms/volt. Independent or common start-stop with positive or negative trigger slope. May also be used as an amplitude discriminator for measuring the frequency or period of only those signals which exceed the settings of the trigger level controls. \$300.00.

## 5233L 1.2 MC Universal Counter

5233L makes frequency, period, time interval and ratio measurements. 6-digit Nixie display, 1.2 MC counting rate, BCD output. 5233L, \$1,800.00\*.

## 5211A,B 300 KC Counters

5211A and 5211B measure frequency, ratio and will totalize. 300 KC maximum counting rate; use power line frequency for time base (0.1% accuracy) fully adequate for most industrial measurements. 5211A has gate times of 0.1 and 1 second, \$750.00; 5211B has gate times of 0.1, 1 and 10 seconds, \$825.00.



## 5275A Time Interval Counter

10 nanosecond resolution in automatic measurements of information previously unavailable in digital form. 5275A is ideal for measuring very short time intervals between events represented by suitable electrical pulses. Range 10 nsec to 0.1 sec. Accuracy  $\pm 10$  nsec  $\pm$  time base accuracy. External 1 MC time base (see 101A, below) required. Input impedance 50 ohms. \$3,250.00.

101A 1 MC Oscillator, designed specifically as a time base for 5275A Counters, offers low-cost versatility for many other applications.  $5/10^8$  stability, output of 1 v min. into 50 ohm load. 101A, \$500.00.



## 562A Digital Recorder

Solid-state digital recorder has data storage for each print wheel. Prints up to 5 lines/sec with 2 millisecond data transfer. Plug-in logic cards available to provide choice of input codes. Can accept input from two unsynchronized sources. 562A, 11-digit printer with six logic cards, \$1,625.00 (cabinet), \$1,600.00 (rack mount). 12th print wheel, additional logic cards, analog output optional at extra cost.

New 580A, 581A Digital-Analog Converters provide outputs for strip-chart or X-Y recorders, both potentiometer and galvanometer types. Automatic zero-shift for "on-scale" records at all times; extremely high resolution, accuracy. 580A,  $16\frac{3}{4}$ " wide x  $3\frac{1}{2}$ " high (adapts to 19" rack); 581A,  $7\frac{3}{4}$ " wide x  $6\frac{1}{2}$ " high. 580A, \$525.00; 581A, \$525.00.

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



## hp 524C,D Electronic Counters



Bright, steady readout, crystal oscillator stability of 5 parts in  $10^8$  per week and plug-in versatility are yours with these popular counters. hp 524C offers Nixie readout, hp 524D columnar readout. Read frequency 10 cps to 10.1 MC over any of 5

selected intervals; period from 0 to 100 KC. 7 plug-in units increase frequency range to 510 MC, increase sensitivity to 10 mv, provide time interval and phase angle measurements and 10,000 period average measurements. See table, right. hp 524C, \$2,400.00; hp 524D, \$2,150.00.

## hp 523C,D Electronic Counters



All-purpose counter measuring frequency 10 cps to 1.2 MC, time interval 1  $\mu$ sec to 27.8 hours, period 0.00001 cps to 100 KC. Stability 2/1,000,000 per week.

Results displayed in sec, msec,  $\mu$ sec or KC; automatic decimal. Usable with external 100 KC standard. hp 523C, Nixie readout, \$1,575.00; hp 523D, columnar readout, \$1,350.00.

## hp 522B Electronic Counter

A low-cost precision instrument covering 10 cps to 120 KC (220 KC optional). All-purpose counter easily used by unskilled personnel. Measures frequency, period and time interval, is direct reading in cps, KC, seconds or milliseconds. hp 522B, \$915.00.

## hp 521 Industrial Counters



hp 521 series Counters measure frequency, random events per unit of time; with transducers, they measure rps, speed, weight, pressure, etc. 521D (shown) 1 cps to 120 KC (4 places), input min. 0.2 v rms; input attenuator adjusts sensitivity 0.2 to 100 v

rms; input impedance 1 megohm. Characteristics of other 521 models similar to 521D. See table at right for details, prices.

## hp 560A, hp 561B Digital Recorders

## hp 570A, hp 571B Digital Clocks



hp 560A provides permanent record of all types of test data, also gives unique analog output for graphic recording of very small data variations. 560A operates from single-line voltage-coded decimal, delivered

with 6 plug-in comparators for 6-digit presentation, additional comparators (to eleven) may be plugged in at any time. hp 561B requires 10-line coded decimal entry; operates from hp 405CR Digital Voltmeter, frequency counters or relays, stepping switches, beam switching tubes. Models 570A/571B Digital Clocks (570A shown installed) mount in 560A/561B respectively and add time-of-day information to other data recorded by 560A/561B. hp 560A (with 6 comparators), \$1,400.00; hp 561B, \$1,150.00; hp 570A (for 560A), \$1,050.00; hp 571B (for 561B), \$1,000.00. hp 565A Digital Printer (for custom systems), \$750.00.

Instrument	Primary Uses	Frequency Range	Characteristics	Price
-hp- 100E Frequency Standard	Establish standard frequencies; calibrate, measure time	6 sine 10 cps to 1 MC; 4 pulse, 10 cps to 10 KC	Stability $5/10^8$ per week Timing comb.	\$1,000.00■
-hp- 103AR Quartz Oscillator	Establish standard frequencies; calibrate, measure time	1 MC, 100 KC; separate 100 KC for driving -hp- 113BR, 115BR	Aging rate $5/10^{11}$ per day	2,500.00
-hp- 104AR Quartz Oscillator	Establish standard frequencies; calibrate, measure time	1 MC, 100 KC; separate 100 KC for driving -hp- 113BR, 115BR 5 MC of high spectral purity	Aging rate $5/10^{10}$ per day; extreme spectral purity	3,250.00
-hp- 500B Frequency Meter	Rapid frequency measurements	3 cps to 100 KC	9 ranges $\pm 2\%$ accuracy. Input 0.2 to 250 volts	300.00†
-hp- 500C Frequency Meter	Rpm measurements	180 to 6,000,000 rpm	Similar to 500B but calibrated in rpm	300.00†
-hp- 506A Tachometer Head	Rps and rpm measurements	300 to 300,000 rpm	Phototube and light source; output 1 v rms	150.00
-hp- 508A-D Tachometer Generator	Shaft speed measurements	A, 15-40,000 rpm; B, 30-30,000; C, 40-25,000; D, 50-5,000	A, 60 cycles/rev.; B, 100; C, 120; D, 360/	125.00
-hp- 520A High Speed Decade 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	750.00△
-hp- 521A Electronic Counter	Measure frequency, speed	1 cps to 120 KC 220 KC optional, add \$35.00	Direct reading, accurate within $\pm 1$ count $\pm 0.1\%$ , 4 place registration	475.00†
-hp- 521C Electronic Counter	Measure frequency, speed	1 cps to 120 KC 220 KC optional, add \$35.00	Direct reading, accuracy within $\pm 1$ count $\pm 0.01\%$ , 5 place registration	650.00†
-hp- 521D Electronic Counter	Measure frequency, speed	1 cps to 120 KC 220 KC optional, add \$35.00	Same as 521A except has Nixie readout	750.00†
-hp- 521E Electronic Counter	Measure frequency, speed	1 cps to 120 KC 220 KC optional, add \$35.00	Same as 521C except has Nixie readout	950.00†
-hp- 521G Electronic Counter	Measure frequency, speed, elapsed time	1 cps to 1.2 MC	Direct reading, accuracy $\pm 1$ count $\pm 0.1\%$ 5 place registration	700.00†
-hp- 522B Electronic Counter	Frequency, period, time interval measurements	10 cps to 120 KC 220 KC optional, add \$35.00	Direct reading, stability 10 parts per million per week	915.00△
-hp- 523C Electronic Counter	Frequency, period, time interval	10 cps to 1.2 MC	Direct reading, stability 2 parts per million per week. Nixie readout, 10-line code arrangement	1,575.00■
-hp- 523D Electronic Counter	Frequency, period, time interval	10 cps to 1.2 MC	Direct reading, stability 2 parts per million per week	1,350.00■
-hp- 524C Electronic Counter	Frequency, period measurements	10 cps to 10.1 MC (Freq.); 0 cps to 100 KC (Period)	Direct reading, no interpolation; stability $5/10^8$ per wk. Nixie readout	2,400.00■
-hp- 524D Electronic Counter	Frequency, period measurements	10 cps to 10.1 MC (Freq.); 0 cps to 100 KC (Period)	Direct reading, no interpolation; stability $5/10^8$ per wk.	2,150.00■
-hp- 525A Frequency Converter Unit	Extends 524 range to 100 MC; increases basic sensitivity	10 cps to 100 MC	Accuracy same as basic counter; 0.1 v rms min. input	300.00
-hp- 525B Frequency Converter Unit	Extends 524 range from 100 to 220 MC; high sensitivity	100 MC to 220 MC	Accuracy same as basic counter; 0.2 v rms min. input	300.00
-hp- 525C Frequency Converter Unit	Extends 524 range to 510 MC; high sensitivity	100 MC to 510 MC	Accuracy same as basic counter; min. input: 20 mv rms, 100 MC to 10.1 MC; 100 mv rms, 100 to 510 MC	475.00
-hp- 526A Video Amplifier Unit	Increases 524 sensitivity to 10 millivolts	10 cps to 10.1 MC	Accuracy same as basic counter; 10 mv rms min. input	200.00
-hp- 526B Time Interval Unit	Measures interval 1 $\mu$ sec to 100 days	1 $\mu$ sec to $10^7$ sec	Resolution to 0.1 $\mu$ sec	200.00
-hp- 526C Period Multiplier	Period measurement	Extends range of 524 to measure 10,000 periods	Greater accuracy in period measurement	225.00
-hp- 526D Phase Unit	Phase angle measurement	1 cps to 20 KC	Reads in time units, resolution to 0.1 $\mu$ sec	750.00
-hp- 540B Transfer Oscillator	Microwave measurement with counter accuracy	to 18 GC	Ideal for use with -hp- counters, frequency converters, mixers	900.00△

△ Rack mounted instruments \$15.00 less. ■ Rack mounted \$25.00 less. † Rack mounted \$5.00 more.

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

# hp General Purpose Traveling-Wave, Wide Band Amplifiers

## hp Traveling-Wave Tube Amplifiers



hp offers traveling-wave tube amplifiers for all frequencies 1 to 12.4 GC. New hp 489A, 491C, 493A, 495A are medium power, broad band, low noise amplifiers using PPM focusing. Provide at least 1 watt output for 1 mw input over their full frequency range. hp 490B, 492A and 494A are low level, high gain amplifiers for amplitude, pulse, phase or FM modulation. See table for prices.

### hp 466A AC Amplifier



General-purpose transistorized instrument amplifier offering standard gains of 20 and 40 db,  $\pm 0.2$  db at 1000 cps. Distortion less than 1%, 10 cps to 100 KC. Frequency response  $\pm 0.5$  db 10 cps to 1 MC,

output 1.5 v rms across 1500 ohms, noise 75  $\mu$ v rms, referred to input; input impedance 1 megohm with 20 pf shunt. Battery operation optional. Weight just 3 lbs. \$165.00.

Instrument	Primary Uses	Frequency Range	Characteristics	Price
-hp- 450A Amplifier	General purpose lab amplifier	10 cps to 1,000,000 cps	20 and 40 db gain, frequency response $\pm 1/2$ db	\$ 160.00
-hp- 460AR Amplifier, Wide Band	Wide band, pulse amplification	20 KC to 120 MC	20 db gain, rise time 0.003 $\mu$ sec	225.00
-hp- 460BR Amplifier, Fast Pulse	Pulse amplification high output	20 KC to 120 MC	15 db gain, 125 peak volts	275.00
-hp- 466A AC Amplifier	General purpose lab amplifier	10 cps to 1 MC	20, 40 db gain; freq. response $\pm 0.5$ db	165.00
-hp- 489A Microwave Amplifier	Medium power "L" band amplification	1 to 2 GC	30 db gain; nsec rise time; 1 watt output	2,300.00
-hp- 490B Microwave Amplifier	Amplification throughout "S" band	2 to 4 GC	30 db gain; nsec rise time; 10 mw output	1,500.00
-hp- 491C Microwave Amplifier	Medium power "S" band amplification	2 to 4 GC	30 db gain; nsec rise time; 1 watt output	2,300.00
-hp- 492A Microwave Amplifier	Amplification through most of "G" and "J" bands	4 to 8 GC	30 db gain; nsec rise time; 20 mw output	2,000.00
-hp- 493A Microwave Amplifier	Medium power "G" and "J" band amplification	4 to 8 GC	30 db gain; nsec rise time; 1 watt output	2,900.00
-hp- 494A Microwave Amplifier	Amplification throughout "X" band	7 to 12.4 GC	30 db gain; nsec rise time; 20 mw output	2,000.00
-hp- 495A Microwave Amplifier	Medium power "X" band amplification	8.2 to 12.4 GC	30 db gain; nsec rise time; 1 watt output	2,900.00

## hp Regulated and Klystron Power Supplies

### hp 716A Power Supply



Unique versatility for powering 250 different types of klystrons is provided by this instrument. Low ripple, high regulation virtually eliminate FM and AM from high-performance klystrons. Set reflector voltage within 0.5%  $\pm 1$  v on direct-reading scale, beam voltage within 2%.

Regulated dc klystron filament supply. Also provides sawtooth supply for FM, square wave for on-off use. \$675.00.

### hp 723A Power Supply



Ideal dc power supply, 0 to 40 v dc, 0 to 500 ma, for systems applications where remote voltage programming is desired. Load regulation, less than 20 mv change from 0 to 500 ma; less than 10 mv change for  $\pm 10\%$  line voltage change. Either positive or negative terminal may be grounded. Master-slave operation for series or parallel use. Units share current in parallel operation. Three modular units can be placed in one rack mount adapter. \$225.00.

Instrument	Primary Uses	Characteristics	Price
-hp- 711A Power Supply	General purpose regulated dc supply for lab and field use	0 to 500 volts @ 100 ma	\$250.00 ■
-hp- 712B Power Supply	Same as 711A	0 to 500 volts @ 200 ma -300 v @ 50 ma, 0 to -150 v @ 5 ma	390.00 △
-hp- 715A Power Supply	Regulated beam, reflector source for low power klystrons	-250 v @ 30 ma to -400 volts @ 50 ma; 0 to -900 v @ 10 $\mu$ a	325.00
-hp- 716A Power Supply	Powering 250 different types of klystrons	-250 to -800 v @ 100 ma 0 to -800 volts	675.00
-hp- 721A Power Supply	Powering transistors, similar applications	0 to 30 v, 150 ma	145.00
-hp- 722AR Power Supply	Powering transistors, banks of tunnel diodes	0 to 60 v, 0 to 2 amps	525.00
-hp- 723A Power Supply	General purpose, medium power low voltage supply; remote programming; master-slave operation	0 to 40 v, 500 ma	225.00
-hp- 726AR Power Supply	Highly accurate testing of systems or transistor circuits; remote sensing, programming	0 to 60 v, 0 to 2 amps	545.00

△ Rack mounted instruments \$15.00 less. ■ Rack mounted \$5.00 more.

### hp 722AR, hp 726AR Transistor Power Supplies

hp 722AR is a dependable, transistorized, fully regulated dc power supply; continuously variable 0 to 60 v dc, 0 to 2 amps. Three-terminal output for either positive or negative grounding. Load regulation, less than 5 mv change for 0 to 2 amp change. Remote sensing, \$525.00 (rack mount).

hp 726AR DC Power Supply. Similar to 722AR, provides 0 to 60 v output, is programmable by external resistance, \$545.00 (rack mount).

### hp 721A Transistor Power Supply

Compact, versatile, completely transistorized. Regulated supply, 0 to 30 v, continuously variable, 150 ma maximum output. Load regulation, 0 to 150 ma, 0.3% or 30 mv, whichever is greater. Positive overload protection with front panel switch prevents damage to transistors, etc. \$145.00.

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





## hp 415C SWR Meter



Designed to use with bolometers or crystals. Increased resolution gives full scale expansion for any 2.5 db increment; no "blind" spots. Single frequency operation, 1,000 cps (others on special order); tunable over 50 cps range for ease in matching source modulator. Readings in SWR or db. Low noise level, 0.1  $\mu$ v sensitivity (full scale), \$325.00. Optional battery pack add \$100.00.

hp 415B Standing Wave Indicator for all waveguide and coaxial slotted sections. Single frequency operation 1,000 cps  $\pm$  2%. Readings in SWR or db. Low noise level, 0.1  $\mu$ v (full scale) sensitivity, 60 db calib. attenuator. \$225.00.



## hp 416A Ratio Meter

Automatically combines forward and reverse signals and displays their ratio directly, irrespective of common

amplitude variations. Contains rf power monitor indicating proper power level. Rear terminal signal available to operate oscilloscope or recorder. Suitable for single and swept frequency operation. \$550.00.

## hp 803A VHF Bridge



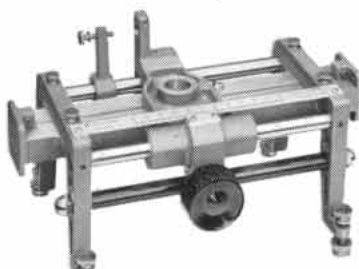
Provides direct impedance measurements in vhf range, 2 to 2,000 ohms,  $-90^\circ$  to  $+90^\circ$  phase angle. Wide frequency range 52 to 500 MC; makes measurements down to 5 MC and up to 1,000 MC. Fast, simple to use. \$1,000.00.

## hp 417A VHF Detector

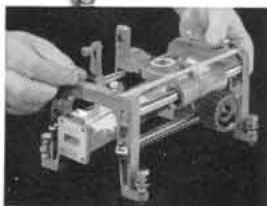


Super-regenerative (AM) receiver covering all frequencies from 10 to 500 MC in 5 bands. Designed for use with hp 803A Bridge. 5  $\mu$ v sensitivity full range. Single frequency control, reads direct in MC. \$475.00.

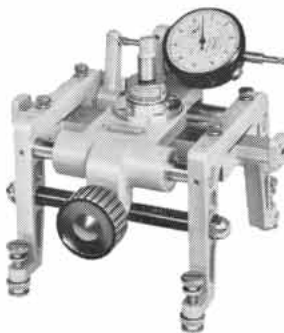
## hp 809B/814B Universal Probe Carriages



hp 809B and 810B



Quick, easy waveguide interchange



hp 814B, 815B, 446B

Instrument	Primary Uses	Frequency Range	Characteristics	Price
-hp- 360A-D Low Pass Filters	Eliminates harmonic voltages from uhf systems	Cut-off frequencies A- 700 MC C-2,200 MC B-1,200 MC D-4,100 MC	50 db rejection at 1.25 cutoff freq.	See below
-hp- 362A Low Pass Filters	Suppress harmonics Slotted section measurements	8.2 to 40.0 GC depending upon model	Rejection at least 40 db	See below
-hp- 415B Standing Wave Indicator	SWR indicator or null indicator	1,000 cps $\pm$ 2%	0 to 70 db attn. Max. sensitivity 0.1 $\mu$ v	\$225.00 ■
-hp- 415C SWR meter	SWR indicator or null indicator	1,000 cps $\pm$ 2%	Full scale expansion for any 2.5 db increment; Max. sensitivity 0.1 $\mu$ v	325.00
-hp- 416A Ratio Meter	Reflection coefficient measurements	1,000 cps $\pm$ 4%	Continuous swept frequency presentation; accuracy $\pm$ 3%	550.00 △
-hp- 417A VHF Detector (for -hp- 803A)	VHF bridge detector	10 to 500 MC	Approx. 5 $\mu$ v sensitivity	475.00
-hp- 803A VHF Bridge	Measurement of vhf impedance, SWR	52 to 500 MC	2 to 2,000 ohms impedance $-90^\circ$ to $+90^\circ$ phase angle	1,000.00
-hp- 805C Coaxial Slotted Section	Measurement of SWR	500 to 4,000 MC	For Type N Connectors flexible cables	525.00
-hp- 805D Coaxial Slotted Section	Same as above	Same as above	For rigid 7/8" RG44/U line	600.00
-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	G, C, J, H, X, M and P810 Waveguide Sections Supports 806B section also		Accepts 442B, 444A probes	175.00
-hp- 814B Universal Probe Carriage	Supports K and R 815B Waveguide Slotted Sections		Accepts Untuned Probe 446B	225.00
-hp- 872A Coaxial Slide-Screw Tuner	Correcting discontinuities, flattening waveguide, coax systems	500 to 4,000 MC	Correctable SWR: 5; insertion loss: 1 db or less	525.00

△ Rack mounted instruments \$15.00 less. ■ Rack mounted \$5.00 more.

## hp 360, hp 362A Low Pass Filters

hp 362A Low Pass Filters are reactive elements facilitating microwave measurements by suppressing harmonics. Present good match in the pass band to the waveguide system for low insertion loss and high transmission efficiency. hp 362A \$325.00 to \$385.00 depending upon waveguide size.

hp 360 Low Pass Filters speed microwave measurements by eliminating harmonics, permitting transmission at single, known frequency only. Particularly necessary in slotted line, filter characteristic, receiver response, similar measurements. Table above gives cut-off frequency; insertion loss not over 3 db; nominal impedance 50 ohms. hp 360A, \$70.00; 360B, \$60.00; 360C/D, \$50.00.



## hp 872A Coaxial Slide-Screw Tuner

Covers 500 to 4,000 MC range. Tuner consists of hp-developed slab line and precision probe carriage. Insertion quickly and easily varied with micrometer drive; line position may be read directly on a recessed scale. Probe travel at least  $\frac{1}{2}$  wavelength at 500 MC. Correctable SWR: 5; low insertion loss. \$525.00.

Models 809B and 814B are precision-built mechanical assemblies operating, respectively, with hp 810B and 815B series slotted sections. Combination of the 809B carriage and 810 slotted sections covers 2.6 to 18.0 GC. Combination of 814B carriage and 815B series sections covers 18.0 to 40.0 GC. For prices see table above.

On either carriage, waveguides can be interchanged in seconds for real savings on engineering time. Only one probe is required for each carriage to cover full frequency range. Manufacture is of highest quality to assure positive mechanical positioning of interchangeable waveguides and precise installation of mating hp probes. hp 809B has a vernier scale reading to 0.1 mm and is equipped for dial gauge mounting. hp 814B has a dial read directly to 0.01 mm.

hp 810B Slotted Sections. hp 810 B, for mounting in 809B carriage, is a flanged, waveguide section with accurately machined slot. Slot is tapered at ends to minimize reflection. Available in 7 waveguide bands, 3.95 through 18.0 GC. \$90.00 to \$175.00.

hp S810A. Complete slotted section assembly including probe carriage. In 2.6 to 3.95 GC (S-band) size only. \$450.00.

hp 815B Slotted Sections. For mounting in 814B carriage. Available K and R bands, 18.0 to 40.0 GC. These sections are accurately machined so that they are quickly and easily interchanged, and precisely positioned. \$265.00 to \$345.00.

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





# Microwave Power Measuring Equipment

Now! End tedious zero setting with new **hp 431A Power Meter**



hp 431A

At last, continual zero setting for your power measurements is a thing of the past! This new hp power meter, which measures 10  $\mu$ w to 10 mw full scale, lets you use one zero setting, good for hours, on all ranges—even on the 10  $\mu$ w range! The hp 431A gives you additional sensitivity of 10 db over previously available instruments. In addition to its 7-range  $\mu$ w-mw calibration, the hp 431A also reads in dbm, -30 to +10. Direct-reading accuracy is  $\pm 3\%$  on all ranges. Operates with new temperature-compensated thermistor mounts, hp 478A, 486A (below). hp 431A, \$425.00.

hp 434A Calorimetric Power Meter



Simply connect and read power 10 mw to 10 watts, dc to 12.4 GC. No barretter, thermistor needed, no external terminations or plumbing. Measures CW or pulsed power. Two simple controls. DC input impedance 50 ohms  $\pm 5$  ohms at Type N input jack; input SWR less than 1.5 full range, less than 1.3 to 5 GC. Accuracy, without correction, within 5% full scale. Response time less than 5 sec. for full scale deflection. Direct reading in watts and dbw, compact, entirely self-contained. \$1,600.00 $\Delta$ .

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 mounts in adjacent table. Range 0.02 to 10 mw. \$250.00 $\blacksquare$ .

hp 477B Coaxial Thermistor Mount



For frequency range 10 MC to 10 GC. SWR less than 1.5. Thermistor element is 200 ohm negative. No tuning required; not susceptible to burnout. \$75.00. (including thermistor).

hp 478A Thermistor Mount



hp 478A Thermistor Mount for coaxial systems, covers 10 MC to 10 GC without tuning, is truly temperature-compensated, contains two thermistor pairs for use with dual bridge hp 431A Power Meter. SWR less than 1.5, high accuracy, drift-free operation. \$145.00.

hp 486A Thermistor Mounts



These waveguide mounts provide close temperature tracking with the hp 431A, even in the presence of thermal shocks. Each covers its full waveguide range. They make the measurement of power as low as 1  $\mu$ w practical. Available for S, G, J, H, X, M, P, K, R bands, 2.6 through 40 GC.

Instrument	Primary Uses	Frequency Range	Characteristics	Price
-hp- 393A Coaxial Attenuator	Accurate, variable attenuation and directional coupling to 120 db	500 to 1,000 MC	Direct-reading in high-power systems	\$ 420.00
-hp- 394A Coaxial Attenuator	Accurate, variable attenuation and directional coupling to 120 db	1,000 to 2,000 MC	Direct-reading in high-power systems	420.00
-hp- 430C Microwave Power Meter	Measurement of rf power	Depends on Bolometer Mount -hp- mounts, 10 MC to 40 GC	0.02 to 10 mw $\pm 5\%$ accuracy	250.00 $\blacksquare$
-hp- 431A Microwave Power Meter	Measurement of rf power	Depends on Bolometer Mount -hp- mounts, 10 MC to 40 GC	1 $\mu$ w to 10 mw stable, temperature-compensated	425.00
-hp- 434A Calorimetric Power Meter	Measurement of rf power	dc to 12.4 GC	Direct reading, no barretters, thermistors or terminations; CW, pulsed	1,600.00 $\Delta$
-hp- 476A Universal Bolometer Mount	Measurement of rf power (with 430B/C)	10 to 1,000 MC	No tuning required SWR less than 1.25	85.00
-hp- 477B Coaxial Thermistor Mount	Measurement of rf power (with 430C)	10 MC to 10 GC	No tuning required SWR less than 1.5	75.00
-hp- 478A Thermistor Mount	Measurement of rf power (with 431A)	10 MC to 10 GC	Drift-free, SWR less than 1.5	145.00
-hp- 485 Waveguide Detector Mount	Measurement of rf power (with 430C)	2,600 to 12,400 MC	Full coverage of waveguide band	75.00 to 200.00
-hp- 486A Thermistor Mounts S thru R Bands	Measurement of rf power (with 431A)	9 models, 2.6 to 40.0 GC	Temperature compensated, SWR less than 1.5	145.00 to 375.00
-hp- 487B Waveguide Thermistor Mount	Measurement of rf power (with 430C)	3,950 to 40,000 MC	Full coverage, no tuning, 1.5 SWR except K/R487B 2.0	75.00 to 110.00
-hp- 760D Dual Directional Coupler	Reflectometer and rf power measurements	250 MC to 1 GC	Directivity 35 db flat coupling	200.00
-hp- 761D Dual Directional Coupler	Reflectometer and rf power measurements	1 to 4 GC	Directivity 30 db flat coupling	185.00
-hp- 764D Dual Directional Coupler	Reflectometer and rf power measurements	216 to 450 MC	Coupling attenuation* 20 db, directivity 30 db	160.00
-hp- 765D Dual Directional Coupler	Reflectometer and rf power measurements	450 to 945 MC	Coupling attenuation* 20 db, directivity 30 db	160.00
-hp- 766D Dual Directional Coupler	Reflectometer and rf power measurements	940 to 1,975 MC	Coupling attenuation* 20 db, directivity 26 db	150.00
-hp- 767D Dual Directional Coupler	Reflectometer and rf power measurements	1,900 to 4,000 MC	Coupling attenuation* 20 db, directivity 26 db	150.00

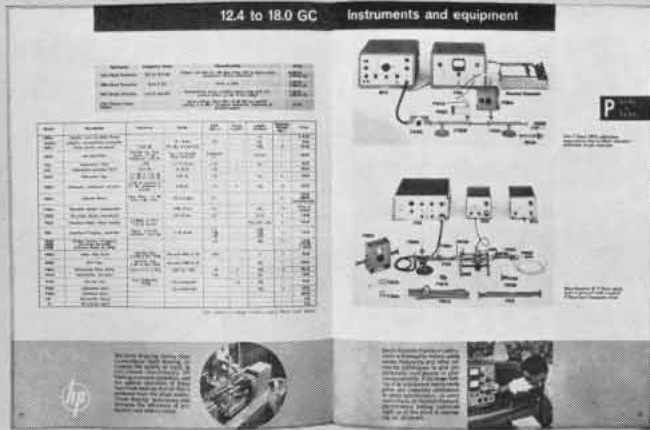
\*Power handling capacity all 760/767 series couplers 50 watts CW, 10 Kw peak.

$\Delta$  Rack mounted instruments \$15.00 less.  $\blacksquare$  Rack mounted \$5.00 more.

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



The waveguide equipment and accessories shown on these pages represent only a small portion of **hp** waveguide instruments. A complete catalog is yours for the asking.



**WRITE:**  
**HEWLETT-PACKARD COMPANY**  
 1501 Page Mill Road  
 Palo Alto, California, U. S. A.  
 Ask for **hp** Microwave Catalog

## **hp** 382A Precision Attenuators



Popular **hp** 382A series precision attenuators are now available from "G" through "R" bands, 3.95 to 40.0 GC. "K," "R" band attenuators are of new, space-saving design (see photo). Direct reading, one-control tuning, high power handling capacity. Attenuation 0 to 50 db full range, independent

of frequency. Phase shift constant with attenuation. \$275.00 to \$580.00.

## **hp** 906A, **hp** 914A,B Moving Loads

Model 906A, 1 to 12.4 GC SWR <1.05 from 1.5 to 12.4 GC; <1.1 from 1 to 1.5 GC, a coaxial moving load which, with the popular **hp** 914A/B waveguide series, provides moving load coverage 1 to 40 GC. **hp** 906A, \$250.00; **hp** 914A/B series, \$60.00 to \$290.00.

## **hp** 764D-767D Dual Directional Couplers



High directivity dual coaxial couplers make reflectometer measurements practical in vhf and uhf coax systems. Flat response, high power capacity, low insertion loss. Four models, covering 216 to 4,000 MC collectively. **hp** 764D/765D, \$160; **hp** 766D/767D, \$150.00.

## **hp** 760D, **hp** 761D Dual Directional Couplers



Ideal for reflectometer systems, flat to  $\pm 0.5$  db over 4-to-1 frequency range. Directivity 35 db (760D) and 30 db (761D). **hp** 760D, 250 MC to 1 GC, \$200.00; **hp** 761D, 1 to 4 GC, \$185.00.

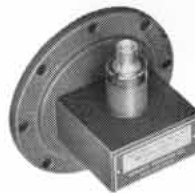
## **hp** 532, **hp** 536A Frequency Meters



Comparable wide band, direct reading convenience are offered by **hp** 532 series, 3.95 to 40 GC, and the new **hp** 536A, 960 MC to 4.2 GC, Frequency Meters. The meters include a high Q resonant cavity tuned by choke

plunger; no sliding contacts. Resonance indicated by approx. 1 db dip in output. The **hp** 532 series meters are for waveguide application, the **hp** 536A for coaxial. **hp** 532 series, \$200.00 to \$480.00; **hp** 536A, \$500.00.

## **hp** 487B Thermistor Mounts



For fast, accurate waveguide power measurements. Each unit covers full range of its waveguide frequency. No tuning needed, SWR 1.5 max., except K and R bands, SWR 2.0 max. Max. power 10 mw. Rugged construction, high temperature coefficient thermistors virtually eliminate burnout. For S, G, J, H, X, M, P, K and R bands. 2.6 to 40.0 GC. \$75.00 to \$315.00.



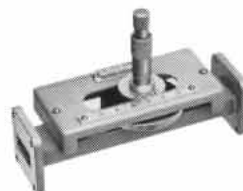
## **hp** 420A,B Crystal Detectors

Employs a silicon crystal to detect rf signals in Type N coaxial lines. Covers frequencies 10 MC to 12.5 GC, sensitivity approx. 0.1 v/mw, frequency response  $\pm 3$  db full range, max. SWR 3. Negative output, positive output optional. **hp** 420A, \$50.00 each. **hp** 420B (has video load), \$75.00 available in matched pairs at \$20.00 extra.

## **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. Type N coax fitting (female). AN-waveguide flange. For S, G, J, H and X bands, 2.6 to 12.4 GC. \$25.00 to \$50.00.



## **hp** 870A Slide-Screw Tuners

For flattening waveguide systems, matching, etc. Probe position and penetration adjusts to setup reflection canceling existing reflection. Precision lead screw or micrometer-varies probe insertion; vernier adjusts probe position. Corrects SWRs of 20 with accuracy of 1.02 SWR. For S, G, C, J, H, X, M, P, K, R, bands, 2.6 to 40.0 GC. \$130.00 to \$380.00.



## **hp** 444A, **hp** 446B Untuned Probes

**hp** 444A is modified crystal plus small antenna in convenient housing. Probe penetration easily variable; may be locked in position. No tuning needed; sensitivity superior to most elaborate single or double tuned probes. Range 3.0 to 18 GC; fits  $\frac{3}{4}$ " bore. **hp** 446B, for **hp** 814 Probe Carriage, similar but covers K and R bands, 18.0 to 40.0 GC. **hp** 444A, \$55.00. **hp** 446B, \$145.00.

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



# New UHF Signal Generator, 800 to 2,400 MC



- In-Line frequency readout
- No ambiguity or reading errors, sets to within 2 MC
- Pushbutton mode selection
- Leveled output
- Two rf outputs, calibrated and gross
- New PIN diode modulator
- Only 5 1/4" high, new modular construction

8614A UHF Signal Generator (top)

8714A Modulator (bottom)

## New 8614A Signal Generator

New 8614A Signal Generator provides automatically leveled output within  $\pm 0.5$  db from 0 dbm to  $-127$  dbm, or unleveled 10 mw or more across the band. PIN modulator permits pulse, AM modulation and remote level control. Internal square wave (400 to 1,200 cps) modulation provided. 8614A is extremely easy to use with pushbutton mode and function selection and in-line frequency readout accurate to  $\pm 1\%$ . Its small size makes it ideal for bench or rack use where it may be stacked with its companion modulator unit. Frequency stability is approximately 0.05%/°C change in ambient temperature; less than 1,000 cps peak incidental fm; less than 0.001% change for line voltage variation of  $\pm 10\%$ . \$1,650.00.

## New 8714A Modulator

### Fast Rise Time, Pushbutton Controls

New 8714A Absorption-type Modulator can be used with any signal source up to 1 watt between 800 and 2,400 MC to provide rf pulses and square waves having less than 10 nsec rise time and decay times and an on-off ratio up to 80 db.

In addition to having an internal pulse and square-wave generator with a rep rate variable from 50 cps to 50 KC for modulating the rf, 8714A can be driven by external pulses at rates to 1 MC. For pulse burst durations of less than 1 sec, repetition rate may be as high as 2 MC. Sync pulses in advance of the rf pulse and simultaneous with the rf pulse are also provided. \$850.00.

## Noise Measuring Equipment



342A Noise Figure Meter

## 340B, 342A Noise Figure Meters

General-purpose instruments making possible, in minutes, receiver and component alignment jobs that once took hours. Simplifies accurate alignment; encourages better maintenance; better performance.

340B automatically measures, continuously displays IF or rf amplifier noise figure at 30 or 60 MC; other freq. on order. \$715.00 (cabinet); \$700.00 (rack).

342A, similar, operates on 30, 60, 70, 105, 200 MC. 30 MC and 4 other frequencies between 38 and 200 MC on order. \$815.00 (cabinet); \$800.00 (rack). Also available with 21.4 MC IF.

(NOTE: Models 340B and 342A not available in Western Europe).

343A VHF Noise Source, temperature-limited diode broadband source, 10 to 600 MC, 5.2 db excess noise, \$100.00.

345B IF Noise Source, 30 or 60 MC (others to order); 4 impedances, 5.2 db excess noise, \$100.00.

347A Waveguide Noise Source, Argon gas discharge tubes in waveguide section  $15.2 \pm 0.5$  db excess noise; for frequencies 2.6 to 18.0 GC, \$200.00 to \$360.00.

349A UHF Noise Source, 400 to 4,000 MC, wider range with correction;  $15.2 \pm 0.5$  db excess noise, \$325.00.

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



## Frequency Doublers to 40 GC



Operating on harmonic generation principles,  $\text{hp}$  938A and 940A Frequency Doubler Sets provide output from 18 to 26.5 GC and 26.5 to 40.0 GC respectively. The doublers can be driven by  $\text{hp}$  626A or 628A Signal Generators,  $\text{hp}$  686C and 687C Sweep Oscillators or by klystrons. The input signal may be CW, pulsed or swept; thus doublers retain flexibility of driving instrument. Output approx. 0.5 to 1 mw with  $\text{hp}$  signal generators; input power 100 mw max. Output monitor accuracy  $\pm 2$  db. 100 db attenuator accurate within  $\pm 2\%$  of reading or 0.2 db.  $\text{hp}$  938A, \$1,500.00.  $\text{hp}$  940A, \$1,500.00.

## 606A Standard Signal Generator



Ultra-modern; 50 KC to 65 MC. Output 3 v full range, continuous attenuation to 0.1  $\mu$ v. MO-PA circuit with full feedback loop provides constant output full range. Low distortion, broad modulating capabilities. Typical  $\text{hp}$  speed, ease of operation; occupies  $\frac{1}{4}$  bench space normally needed for generators of this frequency range. \$1,350.00 $\Delta$ .

## 608D VHF Signal Generator



10 to 420 MC. Highest stability. Low 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 1 and 5 MC. Master-oscillator, intermediate and output amplifier circuit design. Premium quality performance, direct calibration, ideal for aircraft communications equipment testing. \$1,300.00. ■

$\text{hp}$  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. \$1,200.00. ■

Instrument	Frequency Range	Characteristics	Price
-hp- 606A	50 KC to 65 MC	Output 0.1 $\mu$ v to 3 v. Modulation bandwidth dc to 20 KC, low drift and noise, low incidental FM, low distortion	\$1,350.00 $\Delta$
-hp- 608C	10 to 480 MC	Output 0.1 $\mu$ v to 1 v into 50 ohm load, AM, pulse, or CW modulation. Direct calibration	1,200.00 ■
-hp- 608D	10 to 420 MC	Output 0.1 $\mu$ v to 0.5 v. Incidental FM less than 0.001%	1,300.00 ■
-hp- 612A	450 to 1,230 MC	Output 0.1 $\mu$ v to 0.5 v into 50 ohm load. AM, pulse, CW or square wave modulation. Direct calibration	1,400.00 ■
-hp- 614A	800 to 2,100 MC	Output 0.1 $\mu$ v to at least 0.163 v into 50 ohm load. Pulse, CW or FM modulation. Direct calibration	1,950.00 ■
-hp- 616B	1,800 to 4,200 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 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 0.223 v into 50 ohm load. Pulse, FM or square wave modulation. Direct calibration	2,250.00 ■
-hp- 626A	10 to 15.5 GC	Output + 10 dbm to -90 dbm. Pulse, FM, or square wave modulation. Direct calibration	3,400.00 ■
-hp- 628A	15 to 21 GC	Output + 10 dbm to -90 dbm. Pulse, FM, or square wave modulation. Direct calibration	3,400.00 ■
-hp- 8614A	800 to 2,400 MC	Leveled output from 0 dbm to -127 dbm, 10 mw max. Internal square wave, external pulse AM - FM	1,650.00
-hp- 8714A	800 to 2,400 MC	PIN modulator for rf signals up to 1 watt. Square wave, pulse and external modulation. Pulse width and delay controls	850.00

$\Delta$  Rack mounted instruments \$15.00 less.

■ Rack mounted instrument \$20.00 more.

## 626A, 628A SHF Signal Generators

Instruments bringing high power, wide range, convenience and accuracy 10 to 21 GC range. Frequencies, output voltage directly set and read. Output 10 to 20 db better than previous spot-frequency sets; SWR better than 1.2 at 0 dbm and lower. Internal pulse, FM or square wave modulation; also external pulsing or FM'ing.  $\text{hp}$  626A, 10 to 15.5 GC, \$3,400.00. ■  $\text{hp}$  628A, 15 to 21 GC, \$3,400.00. ■



## 355C,D Precision Attenuators

Useful as components or lab instruments,  $\text{hp}$  355C, D together provide 0-132 db attenuation in 1 db steps, dc to 1GC.  $\text{hp}$  355C, 0 to 12 db in 1 db steps or  $\text{hp}$  355D, 0 to 120 db in 10 db steps, \$125.00.

## Swept Frequency Oscillators

### 686C Electronic Sweep Oscillator



Covers all or part of X-band with flexible, quiet electronic sweep. Simple to operate, direct reading, adjustable sweep width and rate, 10 mw output minimum, frequency

sweep linear with time. Has slow sweep for recorders; fast for oscilloscope; single sweep manually started or externally triggered, external FM, AM modulation. \$2,900.00 $\Delta$ .

Instrument	Frequency Range	Output	Characteristics	Price
-hp- 682C	1.0 to 2.0 GC	50 mw	Electronically swept; variable sweep rate, width. Output 10 mw, SWR 3.1 or less Pulse, square wave, FM, AM modulation. All models offer leveled output	\$3,090.00 $\Delta$
-hp- 683C	2.0 to 4.0 GC	30 mw		3,000.00 $\Delta$
-hp- 684C	4.0 to 8.1 GC	10 mw		2,900.00 $\Delta$
-hp- 686C	8.2 to 12.4 GC	10 mw		2,900.00 $\Delta$
H01 686C	7.0 to 11.0 GC	10 mw		3,000.00 $\Delta$
-hp- 687C	12.4 to 18.0 GC	10 mw		3,400.00 $\Delta$

$\Delta$  Rack mounted instruments \$15.00 less.

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





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# HEWLETT-PACKARD COMPANY

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The instruments described in this Short Form Catalog are products of the following Hewlett-Packard divisions:

### ● Audio/Video Division

### ● Frequency & Time Division

### ● Microwave Division

### ● Oscilloscope Division

Other  companies and their products include:

**BOONTON RADIO CORP.**, manufacturers of signal generators, FM stereo modulators, Q meters.

**F. L. MOSELEY CO.**, manufacturers of strip-chart recorders, X-Y recorders.

**SANBORN CO.**, manufacturers of amplifiers, data recording systems, transducers, medical electronic equipment.

**DYMEC**, manufacturers of digital systems, data reduction systems, rf systems.

**HARRISON LABS.**, manufacturers of power supplies.

**PAECO**, manufacturers of inverters, fan drivers, transformers, magnetic components.

