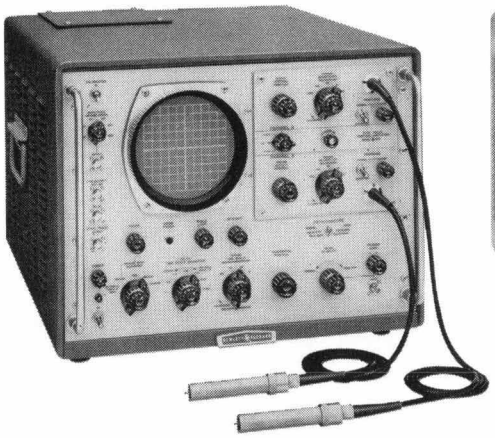
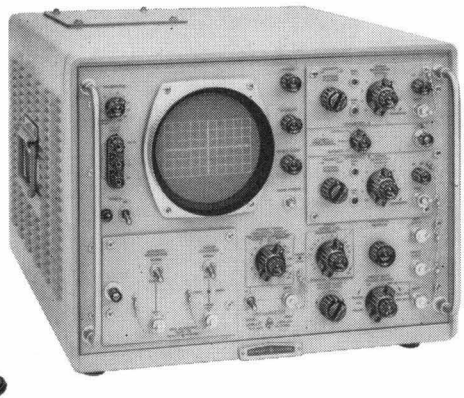
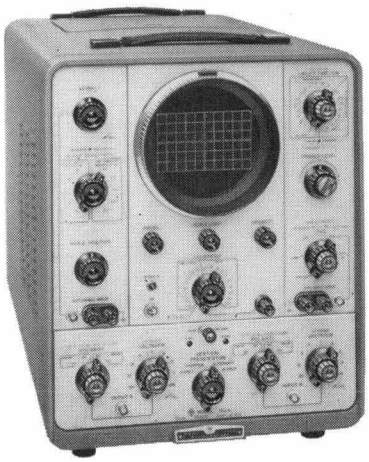
hp offers complete coverage in





NEW!



hp 185A-dc to 1,000 MC

This revolutionary new sampling oscilloscope gives you fatigue-free viewing of *repetitive short pulses requiring a bandwidth up to 1000 MC.* The 3 db point is beyond 800 MC. A rise time of less than 0.45 nsec permits direct measurement and observation of fast phenomena. Bright, traces are provided even at repetition rates of 50 cps.

Dual Trace Amplifier

Model 187B Dual Trace Amplifier (plug-in), permits observation and comparison of two high speed phenomena simultaneously, or highly accurate time measurements. Both channels have independent sensitivity and positioning controls; may be used separately. Vertical sensitivity is 10 mv/cm to 200 mv/cm; vernier increases sensitivity to 3 mv/cm. Dynamic range is wide; 3 mv to 2 v peak. New-design 100,000 ohm probes minimize circuit loading.

0.1 mμsec/cm to 100 mμsec/cm

Horizontal sweep speeds range from 0.1 nsec/cm (with expander) to 100 nsec/cm. Delayed sync pulse (on front panel) is available for triggering circuits under test. X–Y recorder output permits permanent records of high-speed phenomena. Other features: time and amplitude calibrators, beam finder, traditional panel arrangement.

Wide Variety of Accessories

A wide range of accessories is available for the hp 185A and 187B, including BNC adapters, Type N adapters, T connectors, capacitive and resistive dividers, coaxial loads, blocking capacitors, delay lines, sync take-offs, synchronizing trigger units—all designed to increase overall versatility of the scope and dual-trace plug in.

Typical Measurements

Model 185A is particularly useful in measuring transistor response time, memory-unit and diode switching time, determining pulse jitter and analyzing and comparing millimicrosecond signal components. hp 185A, $2,000.00; hp 187B, $1,000.00.

hp 160B - dc to 15 MC
hp 170A - dc to 30 MC

hp 160B, dc to 15 MC, and new hp 170A—dc to 30 MC, guided by exacting MIL specifications, are presented as the most dependable, widely useful oscilloscopes available.

A new design approach using two sets of plug-ins insures maximum versatility, yet does not require you to buy circuitry you do not need.

X-Y Recorder Output

New horizontal (time axis) plug-ins include hp 166C Display Scanner making the 160B and 170A the world's first general purpose scopes with an X–Y recorder output. This output covers the full scope bandwidth and makes possible high resolution, permanent X–Y records of repetitive waveforms. Another plug-in, hp 166D Sweep Delay Generator, offers a unique mixed sweep feature permitting detailed analysis of one pulse in a wave-train, while retaining display (on a slower time scale) of the entire wave preceding the pulse of interest.

Dual Trace Amplifier

New vertical plug-ins will permit scope operation under widely varying input conditions. Typical is hp 162A Dual Trace Amplifier, 20 mv/cm unit permitting simultaneous viewing of two phenomena or differential amplification of signals from dc to 14 MC with hp 160A or dc to 25 MC with hp 170A.

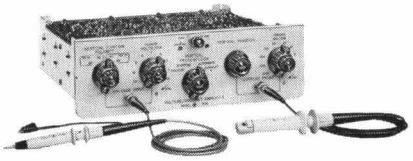
Models 160B and 170A use premium components and latest design techniques throughout. 24 calibrated sweep times, 0.1 μsec/cm to 5 sec/cm, ± 3% accuracy. 7 step magnifier increases fastest sweep to 0.02 μsec/cm. Internal, line voltage or external trigger, horizontal sensitivity 0.1 v/cm to 10 v/cm; vernier to 25 v/cm. hp 160B, $1,850.00; hp 170A, $2,150.00; hp 166C, $300.00; hp 166D, $325.00; hp 162A, $350.00.

hp 150A - dc to 10 MC

Model 150A is intended as the most broadly useful, convenient high quality 10 MC scope offered. A variety of plug-ins (see below) provide dual trace or differential input, or high amplification eliminating pre-amplifiers on input from most transducers.

Automatic Trigger

Sweep Range 0.02 μsec/cm to 15 sec/cm; 24 sweeps 0.1 μsec/cm to 5 sec/cm, 3% accuracy. Internal, line voltage or external triggering, pos. or neg. slopes. Has sweep magnifier, vernier; horizontal amplifier; sensitivity 200 mv/cm to 15 v/cm. Vertical amplifier dc to 10 MC, optimum transient response and rise time less than 0.035 μsec. Calibrating voltages, 1 KC square wave, 0.2 mv to 100 v peak, accuracy 3%. $1,300.00.

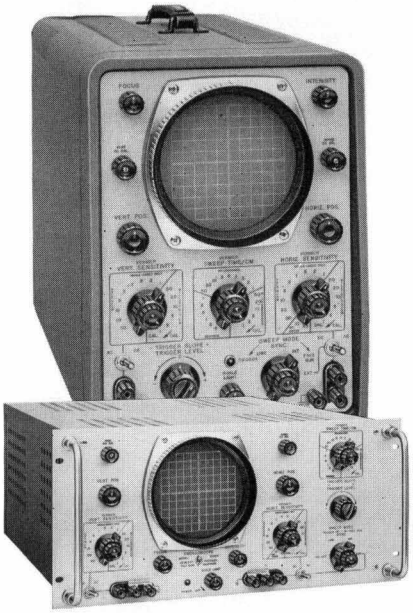


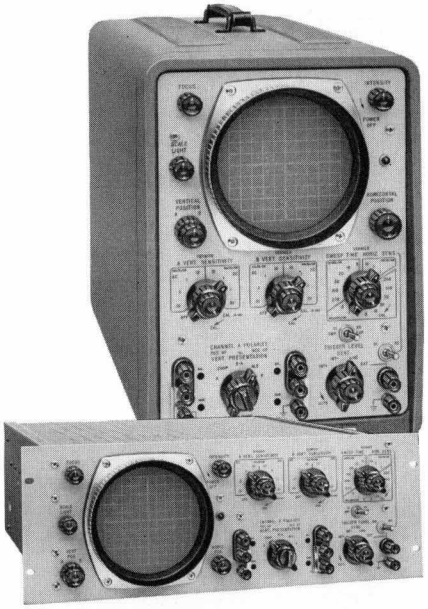
hp 150A Accessories

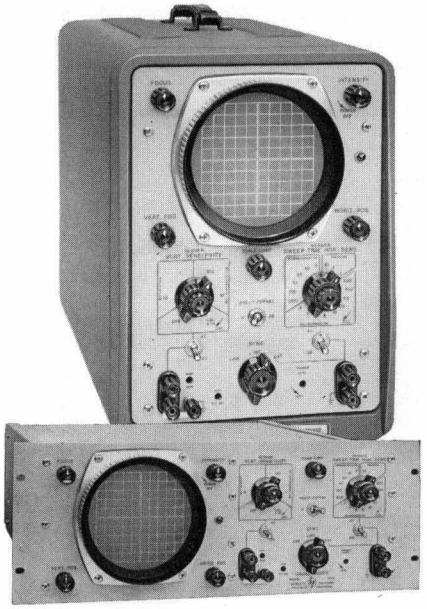
hp 154A Voltage/Current Dual Channel Amplifier (above) permits simultaneous measurement, observation of voltage and current. Current range is 1 ma/cm to 1 a/cm from 50 cps to 8 MC. Voltage range is 50 mv/cm to 20 v/cm from dc to 10 MC. $430.00. **hp 153A Very High Gain Amplifier** permits many measurements direct from transducer without preamplification. Maximum sensitivity is 1 mv/cm and bandpass is dc to 500 KC. $150.00. **hp 152B Dual Trace Differential Amplifier** switches electronically between A, B channels to provide simultaneous viewing of two voltages. Channels may be used separately or for differential input, dc to 10 MC. Maximum sensitivity is 50 mv/cm. $250.00. **hp 151B High Gain Amplifier** provides 5 mv/cm sensitivity, dc to 10 MC. $200.00.

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

quality oscilloscopes – dc to 1,000 MC!





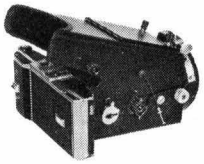


hp 130B/BR - dc to 300 KC

Termed the finest low frequency oscilloscope ever offered, hp 130B/BR combine big scope performance and positive dependability with 1 mv sensitivity and the convenience of "universal" automatic trigger, and direct reading simple controls.

Similar X and Y amplifiers

Models 130B/BR have similar horizontal and vertical amplifiers with sensitivity 1 mv/cm to 125 v/cm. Input circuits are balanced on the 6 most sensitive ranges; single ended input dc or ac coupled. 21 sweep times may be directly set, instrument sweeps 1 μsec/cm to 12.5 sec/cm, triggering is internally, by line power, or externally by 0.5 v or greater. Includes x 5 magnifier for all internal sweeps increasing fastest sweep time to 0.2 μsec/cm. hp 130B (cabinet) or 130BR (rack) $650.



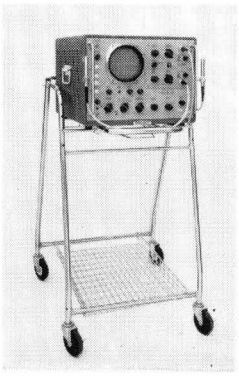
hp 196A Oscilloscope Camera. Most convenient recording camera available. Object-to-image size ratio 1 to 0.9 (1:1 optional) views full 10 cm graticule width. One-hand mounting and multiple picture setting. Easy access to *f*-stop and shutter while camera mounted. Permits viewing image with both eyes while photographing. Employs Polaroid® Land Camera back, Wollensak 3″ *f*/1:9 lens. 7 shutter speeds 1/100 to 1 sec. Weight only 9 lbs. $440.00.

hp 122A/AR - Dual Trace

Model 122A/AR is a dual trace, 200 KC oscilloscope providing two separate traces for simultaneous study; single trace available when desired. Twin vertical amplifiers, alternate and chopped presentation, differential input, automatic syncing and x 5 sweep expansion. Ideal for direct comparison of filter, amplifier, output/input or with vibration testing apparatus.

Sweeps 5 μsec/cm to 200 msec/cm

15 calibrated sweeps; vernier extends slow sweep to 0.5 sec/cm, expander extends fast sweep to 1 μsec/cm. Automatic trigger; manual override sets trigger between + 10 and −10 v. Vertical amplifiers dc to 200 KC (dc coupled) or 2 cps to 200 KC (ac coupled). Sensitivity 10 mv/cm to 100 v/cm. Horizontal amplifier same bandwidth as vertical, sensitivity 0.1 v/cm to 100 v/cm. hp 122A (cabinet) or 122AR (rack mount), $675.00.



hp AC-115B Oscilloscope Testmobile. For hp oscilloscopes. 4″ rubber tired wheels, heavy chrome tube construction, tilts 'scope to 30° in 7½° increments, folds for storage, shipping. $85.00.

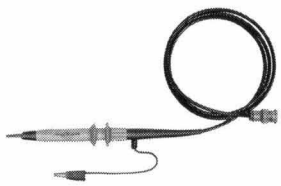
hp 120A/AR - dc to 200 KC

Ideal for industrial or production line work as well as daily lab jobs, Model 120A/AR is outstanding in both value and "big scope" performance features. This instrument covers DC to 200 KC, has the hp universal trigger circuit. Also offers automatic synchronization on any internal or external voltage including line power.

Sweeps 1 μsec/cm to 0.5 sec/cm

Features include 15 calibrated sweeps in 1-2-5 sequence, sweep speeds range 5 μsec/cm to 0.5 sec/cm, "times-5" sweep expansion on all ranges, high sensitivity calibrated vertical amplifiers. All power supplies are regulated for steady, drift-free traces. Automatic trigger and base line. Bright, clear trace for photographing transients. Extra compact Model 120AR is only 7″ high. Utmost dependability, rugged construction. hp 120A (cabinet) or 120AR (rack), $450.00.

NEW! Low Capacity Probes



hp AC-21 series probes available for use with hp oscilloscopes include the hp AC-21A, 10:1 division, $30.00; hp AC-21C, 50:1 division, $30.00; hp AC-21F current probe, 1 mv/ma, $100.00; hp AC-21J, $9.00. Probes may be used with hp 120A, 122A, 130B, 150A, 160B and 170A oscilloscopes.

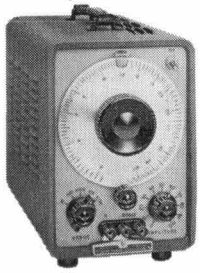
Oscillators – 0.008 to 10,000,000 cps

Hewlett-Packard now offers 12 high quality, fast and accurate oscillators, each an exceptional value and each engineered to do a specific job best. Each incorporates the famous resistance-capacity circuit pioneered by hp. This circuit makes possible instruments that are highly stable, wide range, compact and portable; instruments that are extremely simple to operate and require no tedious re-setting or adjustment during operation.

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 measurements	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- 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	800.00△
-hp- 233A	Carrier oscillator—current tests	50 cps to 500 KC	3 w/600 ohms	650.00
-hp- 650A	Wide range video tests	10 cps to 10 MC	15 mw/3 v	550.00△

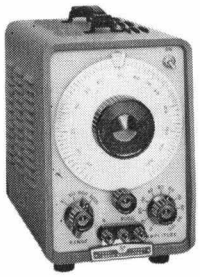
△ Rack mounted instruments $15.00 less.

hp 200CD Audio Oscillator

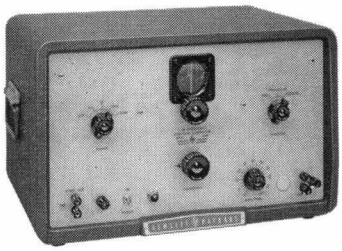


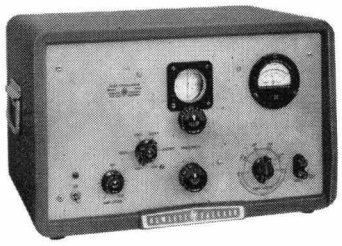
This wide range oscillator, 5 cps to 600 KC, spans the range from sub-sonic to radio frequencies, covered in five overlapping decade bands. Accurate frequency setting on the large easy-to-read dial is provided by 85 dial divisions. Distortion rating is less than 0.5% below 500 KC. Output waveform purity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

hp 200AB Audio Oscillator



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





hp 202A Function Generator

Compact, 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 output peak-to-peak is constant for all wave forms and over full frequency range. hp 202A, $550.00△.

hp 650A Test Oscillator

Covering 10 cps to 10 MC, hp 650A is a highly stable, wide band instrument for audio, supersonic, 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△.

Distortion, Wave Form Analyzers – 20 cps to 50 KC

hp 302A Wave Analyzer

Completely transistorized, advanced instrument provides direct, accurate wave component measurement without calibration or stabilization. 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△.

NEW! hp AC-97C Sweep Drive

hp AC-97C motor accessory converts hp 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. hp AC-97C, $275.00.

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△
-hp- 330B	Measures total audio distortion	20 cps to 20 KC	Includes input amplifier, VTVM	450.00△
-hp- 330C	For FM broadcast measurements	20 cps to 20 KC	Special VU meter to meet F.C.C. requirements	475.00△
-hp- 330D	For AM, FM broadcast measurements	20 cps to 20 KC	AM detector and VU meter to meet F.C.C. requirements	525.00△

△ Rack mounted instruments $15.00 less.

218AR Digital Delay Generator

Two independently adjustable time intervals or pulse delays
±0.1 μsec time interval accuracy
Crystal oscillator time base
Regulated power supplies

Model 218AR Digital Delay Generator is applicable to many types of timing measurements including calibrating the range determining circuits of radar receivers, etc. The generator is built to rigid standards and is suitable for military use. It provides two precision time intervals or pulse delays, either of which are independently adjustable from 1 to 10,000 microseconds in 1 microsecond steps. These time intervals are accurate to within 0.1 microsecond ±0.001% of the selected value, and may be initiated from an internal multivibrator, 10 cps to 10 KC, or from an external rate generator, 0 cps to 10 KC. Total jitter does not exceed 0.02 microseconds in either case. The instrument also provides a 50-volt synchronizing output pulse at the beginning or end of a time interval, and a 1 microsecond timing comb output at the front panel.

No count ambiguity

A unique feature of the 218AR is its time base, a pulsed crystal controlled oscillator. The oscillator starts at T_0 and stops at the last output pulse. This eliminates the "plus-or-minus-1" count ambiguity of many counter circuits in such application.

Model 218AR is a completely self-contained instrument, requiring only one or more 219 series plug-ins to perform a broad variety of time and delay generation measurements. Simplicity and flexibility are increased by the large variety of output signals provided by the plug-in units. The instrument is particularly compact and well-designed; etched circuits and the use of plug-ins materially increase circuit accessibility.

The instrument's power supplies are fully regulated to avoid effects of line voltage variations. It is available as 218AR, rack mount. $2,000.00.

219A Dual Trigger Unit

This plug-in drawer for 218AR supplies trigger pulses of positive polarity, 50 volts, 0.1 μsec rise time from a 50-ohm source. Pulse A occurs at T_0 or T_1 as selected by a switch; Pulse B is triggered at T_2. 219A, $100.00.

219B Dual Pulse Unit

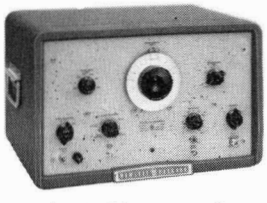
This plug-in drawer for 218AR produces two high-power pulses which are continuously adjustable in width, 0.2 to 5 μsec and in amplitude from 0 to 50 volts, positive or negative polarity. The leading edge of these pulses can be set to occur at the beginning or end of the selected time interval. Both pulses are brought out to separate front panel jacks but may be switched to a common jack with no change in level or output impedance. 219B, $450.00.

219C Digital Pulse Duration Unit

This plug-in drawer for 218AR produces a high power output pulse whose delay and duration are digitally controlled. The pulse is available in both polarities simultaneously, and is continually adjustable in amplitude up to at least 15 volts from a 90-ohm source. It may also be obtained from a directly coupled 500-ohm source with an amplitude of at least 90 volts. 219C, $350.00.

Square Wave and Pulse Generators

212A Pulse Generator



Provides continuously variable, high-power "fast pulses" of superior wave form. Combines broad general usefulness with 0.02 μsec rise and decay time to meet requirements of radar, TV and nuclear work. Pulse length variable 0.07 to 10 μsec; 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 pulse available in advance of, or following output pulse. $600.00 (cabinet), $585.00 (rack mount).

211A Square Wave Generator

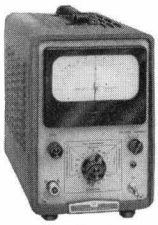
Versatile, wide range instrument for testing oscilloscopes, networks, video and audio amplifier performance, modulating signal generators and measuring time constants. Offers simple control of electronic switches; is also convenient for indicating phase shift, frequency response, transient effects. Two separate outputs (a) 3.5 volts into 75 ohm circuit for TV work; (b) 27 volts into 600 ohm output for high level work. Output amplitudes independently controlled. Instrument operates free-running or externally synchronized with positive going pulse or sine wave of 5 volts minimum amplitude. $325.00 (cabinet), $330.00 (rack mount).

dc and ac Voltmeters; dc Milliammeter

NEW! 411A 1 KMC Millivoltmeter

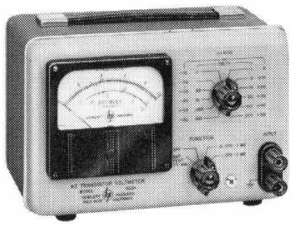
Millivolt sensitivity and two easy-reading linear voltage scales in 1-to-3 ratio make the all-new 411A perhaps the most widely useful voltmeter you have ever seen. Measure 10 mv to 10 v full scale, 500 KC to 1 KMC; get usable indications to 4 KMC! Db scale gives readings from — 42 to + 33 db for convenient gain measurements. Five probe tips meet all measurement requirements. Galvanometer recorder output. Unique photoelectric chopper gives new standard of noise-free, drift-free low voltage readings. 411A (with one probe tip). $450.00.

425A Microvolt-Ammeter



High sensitivity, high stability microvolt meter reading 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. Instrument can also be used as a 100 db amplifier providing up to 1 v output from signals as small as 10 μv. Amplifier ac rejection is at least 3 db at 0.2 cps and 60 db at 60 cps and above. $500.00 (cabinet), $505.00 (rack).

403A Transistorized AC Voltmeter

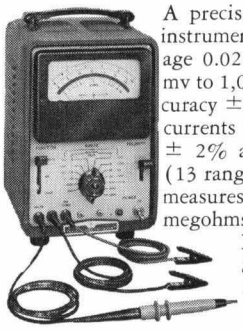


Battery-operated, portable, weighs less than 5 lbs., transistorized, covers 1 cps to 1 MC and 100 μv to 300 v rms (max. full scale sensitivity 1 mv). Also reads db direct from — 72 to + 52 db. 400 hours battery life (6 mos. average use). Noise less than 30 μv on all but lowest range. Accuracy ± 3% to 500 KC, ± 5% to 1 MC. Input impedance 2 megohms; high overload capacity. $275.00.

405BR/CR Automatic DC Digital Voltmeter

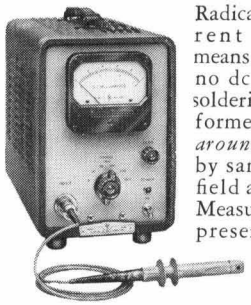
Literally "touch-and-read" measuring speed. Automatic range, polarity selection, covers 0.001 v to 1,000 v (accuracy ± 0.2% of reading ± 1 count). New novel circuitry provides a stability of readings virtually eliminating jitter in the last digit. Floating input, analog-to-digital conversion, and, on 405CR, digital recorder output and front panel switch to hold ranges. *Just 7" high!* 405BR, $850.00. 405CR, $925.00.

412A Precision Volt - Ohm - Ammeter



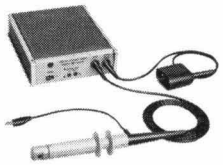
A precision multi-purpose instrument measures dc voltage 0.02 mv to 1,000 v, 1 mv to 1,000 v full scale. Accuracy ± 1% F.S. Measures currents 1 μa to 1 amp with ± 2% accuracy, full scale (13 ranges). As ohmmeter, measures 0.02 ohms to 5,000 megohms. Low noise, drift. Recorder output. $400.00 (cabinet), $405.00 (rack).

428A Clip-On DC Milliammeter



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 presence of strong ac. Covers 0.3 ma to 1 amp; accuracy ± 3%. $500.00 (cabinet), $505.00 (rack).

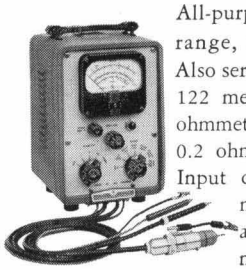
Instrument	Primary Uses	Frequency Range	Voltage or Current Range	Input Impedance	Price
-hp- 400D	Wide range ac measurements High sensitivity	10 cps to 4 MC	0.001 to 300 v 12 ranges	10 megohms 15 μμf shunt	$250.00
-hp- 400H	High accuracy wide range ac measurements	10 cps to 4 MC	0.001 to 300 v 12 ranges	10 megohms 15 μμf shunt	325.00
-hp- 400L	Log voltages, linear db measurements	10 cps to 4 MC	0.001 to 300 v 12 ranges	10 megohms 15 μμf shunt	325.00
-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 μμf shunt	275.00
-hp- 405	Direct, automatic voltage measurement. Recorder output, automatic polarity	dc	0.001 v to 1,000 v (accuracy ±0.2% of reading ±1 count)	11 megohms to dc	See below
-hp- 410B	Audio, rf, VHF measurements; dc voltages; resistances	dc; ac—20 cps to 700 MC	1.0 to 300 v 7 ranges	dc—122 megohms; ac—10 megohms/ 1.5 μμf	245.00
-hp- 411A	Millivolt, db readings to kilomegacycle range	5 KC to 1 KMC	10 mv to 10 v, 7 ranges	——	450.00
-hp- 412A	Precision voltage, current resistance measurements	dc	1 mv to 1,000 v 1 μa to 1 amp	10 to 200 megohms, depending on range	400.00
-hp- 425A	Read μv, μμa; 100 db amplifier; medical, biological, physical, chemical	dc voltages as 100 db amplifier	10 μv to 1 v 11 ranges	1 megohm ± 3%	500.00
-hp- 428A	Clip-on milliammeter eliminates direct connection, circuit loading	dc	0.3 ma to 1 amp, 6 steps, ±3% accuracy	——	500.00
-hp- 456A	Current measurements on meters, scopes	60 cps to 4 MC	1 ma to 1 amp rms	——	190.00
-hp- 738AR	Voltmeter Calibrator	dc pos. or neg. 400 cps sine wave	300 μv to 300 v	Works into 3 to 10 megohms	875.00
-hp- 739AR	Frequency response test set	300 KC* to 10 MC (*5 cps with -hp- 200SR)	3 v output	——	525.00



456A AC Current Probe

Permits measurement of current on indicating meters such as 400D, 400H, 400L (below) or oscilloscopes. New "current" probe clamps *around* wire under test, needs no physical connection, does not load circuit. Range 1 ma to 2 amps peak, accuracy ± 1 % at 1 KC, response ± 2%, 100 cps to 3 MC, ±5%, 60 cps to 4 MC, —3 db at greater than 20 MC. $190.00.

410B Vacuum Tube Voltmeter

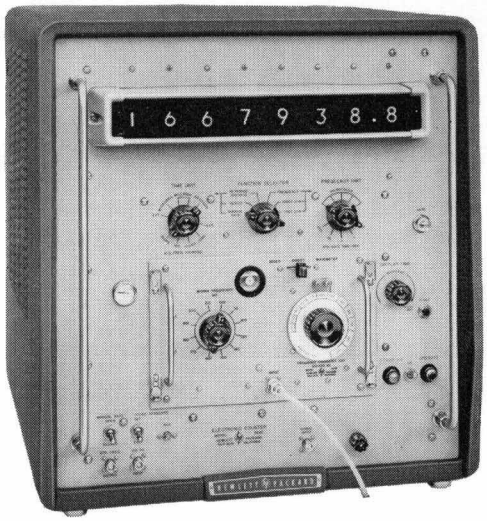


All-purpose test instrument, range, 20 cps to 700 MC. Also serves as dc VTVM with 122 megohms resistance, or ohmmeter for measurements 0.2 ohms to 500 megohms. Input capacity 1.5 μμf, 10 megohms input resistance. $245.00 (cabinet), $265.00 (rack).

400 Series Voltmeters

offers three series 400 voltmeters, each covering 10 cps to 4 MC. 400D provides 2% accuracy, 400H offers 1% accuracy with 5" mirror scale. 400L has true log voltage scale, 5" linear db scale, accuracy 1% of full scale. Measurement 1m v to 300 v full scale 400D, $250.00; 400H, $325.00; 400L, $325.00.

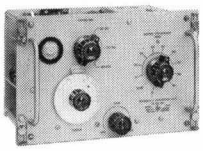
524C Precision Electronic Counter



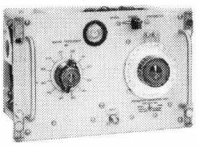
Bright, big-number readout
Stability 3 parts in 10^8 short-term
Direct, fast, automatic readings
Covers frequencies 10 cps to 500 MC*
Measures time interval 1 μsec to 100 days
Measures period 0 cps to 100 KC
Resolution 0.1 microseconds
No calculation or complex setup
Easily used by non-technical personnel
High sensitivity, impedance, reliability

* With proper plug-ins.

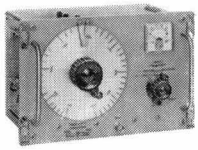
6 PLUG-IN UNITS INCREASE FLEXIBILITY, USEFULNESS



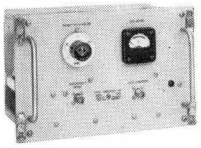
525A Frequency Converter. Extends 524's direct reading range to cover 10 cps to 100 MC with no loss in accuracy. Provides additional amplification to increase video sensitivity to 0.1 v through 524's basic 10 cps to 10.1 MC range. $250.00.



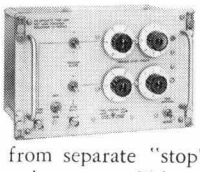
525B Frequency Converter. Converts 524 for direct readings 100 to 220 MC in decade steps. Maintains same high accuracy throughout range; provides high sensitivity for low level work. $300.00.



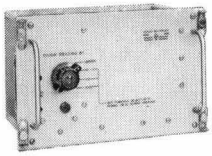
525C Frequency Converter. This new plug-in frequency converter permits direct readings on 524 Counter to 510 MC; maintains high accuracy. $425.00.



526A Video Amplifier. Increases 524 sensitivity to 10 mv for low power frequency measurement 10 cps to 10.1 MC. Minimum input 10 millivolts rms. $200.00.



526B Time Interval Unit. Permits 524 to measure interval 1.0 μsec to 100 days. Accuracy of ± 1 count ± 524 stability. Reads in sec, msec or μsec. Triggering from separate "stop" or "start" on pos. or neg. going waves. Trigger adjustable − 192 to + 192 volts. $200.00.



526C Period Multiplier. Permits 524 to measure period over 100, 1,000 or 10,000 cycles of unknown, thus providing greater accuracy for mid-range frequency readings. $225.00.

Bright, steady, big-number readout, and crystal oscillator stability of 5 parts in 10^8 per week, and a new plug-in extending frequency range to 500 MC—these are significant advances incorporated in the 524C Electronic Counter.

The 524C permits you to buy only the basic counting facilities you need now—later on add inexpensive plug-ins to triple and quadruple the usefulness of your counter.

The basic 524C reads frequency 10 cps to 10.1 MC over any of 5 selected intervals; period from 0 to 100 KC. Display time is variable, counts are automatically reset, action is repetitive, readings are direct without calculation or interpolation; an automatic illuminated decimal pont is included.

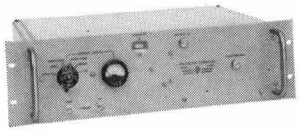
The instrument is of highest quality throughout and employs a military design approach. 524C, less plug-ins, $2,400.00 (cabinet); $2,375.00 (rack mount). also offers Model 524D, similar but with 8 vertical readout units, at lower price.

Instrument	Primary Uses	Frequency Range	Characteristics	Price
-hp- 524C Frequency 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	$2,400.00■
-hp- 524D Frequency 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	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	250.00
-hp- 525B Frequency Converter	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	Extends 524 range to 500 MC; high sensitivity	50 KC to 510 MC	Accuracy same as basic counter; min. input: 20 mv rms, 50 KC to 10.1 MC; 100 mv rms, 100 to 500 MC	425.00
-hp- 526A Video Amplifier	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 μsec to 100 days	1 μsec to 10^7 sec	Accuracy ± 1 count ± 524 stability	200.00
-hp- 526C Period Multiplier	Period measurement	Extends range of 524 to measure 10,000 periods	Greater accuracy in period measurement	225.00

■ Rack mounted instrument $25.00 less.

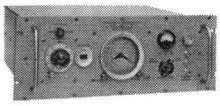
Other hp Frequency Measuring and Monitoring Equipment

NEW! hp 103AR Quartz Oscillator



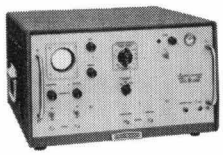
Completely transistorized oscillator offering short term stability better than 5 parts in 10^{10} averaged over 1 sec. intervals; long term stability, 5 parts in 10^{10} per day. Provides 1 MC and 100 KC sine wave, output from low impedance source for distribution over 50-ohm systems. Furnishes separate 100 KC output for driving hp 113AR for time comparison measurements and generating time signals. $2.500.

hp 113AR Clock



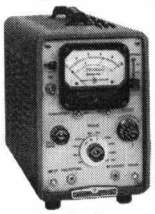
Precision instrument for adjusting frequency standards, and comparing high stability oscillators and time signals with WWV, 10 μsec resolution (equals $1/10^9$ stability over 24 hours). Provides essentially jitter-free 1 second tick output. Meets MIL-E-16400 for operation in extreme environment. Input voltage 0.5 to 5 v rms, 100 KC; input impedance 300 ohms. Transistorized; operates from hp 724AR Standby Power Supply or 24 v dc. $2,500.

hp 100E Frequency Standard



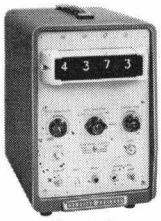
Stability of $5/10^8$ is satisfactory in most applications formerly requiring primary standard. Multiple outputs include 6 sine and 4 pulse signals, plus timing comb. Includes built-in scope for Lissajous comparisons. Rated load 50 ohms at 1 MC and 100 KC; 5,000 ohms at lower frequencies. $925.00.■

hp 500B/C Frequency Meters



Directly measures frequency of voltages 3 cps to 100 KC; expanded scale allows any 10% or 30% of range to be measured full scale. Sensitivity 0.2 v rms, 1 v peak for pulses. Input impedance 1 megohm with 40 pf shunt. 500A calibrated in cps, 500C calibrated in rpm. hp 500B/C, $300.00, (cabinet), $305.00 (rack mount).

hp 521 Industrial Counters

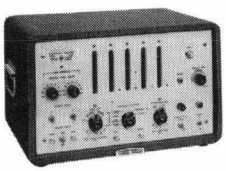


-hp- 521D

hp 521's measure frequency, random events per unit of time; with transducers also measures rps, speed, weight, pressure, etc. 521A range 1 cps to 120 KC (4 places), accuracy ± 1 count ± accuracy of power line frequency (usually ± 0.1%); input min. 0.2 v rms; input attenuator adjusts sensitivity 0.2 to 100 v rms, input impedance 1 megohm with 50 pf shunt. hp 521C same as 521A except has crystal controlled time base and 5-places. hp 521D same as 521A except has in-line readout in bright, large numerals. hp 521E similar to 521C but has 5-place, in-line readout. hp 521G similar to 521A but measures to 1.2 MC (5 places). Prices: see above table.

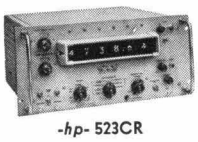
Instrument	Primary Uses	Frequency Range	Characteristics	Price
-hp- 100E Frequency Standard	Establish standard frequencies; calibrate, measure time	6 sine 10 cps to 1 MC; 4 pulse, 10 cps to 10 KC	Stability $5/10^8$ per week Timing comb.	$ 925.00■
-hp- 103AR Quartz Oscillator	Establish standard frequencies; calibrate, measure time	Sine 1 MC, 100 KC; separate 100 KC for driving -hp- 113AR	Stability $5/10^{10}$ per day, long term	2,500.00
-hp- 113AR Frequency Divider, Clock	Adjust freq. standards; comparisons	100 KC input	1 pps tick output for comparison with wwv, etc.	2,500.00
-hp- 500B Electronic Frequency Meter	Rapid frequency measurements	3 cps to 100 KC	9 ranges ±2% accuracy. Input 0.2 to 250 volts	300.00
-hp- 500C Electronic Tachometer Indicator	Rpm measurements	180 to 6,000,000 rpm	Similar to 500B but calibrated in rpm	300.00
-hp- 506A Optical Tachometer Pickup	Rps and rpm measurement	300 to 300,000 rpm	Phototube and light source; output 1 v rms	150.00
-hp- 508A Tachometer Generator	Shaft speed measurement	15 to 40,000 rpm	Output 60 cycles per revolution	125.00
-hp- 508B Tachometer Generator	Shaft speed measurement	15 to 30,000 rpm	Output 100 cycles per revolution	125.00
-hp- 508C Tachometer Generator	Shaft speed measurement	15 to 25,000 rpm	Output 120 cycles per revolution	125.00
-hp- 508D Tachometer Generator	Shaft speed measurement	15 to 5,000 rpm	Output 360 cycles per revolution	125.00
-hp- 520A Nuclear Scaler	For counting high-rate pulses	Capacity 100 counts in 2 decades. 10,000,000 pps counting rate	100:1 divider for operation of low speed scalers	700.00△
-hp- 521A Industrial Electronic Counter	Measure frequency, speed	1 cps to 120 KC	Direct reading, accurate within ±1 count ±0.1%, 4 place registration	475.00
-hp- 521C Industrial Electronic Counter	Measure frequency, speed	1 cps to 120 KC	Direct reading, accuracy within ±1 count ±0.01%, 5 place registration	650.00
-hp- 521D Industrial Electronic Counter	Measure frequency, speed	1 cps to 120 KC	Same as 521A except has in-line digital readout	750.00
-hp- 521E	Measure frequency, speed	1 cps to 120 KC	Same as 521C except has in-line digital readout	950.00
-hp- 521G	Measure frequency, speed, elapsed time	1 cps to 1.2 MC	Direct reading, accuracy ±1 count ±0.1% 5 place registration	700.00
-hp- 522B Electronic Counter	Frequency, period, time interval measurements	10 cps to 120 KC	Direct reading, accuracy ±1 count ±0.001%	915.00△
-hp- 523C	Frequency, period, time interval	10 cps to 1.2 MC	Direct reading, accuracy ±1 count ±2/1,000,000, in-line digital readout, 10-line code arrangement	1,575.00■
-hp- 523D Electronic Counter	Frequency, period, time interval	10 cps to 1.2 MC	Direct reading, accuracy ±1 count ±2/1,000,000	1,310.00■

△ Rack mounted instruments $15.00 less. ■ Rack mounted $25.00 less.



hp 522B Electronic Counter

Compact, low cost, versatile instrument for frequency, period *or* time measurements. Measures frequency 10 cps to 120 KC, time interval 10 μsec to 10^5 sec. Reads direct in cps, KC, seconds or milliseconds. Count automatically reset, action repetitive. Stability of time base 1/100,000/week. $915.00△.



-hp- 523CR

hp 523C/D Electronic Counters

All-purpose counter measuring frequency 10 cps to 1.2 MC, time interval 1 μsec to 27.8 hours, period 0.00001 cps to 100 KC. Stability 2/1,000,000 per week. Results displayed in sec, msec, μsec or KC; automatic decimal. Display time variable 0.1 sec to 10 sec or indefinitely. Accuracy ± 1 count plus crystal stability, 5 gate times. Usable with 100 KC primary standard. Pulse output for Z-axis oscilloscope modulation. hp 523D similar but has neon numeral column readout. hp 523C $1,575.00; hp 523D, $1,310.00.■

540B Transfer Oscillator

Measure frequency to 18.0 KMC quickly, easily, with electronic counter accuracy. Avoid guesswork, end "trial and error," eliminate expensive setups. Measure on pulsed, AM, FM, CW and noisy circuits.

Just two instruments—Model 540B Transfer Oscillator and a 524 series electronic counter, (with plug-ins) are all the equipment you need to measure unknown frequencies up to 12.4 KMC swiftly and accurately.

This simple, two instrument setup is particularly useful for quick CW and AM frequency measurement, FM center frequency and deviation checks, and frequency of high-noise signals. Frequencies of pulsed signals can be measured using an external oscilloscope. Overall accuracy is better than 10 times that of the best microwave wavemeters; and on clean CW signals, is about 1/1,000,000.

New Mixers

For use with the 540A, 540B and other mixing applications, 934A and P932A Harmonic Mixer (not pictured) provide untuned mixing action from 2 to 12.4 KMC and from 12.4 to 18 KMC, respectively. Maximum input power is 100 mw and minimum output is at least 0.1 mv rms with 0 dbm input. Fittings mate with 540, 524, 525B. 934A, $150.00. P932A, $250.00.

Brief Specifications, 540B

Oscillator Freq. Range: 100 to 220 MC.
Harmonic Freq. Range: Up to 12.4 KMC.
Stability: Better than 0.002%/minute.
Output: 2 volts into 50 ohms.
Amplifier Gain: 40 db max. 1 v output.
Oscilloscope: 100 cps to 200 KC; vert. sens. 5 mv rms/inch.
Price: $850.00△.

560A/561B Digital Recorder, 570A/571B Digital Clock

Continuous digital record from and Dymec counters, voltmeters, other equipment
Direct reading, simple hookup
Accuracy identical to driving instrument
Records five 11-digit lines per second
Secondary, coding data entered simultaneously

560A Digital Recorder provides a permanent printed record of all types of test data. In addition, a unique analog output makes possible graphic recording of very small data variations.

The analog output is a voltage or current proportional to the number represented by any three consecutive digits of recorded data. This digitally-derived analog output provides zero-suppression which is virtually error-free. An inherent range-shifting feature keeps the record on scale. Expanded scale records with extreme resolution can thus be made using conventional potentiometer or galvanometer recorders.

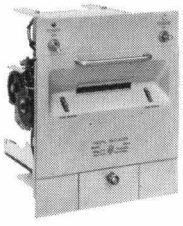
Model 560A, which operates from a single-line voltage coded decimal, is normally furnished with 6 plug-in comparators for 6-digit presentation; additional comparators may be plugged in at any time.

561B Digital Recorder requires 10-line coded decimal entry with separate connection for each position of each print wheel so that the instrument may be operated from the 405AR Digital Voltmeter, In-Line Frequency Counters or relays, stepping switches and beam switching tubes.

570A (shown installed) *and 571B Digital Clocks* mount in the left-hand side of 560A and 561B respectively, and add time-of-day information to other recorded data. These clocks can also control rate at which measurements are made. In-Line, 6-place numeric readout; maximum 23 hours, 59 minutes, 59 seconds. Operates from internal or external time base.

Prices: 560A (with 6 comparators), $1,325.00△; 561B, $1,150.00△; 570A (fits 560A), $1,050.00; 571B (fits 561B), $950.00.

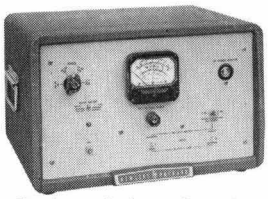
NEW! 565A Digital Printer



565A is a fast 11-column digital printer for use in custom systems. This compact printer can be driven by a wide variety of methods; is useful as an output device in computer and data handling systems, as well as other systems involving electronic counters, mechanical counters with electrical output, stepping switches, relays, beam switching tubes, other digital devices. Parallel data entry, prints 5 lines per second maximum. 565A, $640.00.

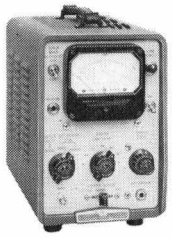
△ Rack mounted instrument $15.00 less.

Microwave Impedance Measuring Equipment



416A Ratio Meter

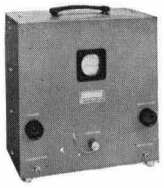
Automatically combines forward and reverse signals and displays their ratio directly, irrespective of common amplitude variations. Contains rf power monitor indicating proper power level. Rear terminal signal available to operate oscilloscope or recorder. Suitable for single and swept frequency operation. $550.00△.



415B Standing Wave Indicator

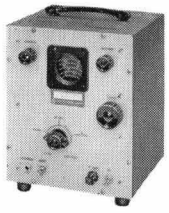
For all waveguide and coaxial slotted sections. Gives readings in SWR or db. Single frequency operation; 315 to 2020 cps. Low noise level, 0.1 μv (full scale) sensitivity, 60 db. calib. attenuator. $200.00.

803A vhf Bridge



Provides direct impedance measurements in vhf range, 2 to 2,000 ohms, −90° to +90° 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. $900.00.

417A vhf Detector



Super-regenerative (AM) receiver covering all frequencies from 10 to 500 MC in 5 bands. Designed for use with 803A Bridge. 5 μv sensitivity full range. Single frequency control, reads direct in MC. $400.00.

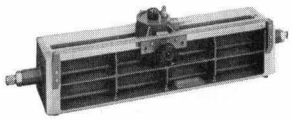
Instrument	Primary Uses	Frequency Range	Characteristics	Price
-hp- 360A-D Low Pass Filters	Eliminates harmonic voltages from uhf systems	Cut-off frequencies A- 700 MC C-2,200 MC B-1,200 MC D-4,100 MC	50 db rejection at 1.25 cutoff freq.	See below
-hp- 415B Standing Wave Indicator	SWR indicator or null indicator	Uses external detectors	0 to 70 db attn. Max. sensitivity 0.1 μv	200.00
-hp- 416A Ratio Meter	Reflection coefficient measurements	Uses external detectors	Continuous swept frequency presentation; accuracy ±3%	550.△
-hp- 417A vhf Detector	vhf bridge detector (for -hp- 803A)	10 to 500 MC	Approx. 5 μv sensitivity	400.00
-hp- 803A vhf Bridge	Measurement of vhf impedance, SWR	52 to 500 MC	2 to 2,000 ohms impedance —90° to +90° phase angle	900.00
-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 P 810 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

△ Rack mounted instruments $15.00 less.

360 Low Pass Filters

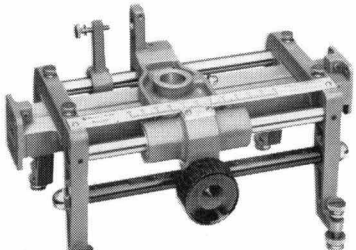
Low pass filters speed microwave measurements by eliminating harmonics, permitting transmission at single, known frequency only. Particularly necessary in slotted line, filter characteristic, receiver response, similar measurements. Table above gives cut-off frequency; insertion loss not over 3 db; nominal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

805C/D Slotted Lines

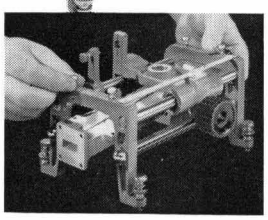


Original "parallel-plane" design insures utmost mechanical rigidity, less leakage, greater accuracy, low SWR of 1.02 or 1.04 (depending on model). Range 500 MC to 4 KMC, reads in cm and mm to 0.1 mm. 805C, for 50 ohm Type N use, 805D, for 46.3 ohm RG 44/U stub supported 7/8" O. D. coax 805C, $525.00. 805D, $600.00.

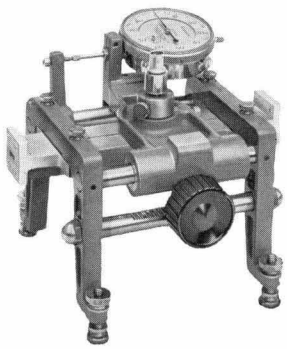
809B/814B Universal Probe Carriages



809B and 810B



Quick, easy waveguide interchange



814B, 815B, 446B

Models 809B and 814B are precision built mechanical assemblies operating, respectively, with 810B and 815B series slotted sections. Combination of the 809B carriage and 810 slotted sections covers 2.6 to 18.0 KMC. Combination of 814B carriage and 815B series sections covers 18.0 to 40.0 KMC. 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 probes (see table, "Waveguide Test Equipment"). 809B has a vernier scale reading to 0.1 mm and is equipped for dial gauge mounting. 814B has a dial read directly to 0.01 mm.

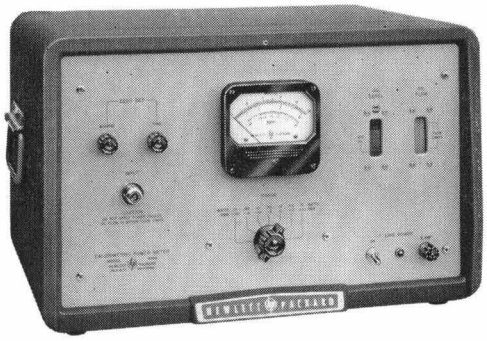
810B Slotted Sections. 810B, for mounting in 809B carriage, is a flanged, waveguide section with accurately machined slot. Slot is tapered at ends to minimize reflection. Available in 7 waveguide bands, 3.95 through 18.0 KMC*

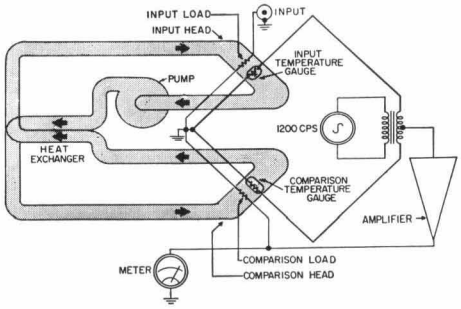
S810A. Complete slotted section assembly including probe carriage. In 2.6 to 3.95 KMC (S-band) size only. *

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

*For prices, see Waveguide Test Equipment table.

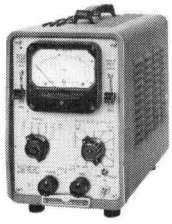
Microwave Power Measuring Equipment





Circuitry, ℗ 434A

℗ 430C Microwave Power Meter

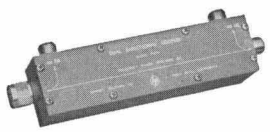


No computations! Provides instantaneous, automatic power readings *direct* in dbm or mw at all frequencies for which there are suitable bolometer mounts. For CW measurements, uses either 1/100 amp. fuse or Sperry 821 barretter. Also measures CW or pulsed power with negative coefficient thermistor. Provides up to 16 ma bias current. Operates with all mounts in adjacent table. Range 0.02 to 10 mw. $250.00.

℗ 477B Coaxial Thermistor Mount

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

℗ 764D-767D Dual Directional Couplers



New 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, 764D/765D $160.00. 766D/767D $150.00.

℗ 434A Calorimetric Power Meter

Just connect and read powers 10 mw to 10 watts! Covers dc to 12.4 KMC. No barretter or thermistor needed. No external terminations or plumbing. Measures CW or pulsed power. Two simple controls.

℗ 434A Calorimetric Power Meter is factually, the fastest, easiest way yet devised to measure powers accurately from 10 milliwatts to 10 watts, dc to 12.4 kilomegacycles.

With the 434A, measurement is literally as simple as connecting to the 50 ohm, type N front panel terminal and reading power directly. Thus the instrument is particularly suited for use by non-technical people.

Compact, self-contained

℗ 434A fills the range between bolometer microwave power meters (such as the popular ℗ 430C, below) and conventional calorimeters for powers above 10 watts. But unlike previous cumbersome equipment suggested for its range, the ℗ 434A is compact, moderate in cost, completely self-contained, and needs no detectors or external plumbing whatsoever.

Brief Specifications

Input Power Range: 7 ranges; full scale readings 0.01 to 10 watts.
Frequency Range: dc to 12.4 KMC.
Dc Input Impedance: 50 ohms ± 5 ohms at input jack.
Input SWR: Less than 1.5 full range, less than 1.3 to 5 KMC.
Meter Response (full scale): Less than 5 seconds.
Controls: Zero Set, Meter Range.
Accuracy: Within 5% of full scale.
Price: $1,600.00 (cabinet); $1,585.00 (rack mount).

Instrument	Primary Uses	Frequency Range	Characteristics	Price
-*hp*- 430C Microwave Power Meter	Measurement of rf power	Depends on Bolometer Mount	0.02 to 10 mw ±5% accuracy	$ 250.00
-*hp*- 434A Calorimetric Power Meter	Measurement of rf power	dc to 12.4 KMC	Direct reading, no barretters, thermistors or terminations; CW, pulsed	1,600.00△
-*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 KMC	No tuning required SWR less than 1.5	75.00
-*hp*- 485 Waveguide Detector Mount	Measurement of rf power	2,600 to 12,400 MC	Full coverage of waveguide band	See Table Waveguide Equipment
-*hp*- 487B Waveguide Thermistor Mount	Measurement of rf power	3,950 to 40,000 MC	Full coverage, no tuning, 1.5 SWR except K/R487B 2.0	See Table Waveguide Equipment
-*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 764/767 series couplers 50 watts CW, 10 Kw peak.
△ Rack mounted instrument $15.00 less.

Waveguide Test Equipment – 2.6 to 40.0 KMC

Basic, low-cost elements offer utmost flexibility for assembly of exact instrumentation required. Each unit covers entire range of its waveguide size. Careful engineering, simple, sturdy mechanical design, highest quality manufacture insures accurate, multi-purpose operation.

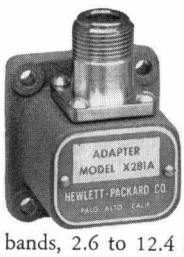
Instrument	Coaxial Type N Conn.	"S" 3" x 1½" 2.6 - 3.95 KMC	"G" 2" x 1" 3.95 - 5.85 KMC	"C" 1.718" x .423" 4.9 - 7.05 KMC	"J" 1½" x ¾" 5.3 - 8.2 KMC	"H" 1¼" x ⅝" 7.05 - 10 KMC	"X" 1" x ½" 8.2 - 12.4 KMC	"M" .850" x .475" 10 - 15 KMC	"P" .702" x .391" 12.4 - 18 KMC	"K" .500" x .250" 18 - 26.5 KMC	"R" .360" x .220" 26.5 - 40 KMC
Adapter, Waveguide to Coax		S281A $50	G281A $40		J281A $35	H281A $30	X281A $25				
Cover to Choke Flange		S290A $65	G290A $55		J290A $40	H290A $35	X290A $20		P290A $30		
Waveguide to Waveguide					-hp- 292 Series: HX292B $25, MX292A $40, MP292A $40, NP292A $40, NK292A $40						
Low Pass Filters							X362A $325	M362A $350***	P362A $350	K362A $385	R362A $385
Attenuators Fixed 3, 6, 10, 20 db		S370A $100	G370A $85	C370A $100	J370A $75	H370A $75	X370A $65		P370A $80	K370A $115	R370A $115
Precision Fixed		S372 $400	G372 $275		J372 $165	H372 $135	X372 $110		P372 $125	K372 $240	R372C/D $275
Flap, 25 db max.		S375A $120	G375A $110	C375A $110	J375A $100	H375A $90	X375A $90		P375A $100	K375A†† $140	R375A†† $180
Calibrated, precision		S380A $260	G382A $500	C382A $800	J382A $375	H382A $350	X382A $275	M382A $300	P382A $275	K382A†† $475	R382A†† $500
Detector Mounts	420A $50					H421A $95	X421A $75	M421A $125	P421A $130	K422A $200	R422A $200
	420B $75										
	440A† $85										
		S485D° $185	G485D° $170		J485D° $170						
		S485A† $165	G485B† $95		J485B† $90	H485B† $85	X485B† $75				
Thermistor Mounts (Fixed tuned)■	477B $75		G487B $95		J487B $90	H487B $80	X487B $75	M487B $110	P487B $110	K487B†† $225	R487B†† $225
Frequency Meters, Reaction				C530A $160	J530A/B**						
Direct Reading	536A $500	1-4 KMC	G532A $325		J532A $300	H532A $250	X532B $175	M532A $275	P532A $210	K532A $280	R532A $300
Directional Coupler, Cross Guide: 20, 30 db		S750 $150	G750 $120		J750 $85	H750 $75	X750 $60				
Directional Couplers, Multi Hole: 3,10, 20 db		S752 $375	G752 $250		J752 $140	H752 $120	X752 $100	M752 $130	P752 $115	K752†† $175	R752†† $200
Slotted Sections, Waveguide		S810A* $450	G810B§ $125	C810B $150	J810B§ $110	H810B§ $110	X810B§ $90	M810B§ $110	P810B§ $110		
Slotted Sections, Waveguide										K815B†† $265	R815B†† $265
Tuners, Slide Screw		S870A $225	G870A $185	C870A $225	J870A $150	H870A $130	X870A $125	M870A $130	P870A $130	K870A†† $250	R870A†† $300
E - H							X880A $130		P880B $150		
Waveguide Phase Shifter					J885A $550		X885A $425		P885A $600		
Terminations, Low Power	908A $35	S910A $75	G910A $65	C910A $75	J910A $45	H910A $40	X910B $35		P910A $40		
Terminations, High Power		S912A $200					X912A $75				
Moving Load		S914A $100	G914A $75		J914A $70	H914A $60	X914B $50	M914A $65	P914A $55	K914B†† $250	R914B†† $250
Standard Reflections							X916 $125				
Adjustable Shorts		S920A $150	G920A $125		J920A $100	H920A $75	X920A $75	M920A $75	P920B $125	K920B/C†† $155	R920B/C†† $155
Waveguide Shorting Switch							X930 $160				
Harmonic Mixer	934A $150	2 to 12.4 KMC							P932A $250		
Broad Band Probe	442B§ $40						All Frequencies				
Broad Band Probe, Untuned				444A $40	3 to 18 KMC				446B $145	18 to 40 KMC	
Waveguide Clamps, Stands			Model 24 stand, $3.00						Model 25 clamps, $2.50 each, all bands		

†For use with barretter or crystal. ‡For use with barretter only. *Complete assembly including carriage. §Mounts in 809B Carriage.
■Includes Thermistor, installed. **J530A, 5.85 to 8.2 KMC, $120; J530B, 5.20 to 7.05 KMC, $150. ° Includes barretter; checked for square law characteristics. ***N362A, "N" Band 15-21 KMC $350.00
††Available with circular flanges equivalent to UG-425/u for K bands and UG-381/u for R bands. Specify by adding suffix "C" to model number: i.e., K487BC.

382A Precision Attenuators

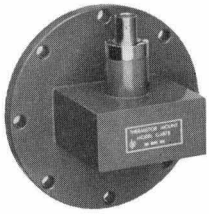
Previously offered for frequencies 3.95 through 18.0 KMC, popular 382A series precision attenuators are now available in "K" and "R" bands, 18.0 to 40.0 KMC. "K," "R" band attenuators are of new, space-saving design (see photo). Direct reading, one control tuning, high power handling capacity. Attenuation 0 to 50 db full range, independent of frequency. Phase shift constant with attenuation. For prices G, C, J, H, X, M and P382A, see table above. K382A, $475.00. R382A, $500.00.

281A Waveguide - Coax Adapters

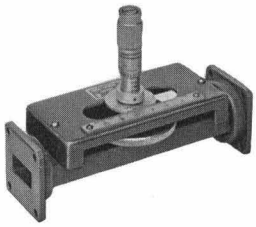


For convenient transition between waveguide and coax systems. Each unit covers a full waveguide range with SWR less than 1.25. Type N coax fitting (female). AN-waveguide flange. For S, G, J, H and X bands, 2.6 to 12.4 KMC. $25.00 to $50.00.

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 G, J, H, X, M, P, K and R bands. 3.95 to 40.0 KMC. $75.00 to $225.00.



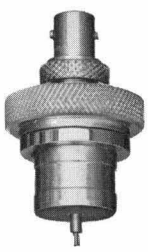
870A Slide Screw Tuners

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 KMC. $125.00 to $300.00.

420A/B Crystal Detectors

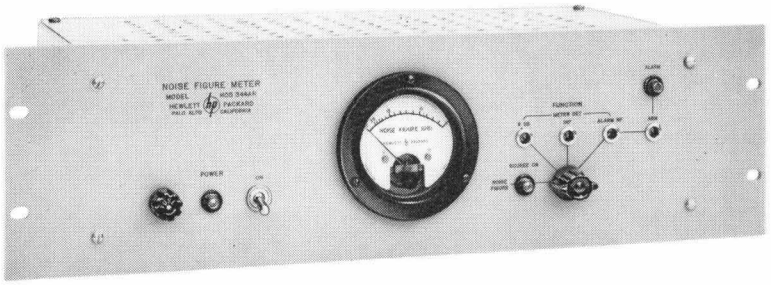
Employs a silicon crystal to detect rf signals in Type N coaxial lines. Covers frequencies 10 MC to 12.5 KMC, sensitivity approx. 0.01 v/0.1 mw, frequency response ± 3 db full range. Uses modified 1N26 crystal, max. SWR 3. $50.00 each. Also available in matched pairs as 420B, $150.00 pair.

444A/446B Untuned Probes



444A is modified crystal (1N76 or 1N26) 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 KMC; fits ¾" bore. *New 446B,* for 814 Probe Carriage, similar but covers K and R bands, 18.0 to 40.0 KMC. 444A, $40.00. 446B, $145.00.

Noise Measuring Equipment

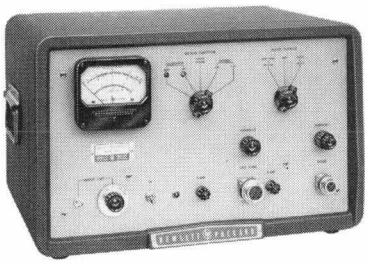


344AR Noise Figure Meter

This automatic, transistorized instrument *reliably and continuously measures noise figure on operating radars.* Its fast meter response lets you optimize noise figure during operation. Its high sensitivity (can be decoupled 20 db from transmitter line) minimizes system degradation and effectively extends radar range. High sensitivity also permits measuring high noise figures (to 40 db) such as those found in TWT's. The instrument is militarized for dependability in all environments.

Model 344AR is used with a remote modulator and noise source so that high voltage slip-rings or antennas are unnecessary. 1 MC bandwidth, 25 or 30 MC input, designed for pulse rep rates of 90 to 500 pps but usable with most jitter repetition systems.

Required gain between 344AR and noise source is 35 db ± 5 db. Input impedance is 75 ohms, return loss 20 db, 20 to 40 MC. Accuracy (excluding excess noise accuracy) is ± 0.5 db, 0 to 12 db; ± 1 db, 12 to 20 db. Simple front panel calibration, remote metering if desired. Optional alarms indicate noise figure above preset level, or failure in noise source current. 344AR, $1,600.00 *(Approximately. Depends on options and modifications.)*



342A Noise Figure Meter

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 ± 0.5 db excess noise; for bands S, G, J, H, X and P, 2.6 to 18.0 KMC, $200.00 to $300.00.

349A UHF Noise Source. 400 to 4,000 MC, wider range with correction; 15.2 ± 0.5 db excess noise, $325.00. H01 349A same as 349A except 18.2 ± 0.5 db excess noise. $325.00.

340B/342A Noise Figure Meters

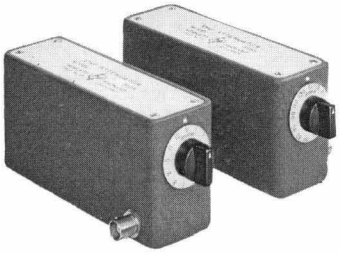
General-purpose instruments making possible, in minutes, receiver and component alignment jobs that once took hours. Simplifies accurate alignment; encourages better maintenance; better performance.

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).

(NOTE: Models 340B, 342A and 344A not available in Western Europe).

355A/B Attenuators – 0 to 132 db



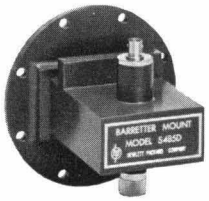
Here are two 50 ohm attenuators providing, together, 0 to 132 db attenuation in 1 db steps from dc to 500 MC! 355A provides 0 to 12 db attenuation in 1 db steps; 355B provides 0 to 120 db attenuation in 10 db steps. One simple control for each attenuator; overall full range accuracy is ± 0.25 db for 355A. For 355B, accuracy is ± 1 db to 250 MC; ± 2 db to 500 MC. 355A or 355B, $125.00.

350 Attenuators

Basic bridged-T high accuracy attenuators (not pictured). 350A matches 500 ohm lines, 350B matches 600 ohms. Maximum 110 db attenuation in 1 db steps. 5 watts capacity, high accuracy, compact, low cost. 350A or 350B, $110.00.

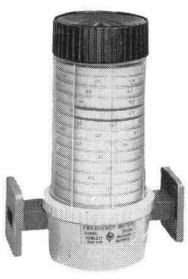
More equipment, available for most waveguide frequencies

485 Detector Mounts



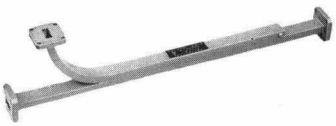
Three basic series offered; *S485A* for S band (no tuning, 1.35 SWR, 821 element); *485B,* for G, J, H, X bands (tunable, 1.25 SWR (with barretter) full range. 1N23, 1N21 or 821 element); *485D* for S, G, J bands (factory-installed 821 barretter). $75.00 to $185.00.

532/536 Frequency Meters



532 series, G, J, H, M, P, K, R bands (pictured). Wide band, direct reading, no interpolation or charts. Comprises a high Q resonant cavity tuned by choke plunger; no sliding contacts. Transmits almost full power at resonance; resonance indicated by 1.5 db dip in output. Precision tuning mechanism; no back-lash. Also similar model for X-band. $175.00 to $325.00. *536A Coaxial Frequency Meter,* 1 to 4 KMC, $500.00.

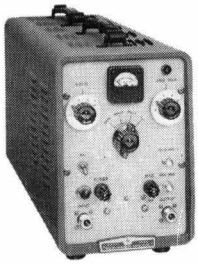
752 Multi-Hole Couplers



Precision directional couplers available with coupling factors of 3, 10 and 20 db. Coupling accuracy ± 0.4 db except K, R bands which are ± 0.7 db. Directivity better than 40 db full range, coupling variation not over ± 0.5 db full range. Primary guide SWR less than 1.05. S, G, J, H, M, X, P, K, R bands, 2.6 to 40.0 KMC. $100.00 to $375.00.

Wide Band Amplifiers for Fast Circuit Work

Traveling-Wave Tube Amplifiers



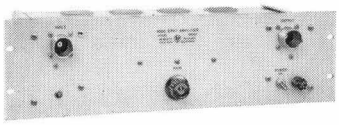
offers Traveling-Wave Tube Amplifiers for all frequencies 2 to 12.4 KMC. 490B, 492A and 494A are low level, high gain amplifiers with 30 and 25 db gain; they offer amplitude, pulse, phase or FM modulation. 491A is a high power traveling-wave tube amplifier having a rated output of 1 watt, 2 to 4 KMC. All amplifiers have exclusive helical coupling system, and employ encapsulated traveling-wave tubes that can be readily replaced. 490B/491A, $1,400.00. 492A, $1,500.00. 494A, $1,800.00.

Instrument	Primary Uses	Frequency Range	Characteristics	Price
-hp- 450A Amplifier, Stabilized	General purpose lab amplifier	10 cps to 1,000,000 cps	20 and 40 db gain, frequency response ±½ db	$ 160.00
-hp- 460AR Amplifier, Wide Band	Wide band, pulse amplification	20 KC to 120 MC	20 db gain, rise time 0.003 μsec	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 ± 0.5 db	150.00
-hp- 490B Traveling-Wave Tube Amplifier	Amplification throughout "S" band	2 to 4 KMC	30 db gain; mμsec rise time; 10 mw output	1,400.00
-hp- 491A Traveling-Wave Tube Amplifier	High power "S" band amplification	2 to 4 KMC	30 db gain; mμsec rise time; 1 watt output	1,400.00
-hp- 492A Traveling-Wave Tube Amplifier	Amplification through most of "G" and "J" bands	4 to 8 KMC	30 db gain; mμsec rise time; 10 mw output	1,500.00
-hp- 494A Traveling-Wave Tube Amplifier	Amplification throughout "X" band	7 to 12.4 KMC	25 db gain; mμsec rise time; 5 mw output	1,800.00

466A ac Amplifier

General-purpose transistorized instrument amplifier offering standard gains of 20 and 40 db, ± 0.2 db at 1000 cps. Distortion less than 1%, 10 cps to 100 KC. Frequency response ± 0.5 db 10 cps to 1 MC, output 1.5 v rms across 1500 ohms, noise 75 μv rms, referred to input; input impedance 1 megohm with 20 μμf shunt. Battery powered, 150 hours operation; or ac driven. Weight just 3 lbs. $150.00. Specify battery or ac operation.

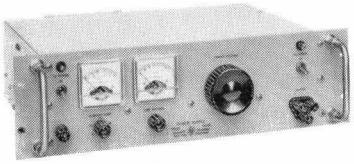
460AR/BR Fast Pulse Amplifiers



460AR Wide Band Amplifiers, in cascade with 460BR Fast Pulse Amplifiers, provide up to 90 db gain, 125 v open circuit. This permits direct connection to oscilloscope deflection plates. Rise time 0.003 μsec. Will amplify millimicrosecond pulses. Over 100 MC band width for 'scopes. 460AR, $225.00. 460BR, $275.00.

Regulated and Klystron Power Supplies

NEW! 722AR Transistorized Power Supply

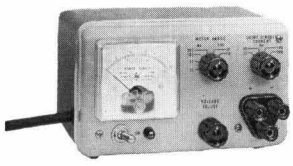


New power output capability, 0 to 60 volts at 0 to 2 amps, from this compact (5¼" high), dependable transistorized power supply. 722AR supplies fully regulated dc output, continuously variable from 0 to 60 v. Ideal for safe transistor investigation, it has a three-terminal output for either positive or negative grounding. Special circuit limits output current to pre-set value, providing extra safety factor. Load regulation less than 5 mv change for 0 to 2 amp current change. Features front-panel monitor meters for voltage current, low power consumption, easy-to-use controls. $525.00.

Instrument	Primary Use	Characteristics	Price
-hp- 711A Laboratory 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	390.00△
-hp- 715A Klystron Power Supply	Regulated beam, reflector source for low power klystrons	250 to 400 volts @ 50 ma	325.00
-hp- 721A Transistor Power Supply	Powering transistors, similar applications	0 to 30 v, 150 ma	145.00
-hp- 722AR Transistorized Power Supply	Powering transistors, banks of tunnel diodes	0 to 60 v, 0 to 2 amps	525.00

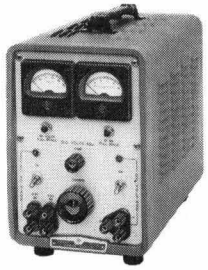
△ Rack mounted instruments $15.00 less.

721A Power Supply



New, completely transistorized, compact, regulated supply. Output 0 to 30 v, continuously variable. 150 ma maximum output, output impedance less than 0.2 ohms. Regulation, no load to full load, 0.3% or 30 mv whichever is greater. Line voltage change of ± 10% causes output change of less than 0.3% or ± 15 mv, whichever is greater. Front panel switch limits maximum output current preventing damage to transistors, etc., from accidental overload. Reads ma, v direct. $145.00.

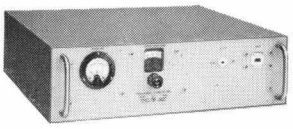
711A/712B Power Supplies



High regulation is offered in both the 711A and 712B, 0 to 500 v power supplies. The 711A features regulation 0.5% or 1.0 v, whichever is greater, no load to full load or on line voltages 110/230 v ± 10%. Less than 1.0 mv ripple, includes two 6.3 v ac 3 amp supplies. $250.00 (rack mount, $255.00). The 712B features regulation 50 mv no load to full load, 0.1 millisecond transient response. Furnishes 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. $390.00△.

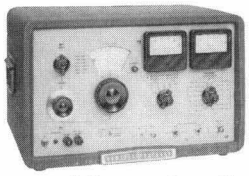
Signal Generators and Doublers–50 KC to 40 KMC

NEW! Frequency Doublers to 40 KMC



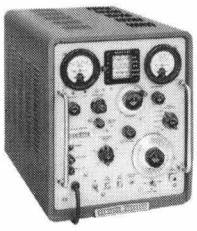
Operating on harmonic generation principles, new 938A and 940A Frequency Doubler Sets provide output from 18 to 26.5 KMC and 26.5 to 40.0 KMC respectively. The Doublers can be driven by 626A or 628A Signal Generators, 686C and 687C Sweep Oscillators or by klystrons. The input signal may be CW, pulsed or swept; thus Doublers retain flexibility of driving instrument. Output approx. 0.5 to 1 mw with Signal Generators; input power is 10 mw to 200 mw. Output monitor accuracy ± 1 or 2 db. 100 db attenuator accurate within ± 2% of reading or 0.2 db. 938A, $1,500.00. 940A, $1,500.00.

606A Standard Signal Generator



New, ultra-modern; 50 KC to 65 MC. Output 3 v full range, continuous attenuation to 0.1 μv. MO-PA circuit with full feedback loop provides constant output full range. Low distortion, broad modulating capabilities. Typical speed, ease of operation; occupies ¼ bench space normally needed for generators of this frequency. $1,350.00.

608D vhf Signal Generator



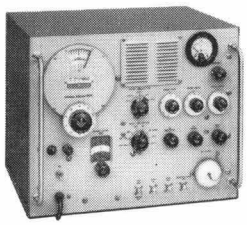
10 to 420 MC. Highest stability. Low incidental FM or frequency drift. Calibrated output 0.1 μv to 0.5 v throughout range. Built-in crystal calibrator provides frequency check accurate within 0.01% each 1 and 5 MC. Master-oscillator, intermediate and output amplifier circuit design. Premium quality performance, direct calibration, ideal for aircraft communications equipment testing. $1,200.00■

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. $1,100.00■

Instrument	Frequency Range	Characteristics	Price
-hp- 606A	50 KC to 65 MC	Output 0.1 μv to 3 v. Modulation bandwidth dc to 20 KC, low drift and noise, low incidental FM, low distortion.	$1,350.00△
-hp- 608C	10 to 480 MC	Output 0.1 μv to 1 v into 50 ohm load. AM, pulse, or CW modulation. Direct calibration	1,100.00■
-hp- 608D	10 to 420 MC	Output 0.1 μv to 0.5 v. Incidental FM less than 0.001%	1,200.00■
-hp- 612A	450 to 1,230 MC	Output 0.1 μv to 0.5 v into 50 ohm load. AM, pulse, CW or square wave modulation. Direct calibration	1,300.00■
-hp- 614A	800 to 2,100 MC	Output 0.1 μv to 0.223 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 μv 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 μv 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 μv 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 KMC	Output 10 dbm to —90 dbm. Pulse, FM, or square wave modulation. Direct calibration	3,400.00■
-hp- 628A	15 to 21 KMC	Output 10 dbm to —90 dbm. Pulse, FM, or square wave modulation. Direct calibration	3,400.00■

△ Rack mounted instruments $15.00 less. ■ Rack mounted instrument $20.00 more.

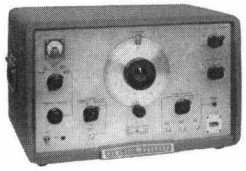
626A/628A shf Signal Generators



New instruments, bringing high power, wide range, convenience and accuracy 10 to 21 KMC 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. 626A, 10 to 15.5 KMC, $3,400.00.■ 628A, 15 to 21 KMC, $3,400.00.■

Swept Frequency Oscillators

686C Electronic Sweep Oscillator



Totally new kind of backward-wave device eliminating sweep motors, tuning plungers, range limitations, etc. 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. Ultimate in X-band sweep oscillators, $2,900.00△.

Instrument	Frequency Range	Characteristics	Price
-hp- 682C	1.0 to 2.0 KMC	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△
-hp- 683C	2.0 to 4.0 KMC		3,000.00△
-hp- 684C	4.0 to 8.1 KMC		2,900.00△
-hp- 686C	8.2 to 12.4 KMC		2,900.00△
-hp- 687C	12.4 to 18.0 KMC		3,400.00△

△ Rack mounted instruments $15.00 less.

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

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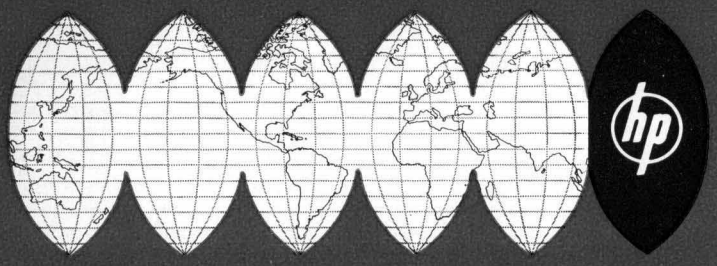

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PRINTED IN U.S.A.