LABORATORY INSTRUMENTS OF SPEED AND ACCURACY

Standard -hp- instruments shown here are adaptable for making nearly every electronic measurement in the electronic field. Following is a brief description of a few of these instruments. Complete technical information will be sent—without obligation—on request. In addition, -hp- engineers are at your service to help solve special problems.

WIDE-BAND VOLTMETER

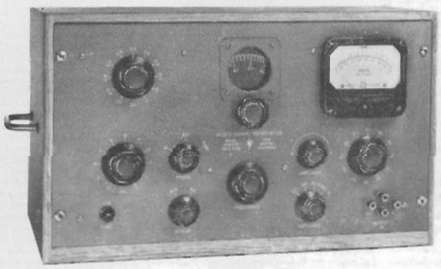
-hp- Model 400C Vacuum Tube Voltmeter features both a wide voltage and wide frequency range, with a high input impedance of 10 megohms. The instrument measures from 1 millivolt to 300 v full scale in 12 ranges. Accuracy is within 3% 20 cps to 100 kc; 5%, 20 cps to 2 mc. Instrument includes decibel scale (0 db = 1 mw, 600 ohms), making available continuous readings, —72 to +52 dbm. (*-hp-* also makes low frequency and battery operated voltmeters.)

H-F VACUUM TUBE VOLTMETER

-hp- 410A High Frequency Vacuum Tube Voltmeter combines in one instrument an ac voltmeter covering frequencies from 20 cps to 700 mc, a dc voltmeter with 100 megohms input impedance, and an ohmeter capable of measuring resistances from .2 ohms to 500 megohms. The special probe places a capacity of 1.3 uufd across the circuit under test. Input resistance for ac measurements is 6 megohms. Six voltage ranges provide full-scale sensitivities from 1 to 300 volts.

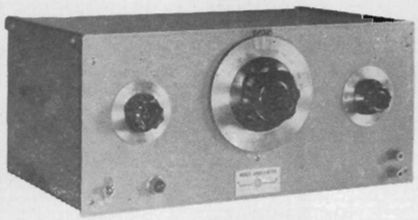
WIDE-BAND AMPLIFIER

-hp- 450A Amplifier is a new, versatile, wide-band amplifier designed for general laboratory or production use. It provides exceptional stability at 40 or 20 db gain, and gives new freedom from spurious responses. Low phase shift is assured by a straight-forward, resistance-coupled amplifier design, together with inverse feed back. Frequency response is flat within ½ db between 10 and 1,000,000 cps. Varying tube voltages or aging tubes have no appreciable effect on the gain or other characteristics. When used in conjunction with *-hp-* 400A Vacuum Tube Voltmeter, it increases voltmeter sensitivity 100 times.



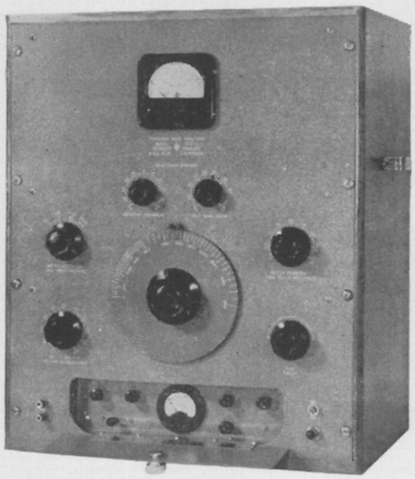
AUDIO SIGNAL GENERATORS

-hp- Model 206A Audio Signal Generator is specially designed for am and fm broadcast measurements. Frequency range is 20 cps to 20 kc. Distortion is less than 0.1%, 50 cps to 20 kc; and 0.25% down to 20 cps. Attenuators are adjustable from 0 to 111 db of attenuation in 0.1 db steps. Maximum output is +15 dbm. Balanced center-tapped output system matches 600, 150 or 50 ohm systems. Other *-hp-* audio signal generators provide up to 5 watts power between 20 cps to 100 kc.



RESISTANCE-TUNED AUDIO OSCILLATORS

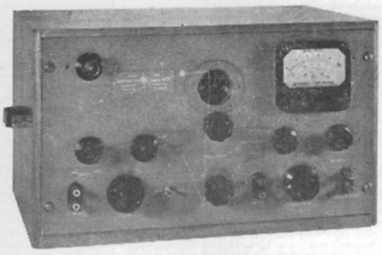
-hp- Resistance-Tuned Oscillators are suitable for almost every type of work. Their low distortion makes them particularly valuable in making distortion measurements on audio amplifiers, broadcast transmitters and other equipment. They provide an excellent source of voltage for accurate bridge measurements. The output is sufficient to drive signal generators and other equipment requiring considerable power. Their wide frequency range also makes them suitable for work in the supersonic region.



HARMONIC WAVE ANALYZER

-hp- Model 300A Harmonic Wave Analyzer is an excellent instrument for both laboratory and production work where accurate and rapid measurement of individual components of a complex wave is required.

The maximum selectivity is sufficient for measurement of harmonics of frequencies as low as 30 cycles and it can be varied over a wide range. With this variable selectivity feature, measurements at higher frequencies can be made more rapidly, yet with no sacrifice in accuracy.



DISTORTION ANALYZER

This model 330B Distortion Analyzer is *-hp-*'s newest, finest distortion measuring instrument. It is capable of measuring distortion at any frequency between 20 cps and 20,000 cps. It will make noise measurements of voltages as small as 100 microvolts. A linear r-f detector makes it possible to measure these characteristics directly from a modulated r-f carrier. The high sensitivity, stable accuracy and compactness of the 330B make it extremely valuable for broadcast, laboratory and production measurements.

ADDITIONAL INSTRUMENTS ON REVERSE SIDE OF PAGE

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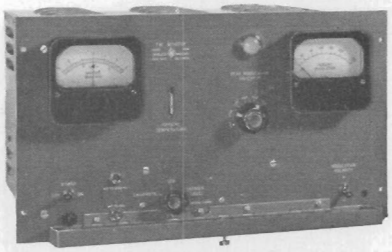
LABORATORY INSTRUMENTS OF SPEED AND ACCURACY

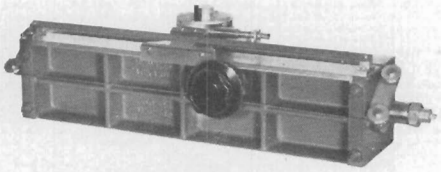


FM MONITOR

-hp- Model 335B FM Monitor is a frequency monitor and modulation meter combined. It is F.C.C. approved, and is in wide use in FM stations. Special circuits in the Monitor permit fast, easy measurements of spurious am modulation as well as point-by-point measurements of percentage modulation. Other features include: provision for aural monitoring, remote metering, and 600-ohm audio output.

MICROWAVE POWER METER

-hp- Model 430A Microwave Power Meter measures low-level microwave power from 0.1 milliwatt to 10 milliwatts full scale in 5 ranges. Power is read direct on large, 4" meter face. Instrument consists of a self-balancing bridge circuit using an external barretter as one arm. UHF power applied to the barretter indicated directly on meter. Instrument can be used at any microwave frequency for which external barretter and mount (not supplied) are available.



SLOTTED LINE

-hp- Model 805A Slotted Line incorporates a radically new, different configuration known as the "parallel plane" design. It consists of two mechanically rigid planes, and a centerless ground silver-plated brass rod central conductor. The instrument is used to detect standing waves between 500 and 4,000 mc. It is designed for use with conventional 50 ohm systems. For use with 46.3 ohm, ⅞" coaxial systems, *-hp-* Model 805B is available.

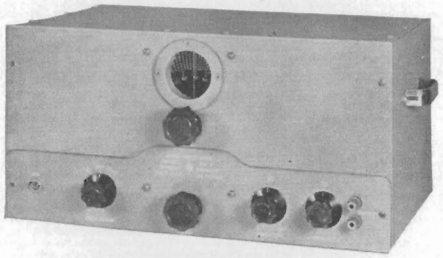
SECONDARY FREQUENCY STANDARDS

New *-hp-* Model 100D offers many advantages of a primary standard at much lower cost. Generates 100 kc, 10 kc, 1 kc, 100 cps, and 10 cps; stability 0.0001%. Sine or rectangular waves, 100 μsec timing markers, built-in oscilloscope.

-hp- 100C offers sine waves only. Both have 5 v. output, accuracy .001%, self-contained power supply.

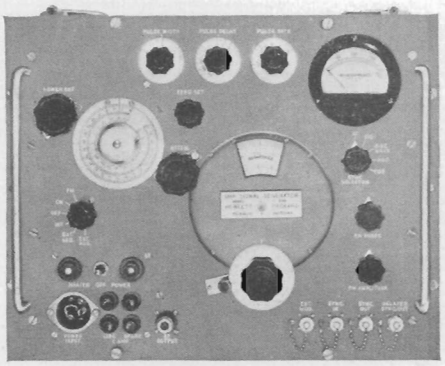
ELECTRONIC FREQUENCY METER

-hp- Model 500A Frequency Meter is designed to measure the frequency of an alternating voltage from 5 cps to 50 kc. It can be used to measure difference between two h-f signals. It is particularly suited to crystal grinding work where it can be used to measure the frequency deviation from the standard, quickly and accurately.



PRECISION OSCILLATORS

-hp- Model 201B and *-hp-* Model 200I are precision measuring instruments of utmost accuracy and latest design. The 201B spans a range from 20 cps to 20 kc in three bands; the 200I, a spread-scale oscillator, covers frequencies from 6 to 6000 cps in six bands. Both include a 6" main frequency tuning dial calibrated over 300 degrees, controlled directly or by 6-1 micro-drive. Both meet all requirements for measurement speed, accuracy, and purity of wave form. And both instruments incorporate *-hp-* family characteristics of no zero set, constant output, and great stability.

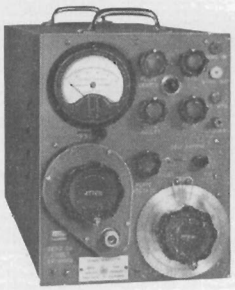


UHF SIGNAL GENERATOR

-hp- Model 616A UHF Signal Generator is the first instrument developed commercially which combines great operational speed, accuracy and ease of operation with a frequency range of 1800 mc to 4000 mc. R-f power is generated by a reflex klystron oscillator, and voltage adjustments during operation are eliminated by special *-hp-* automatic coupling device which causes oscillator repeller voltage to track frequency changes. The *-hp-* 616A features direct frequency and voltage control; c-w, f-m or pulsed output; plus wide variety of input and output delay and synchronization features.

POWER SUPPLY UNIT

-hp- Model 710A Power Supply is an excellent source of d-c power for every laboratory and production department use. The power pack is designed for the utmost in flexibility, compactness, portability and economy. Output is continuously variable between 180 and 360 volts. The output voltage varies approximately 1 per cent with changes in load current up to 75 ma and with normal line variations. Noise and hum level is exceptionally low, and output unusually stable over a long period of time. Also contains auxiliary center-tapped 6.3 volt source providing 5 amperes of a-c.



UHF SIGNAL GENERATOR

-hp- Model 610B UHF Signal Generator is a precision instrument covering frequency range of 460 to 1,200 mc. Maximum output level is 0.1 volts into a 50-ohm impedance. Output frequency and power are selected on direct reading, direct control dials. Instrument contains an internal pulse generator permitting output rf pulse width to be varied from 2 to 50 microseconds, and pulse rate to be varied from 60 to 3,000 pps.

hp laboratory instruments
FOR SPEED AND ACCURACY

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