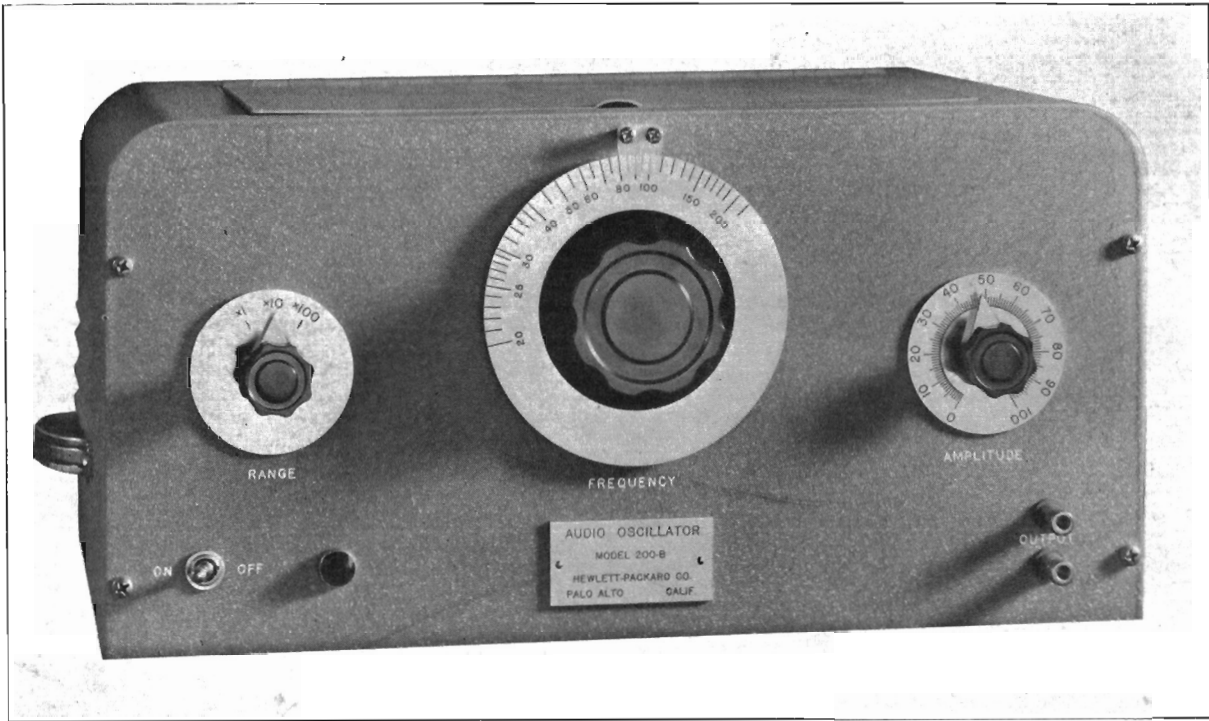


# RESISTANCE-TUNED AUDIO FREQUENCY OSCILLATORS



The Model 200B

## A NEW PRINCIPLE OF OPERATION

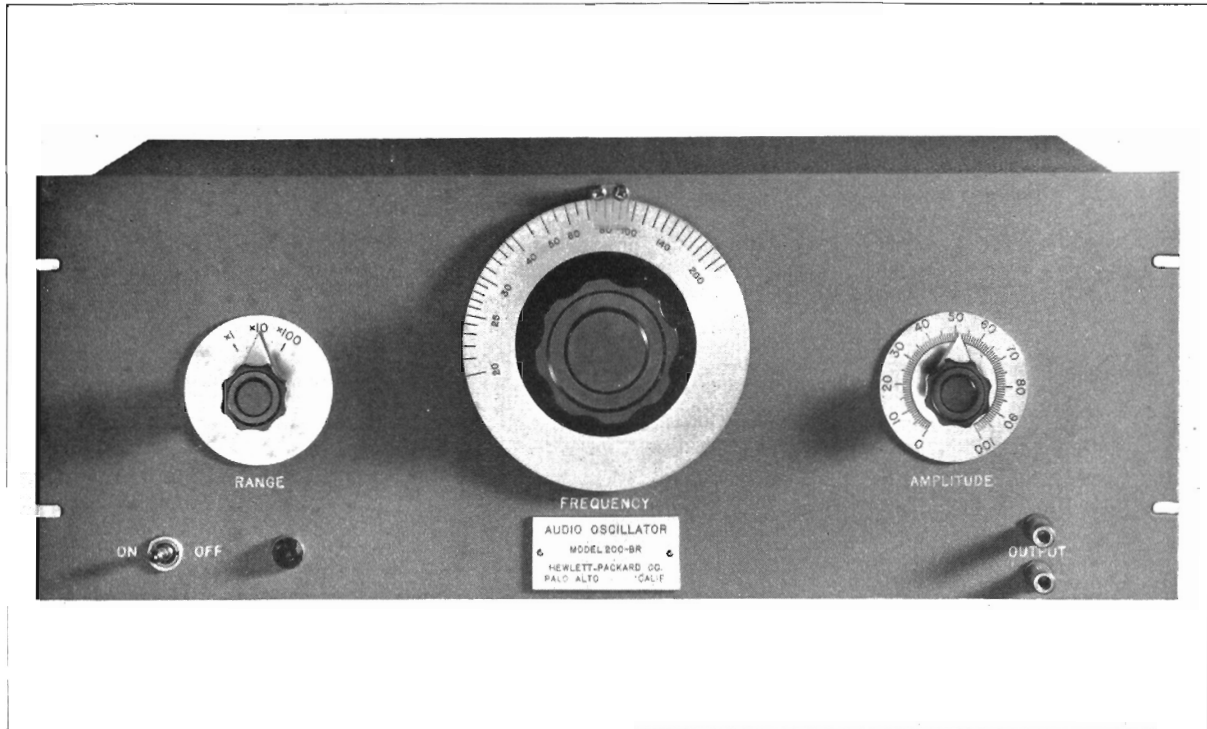
- LOW DISTORTION
- NO ZERO SETTING
- CONSTANT OUTPUT
- SMALL SIZE
- LOGARITHMIC SCALE
- HIGH OUTPUT

ACCURATE - INEXPENSIVE - FLEXIBLE

PALO ALTO

HEWLETT  PACKARD

CALIFORNIA



The Model 200BR

The HEWLETT-PACKARD Resistance-Tuned Oscillators are an important new development in the communication field. They are the result of a long research program in a well equipped laboratory. They have been thoroughly tried and tested in every respect, both in the laboratory and in the field. The inherent stability and fundamental simplicity of these new oscillators make it possible for us to produce an instrument which meets the highest standards of performance at a very low price.

**USES:** These new 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 super-sonic region.

These Resistance-Tuned Oscillators will save valuable time in production testing, maintenance, and development work. The frequency drift is negligible even during the first few minutes of operation and consequently no zero adjustment is necessary. The constant output of these oscillators makes it easy to check the frequency response of apparatus quickly and accurately. They give laboratory type performance with extreme simplicity of operation. There are only three controls on the panel: the main frequency dial, the range selecting switch, and the output voltage control. Their usefulness is increased because they are small in size and light in weight. The simplicity of this new resistance-tuned principle and the sturdy construction of these oscillators assure you of dependability and continued high quality performance.

**SPECIFICATIONS:** The HEWLETT-PACKARD oscillators are designed and built to give long trouble free service. High quality parts are used throughout, and each oscillator is subjected to rigid tests before shipment. Four standard models are available. The Models 200A and 200B have a transformer-coupled output amplifier which will deliver 1 watt into a matched load. The Models 200C and 200D have a resistance-coupled output amplifier to provide uniform output voltage over their wide frequency range. These oscillators are supplied in a relay rack mounting as the 200AR, 200BR, 200CR, and 200DR, respectively.

**FREQUENCY RANGE:** Model 200A 35 cps. to 35 kc.  
 Model 200B 20 cps. to 20 kc.  
 Model 200C 20 cps. to 200 kc.  
 Model 200D 7 cps. to 70 kc.

**CALIBRATION:** The dial is calibrated directly in cycles for the lowest range. A switch selects the range and indicates the proper multiplying factor. Each range covers 180 degrees on the dial and so the equivalent scale length is from 20 to 30 inches on the various models.

	200A	200B	200C	200D
Range 1	35-350 cps.	20-200 cps.	20-200 cps.	7-70 cps.
Range 2	350-3500 cps.	200-2000 cps.	200-2000 cps.	70-700 cps.
Range 3	3500 cps.-35 kc.	2000 cps.-20 kc.	2000 cps.-20 kc.	700-7000 cps.
Range 4			20 kc.-200 kc.	7000 cps.-70 kc.

**STABILITY:** Under normal temperature conditions the frequency drift is less than 2% even including initial warm-up. Plus or minus 20% line voltage variations changes the frequency less than 0.2%. No zero setting is necessary on these oscillators.

**OUTPUT:** The Models 200A and 200B will supply one watt output into a matched resistance load of 500 ohms, 25 volts on open circuit. Special output impedances can be supplied on order. The Models 200C and 200D will deliver 10 volts into a 1000 ohm load. The internal impedance of the output amplifier is about 50 ohms at 1000 cps.

**FREQUENCY RESPONSE:** The output voltage of the Models 200A and 200B is constant within plus or minus 1 decibel from 20 cps. to 15 kc.

The output voltage of the Model 200C is constant within plus or minus 1 decibel from 20 cps. to 150 kc.

The output voltage of the Model 200D is constant within plus or minus 1 decibel from 7 cps. to 70 kc.

**DISTORTION:** The total rms. distortion contained in the wave-form of the various models is within the following limits:

Model 200A	Less than 1% distortion above 35 cps.
Model 200B	Less than 1% distortion above 35 cps.
Model 200C	Less than 1% distortion from 20 cps. to 150 kc.
Model 200D	Less than 1% distortion above 10 cps.

**HUM VOLTAGE:** The hum voltage is less than 0.1% of the maximum output voltage.

**POWER SUPPLY:** 115 volts — 60 cycles — 50 watts.

**TUBES:** Models 200A and 200B 1 6J7, 1 6F6, 1 6F5, 1 6V6, 1 5Z4.  
 Models 200C and 200D 2 6J7, 1 6F6, 1 6V6, 1 5Z4.

**MOUNTING:** The cabinet models are mounted in an attractive steel cabinet finished in wrinkle grey. The panels are wrinkle grey finish with machine engraved designations.

The relay rack mounting fits the standard 19" relay rack with 3/4" spacing. This panel is 3/16" thick finished in wrinkle grey with machine engraved designations. The dust cover mounts on the chassis and is removable from the rear.

Model	Mounting	Length	Height	Depth	Weight	Price
200A	Cabinet	16"	8"	9"	32#	\$ 85.80
200B	Cabinet	16"	8"	9"	32#	85.80
200C	Cabinet	16"	8"	9"	30#	115.00
200D	Cabinet	19"	8 3/4"	11"	32#	125.00
200AR	Relay Rack	19"	7"	9"	35#	90.80
200BR	Relay Rack	19"	7"	9"	35#	90.80
200CR	Relay Rack	19"	7"	9"	35#	120.00
200DR	Relay Rack	19"	8 3/4"	11"	37#	130.00

Prices are net, complete with tubes, f.o.b. Palo Alto, California.

Prices and data subject to change without notice.

Patents Applied For.

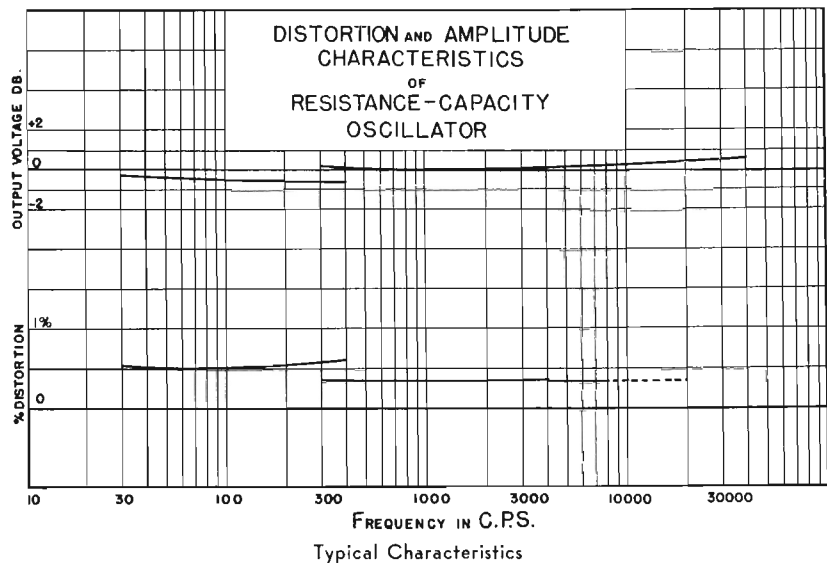
June 2, 1941

## HEWLETT-PACKARD COMPANY

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 PALO ALTO, CALIFORNIA

**PRINCIPLE OF OPERATION:** These Resistance-Tuned Oscillators consist of a stabilized amplifier with regeneration supplied through a frequency selective resistance capacity network. The amplifier increases the effective  $Q$  of this network so that the oscillation frequency is stable. The thermal drift can be made extremely small by using low temperature coefficient elements in the network. Furthermore, the thermal drift is not magnified as it is in the case of a beat-frequency oscillator. To increase the usefulness of this resistance-tuned principle we have developed a unique balancing circuit which automatically selects the proper operating point for the oscillator. This balancing circuit keep the distortion at a low value at all times so that no manual adjustment of the operating point is necessary. The frequency is tuned over a 10 to 1 range by means of a variable condenser. The range is multiplied in decimal steps by selecting the resistors in the regeneration network.

This new oscillator is fundamentally more stable and produces less distortion than the principle now ordinarily used for variable frequency audio oscillators. A typical distortion and frequency characteristic is shown at the right. This is the actual performance of the Model 200A over most of the frequency range. With full output the distortion rises somewhat at the lower frequencies because of the output amplifier. At less than full output the distortion of a typical oscillator is as shown in this curve.



**SPECIAL OSCILLATORS:** This resistance-tuned principle is excellent for many special purposes. The frequency can be extended several decades to the lower radio frequency region. Excellent oscillators for stroboscopic work can be made because the frequency is stable over long periods of time. Special and more accurate calibrations can be made. If you have any problems requiring audio or super-sonic oscillators we invite your inquiry. We are prepared to supply special oscillators at attractive prices.

**WARRANTY:** We warrant each instrument sold by us to be free from defects in material and workmanship for a period of one year from date of purchase. Our obligation under this warranty is limited to repairing or replacing instruments or parts thereof which prove to be defective by our examination.

**DELIVERY:** Delivery will be made on the cabinet models one week from receipt of order and on the relay rack models two weeks from receipt of order. When full payment accompanies order transportation charges will be paid to anywhere in the United States.