200 I

~~200D~~

ISTRUCTIONS

IO OSCILLATOR

YPE NO. 9 1 0 4 4

HEWLETT hp PACKARD COMPANY

Laboratory Instruments for Speed and Accuracy

395 PAGE MILL ROAD • PALO ALTO • CALIFORNIA

A U D I O O S C I L L A T O R

MODEL 200-D

ELECTRICAL SPECIFICATIONS

Frequency.....7 cps to 70,000 cps.

Calibration: Main dial 7-70

Freq. Range	Mult. Factor	Frequency
X1	1	7-70 cps
X10	10	70-700 cps
X100	100	700-7000 cps
X1000	1000	7000-70,000 cps

Power Output.....100 milliwatts into 1000 ohm load.

Output Impedance.....50 ohms.

Frequency Response..... ±1 db from 20 cps to 15 kc .

Stability (rated output).....less than ±2% under normal temperature conditions.

Distortion.....less than 1% from 10 cps to 20 kc.

Hum.....less than 0.1% of maximum output voltage.

Power Supply.....110-120 volts, 50-60 cps.

Fuse Rating.....1 ampere.

MECHANICAL SPECIFICATIONS

Cabinet Size.....17" x 8-3/4" x 11".

Finish.....Grey wrinkle enamel.

Relay Rack Size.....19" x 8-3/4" x 11"

Finish.....Grey wrinkle enamel.

The oscillator has been adjusted to deliver more than rated power into the load. Because of this adjustment the output wave may show some distortion when the VOL. control is completely clockwise. This condition is normal and when low distortion is required the instrument should be operated at its rated output or slightly below.

POWER SUPPLY.

The oscillator is designed to operate on 110 - 120 volts, 50 - 60 cps.

MAINTENANCE

GENERAL.

For proper operation both the frequency calibration and the distortion level in the output should be periodically checked. Also the unit should be thoroughly cleaned and a drop of light oil should be applied to the bearing on the main dial shaft.

CALIBRATION.

To adjust the tracking of the main frequency selecting dial, a standard source of frequency must be used for comparison. Set the dial to 7 and the range switch X10. Note output of oscillator at 7 on dial (70 cps) then set to 70 on dial. Adjust oscillator frequency to 700 cps by means of C1, at the same time adjust the voltage output to be equal to that obtained at 7 on the dial by the compensating condenser C8. This requires some maneuvering as the settings are interdependent. Check output at 7 again to make sure it has not changed. If it has changed, readjust output and frequency at 70 to match.

These adjustments are all made from the bottom because the final calibration is correct only when the dust cover is in place. If the instrument still does not track properly, the resistors have probably changed value. Return oscillator to the factory for range switch replacement and recalibration.

DISTORTION.

The total harmonic distortion will be less than one-half of 1 percent when the instrument is operating properly. If tubes are changed the distortion should be measured if possible, because a poor tube will increase the distortion without otherwise affecting the operation of the instrument. Instability of the output section T-1 or T-2 or by a defective coupling condenser which places a positive voltage on the grid of T-2.

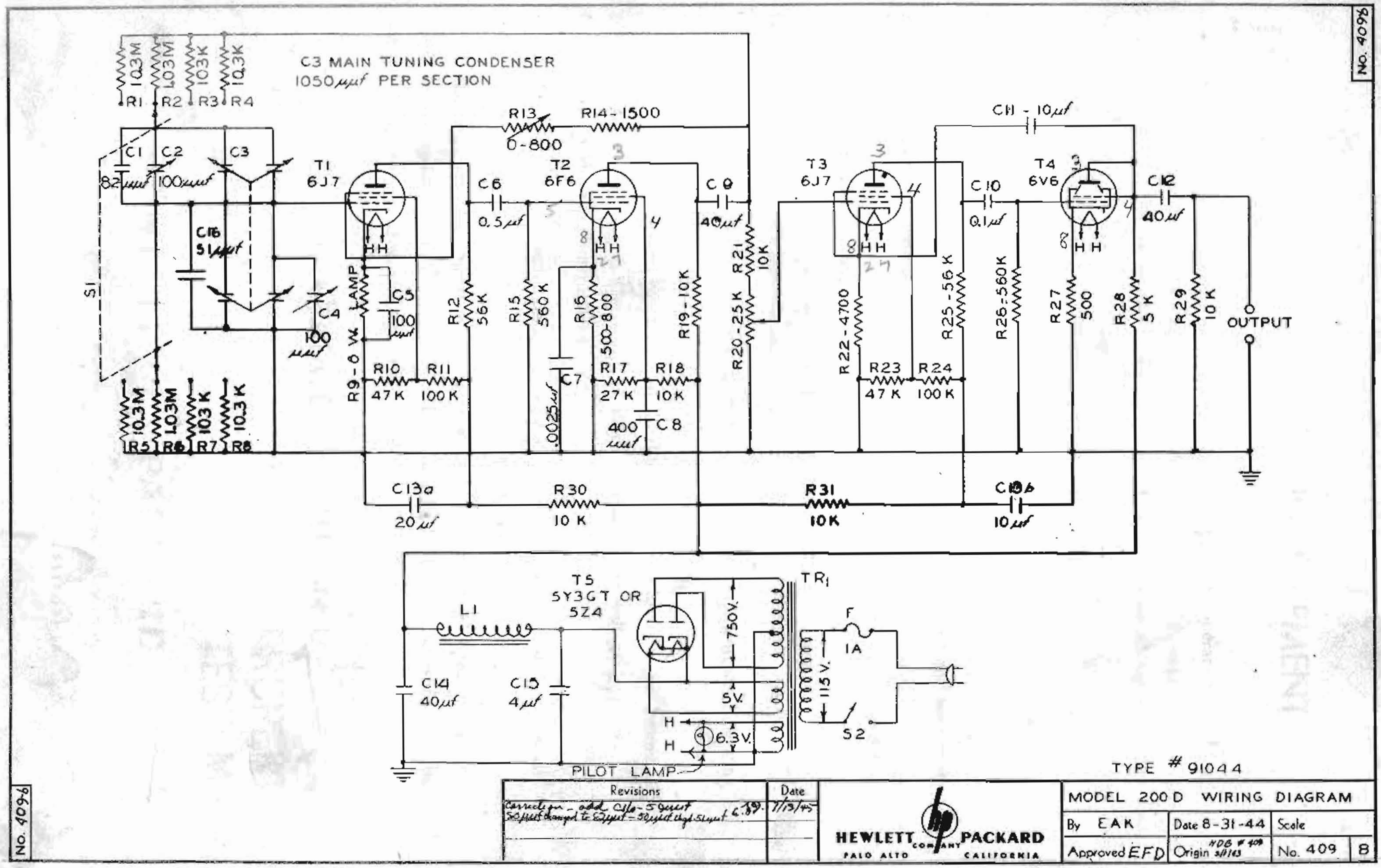
CIRCUIT CONSTANTS

MODEL 200-D

R1	10.3 M	1 W precision composition
R2	1.03 M	1 W precision composition
R3	103 K	1 W precision composition
R4	10.3 K	1 W precision composition
R5	10.3 M	1 W precision composition
R6	1.03 M	1 W precision composition
R7	103 K	1 W precision composition
R8	10.3 K	1 W precision composition
R9	.....	6 W Mazda lamp
R10	47 K	1 W composition
R11	100 K	2 W composition
R12	56 K	1 W composition
R13	0-800 ohms	1 W composition
R14	1500 ohms	1 W wirewound
R15	560 K	1 W composition
R16	500-800 ohms	10 W wirewound
R17	27 K	2 W composition
R18	10 K	10 W wirewound
R19	10 K	20 W wirewound
R20	25 K	1 W carbon potentiometer
R21	10 K	1 W composition
R22	4700 ohms	1 W composition
R23	47 K	1 W composition
R24	100 K	2 W composition
R25	56 K	1 W composition
R26	560 K	1 W composition
R27	500 ohms	10 W wirewound
R28	5 K	20 W wirewound
R29	10 K	1 W composition
R30	10 K	1 W composition
R31	10 K	1 W composition

C1	80 mmf	..... fixed ceramic
C2	100 mmf	..... variable air
C3	4 section	..... variable air
	(1050 mmf per	section) .....
C4	100 mmf	..... variable air
C5	100 mmf	600 vdcw fixed mica
C6	0.5 mf	600 vdcw fixed paper
C7	.002 mf (or)	500 vdcw fixed mica
	.0025 mf	500 vdcw fixed mica
C8	400 mmf	500 vdcw fixed mica
C9	40 mf	450 vdcw electrolytic
C10	0.1 mf	600 vdcw fixed paper
C11	10 mf	450 vdcw electrolytic
C12	40 mf	450 vdcw electrolytic
C13a	20 mf)	.....
C13b	10 mf)	450 vdcw electrolytic
C14	40 mf	450 vdcw electrolytic
C15	4 mf	800 vdcw fixed paper
C16	50 mmf	..... fixed ceramic

S1	Range Switch
S2	Power Switch
F	1 amp 3AG fuse
L1	6h filter
T1	6J7
T2	6F6
T3	6J7
T4	6V6
T5	5Y3GT or 5Z4
TR1	Power Trans.


No. 4096
C3 MAIN TUNING CONDENSER
1050 μμf PER SECTION
R1 10.3M
R2 103M
R3 103K
R4 10.3K
C1 82 μμf
C2 100 μμf
C3
C16 51 μμf
C4 100 μμf
C5 100 μμf
S1
R5 10.3M
R6 103M
R7 103 K
R8 10.3 K
T1 6J7
R9 - 6 W. LAMP
R10 47K
R11 100K
R12 56K
R13 0-800
R14-1500
C6 0.5 μf
T2 6F6
R15 560K
R16 500-800
C7 .0025 μf
R17 27K
R18 10K
C8 400 μμf
R19-10K
C9 40 μf
R21 10K
R20-25K
T3 6J7
R22-4700
R23 47 K
R24 100 K
R25-56 K
C10 0.1 μf
C11 - 10 μf
T4 6V6
R26-560K
R27 500
R28 5 K
C12 40 μf
R29 10 K
OUTPUT
C13a 20 μf
R30 10 K
R31 10K
C13b 10 μf
T5 5Y3GT OR 5Z4
L1
C14 40 μf
C15 4 μf
TR1
750V.
5V.
6.3V.
115 V.
F 1A
S2
H
H
PILOT LAMP
TYPE # 91044
Revisions
Correction - add C16 - 51 μμf; 50 μμf changed to 82 μμf - 50 μμf changed to 51 μμf
Date 7/13/45
HEWLETT PACKARD COMPANY
PALO ALTO CALIFORNIA
MODEL 200 D WIRING DIAGRAM
By EAK
Date 8-31-44
Scale
Approved EFD
Origin
No. 409 B
No. 4096

CLAIM FOR DAMAGE IN SHIPMENT

The instrument should be tested as soon as it is received. If it fails to operate properly, or is damaged in any way, a claim should be filed with the carrier. A full report of the damage should be obtained by the claim agent, and this report should be forwarded to us. We will then advise you of the disposition to be made of the equipment and arrange for repair or replacement. Include model number, type number and serial number when referring to this instrument for any reason.

WARRANTY

Our instruments are guaranteed to be free from defects in material and workmanship for one year from date of purchase. Our liability under this warranty is limited to repairs and adjustment or replacement of defective parts (except tube, fuses and batteries) or instruments when the fault is a direct result of defective materials or workmanship in the manufacture of the apparatus. This warranty covers service for the first year without charge except for transportation to the factory.

If, during subsequent service, any fault develops in the equipment, the following steps should be taken:

1. Notify us, giving full particulars of the difficulty, and include the serial number of the instrument in question. On receipt of this information, we will give you service information or shipping instructions.

2. On receipt of shipping instructions, forward the apparatus to us prepaid, and we will make repairs and adjustments immediately at the factory.

If the fault has been caused by misuse or abnormal conditions of operation as disclosed by our examination, repairs will be billed at cost. In this case, an estimate of the cost will be submitted before the work is started.

DO NOT HESITATE TO CALL ON US

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LABORATORY INSTRUMENTS

Standard -*hp*- instruments are available for making every important test and measurement in the audio frequency 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.

VACUUM TUBE VOLTMETER

Model 400A Vacuum Tube Voltmeter sets standard of performance for voltage measurements in the audio, supersonic, and lower radio frequency region. Measurements up to 1 megacycle with this instrument are as simple as measurements with the usual multi-range meter at d-c. Primarily no precautions whatsoever are required: turn-over effect and waveform errors are minimized because this meter responds to the average value of the full wave; there are no adjustments to make during operation; a large overload will not damage the instrument; and the input impedance is high enough so that **it will not** load the circuit being measured.

AUDIO SIGNAL GENERATORS

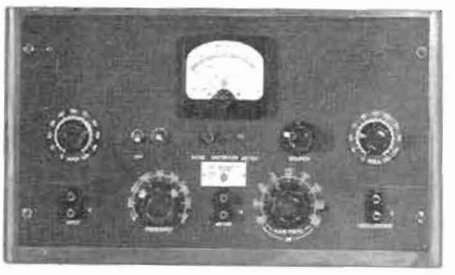
Audio Signal Generators are designed **for** power saving performance. They are excellent **for** general laboratory applications because they supply a known voltage as well as a known frequency into the commonly used impedance levels. They are particularly suitable for gain measurements because no auxiliary apparatus is required. They provide an excellent source of voltage for distortion measurements because their waveform distortion is very small.

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.

SQUARE WAVE GENERATOR

-*hp*- Model 210 Square Wave Generator provides a new approach to the problem of measuring the characteristics of audio frequency equipment. One of two observations with this generator will check the frequency response of apparatus where heretofore a large number of observations were necessary. It will show up phase shift and transient effects, both of which are rather difficult to study by other methods.



NOISE AND DISTORTION ANALYZER

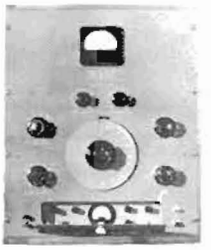
-*hp*- Model 325B Noise and Distortion Analyzer provides a new approach to the problem of audio frequency measurements. Distortion measurements at nine audio frequencies can be made with ease and rapidity. In addition, this instrument can be used as a high-impedance voltmeter for measuring low noise levels, amplifier gain and any of the other measurements requiring a high-impedance voltmeter with a wide frequency range.
With the addition of a detector, the Model 325B can be used for measuring distortion in the modulated carrier of transmitters.

RESISTANCE-TUNED INTERPOLATION OSCILLATOR

-*hp*- Model 200I Interpolation Oscillator is a good example of the newer type of electronic measuring instruments which are built for split-hair accuracy. The main frequency control dial is 6 inches in diameter, calibrated over approximately 300 degrees, and is driven by a smooth friction vernier. A total of more than 750 calibrated points is available to cover the entire frequency range. Each range is provided with an individual frequency adjustment to enable the calibration to be set to a frequency standard such as the -*hp*- Model 100B, where very accurate calibration is required. The frequency range of this instrument is 6 cps to 6000 cps.

ELECTRONIC FREQUENCY METER

-*hp*- Model 500A Frequency Meter is designed to measure the frequency of an alternating voltage from 0 to 50 kc. In frequency measurement work at higher frequencies it can be used to measure the frequency difference between two radio frequency 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.

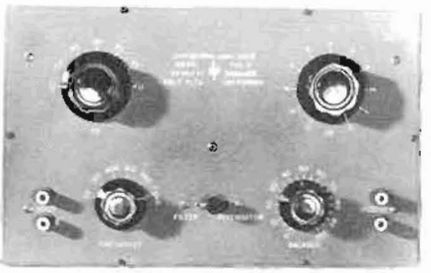


HARMONIC WAVE ANALYZER

-*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.

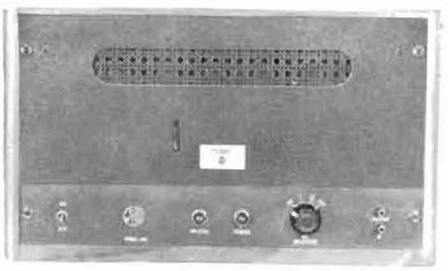
ATTENUATORS AND VOLTAGE DIVIDERS

-*hp*- Model 350A is a bridged-T attenuator consisting of one 100 db attenuator with 10 db steps and a 10 db attenuator having 1 db steps. Special construction is used to assure high frequency response. Inquiries pertaining to your particular attenuator or voltage divider problems will be given careful attention.



DISTORTION ANALYZER

-*hp*- Model 320B Distortion Analyzer is a simple and convenient device for studying and measuring the harmonic distortion in audio frequency apparatus. It is particularly suitable for development work because with it the character and type of distortion can be determined at the same time the amount of distortion is being measured. It is excellent for production work because it is easy to operate and provides a rapid and accurate check for normal operation.



SECONDARY FREQUENCY STANDARD

-*hp*- Model 100 Low Frequency Standard provides a convenient and extremely useful source of standard frequencies from 100 cps to 100 kc. It provides standard frequencies for accurate measurement purposes, for calibrating audio equipment and for various other work where great accuracy is required. It is useful in making accurate interpolation measurements at higher frequencies. A single unit can be used to provide standard frequencies at a number of test positions on production lines.