SECTION I
GENERAL INFORMATION

1-1. DESCRIPTION.

1-2. The Hewlett-Packard Model 4333A Distortion Analyzer is a solid state instrument suitable for semi-automatic measurement of very low levels of distortion* on audio frequencies. The Model 4333A includes a Twin-T Filter which provides high fundamental rejection. As the capacitance values of the Twin-T Filter are electrically controlled, the Model 4333A has high stability against mechanical shock.

1-3. Distortion levels of 0.01% to 100% full scale are measured in nine ranges at any of the 44 spot frequencies between 10Hz to 100kHz. Any spot frequency can be shifted up or down by more than 8% of setting. This brackets more than 75% of the 10Hz - 100kHz fundamental frequency range. Harmonics are indicated up to 600kHz. Distortion characteristics can be monitored at the MONITOR terminal with an oscilloscope, a true rms voltmeter, or a wave analyzer.

1-4. The built-in voltmeter can be used separately for general purpose voltage measurements. It has a frequency range of 10Hz to 600kHz (10Hz to 200kHz for 100μV range) and a voltage range of 100μV to 100V rms full scale.

1-5. SPECIFICATIONS.

1-6. Instrument specifications are listed in Table 1-1. These specifications are the performance standards, or limits against which the instrument may be tested.

1-7. INSTRUMENTS COVERED BY MANUAL.

1-8. This instrument has a two-part serial number. The first four digits and a letter comprise the serial number prefix. The last five digits form the sequential suffix that is unique to each instrument. The contents of this manual apply to instruments having the same serial number prefix(es) as listed under SERIAL NUMBERS on the title page (also see Section VII).

* In these specifications "Distortion Factor" is as defined by IEC Publication 403 "Audio Frequency Generators" subclause 2.7.13 "Total Distortion Factor".

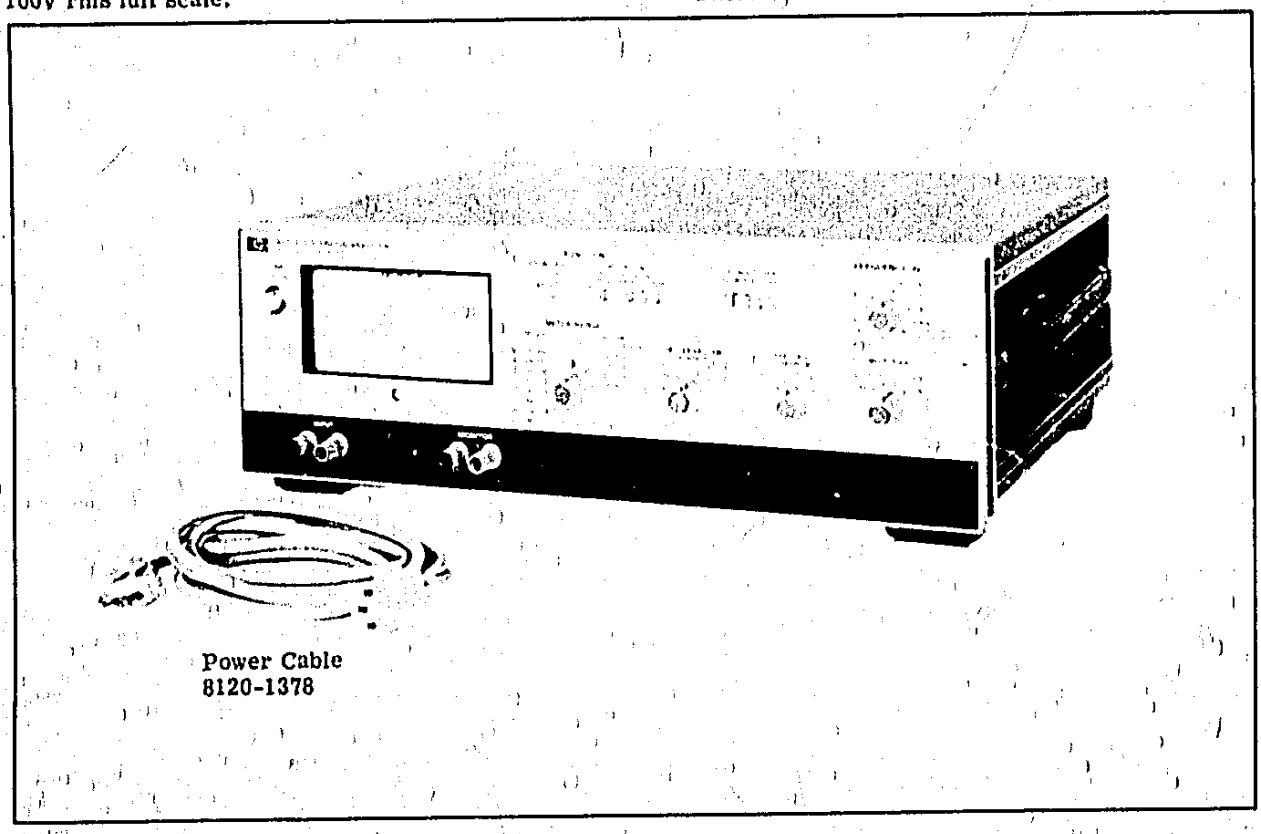

Figure 1-1. Model 4333A Distortion Analyzer.

1-9. An instrument manufactured after the printing of this manual may have a serial prefix that is not listed on the title page. This unlisted serial prefix indicates that the instrument is different from those documented in this manual. The manual for this instrument includes a yellow Manual Changes supplement that contains "change information" that documents the differences.

1-10. In addition to change information, the supplement may contain information for correcting errors in the manual. To keep this manual as current and accurate as possible, Hewlett-Packard recommends that you periodically request the latest Manual Changes supplement. The supplement for this manual is keyed to this manual's print date and part number, both of which appear on the title page. Complimentary copies of the supplement are available from Hewlett-Packard.

1-11. For information concerning a serial number prefix not listed on the title page or in the Manual Changes supplement, contact your nearest Hewlett-Packard Sales/Service Office.

1-12. ACCESSORIES FURNISHED.

1-13. A power cable (HP Part No. 8120-1378) is furnished with Model 4333A (see Figure 1-1). For the other power cables, contact your nearest Hewlett-Packard Sales Office (see Section II paragraph 2-6).

1-14. ACCESSORY KIT.

1-15. An extender board (HP Part No. 5060-4013) is provided for maintenance or service.

1-16. A handle kit (HP Part No. 5061-0089) and two types of rack mounting kits, a rack mount kit without front handles (HP Part No. 5061-0077) and a rack mount kit with front handles (HP Part No. 5061-0083), are available for installation (see Section II paragraph 2-12 through 2-16).

1-17. OPTIONS.

1-18. No options are offered at the present time.

1-19. SAFETY CONSIDERATIONS.

1-20. This operating and service manual contains cautions and warnings alerting the user to hazardous operating and maintenance conditions. This information is flagged by a caution or warning heading and/or symbol. The symbol ⚠ appears on the rear panel and is an international symbol meaning "refer to the Operating and Service Manual". This symbol flags important operating instructions located in Section II and/or Section III. To ensure the safety of the operating and maintenance personnel and retain the operating condition of the instrument, these instructions must be adhered to.

Table 1-1. Specifications.

Note

In these specifications "Distortion Factor" is as defined by IEC Publication 403 "Audio Frequency Generators" sub-clause 2.7.13 "Total Distortion Factor".

DISTORTION MEASUREMENT RANGE:

0.01% - 100% full scale in 9 ranges.

FREQUENCY RANGE:

10Hz - 100kHz, 44 spot frequencies. (excluding overlapping 41 spot frequencies) in 1, 1.5, 2, 3, 4, 5, 6, 7, 8, 9 and 10 steps.

FREQUENCY VERNIER:

±8% of fundamental frequency.

DISTORTION MEASUREMENT ACCURACY:

Harmonic Measurement Accuracy:

(% of full scale)

Range	±3%	±6%
100% - 0.3%	10Hz - 400kHz	10Hz - 600kHz
0.01%	10Hz - 100kHz	10Hz - 200kHz

Elimination Characteristics:

Fundamental Rejection:

10Hz - 10kHz
(MULTIPLIER x 10, x 100, x 1k): >100dB

10kHz - 100kHz
(MULTIPLIER x 10k): >95dB

Second Harmonic Accuracy for Fundamental Frequencies between:

10Hz - 100kHz: better than $^{+0}_{-0.6}$ dB.

Distortion Introduced by Instrument:

10Hz - 10kHz
(MULTIPLIER x 10, x 100, x 1k): <-95dB (0.0018%)

10kHz - 30kHz
(MULTIPLIER x 10k): <-90dB (0.0032%)

40kHz - 100kHz
(MULTIPLIER x 10k): <-85dB (0.0056%)

INPUT IMPEDANCE: 100kΩ, 80pF.

INPUT LEVEL for distortion measurement:

1.0Vrms for 100% (0dB) set level, maximum 130Vrms (minimum input level for automatic tuning is 0.1Vrms).

VOLTMETER RANGE:

100μV - 100V full scale in 13 ranges (10dB per range).

VOLTMETER FREQUENCY RANGE:

10Hz - 600kHz (100μV range: 10Hz - 200kHz).

VOLTMETER ACCURACY:

(% of full scale)

Range	±2%	±6%
100μV	20Hz - 50kHz	10Hz - 200kHz
300μV - 100V	20Hz - 300kHz	10Hz - 600kHz

VOLTMETER RESIDUAL NOISE:

When input terminal is terminated with shielded 600Ω resistor —

100μV range: < 10μVrms.
300μV range: < 25μVrms.

MONITOR OUTPUT:

0.1Vrms ±0.01Vrms open circuit for full scale meter indication, proportional to meter deflection (impedance: 2kΩ ±10%).

HIGH-PASS FILTER:

3dB point at 400Hz with 18dB per octave roll-off. Normally used only with fundamental frequencies greater than 1kHz.

GENERAL:

Temperature: 25°C ±15°C.

Power Requirements:

AC: 100, 120, 220, 240V ±10%, 48 - 66Hz.
Power Consumption: Approximately 11VA.

DC (external power supply):
Two batteries or two DC power supplies 22 - 40V (current is approximately 150mA from each supply).

Weight: Approximately 7.5kg.

Dimensions:

426 mm (W) x 147 mm (H) x 340 mm (D).