SECTION I
GENERAL INFORMATION

1-1. DESCRIPTION.

1-2. The Hewlett Packard Models 331A and 332A Distortion Analyzers are solid state instruments for measuring distortion and ac voltages. The Model 332A includes a high impedance AM detector which operates from 550 kHz to greater than 65 MHz.

1-3. Distortion levels of 0.1% to 100% full scale are measured in seven ranges for any fundamental frequency from 5 Hz to 600 kHz; harmonics are indicated up to 3 MHz. The high sensitivity of these instruments requires only 0.3 V rms for the 100% set level reference. An output is provided at the OUTPUT connectors for monitoring the distortion with an oscilloscope, a true rms voltmeter, or a wave analyzer. The instruments are cabable of a dc isolation voltage of 400 volts above chassis ground.

1-4. The transistorized voltmeter contained in the Model 331A and 332A can be used separately for general purpose voltage and gain measurements. The voltmeter has a frequency range of 5 Hz to 3 MHz (20 Hz to 500 kHz for 300 μV range) and a voltage range of 300 μV to 300 V rms full scale.

1-5. The AM detector included in the Model 332A is a broadband dc restoring peak detector consisting of a semiconductor diode and filter circuit. AM distortion levels as low as 0.3% can be measured on a 3 V to 8 V rms carrier modulated 30% in the standard broadcast band, and lower than 1% distortion can be measured at the same level of the carrier up to 65 MHz.

1-6. ACCESSORY FEATURES.

1-7. The accessory available with the 331A and 332A Distortion Analyzers is a voltage divider probe, -hp- Model No. 10001A. The features of the probe are:

a. 10 megohm shunted by 10 pF.
b. 10:1 attenuation dc to 30 MHz bandwidth.
c. 2% division accuracy.
d. 600 V peak input.
e. 5 nsec rise-time.

1-8. OPTION.

1-9. Option 01 is a standard -hp- Model 331A or 332A with a special meter and meter amplifier, compensated to permit response to VU (volume units) characteristics.

1-10. INSTRUMENT IDENTIFICATION.

1-11. Hewlett-Packard uses a two-section serial number. The first section (prefix) identifies a series of instruments. The last section (suffix) identifies a particular instrument with the series. If a letter is included with the serial number, it identifies the country in which the instrument was manufactured. If the serial prefix of you instrument differs from the one on the title page of this manual, a change sheet will be supplied to make this manual compatable with newer instruments. All correspondence with Hewlett-Packard should include the complete serial number.

Table 1-1. Specifications

MODEL 331A

DISTORTION MEASUREMENT RANGE
Any fundamental frequency, 5 Hz to 600 kHz. Distortion levels of 0.1% to 100% are measured full scale in 7 ranges.

INPUT LEVEL FOR DISTORTION MEASUREMENTS
0.3 V rms for 100% set level (up to 300 V may be attenuated to set level reference).

DISTORTION MEASUREMENT ACCURACY
Harmonic measurement accuracy (full scale).

Fundamental Input Less Than 30 V

RANGE	±3%	±6%	±12%
100% to 0.3%	10 Hz 1 MHz	10 Hz 3 MHz	
0.1%	30 Hz 300 kHz	20 Hz 500 kHz	10 Hz 1.2 MHz

Fundamental Input Greater Than 30 V

RANGE	±3%	±6%	±12%
100% to 0.3%	10 Hz 300 kHz	10 Hz 500 kHz	10 Hz 3 MHz
0.1%	30 Hz 300 kHz	20 Hz 500 kHz	10 Hz 1.2 MHz

Elimination Characteristics:
Fundamental Rejection >80 dB
Second Harmonic Accuracy for a fundamental of:
5 Hz to 20 Hz : better than ±1 dB
20 Hz to 20 kHz: better than ±0.6 dB
20 kHz to 100 kHz: better than -1 dB
100 kHz to 300 kHz: better than -2 dB
300 kHz to 600 kHz: better than -3 dB

Distortion Introduced by Instrument:
>-70 dB from 5 Hz to 200 kHz
>-64 dB from 200 kHz to 600 kHz

Table 1-1. Specifications (Cont'd)

DC ISOLATION
Signal ground may be ±400 Vdc from external chassis.

VOLTMETER RANGE
300 μV to 300 V rms full scale (13 ranges), 10 dB per range.

VOLTMETER FREQUENCY RANGE
5 Hz to 3 MHz (300 μV range: 20 Hz to 500 kHz).

VOLTMETER ACCURACY:

RANGE	±2%	±5%
300 μV	30 Hz 300 kHz	20 Hz 500 kHz
1 mV to 30 V	10 Hz 1 MHz	5 Hz 3 MHz
100 V to 300 V	10 Hz 300 kHz	5 Hz 500 kHz

Meter indication is proportional to average value of waveform.

FREQUENCY CALIBRATION ACCURACY
Better than ± 5% from 5 Hz to 300 kHz
Better than ±10% from 300 kHz to 600 kHz

INPUT IMPEDANCE
Distortion Mode: 1 MΩ ±5% shunted by <70 pF.
Voltmeter Mode:
1 MΩ ±5% shunted by <30 pF (331A only),
1 MΩ ±5% shunted by <35 pF (332A only),
1 to 300 V ranges; 1 MΩ ±5% shunted by <70 pF, 300 μV to 0.3 V ranges.

NOISE MEASUREMENTS
Voltmeter residual noise on the 300 μV range: <25 μV rms terminated in shielded 600 Ω; <30 μV rms terminated in shielded 100 kΩ.

OUTPUT
0.1 V rms ±0.01 V open circuit for full scale meter deflection; 0.05 V rms ±0.005 V into 2 kΩ for full scale meter deflection.

POWER SUPPLY
115 V or 230 V ±10%, 48 to 440 Hz, approximately 4 watts. Terminals are provided for external battery supply. Positive and negative voltages between 28 V and 50 V are required. Current drain from each voltage is 40 mA.

MODEL 332A

Same as Model 331A except as indicated below:

AM DETECTOR
High impedance dc restoring peak detector with semi-conductor diode operates from 550 kHz to greater than 65 MHz. Broadband input. Maximum input; 40 V p-p ac or 40 V peak transient.

CARRIER FREQUENCY
550 kHz to 1.6 MHz: Distortion introduced by detector is <0.3% for 3 to 8 volt carriers modulated 30%.

1.6 MHz to 65 MHz: Distortion introduced by detector is <1% for 3 to 8 volts rms carriers modulated 30%.

NOTE

Distortion measurement at carrier levels as low as 1 volt may be made with reduced accuracy.

OPTION 01

Indicating meter has VU characteristics conforming to FCC Requirements for AM, FM, and TV broadcasting.