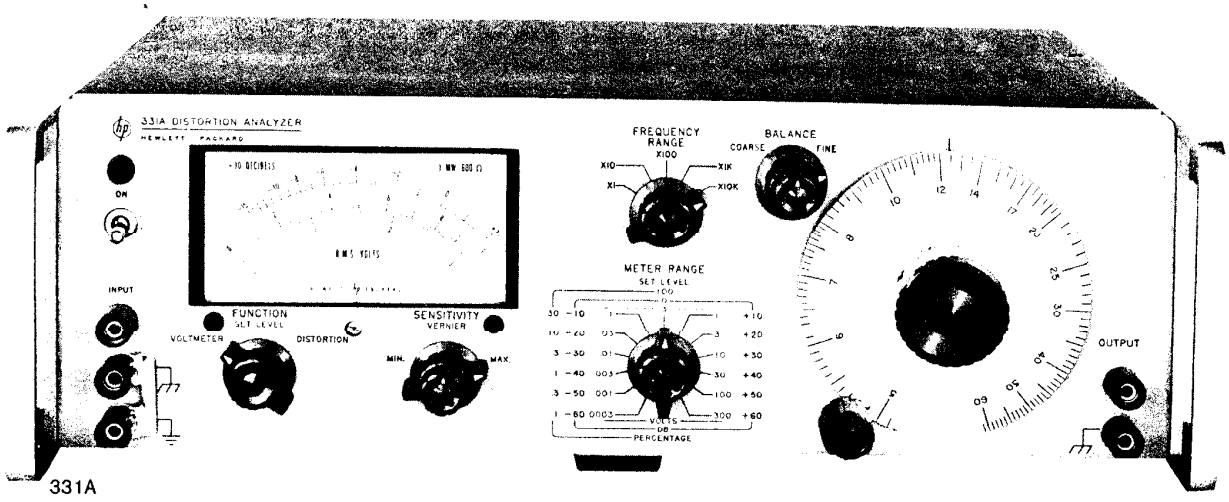
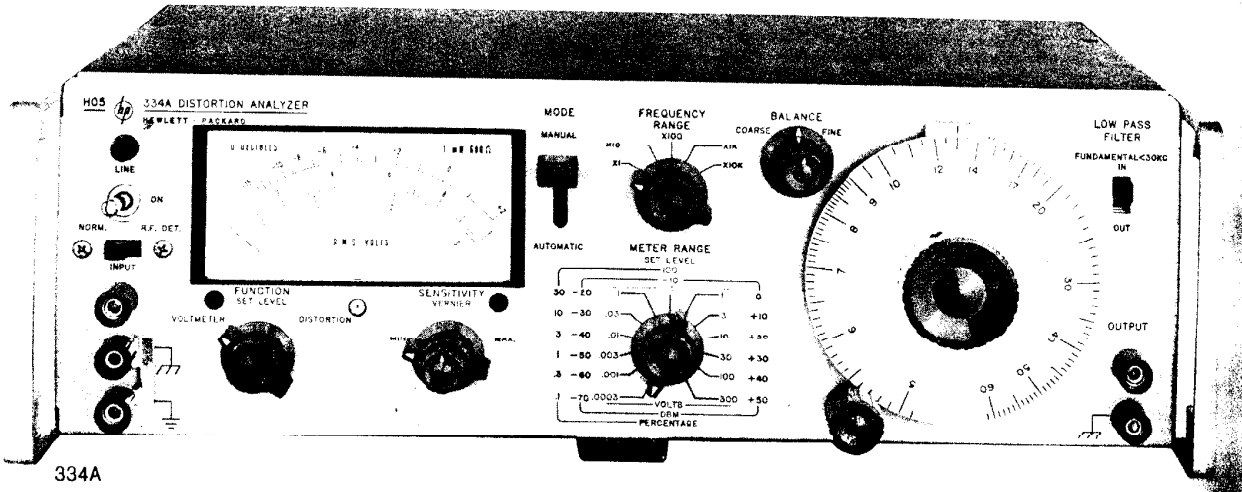
SIGNAL ANALYZERS

Distortion Analyzers

Models 331A, 333A, 334A



331A



334A

Description

Hewlett-Packard's models 331A, 333A and 334A Distortion Analyzers measure total distortion down to 0.1% full scale at any frequency between 5 Hz to 600 kHz; harmonics are indicated up to 3 MHz. These instruments measure noise as low as 50 microvolts and measure voltages over a wide range of level and frequency. Refer to table below for available models and features.

Model No.	Auto Nulling	Hi-Pass Filter	Lo-Pass Filter	AM Detector
331A				
333A	X	X		
334A	X	X		X
334A Opt. H05	X		X	X

Option 001, for each model, features VU meter characteristics conforming to FCC requirements.

Automatic Fundamental Nulling

Automatic fundamental nulling speeds up the normally time-consuming portion of the measurement. This is done by manually nulling with the coarse tuning and balance controls to less than 10% of the Set Level Reference. The automatic mode is used to complete rejection of the fundamental on more sensitive ranges without any further manual tuning.

High-Pass Filter

In order to reduce the effect of hum components, a high pass filter is provided which attenuates frequencies below 400 Hz. The filter may be activated by a front panel switch when measuring distortion of signals greater than 1 kHz in frequency.

Amplitude Modulation Detector

HP's model 334A Analyzer is provided with an amplitude modulation detector having a frequency range from 550 kHz to greater than 65 MHz.

The high impedance dc restoring peak detector which utilizes a semiconductor diode measures distortion at carrier levels as low as 1 volt. Input to the detector is located on the rear of the instrument. HP's model 334A is provided with Automatic Fundamental Nulling and a High-Pass Filter. The switchable RF Detector at the input of the instrument has a frequency range of 550 kHz to 65 MHz. Input connector is located on the rear panel of the instrument.

High Impedance Voltmeter

The transistorized metering circuit of HP 331A, 333A, and 334A employs feedback to insure stability and a flat frequency response from 5 Hz to 3 MHz. The voltmeter mode offers 13 ranges in 10 dB steps. Range is from 300 μV to 300 V rms full scale. The bandwidth is 5 Hz to 3 MHz for 1 mV to 30 V ranges; 5 Hz to 500 kHz for 100 V to 300 V ranges; and 20 Hz to 500 kHz for the 300 μV range. Average responding meter is calibrated to rms value of a sine wave.

VU Option Available

Option: 001 provides an indicating meter having VU ballistic characteristics.
Distortion analyzers: meet FCC requirements.

Model H05-334A

Similar to the HP 334A, this solid-state distortion analyzer offers extended frequency range, greater set level sensitivity, improved selectivity, greater overall accuracy, and unprecedented ease of use. The H05-334A meets FCC requirements on broadcast distortion levels. Measures total distortion down to 0.1% full scale. Automatic fundamental nulling (>80 dB rejection) is included for fast measurements. The H05-334A has a switchable low pass filter to reduce effect of unwanted high frequencies (noise, etc.) when measuring low frequency signals with high accuracy. Also included is a 3 MHz voltmeter, 300 μV to 300 V full scale. An AM detector covers the 550 kHz to >65 MHz range at carrier levels as low as 1 V.

Distortion measurement range: any fundamental frequency, 5 Hz to 600 kHz. Distortion levels of 0.1%–100% are measured full scale in 7 ranges.

331A Specifications

Distortion Measurement Accuracy

Harmonic measurement accuracy (full scale)

Fundamental Input Less Than 30 V

Range	±3%	±6%	±12%
100%–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%–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 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 (0.03%) from 5 Hz to 200 kHz. >−64 dB (0.06%) from 200 kHz to 600 kHz. Meter indication is proportional to average value of a sine wave.
Frequency calibration accuracy: better than ±5% from 5 Hz to 300 kHz. Better than ±10% from 300 to 600 kHz.
Input impedance: distortion mode: 1 MΩ ±5% shunted by <70 pF (10 MΩ shunted by <10 pF with HP 10001A 10:1 divider probe).
Voltmeter mode: 1 MΩ ±5% shunted by <35 pF, 1 to 300 V rms; 1 MΩ ±5% shunted by <70 pF, 300 μV to 0.3 V rms.
Input level for distortion measurements: 0.3 V rms for 100% set level or 0.245 V for 0 dB set level (up to 300 V may be attenuated to set level reference).
DC isolation: signal ground may be ±400 V dc from external chassis.
Voltmeter range: 300 μV to 300 V rms full scale (13 ranges) 10 dB per range.
Voltmeter accuracy: (using front panel input terminals)

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

Noise measurements: voltmeter residual noise on the 300 μV range: <25 μV rms, when terminated in 600 (shielded) ohms, <30 μV rms terminated with a shielded 100 kΩ resistor.
Output: 0.1 ±0.01 V rms open circuit and 0.05 ±0.005 V rms into 2 kΩ for full scale meter deflection.
Output impedance: 2 kΩ.
Power supply: 115 or 230 V ±10%, 50 to 66 Hz, approximately 4 VA.

333A Specifications

Same as Model 331A except as indicated below:
Automatic nulling mode: set level: at least 0.2 V rms
Frequency ranges: X1, manual null tuned to less than 3% set level; total frequency hold-in ±0.5% about true manual null. X10 through X10 k, manual null tuned to less than 10% of set level; total frequency hold-in ±1% about true manual null.
Automatic null accuracy: 5 Hz to 100 Hz: meter reading within 0 to +3 dB of manual null. 100 Hz to 600 kHz: meter reading within 0 to +1.5 dB of manual null.
High-pass filter: 3 dB point at 400 Hz with 18 dB per octave roll off. 60 Hz rejection: 40 dB. Normally used with fundamental frequencies greater than 1 kHz.

334A Specifications

Same as Model 333A except as indicated below:
AM detector: high impedance DC restoring peak detector with semiconductor diode operates from 550 kHz to greater than 65 MHz. Broadband input, no tuning is required.
Maximum input: 40 V p-p AC or 40 V peak transient.
Distortion introduced by detector: carrier frequency: 550 kHz–1.6 MHz: <50 dB (0.3%) for 3–8 V rms carriers modulated 30%. 1.6 MHz–65 MHz: <40 dB (1%) for 3–8 V rms carriers modulated 30%.
Note: Distortion introduced at carrier levels as low as 1 Volt is normally <40 dB (1%) 550 kHz to 65 MHz for carriers modulated 30%.

General

Size: 426 mm W x 126 mm H x 337 mm D (16.75" x 5" x 13.25").
Weight: net, 7.98 kg (17.75 lb). Shipping, 10.35 kg (23 lb).

Ordering Information

	Price
Option 001, indicating meter has VU characteristics conforming to FCC requirements for AM/FM and TV broadcasting	add $25
H05-334A (meets FCC requirements)	add $105
331A Distortion Analyzer	$1280
333A Distortion Analyzer	$1425
334A Distortion Analyzer	$1485