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Agilent Technologies
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HP 8903B Audio Analyzer
HP 8903E Distortion Analyzer

20 Hz to 100 kHz

Technical Specifications

HEWLETT® PACKARD

The versatile choice for audio analysis

All parameters describe performance in automatic operation or properly set manual conditions. Specifications describe the instrument's warranted performance. Supplemental characteristics (shown in italics) are intended to provide information useful in applying the instrument by giving typical, but non-warranted, performance parameters.

Related Literature:
Product Overview 5968-1388E
Price List 5968-1389EUS

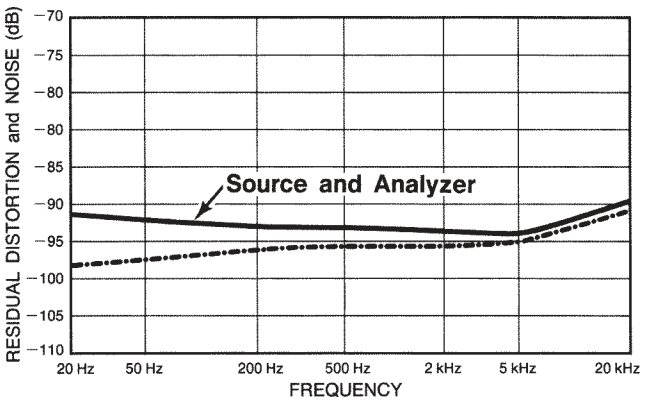
HP 8903B System Specifications

(HP 8903B only, source and analyzer combined)

Distortion

Residual Distortion and Noise (the higher of): 80 kHz BW: –80 dB or 17 µV, 20 Hz to 20 kHz.
500 kHz BW: –70 dB or 50 µV, 20 Hz to 50 kHz.
–65 dB or 50 µV, 50 kHz to 100 kHz.

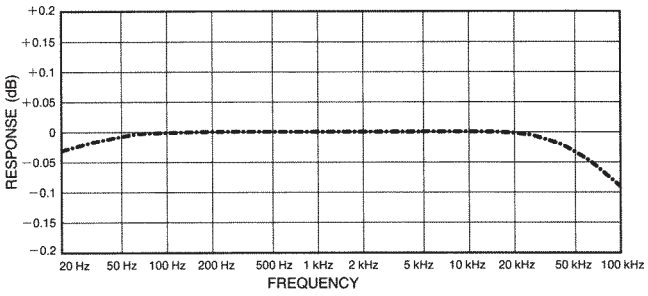
Supplemental Characteristics



Typical residual distortion and noise of the source and analyzer combined (source voltage set to 1.5 V, 80 kHz BW). Dashed line represents typical residual distortion and noise for the analyzer only.

Flatness

Supplemental Characteristics



Typical flatness of source and analyzer combined (source voltage set to 1 V, 1 kHz reference).

Signal-to-Noise

Frequency Range: 50 Hz to 100 kHz
Display Range: 0 to 99.99 dB
Accuracy: ±1 dB
Input Voltage Range: 50 mV to 300 V
Residual Noise (the higher of):
80 kHz BW: –85 dB or 17 µV
500 kHz BW: –70 dB or 50 µV

Supplemental Characteristics

Time to Return First Measurement: *<2.5 second*
Measurement Rate: *One reading per second*
Resolution: *Same as listed under SINAD, on page 2*

HP 8903B Source Specifications

(HP 8903B only)

Frequency

Range: 20 Hz to 100 kHz

Resolution: 0.3%

Accuracy: 0.3% of setting

Output Level

Range: 0.6 mV to 6 V open circuit

Resolution: 0.3% or better

Accuracy:

2% of setting 60 mV to 6 V, 20 Hz to 50 kHz.
3% of setting 6 mV to 6 V, 20 Hz to 100 kHz.
5% of setting 0.6 mV to 6 mV, 20 kHz to 100 kHz.

Flatness (1 kHz reference):

±0.7% (±0.06 dB), 20 Hz to 20 kHz.
±2.5% (±0.22 dB), 20 Hz to 100 kHz.

Distortion and Noise (the higher of):

80 kHz BW: –80 dB or 15 µV, 20 Hz to 20 kHz.
500 kHz BW: –70 dB or 38 µV, 20 Hz to 50 kHz.
–65 dB or 38 µV, 50 kHz to 100 kHz.

Impedance: 600 Ω ±1% or 50 Ω ±2% front panel or HP-IB programmable (47 special function).

Supplemental Characteristics

Frequency Switching Speed: *<3 ms (does not include HP-IB programming time)*

Output Level Switching Speed: *20 ms (does not include HP-IB programming time)*

Sweep Mode: *Log sweep with up to 500 points per decade or 255 points total between entered start and stop frequencies.*

HP 8903B and HP 8903E Analyzer Specifications

Distortion

Fundamental Frequency Range: 20 Hz to 100 kHz

Display Range: 0.001% to 100% (–99.99 to 0 dB)

Accuracy:

±1 dB, 20 Hz to 20 kHz.
±2 dB, 20 kHz to 100 kHz.

Input Voltage Range: 50 mV to 300 V

Residual Distortion and Noise (the higher of):

80 kHz BW: –80 dB or 15 µV, 20 Hz to 20 kHz.
500 kHz BW: –70 dB or 45 µV, 20 Hz to 50 kHz.
–65 dB or 45 µV, 50 kHz to 100 kHz.

Supplemental Characteristics

3 dB Measurement Bandwidth: *10 Hz to 500 kHz*

Detection: *True rms or rms-calibrated average*

Displayed Resolution:

0.0001% (<0.1% distortion).
0.001% (0.1% to 3% distortion).
0.01% (3% to 30% distortion).
0.1% (>30% distortion).

Time to Return First Measurement: *1.5 s*

Measurement Rate: *Two readings per second*

SINAD

Fundamental Frequency Range: 20 Hz to 100 kHz

Display Range: 0 to 99.99 dB

Residual Distortion and Noise: Same as listed under distortion

Accuracy:

±1 dB, 20 Hz to 20 kHz.
±2 dB, 20 kHz to 100 kHz.

Input Voltage Range: 50 mV to 300 V

Supplemental Characteristics

Detection: *True-rms or rms-calibrated average*

Resolution:

HP 8903B: *0.01 dB for SINAD ratios >25 dB. For ratios <25 dB the display is rounded to the nearest 0.5 dB to reduce digit flickering of noisy signals (full resolution is available via special function 16.1).*

HP 8903E: *Powers up with special function 16.1 active for 0.01 dB resolution at all SINAD ratios.*

Analog Meter (HP 8903B only): *Active in SINAD mode only and for SINAD ratios up to 18 dB (24 dB using special function 7.1).*
1.0 dB typical accuracy.

Tuning:

HP 8903B: *Notch filter is tuned to the internal audio source frequency.*

HP 8903E: *Notch filter is tuned to the counted input frequency.*

Time to Return First Measurement: *1.5 s*

Measurement Rate: *Two readings per second*

AC Level

Full Range Display: 300.0 V, 30.00 V, 3.000 V, 0.3000 V, 30.00 mV, 3.000 mV, 0.3000 mV.

Overrange: 33%, except on 300 V range

Accuracy: (rms and average detection)

±2%, 50 mV to 300 V, 20 Hz to 20 kHz.
±3%, 0.3 mV to 50 mV, 20 Hz to 100 kHz.
±5%, 50 mV to 300 V, 20 kHz to 100 kHz.

Supplemental Characteristics

AC Converter: *True-rms responding for signals with crest factor up to 3, rms calibrated average detection, or quasi-peak detection.*

Time to Return First Measurement: *<1.5 s*

Measurement Rate: *>2.5 readings per second*

3 dB Measurement Bandwidth: *>500 kHz*

Quasi-Peak Detector Characteristic: *Meets CCIR 468-4*

Quasi-Peak Detector Accuracy: *(20 Hz to 20 kHz) ±6% typically*

HP 8903B and HP 8903E Analyzer Specifications *cont.*

DC Level

Full Range Display: 300.0 V, 48.00 V, 16.00 V, 4.000 V.

Overrange: 33%, except on 300 V range

Accuracy: ±1.0% of reading (600 mV to 300 V). ±6 mV (V_{in} <600 mV).

Supplemental Characteristics

Time to Return First Measurement: *<1.5 s*

Measurement Rate: *Three readings per second*

Frequency Measurement

Measurement Range: 20 Hz to 150 kHz. (20 Hz to 100 kHz in distortion and SINAD modes.)

Resolution: Five digits (0.01 Hz for input frequencies <100 Hz).

Accuracy: ±(0.004% plus one digit).

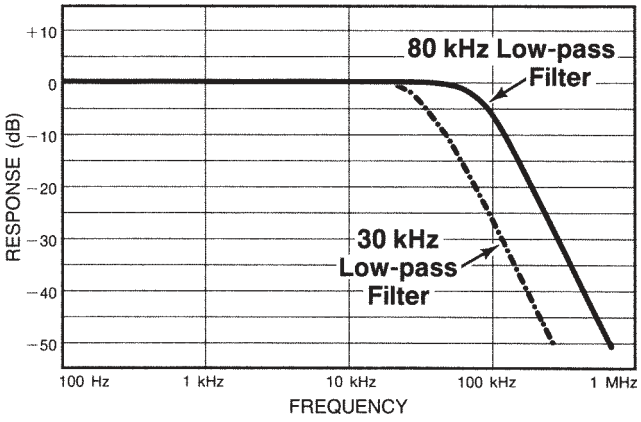
Sensitivity: 50 mV in distortion and SINAD modes. 5 mV in AC-level and signal-to-noise (HP 8903B only) modes.

Supplemental Characteristics

Measurement Rate: *Same as measurement mode selected*

Counting Technique: *Reciprocal with 2 MHz timebase*

Standard Audio Filters



30 kHz Low-Pass Filter

3 dB Cutoff Frequency: 30 kHz ±2 kHz.

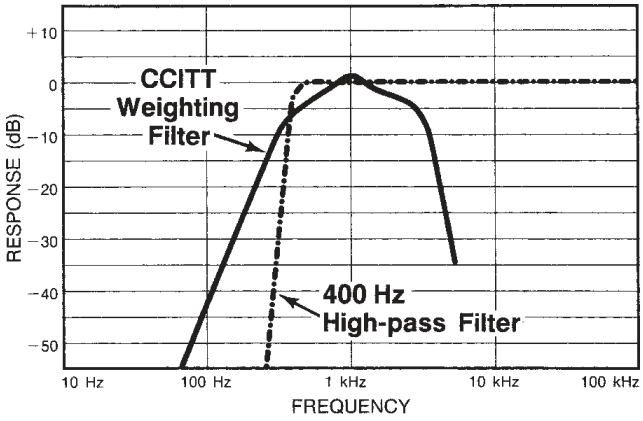
Roll-off: Third-order Butterworth; 18 dB per octave or 60 dB per decade

80 kHz Low-Pass Filter

3 dB Cutoff Frequency: 80 kHz ±4 kHz.

Roll-off: Third-order Butterworth; 18 dB per octave or 60 dB per decade

Plug-In Audio Filters



400 Hz High-Pass Filter

3 dB Cutoff Frequency: 400 kHz ±40 Hz.

Roll-off: Seventh-order Butterworth; 42 dB per octave or 140 dB per decade

CCITT Weighting Filter (CCITT rec. P53)

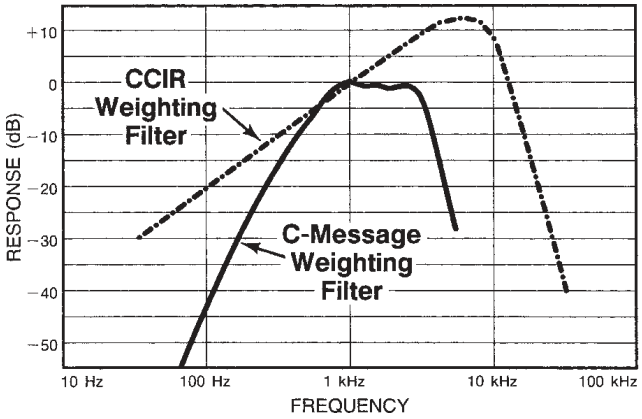
Deviation from Ideal Response:

±0.2 dB at 800 Hz.

±1.0 dB, at 300 Hz to 3 kHz.

±2.0 dB, at 50 Hz to 3.5 kHz.

±3.0 dB, at 3.5 kHz to 5 kHz.



CCIR Weighting Filter (CCIR rec. 468-2)

Deviation from Ideal Response:

±0.1 dB at 6.3 kHz.

±0.2 dB, at 6.3 kHz to 7.1 kHz.

±0.4 dB, at 7.1 kHz to 10 kHz.

±0.5 dB, at 200 Hz to 6.3 kHz.

±1.0 dB, at 31.5 Hz to 200 Hz, 10 kHz to 20 kHz.

±2.0 dB, at 20 kHz to 31.5 kHz.

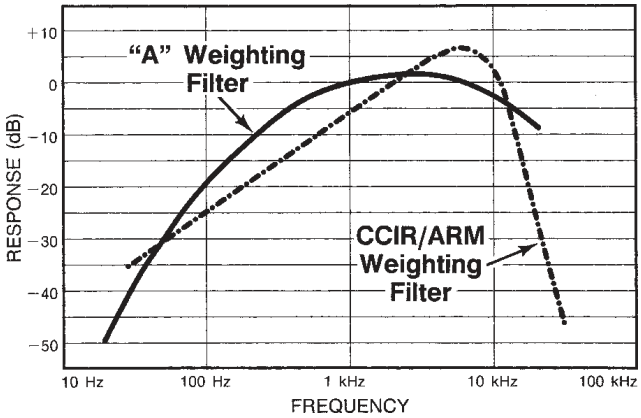
C-Message Weighting Filter (per BSTM 41004)

Deviation from Ideal Response:

±0.1 dB at 1 kHz

±1.0 dB, 60 Hz to 5 kHz

Plug-In Audio Filters *cont.*



CCIR/ARM Weighting Filter (CCIR rec. 468-2, average-responding meter, Dolby Labs Bulletin No. 19/4)

Deviation from Ideal Response: Same as listed previously under CCIR Weighting Filter.

"A" Weighting Filter (IEC rec. 179 and ANSI S1.4, type one sound-level meter)

Deviation from Ideal Response:
±0.1 dB at 1 kHz.
±0.5 dB, 20 Hz to 10 kHz.
±1.0 dB, at 10 kHz to 20 kHz.

HP 8903B and HP 8903E General Specifications

HP 8903B Rear Panel Features

HP-IB Connector

Monitor Output: Provides a scaled output of the input signal. In SINAD, distortion, and distortion-level modes, the fundamental is removed.

Front/Rear Panel Outputs

Monitor Output: *Output impedance 600 Ω.*

AC-level mode: *provides scaled output of input signal.*

SINAD, distortion, and distortion-level modes: *provide a scaled output of the input signal with the fundamental removed.*

HP 8903E Rear Panel Features

HP-IB Connector

Analyzer Input

Input Type: Balanced (full differential).

Input Impedance: 100 kΩ ±1% shunted by <300 pF, each side to ground. (In dc-level mode the input resistance is 101 kΩ ±1%).

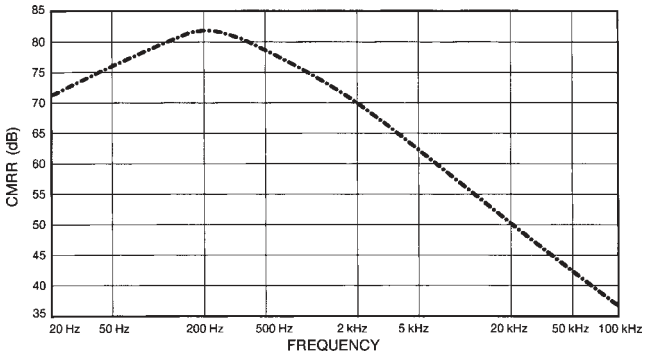
Maximum Input: Maximum peak input voltage, any combination of ac and dc:

HP 8903B: 425 volts peak, applied differentially or between either input and ground.

HP 8903E: 42 volts peak, low side to ground. 425 volts peak, differentially or high side to ground.

CMRR: >60 dB, 20 Hz to 1 kHz, V_{in} <2 V.
>45 dB, 20 Hz to 1 kHz.
>30 dB, 20 Hz to 20 kHz.

Supplemental Characteristics



Typical CMRR: *From 20 Hz to 100 kHz with input voltage of 6 volts.*

General

Temperature: Operating, 0 °C to 55 °C: storage, −55 °C to 75 °C.

Remote Operation: HP-IB. All functions except the line switch, low-terminal ground switches, and the ×10- and ÷10- increment keys (HP 8903B only), are remotely controllable. The HP 8903E has many special functions which can only be accessed via HP-IB commands.

HP-IB Compatibility: SH1, AH1, T5, TE0, L3, LE0, SR1, RL1, PP0, DC1, DT1, C0, E1.

Power: 100, 120, 220, or 240 V (+5, −10%); 48 to 66 Hz. 100 or 120 V (+5, −10%); 48 to 440 Hz. 100 VA maximum.

Weight:
HP 8903B: Net 12.3 kg. (27 lb.); shipping 16.4 kg. (36 lb.)
HP 8903E: Net 11.8 kg. (26 lb.); shipping 15.9 kg. (35 lb.)

Dimensions: 146 mm H × 425 mm W × 462 mm D. (5.75 × 16.8 × 18.2 in.)

HP System II Size: 5.25 H × 1 MW × 17 D.

EMI: Radiated interference is within the requirements of RE02 of MIL STD 461B and FTZ 526/527.

Conducted and Radiated Susceptibility: Meets the requirements of methods CS01, CS02, and RS03 (1 V/meter) of MIL STD 461B dated 1980.

Warranty Information

This Hewlett-Packard instrument product is warranted against defects in material and workmanship for a period of one year from date of shipment. During the warranty period, Hewlett-Packard Company will at its option, either repair or replace products which prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by HP. Buyer shall prepay shipping charges to HP and HP shall pay shipping charges, duties, and taxes for products returned to HP from another country.

HP warrants that its software and firmware designated by HP for use with an instrument will execute its programming instructions when properly installed on that instrument. HP does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error free.

Limitation Of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by buyer, buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance. No other warranty is expressed or implied. Hewlett-Packard specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

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