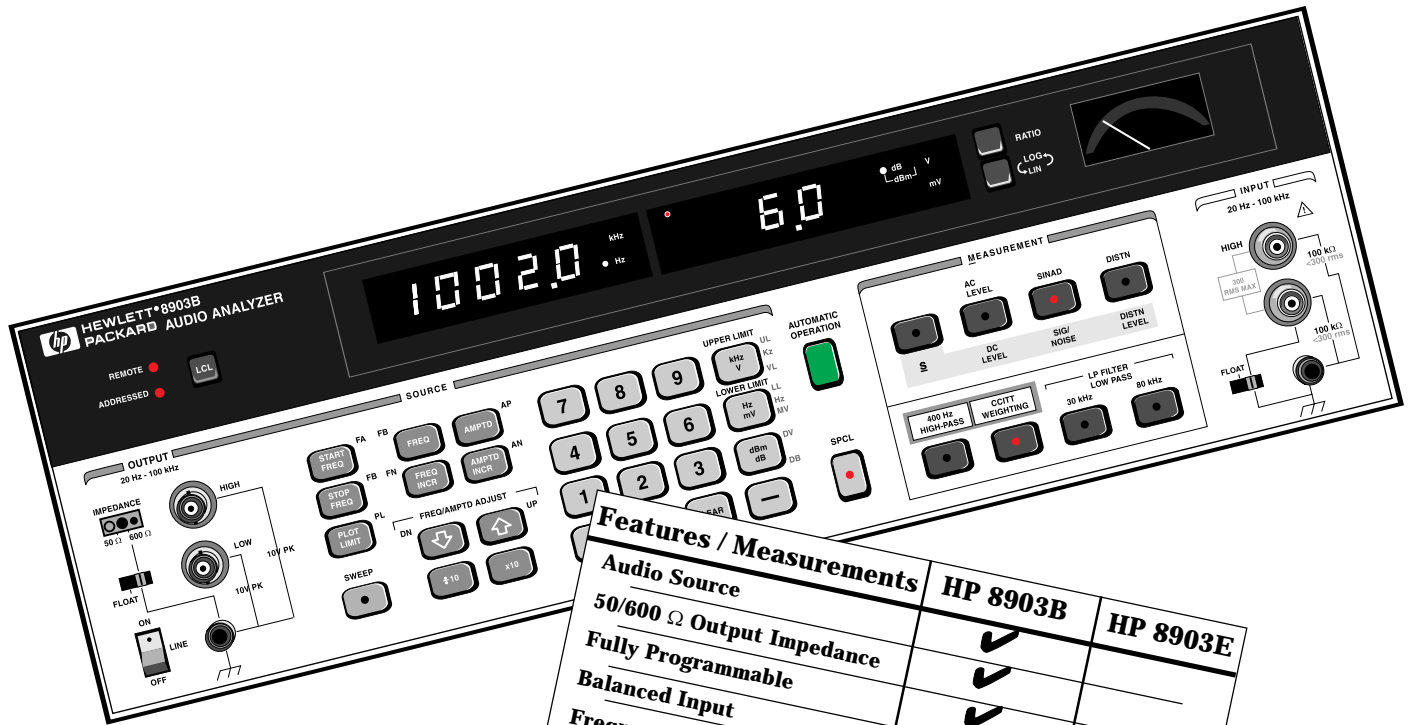


# HP 8903B Audio Analyzer HP 8903E Distortion Analyzer

20 Hz to 100 kHz

## Technical Specifications

The Versatile Choice for  
Audio Analysis



Features / Measurements	HP 8903B	HP 8903E
Audio Source		
50/600 $\Omega$ Output Impedance	✓	
Fully Programmable	✓	
Balanced Input	✓	
Frequency Counter	✓	✓
Distortion	✓	✓
SINAD	✓	✓
AC Volts	✓	✓
DC Volts	✓	✓
RMS/Average/Quasi-Peak Detection	✓	✓
Plug-in Filters	✓	✓
Distortion Level	✓	✓
Signal-To-Noise	✓	✓
Sweep	✓	✓

# HP 8903B Audio Analyzer

Special function 47 switches source OUTPUT IMPEDANCE- (50 or 600 ohms) to provide higher output into lower impedance loads (+ 17 dBm into 600 ohms in 50 ohm position).

LOG/LIN key allows results to be displayed in linear or log units. Log mode displays readings in dBm into 600 ohms when measuring AC level.

RATIO key permits display in dB or percent relative to an entered or measured value.

Low-noise input amplifier provides superior analyzer performance.

Audio source output level from 0.6 mV to 6 V open circuit, 20 Hz to 100 kHz.

Log SWEEP allows measurement of frequency response and swept distortion automatically.

Special functions control detector response: rms, average (rms calibrated), and quasi-peak responses are available.

Plug-in filters add measurement flexibility to the HP 8903B and HP 8903E. Both instruments have two slots which can be filled with any combination of six optional filters.

Analog meter for SINAD mode provides easier reading when measuring noisy signals.

Balanced (full-differential) input allows testing of bridged amplifiers and other devices with floating outputs. Maximum input voltage is a full 300 volts, differential or applied to either the high or low input

# HP 8903E Distortion Analyzer

LOG/LIN key allows results to be displayed in linear or log units. Log mode displays readings in dBm into 600 ohms when measuring ac level.

RATIO key permits display in dB or percent relative to an entered or measured value.

Low-noise input amplifier provides superior analyzer performance.

Front panel MONITOR output provides a scaled output of the input signal. In SINAD and distortion modes, the fundamental is removed.

NOTCH TUNE key allows the user to lock the notch filter at any measured input frequency. This is useful when measuring very noisy signals in distortion and SINAD modes.

Plug-in filters add measurement flexibility to the HP 8903B and HP 8903E. Both instruments have two slots which can be filled with any combination of six optional filters.

Front panel key allows selection of rms or average (rms calibrated) detector response. Quasi-peak detector response available via HP-IB programming.

Balanced (full-differential) input has a maximum input voltage of 300 volts differentially or applied from the high input to ground, and 30 volts applied from the low input to ground.



HP-IB Not just IEEE-488, but the hardware, documentation and support that delivers the shortest path to a measurement system.

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## **Transceiver Tests**

Both the HP 8903B and HP 8903E have been optimized for receiver testing. For SINAD measurements, extra filtering and smoothing circuits yield more accurate and repeatable results. With its built-in source, the HP 8903B makes signal-to-noise measurements on AM receivers using similar smoothing techniques. Transmitter testing is also easy. In conjunction with the HP 8901A , HP 8901B , or HP 8902A modulation analyzers you can measure transmitter distortion, frequency response, and count squelch tones. The HP 8903B also provides the audio tones to modulate the transmitter.

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## **Audio Applications**

The HP 8903B Audio Analyzer and HP 8903E Distortion Analyzer make your audio measurements fast and easy. The analyzers automatically tune and autorange for maximum accuracy and resolution. Distortion, frequency response, ac and dc voltage measurements are only a single keystroke away. With a built-in low distortion audio source, the HP 8903B is ideally suited to stimulus-response applications. Microprocessor control of source and analyzer allows the HP 8903B to perform swept measurements. For applications where a separate source is used, the HP 8903E is an ideal lower-cost solution.

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## **ATE Systems**

HP-IB control of all measurement functions makes analyzers valuable tools for ATE applications. These analyzers combine the power of a digital voltmeter, frequency counter, and distortion analyzer into one instrument. Since these functions are all available at one input connector, interfacing requirements, hardware costs, and software development time are reduced. The HP 8903B also includes a low-distortion programmable audio source.

## Versatile

The HP 8903B Audio Analyzer and HP 8903D Distortion Analyzer provide unparalleled versatility and performance for audio measurements from 20 Hz to 100 kHz. Both instruments combine the functionality of a high-performance distortion analyzer, frequency counter, ac voltmeter, dc voltmeter, and SINAD meter into one compact package. In addition, the HP 8903B has a low-distortion audio source which allows it to perform stimulus-response measurements, such as signal-to-noise ratio, automatically with no additional equipment.

## Simple

For ease of use, most measurements are made with one or two keystrokes. Both analyzers automatically tune and autorange for maximum accuracy and resolution. For quick identification of input signals, the analyzers count and display the input frequency in all ac measurement modes. The HP 8903B can also measure distortion of one signal while generating another frequency, because analyzer tuning and source frequency are independent.

## Accurate

For accurate measurement of complex waveforms and noise, the analyzers use true-rms detection. Average (rms calibrated) and quasi-peak detection are also available via front panel control. Accurate distortion measurements can typically be made down to less than  $-90$  dB (0.003%) between 20 Hz and 20 kHz. Over the same frequency range, flatness measurements are possible to 0.05 dB (0.5%). The analyzers' precision reciprocal counters give you fast, accurate characterizations of audio frequencies. For example, when counting a 1 kHz signal, the analyzers will be accurate within  $\pm 14$  Hz.

## Audio Application

The analyzers have many features which make difficult audio measurements easy. These include flexible data display formats, balanced analyzer input, plug-in filters, fully-automatic notch filter tuning, and for the HP 8903B, convenient audio source control and swept measurements. Complete control over display formatting gives you a choice between volts, millivolts, dBm into 600 ohms, and watts for ac level measurements or percent and dB for distortion measurements. Using the ratio key, you can establish a reference in percent or dB and directly make frequency response and 3 dB bandwidth measurements without computation.

### Balanced Analyzer Input

In the quest for higher output power, many audio amplifiers use bridged output stages. Such amplifiers can be difficult to characterize because their outputs cannot be grounded. To test these devices, the usual approach has to be to use a balanced, calibrated isolation transformer connected to an analyzer with an unbalanced input. Balanced inputs on the HP 8903B and HP 8903E make transformers unnecessary. Simply float the analyzer input and connect the bridged device directly and you are ready to make measurements.



**Balanced analyzer inputs make testing bridged amplifiers easy and fast**

## Audio Applications

### Choose the Filters for Your Applications

Internal plug-in filters simplify your audio measurements by providing weighting networks required by international standards. Among the filters available are the CCIR weighting filter, CCIR/ARM weighting filter, and the ANSI "A" weighting filter. In addition to these filters, both analyzers come with selectable 30 kHz and 80 kHz low-pass filters to reject unwanted out-of-band signals and noise.

Filters	Standard	Optional*
80 kHz low-pass	yes	
30 kHz low-pass	yes	
400 Hz high-pass		yes
CCITT weighting		yes
CCIR weighting		yes
C-Message weighting		yes
CCIR/ARM weighting		yes
"A" weighting		yes

\*These are plug-in filters: any two can be installed in either analyzer.

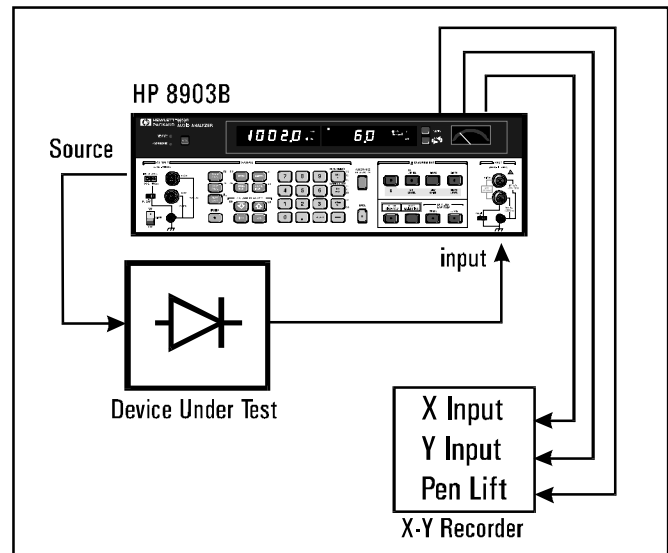
### High-Performance Distortion Capability

Distortion measurements are fast and accurate. With a single keystroke, the analyzers count the input signal, autorange for maximum performance, and display the result. Typical time to return the first distortion measurement is 1.5 seconds with a measurement rate of two readings per second thereafter. Residual distortion and noise for the analyzer sections is specified to be less than  $-80$  dB from 20 Hz to 20 kHz in an 80 kHz measurement bandwidth.

### Simplicity in Stimulus-Response Testing

With its internal audio source and microprocessor, the HP 8903B performs swept frequency response, swept distortion, and signal-to-noise measurements automatically.

Making swept measurements with the HP 8903B is very easy. For example, to check the frequency response of an active filter, only a few steps are required. After connecting the device and setting the required source level, you need only to enter the sweep start and stop frequencies, and then press the sweep key. You can have a hard-copy plot of your results using an analog X-Y recorder with a few extra keystrokes.



*X-Y Recorder setup diagram.*

### Automatic Signal-To-Noise Measurements

For signal-to-noise measurements, the HP 8903B monitors the ac input level while turning the source on and off and displaying the ratio. With optional plug-in filters, you can perform weighted signal-to-noise measurements easily, accurately, and in real time.

## Transmitter and Receiver Tests

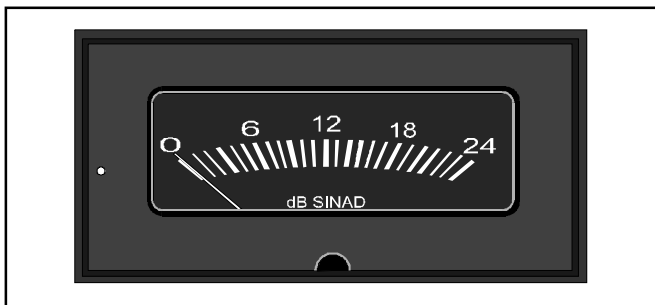
The analyzers have several measurements and features which have been designed specifically for transceiver tests. These include SINAD measurements, optional plug-in weighting filters for testing to CEPT, EIA, CCIR, and Bell standards, rms detection for accurate noise readings, a reciprocal counter for measuring squelch tones and, with the HP 8903B, signal-to-noise ratio measurements.

### SINAD... Designed for the Real World

SINAD measurements, which are one of the most common FM receiver tests, must be made repeatedly when checking receiver sensitivity or adjacent-channel selectivity. In order to smooth out the noisy signals found in receiver testing, the analyzers' SINAD mode employs extra filtering circuits. These circuits have been optimized for high speed (more than two readings per second) and excellent repeatability. The HP 8903B overcomes the tendency of many automatic analyzers to become unlocked in SINAD mode by tuning its notch filter to the source frequency. Since it has no internal audio source, the HP 8903E tunes its notch filter to the input frequency. To make sure that the HP 8903E does not become unlocked when measuring noisy signals, a front-panel notch-hold key allows you to lock the filter to a given input frequency.

### Optimized SINAD Display

To reduce digit flicker, the analyzers round off the display to the nearest 0.5 dB for SINAD ratios less than 25 dB. As an extra aid in reading noisy signals, the HP 8903B adds an analog SINAD meter which displays ratios less than 24 dB.



*The HP 8903B's analog SINAD meter helps smooth out noisy signals found in receiver testing.*



*The HP 8903B is an integral part of HP's total solution for transceiver testing.*

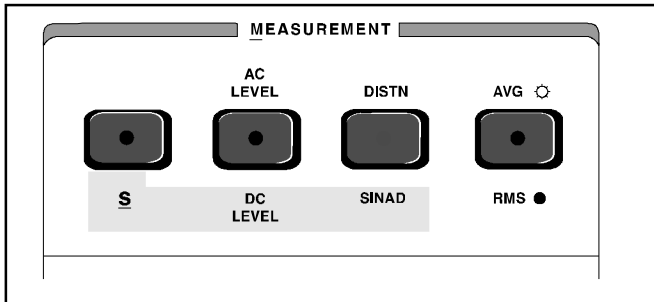
### Filters for Transmitter and Receiver Applications

With two internal filter positions and six optional plug-in filters to choose from, you can tailor the analyzers to fit your applications. The CCITT, CCIR, and C-MES-SAGE weighting filters meet international standards for receiver testing. For transmitter testing, a seven-pole 400 Hz high-pass filter is available to reject subaudible squelch signals. Providing greater than 40 dB rejection of signals up to 250 Hz, the analyzers' 400 Hz high-pass filter allows you to measure transmitter audio distortion to 1 percent without disabling squelch signals.

## ATE Systems

### Accurate Signal Detection

In order to accurately characterize signals with high noise content, as found in receiver SINAD measurements, true-rms detection is required. The analyzers employ true-rms detection for all signals with crest factor less than three. In addition, average detection (rms calibrated) and quasi-peak detection (CCIR 468-4) are also available via front panel control.



*You can choose between rms, average, or quasi-peak detection. (Shown above: HP 8903E front panel)*

### Generate and Count Tone Bursts

Under HP-IB control, the analyzers use their reciprocal counters to count tone-burst sequences. Maximum count rate for the Rapid Frequency Count mode is six milliseconds per reading. With the HP 8903B, you can generate tone burst sequences. Minimum tone duration is three milliseconds, which is fast enough for such applications as unquenching pagers.

### Signal-to-Noise Ratio for Receivers

Just as SINAD measurements are most often performed on FM receivers, signal-to-noise ratio measurements are usually employed as a measure of signal quality on AM receivers. The HP 8903B automatically makes signal-to-noise ratio measurements by monitoring the ac level while turning its source on and off. Like SINAD, signal-to-noise mode in the HP 8903B uses display rounding and filtering to reduce the effects of noise on the measurement.

Simple but powerful programming, combined with HP-IB control of all major functions, make the analyzers valuable tools for the automatic test equipment environment. All analyzer functions are available at one input connector, reducing hardware and software development time and costs. Many ATE systems require automated measurements to determine the quality of audio signals. The analyzers provide distortion and SINAD measurements with an acquisition time of less than 1.5s and a measurement rate of greater than two readings per second after locking. Another application often found in ATE systems involves measuring low-level ac signals. With a full-range ac-level display of .3000 mV and an accuracy of 2 percent of reading ( $V_{in} > 50$  mV, 20 Hz to 20 kHz), the analyzers accurately characterize these small ac signals.



*The HP 8903E provides high performance distortion analysis for ATE applications where an external audio source is used.*

### Flexible ATE Source

The HP 8903B has enhanced ATE capabilities with its internal low-distortion source. Rapid-source programming mode enables the internal oscillator to be directly programmed through HP-IB with five bytes. Additionally, the source has switchable output impedance (50 or 600 ohms). With a choice of source output impedance, you can match the HP 8903B to the instruments in your ATE system. In the 50-ohm position, the HP 8903B delivers +17 dBm into a 600-ohm load.

# HP 8903B Specifications

**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.

## System Specification

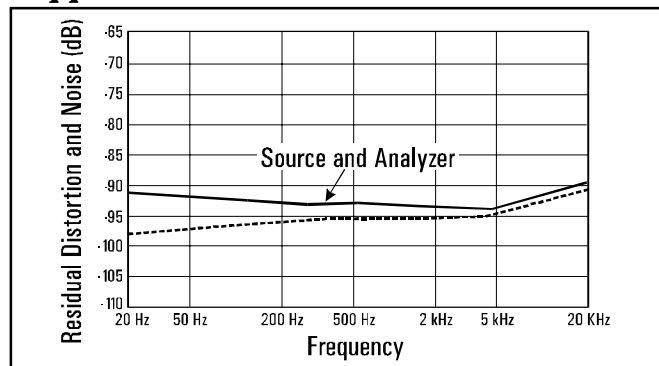
(HP 8903B only, source and analyzer combined.)

## Distortion

RESIDUAL DISTORTION AND NOISE (the higher of):

80 kHz BW:	-80 dB or 17 $\mu$ V, 20 Hz to 20 kHz.
500 kHz BW:	-70 dB or 50 $\mu$ V, 20 Hz to 50 kHz. -65 dB or 50 $\mu$ V, 50 kHz to 100 kHz.

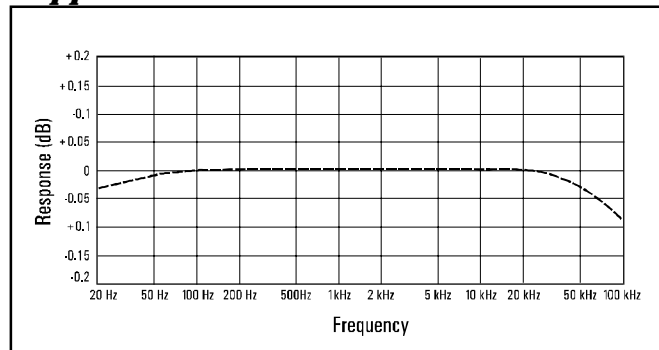
## Supplemental Characteristics



Typical residual distortion and noise of the source and analyzer combined (source voltage set to 1.5V, 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 1V, 1 kHz reference).

## Signal-To-Noise

FREQUENCY RANGE:	50 Hz to 100 kHz.
DISPLAY RANGE:	0 to 99.99 dB.
ACCURACY:	$\pm 1$ dB.
INPUT VOLTAGE RANGE:	50 mV to 300 V.
RESIDUAL NOISE (the higher of):	
80 kHz BW:	-85 dB or 17 $\mu$ V.
500 kHz BW:	-70 dB or 50 $\mu$ V.

## Supplemental Characteristics

*TIME TO RETURN FIRST MEASUREMENT: < 2.5s.*  
*MEASUREMENT RATE: 1 reading per second.*  
*RESOLUTION: same as Listed under SIXAD, on next page.*

## 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 (open circuit):	
	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 Hz to 100 kHz.

FLATNESS (1 kHz reference);  
 $\pm 0.7\%$  ( $\pm 0.06$  dB), 20 Hz to 20 kHz.  
 $\pm 2.5\%$  ( $\pm 0.22$  dB), 20 Hz to 100 kHz.

DISTORTION AND NOISE (the higher of):

80 kHz BW:	-80 dB or 15 $\mu$ V, 20 Hz to 20 kHz.
500 kHz BW:	-70 dB or 38 pV, 20 Hz to 50 kHz. -65 dB or 38 $\mu$ V, 50 kHz to 100 kHz.

IMPEDANCE: 600  $\Omega$   $\pm 1\%$  or 50  $\Omega$   $\pm 2\%$  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: 1.5s.*

*MEASUREMENT RATE: 2 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 Flick-ering 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: 1.5s.*

*MEASUREMENTS RATE: 2 readings per second.*

## AC Level

FULL RANGE DISPLAY: 300.0 V, 30.00 V, 3.000 V,  
.3000 V, 30.00 mV, 3.000 mV, 0.3000 mV.

OVER RANGE: 33% except on 300 V range.

ACCURACY (rms and average detection):  
±2%, 50 mV to 300 V, 20 Hz to 20 kHz.  
±4%, 0.3 mV to 50 mV, 20 Hz to 100 kHz.  
±4%, 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: < 1.5s.*

*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.*

## DCL level

FULL RANGE DISPLAY:  
300.0 V, 48.00 V, 16.00 V, 4.000 V.

OVER RANGE: 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: <1.5s.*

*MEASUREMENT RATE: 3 readings per second*

## Frequency Measurement

MEASUREMENT RANGE:  
20 Hz to 150 kHz. (20 Hz to 100 kHz in distortion and SINAD modes.)

RESOLUTION:  
5 digits (0.01 Hz for input frequencies < 100 Hz).

ACCURACY: ±(0.004% + 1 digit).

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

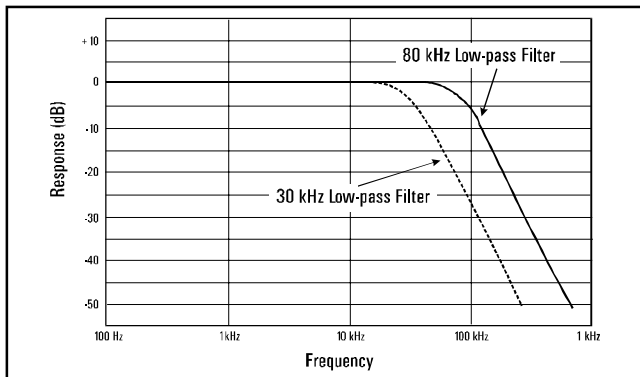
## Supplemental Characteristics

*MEASUREMENT RATE: same as measurement mode selected.*

*COUNTING TECHNIQUE:*  
*reciprocal with 2 MHz timebase.*

# HP 8903B and HP 8903E Analyzer Specifications

## Standard Audio Filters



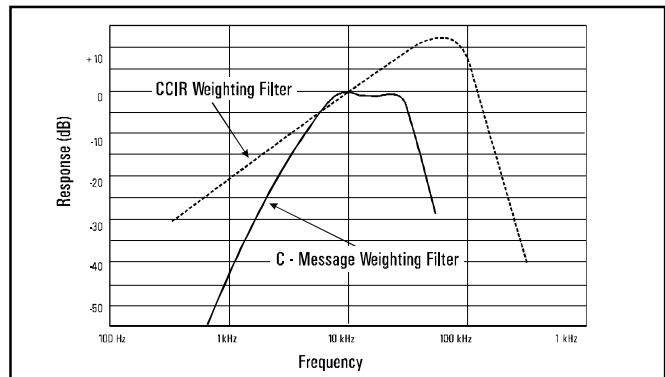
### 30 kHz LOW-PASS FILTER

3 dB Cutoff Frequency: 30 kHz  $\pm$  2 kHz,  
Rolloff: Third-order Butterworth; 18 dB  
per octave or 60 dB per decade.

### 80 kHz LOW-PASS FILTER

3 dB Cutoff Frequency: 80 kHz  $\pm$  4 kHz.  
Rolloff: Third-order Butterworth; 18 dB  
per octave or 60 dB per decade.

## Plug-in Audio Filters



### CCIR WEIGHTING FILTER (CCIR rec, 468-2)

Deviation from Ideal Response:

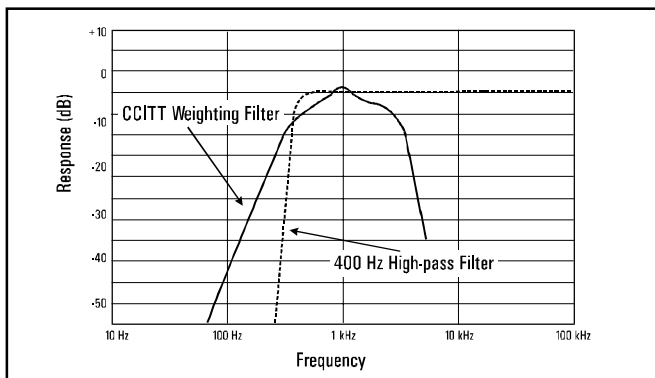
- $\pm$ 0.1 dB at 6.3 kHz.
- $\pm$ 0.2 dB, 6.3 kHz to 7.1 kHz.
- $\pm$ 0.4 dB, 7.1 kHz to 10 kHz.
- $\pm$ 0.5 dB, 200 Hz to 6.3 kHz.
- $\pm$ 1.0 dB, 31.5 Hz to 200 Hz, 10 kHz to 20 kHz.
- $\pm$ 2.0 dB, 20 kHz to 31.5 kHz.

### C-MESSAGE WEIGHTING FILTER (Per BSTM 41004)

Deviation from Ideal Response:

- $\pm$ 0.1 dB at 1 kHz.
- $\pm$ 1.0 dB, 60 Hz to 5 kHz.

## Plug-in Audio Filters



### 400 Hz HIGH-PASS FILTER

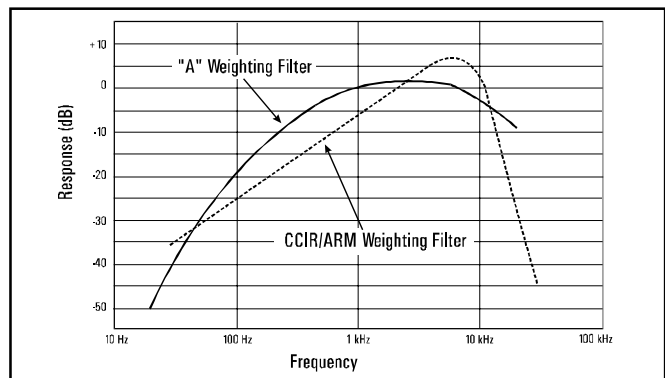
3 dB Cutoff Frequency: 400 Hz  $\pm$  40 Hz.  
Rolloff: Seventh-order Butterworth;  
42 dB per octave or 140 dB per decade.

### CCITT WEIGHTING FILTER (CCITT rec. P53)

Deviation from Ideal Response:

- $\pm$ 0.2 dB at 800 Hz.
- $\pm$ 1.0 dB, 300 Hz to 3 kHz.
- $\pm$ 2.0 dB, 50 Hz to 3.5 kHz.
- $\pm$ 3.0 dB, 3.5 kHz to 5 kHz.

## Plug-in Audio Filters



### CCIR/ARM WEIGHTING FILTER (CCIR rec. 468-2,

average-responding meter, Dolby Labs Bulletin No. 19/4)

Deviation from Ideal Response:

Same as listed under CCIR  
WEIGHTING FILTER above.

### "A" WEIGHTING FILTER

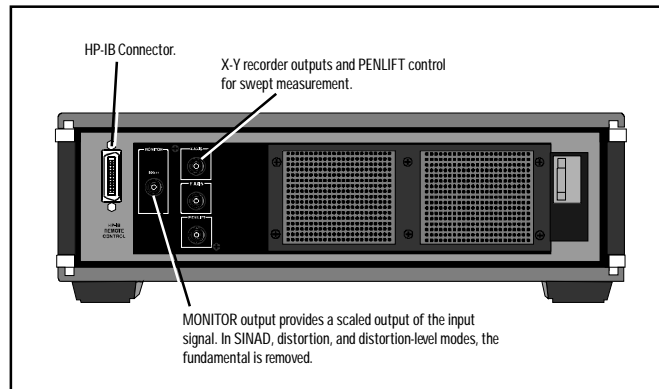
(IEC rec. 179 and ANSI S1.4,  
type 1 sound-level meter)

Deviation from Ideal Response:

- $\pm$ 0.1 dB at 1 kHz.
- $\pm$ 0.5 dB, 20 Hz to 10 kHz.
- $\pm$ 1.0 dB, 10 kHz to 20 kHz.

# HP 8903B and HP 8903E General Specifications

## HP 8903B REAR-PANEL FEATURES



### Front/Rear-Panel Outputs

#### Supplemental Characteristics

##### RECORDER OUTPUTS (HP 8903B only):

**X-axis:** 0-10 Vdc corresponding to log of oscillator frequency. Output resistance 1k $\Omega$ .

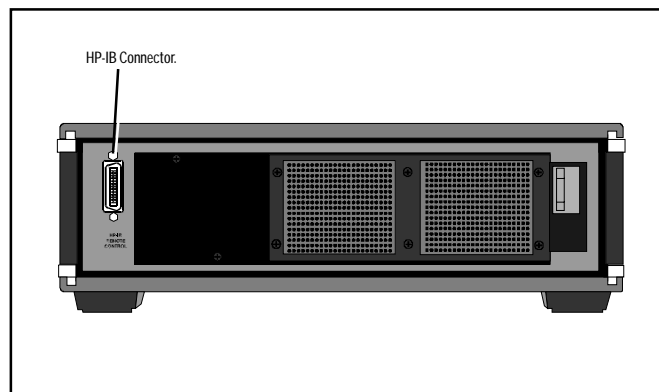
**Y-axis:** 0-10 Vdc corresponding to displayed value and entered plot limits. Output resistance 1 k $\Omega$ .

**Penlift:** TTL output.

##### MONITOR OUTPUT:

Output impedance 600 $\Omega$ . AC-level mode: provides a scaled output of the 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



### Analyzer Input

INPUT TYPE: Balanced (full differential).

##### INPUT IMPEDANCE:

100 k $\Omega$   $\pm$ 1% shunted by <300 pF, each side to ground. (In dc-level mode the input resistance is 101 k $\Omega$   $\pm$ 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.

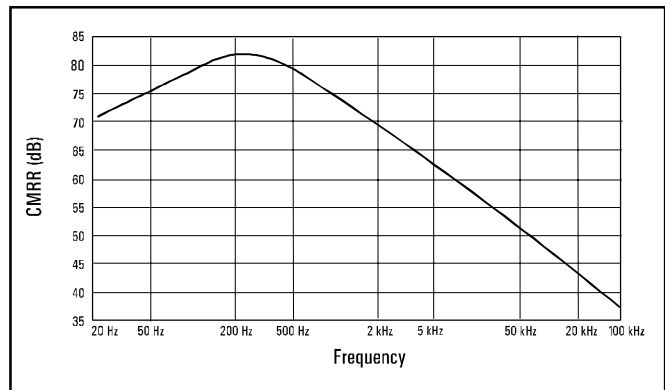
HP 8903K

42 volts peak, low side to ground, 425 volts peak, differentially or high side to ground.

##### CMRR:

- > 60 dB, 20 Hz to 1 kHz,  $V_{in} < 2V$ .
- > 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  $^{\circ}$ C to 55  $^{\circ}$ C; storage, -55  $^{\circ}$ C to 75  $^{\circ}$ C.

##### REMOTE OPERATION:

HP-IB. All functions except the line switch, low-terminal ground switches, source output-impedance switch (HP 8903B only), and the X10- and  $\div$ 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 -66 Hz.  
100 or 120 V (+5, -10%); 48 -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.).

##### DIMENSION:

146 mm H x 425 mm W x 462 mm D (5.75 x 16.8 x 18.2 in.).

HP SYSTEM II SIZE: 5-1/4 H x 1 MW x 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 (1V/meter) of  
MIL STD 461B dated 1980.

## ORDERING INFORMATION

### ANALYZER MAINFRAMES HP 8903B AUDIO ANALYZER

- Option 001: rear panel input and output
- Option 910: provides additional operation/  
calibration manual [08903-90079] and  
two service manuals (08903-90062)
- Option 915: add service manual (08903-90062)
- Option W30: 3-year return repair service

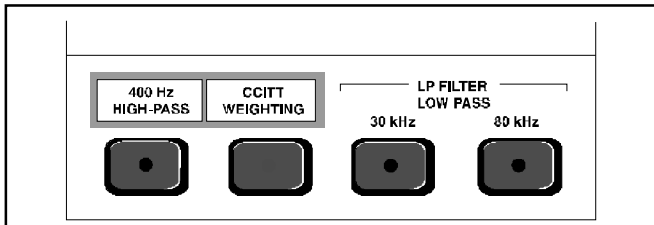
### HP 8903E DISTORTION ANALYZER

- Option 001: rear panel input and output
- Option 910: provides additional operation/  
calibration manual (08903-90053) and  
two service manuals (08903-90065)
- Option 915: add service manual (08903-90065)
- Option W30: 3-year return repair service

### OPTIONS FOR BOTH HP 8903B AND HP 8903E

- Option 907: front handle kit
- Option 908: rack flange kit
- Option 909: rack flange kit with front handles

## INTERNAL PLUG-IN FILTER OPTIONS



*Two band-limiting low-pass filters are standard. Optional high-pass and weighting filters can be fitted to match your requirements.*

Both the HP 8903B and HP 8903E have two plug-in filter positions which can be loaded with any of six optional filters. The standard HP 8903B and HP 8903E come with no plug-in filters. You must order the appropriate filter options if you wish to have any of the filters listed in the next column. Each filter option ordered adds additional cost to the instrument.

## FILTER OPTIONS

Filters	Option Numbers Filter Positions		Price
	Left	Right	
400 Hz high-pass	010	050	
CCITT weighting filter	011	051	
CCIR weighting filter	012	052	
C-MESSAGE weighting filter	013	053	
CCIR/ARM weighting filter	014	054	
"A" weighting filter	015	055	

## Plug-in Filter Ordning Examples

Here are two examples of how the plug-in filters might be ordered:

<b>First Example</b>	<b>HP 8903B</b>
<b>One</b>	<b>Option 010</b>
	<b>Total \$</b>

### Explanation:

This HP 8903B has a 400 Hz high-pass filter in the left slot and no filter in the right slot.

<b>Second Example</b>	<b>HP 8903E</b>
<b>One</b>	<b>Option 012</b>
<b>One</b>	<b>Option 055</b>
	<b>Total \$</b>

### Explanation:

This HP 8903E has a CCIR weighting filter in the left slot and an "A" weighting filter in the right slot.

For more information about Hewlett-Packard Test & Measurement products, applications, services and for a current sales office listing, visit our web site, <http://www.hp.com/go/tmdir>. You can also contact one of the following centers and ask for a test and measurement sales representative.

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Hewlett-Packard Company  
Test and Measurement  
Call Center  
PO Box 4026  
Englewood, CO 80155-4026  
1-800-452-4844

**Canada:**  
Hewlett-Packard Canada Ltd.  
5150 Spectrum Way  
Mississauga, Ontario  
L4W 5G1  
(905) 206-4725

**Europe:**  
Hewlett-Packard  
European Marketing Centre  
P.O. Box 999  
1180 AZ Amstelveen  
The Netherlands

**Japan:**  
Hewlett-Packard Japan Ltd.  
Measurement Assistance  
9-1, Takakura-cho,  
Hachioji-shi,  
Tokyo 192, Japan  
(81) 426 56 0732  
Fax (81) 426 56 7840

**Latin America:**  
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**Asia Pacific:**  
Hewlett-Packard  
Asia Pacific Ltd.  
17-21/F Shell Tower,  
Times Square,  
1 Matheson Street,  
Causeway Bay,  
Hong Kong  
Tel: (852) 2599 7777

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