

**1121A** Audio Analyzer

The Model 1121A Audio Analyzer is an updated version of the Boonton Model 1121. The 1121A incorporates: selectable output impedances of 50, 150 and 600 ohms, 16 volt rms output, 0.3 millivolt full scale measurement range, and quasi-peak detection. It can be used as a direct replacement in all 1121 applications. The 1121A instrument automatically tunes and auto-ranges for maximum accuracy and resolution. Distortion, frequency response, AC and DC voltage measurements are a single keystroke away. The instrument is ideally suited for stimulus response applications because of an on-board low-distortion audio source. Internal control of the source and analyzer allows for swept measurements.

# 1121A Audio Analyzer

## Specifications



For the accurate measurement of complex waveforms and noise, the audio analyzer uses true RMS average or quasi-peak detection. Accurate distortion measurements can be made to -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 audio analyzer precision reciprocal counter gives fast and accurate characterization of audio frequencies.

- Low distortion audio source for testing systems, amplifiers, radio transceivers and components
- Non-volatile memory for instant recall of up to 99 complete front panel setups

### Frequency Measurement

<b>Range</b>	5 Hz to 200 kHz
<b>Resolution</b>	
0.001 Hz	5.000 Hz to 199.999 Hz
0.01 Hz	200.00 Hz to 1999.99 Hz
0.1 Hz	2.0000 kHz to 19.9999 kHz
1.0 Hz	20.000 kHz to 199.999 kHz
<b>Accuracy</b>	Timebase accuracy + 1 count
<b>Sensitivity</b>	5.0 mV (Frequency mode) 50.0 mV (Distortion & SINAD modes)

### Timebase

<b>Type</b>	10 MHz TCXO
<b>Accuracy</b>	±1 ppm/yr

### AC Level Measurement

<b>Ranges (full scale)</b>	300.0 V, 30.00 V, 3.000 V, 300.0 mV, 30.00 mV, 3.000 mV, and 0.3000 mV
<b>Overrange</b>	33% except on 300 V range
<b>Accuracy</b>	
± 1%, 50 Hz to 50 kHz	1 mV to 300 V, 0.5% typ.
± 2%, 20 Hz to 100 kHz	1 mV to 300 V, 1.0% typ.
± 3%, 10 Hz to 100 kHz	1 mV to 300 V, 1.5% typ.
± 4%, 10 Hz to 100 kHz	0.3 mV to 300 V, 2.0% typ.

### DC Level Measurement

<b>Ranges (full scale)</b>	300.0 V, 30.00 V, and 3.000 V
<b>Overrange</b>	33% except on 300 V range
<b>Accuracy</b>	±1.0% or 6 mV whichever is greater

### Distortion Measurement

<b>Fundamental Frequency Range</b>	10 Hz to 100 kHz usable to 140 kHz
<b>Resolution</b>	
0.00001 % for <0.11000% THD	0.0001 % for <1.1 % THD
0.001 % for <11 % THD	0.01 % for <100% THD
<b>Display Range</b>	0.00001% to 100.0% (-140.00 to 0.00 dB)
<b>Accuracy</b>	± 1 dB; 20 Hz to 20 kHz ± 2 dB; 10 Hz to 100 kHz
<b>Input Voltage Range</b>	50 mV to 300 V
<b>Distortion Measurement Range (the higher of)</b>	
10 Hz to 20 kHz, 80 kHz bandwidth	
0.010% (-80 dB); 350 mV to 300 V Input Voltage Range	
0.032% (-70 dB); 200 mV to 350 mV Input Voltage Range	
0.056% (-65 dB); 100 mV to 200 mV Input Voltage Range	
10 Hz to 50 kHz, 220 kHz bandwidth	
0.020% (-74 dB); 200 mV to 300 V Input Voltage Range	
0.056% (-65 dB); 100 mV to 200 mV Input Voltage Range	
10 Hz to 50 kHz, 500 kHz bandwidth	
0.032% (-70 dB); 200 mV to 300 V Input Voltage Range	
0.056% (-65 dB); 100 mV to 200 mV Input Voltage Range	
50 kHz to 100 kHz, 500 kHz bandwidth	
0.056% (-65 dB); 100 mV to 300 V Input Voltage Range	
10 Hz to 100 kHz, all bandwidths	
0.10% (-60 dB) (typical); 50 mV to 100 mV Input Voltage Range	

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### SINAD Measurement

<b>Fundamental Frequency Range</b>	10 Hz to 100 kHz usable to 140 kHz tuned to the source frequency setting
<b>Display Range</b>	0.00 to 140.00 dB
<b>Accuracy</b>	±1 dB; 20 Hz to 20 kHz ±2 dB; 10 Hz to 100 kHz
<b>Input Voltage Range</b>	50 mV to 300 V

### SINAD Measurement Range

10 Hz to 20 kHz, 80 kHz bandwidth 80 dB; 350 mV to 300 V Input Voltage Range 70 dB; 200 mV to 350 mV Input Voltage Range 65 dB; 100 mV to 200 mV Input Voltage Range
10 Hz to 50 kHz, 220 kHz bandwidth 74 dB; 200 mV to 300 V Input Voltage Range 65 dB; 100 mV to 200 mV Input Voltage Range
10 Hz to 50 kHz, 500 kHz bandwidth 70 dB; 200 mV to 300 V Input Voltage Range 65 dB; 100 mV to 200 mV Input Voltage Range
50 kHz to 100 kHz, 500 kHz bandwidth 65 dB; 100 mV to 300 V Input Voltage Range
10 Hz to 100 kHz, all bandwidths 60 dB (typical); 50 mV to 100 mV Input Voltage Range

### S/N Measurement

<b>Fundamental Frequency Range</b>	10 Hz to 100 kHz usable to 140 kHz tuned to the source frequency setting
<b>Display Range</b>	0.00 to 140.00 dB
<b>Accuracy</b>	±1 dB
<b>Input Voltage Range</b>	50 mV to 300 V
<b>Residual Noise* (the higher of)</b>	85 dB or 10 µV; 80 kHz BW 85 dB or 20 µV; 220 kHz BW 85 dB or 40 µV; 500 kHz BW *for input voltages of 250mV or greater
<b>Common Mode Rejection Ratio CMRR</b>	>70 dB >45 dB
	20 Hz to 1 kHz, V in <3V 1 kHz to 20 kHz, V in <3V
<b>Limits</b>	
Common mode	Differential input voltage
< 4.25 V pk	3.000 V range
< 42.5 V pk	30.00 V range
< 425 V pk	300.0 V range

### Analyzer Input

**Type** Balanced (full differential)

### Impedance

100 k ohms ± 1% and <300 pF each side to ground in all measurement modes

### Protection

Excessive common mode levels are hardware limited on all input ranges and fuse protection is employed against peak levels exceeding 425 V

### Audio Filters

<b>30 kHz Low-Pass Filter Accuracy</b>	30 kHz ± 2 kHz. Rolloff: Third-order Butterworth; 60 dB/decade
<b>80 kHz Low-Pass Filter Accuracy</b>	80 kHz ± 4 kHz. Rolloff: Third-order Butterworth; 60 dB/decade
<b>220 kHz Low-Pass Filter Accuracy</b>	220 kHz ± 20 kHz. Rolloff: Third-order Butterworth; 60 dB/decade

### Source Specifications

<b>Frequency Range</b>	10 Hz to 140 kHz
<b>Resolution</b>	0.001 Hz 0.01 Hz 0.1 Hz 1.0 Hz
	10.000 Hz to 199.999 Hz 200.00 Hz to 1999.99 Hz 2.0000 kHz to 19.9999 kHz 20.000 kHz to 140.000 kHz
<b>Accuracy</b>	20 ppm + timebase accuracy + 1 count

### Output Level

<b>Range (open circuit)</b>	0.01 mV to 16.0 Vrms
<b>Resolution</b>	0.01 mV 0.1 mV 1.0 mV 5.0 mV
	0 mV to 30 mV 30 mV to 300 mV 300 mV to 3V 3V to 16V

### Accuracy (0.6 mV to 16 V)

± 0.5% of setting + 0.05% of Range 10 Hz to 50 kHz; typ 0.3%  
± 1.0% of setting + 0.05% of Range 50 kHz to 100 kHz; typ 0.6%  
± 1.5% of setting + 0.1 % of Range 100 kHz to 140 kHz; typ 1.0%

### Flatness (30 mV to 8 V into 50 ohms, relative to 1 kHz)

± 0.5% 10 Hz to 50 kHz  
± 1.0% 10 Hz to 100 kHz  
± 1.5% 10 Hz to 140 kHz

### Distortion and Noise (the higher of)

0.01% (-80 dB) or 10 µV 10 Hz to 20 kHz, 80 kHz BW  
0.02% (-74 dB) or 10 µV 20 kHz to 50 kHz, 220 kHz BW  
0.032% (-70 dB) or 35 µV 10 Hz to 50 kHz BW  
0.056% (-65 dB) or 50 µV 50 kHz to 100 kHz, 500 kHz BW  
0.1% (-60 dB) or 50 µV 100 kHz to 140 kHz, 500 kHz BW

### Output Impedance

50 ohms ± 2%  
150 ohms ± 1%  
600 ohms ± 1%

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## Specifications

### Supplemental Information

**Power Requirements** 100, 120, 220 or 240 VAC  
50 to 400 Hz, 100 VA

This instrument is designed for indoor use only

**Operating Temperature** 0° to 55°C

**Weight** 25 lbs (11.3 kg)

**Dimensions** 17.75 in (45.1 cm) wide  
5.85 in (14.9 cm) high  
18 in (45.8 cm) deep

### AC Measurement

**RMS Detector** True RMS responding for signals with a crest factor of <3

**Average Detector** Average responding  
RMS calibrated

**Quasi-peak Detector** Meets CCIR recommendations  
468-3, accuracy ± 6%  
20 Hz to 20 kHz

**Bandwidth** 5 Hz to 500 kHz

### Frequency Measurement

**Technique** Reciprocal counting with 10 MHz time base

**Source Oscillator Switching Speed** Simultaneous frequency and level changes (using IEEE-488 burst mode) <12 ms

**Level Transition** <10 ms

### Analyzer Measurement Speed

	First rdg	Measurement rate
<b>Frequency</b>	<1.0 sec	4 rdgs/sec
<b>Level</b>	<1.0 sec	10 rdgs/sec
<b>Distortion</b>	<1.0 sec	8 rdgs/sec
<b>SINAD</b>	<1.0 sec	8 rdgs/sec
<b>S/N</b>	<2.0 sec	1 rdgs/sec

### Accessories

**Included** Spare input/output fuses, line fuses

#### Accessories Available

Rack-mounting kit ears only (gray) P/N 95004493A  
Rack-mounting kit with ears and handles (gray) P/N 95004494A  
Single binding post to BNC(M) P/N 95401801A

### Rear Panel Connectors

**Monitor** (600 ohm output impedance)

AC level, Frequency and S/N Modes  
Provides a scaled output of input signal

Distortion and SINAD Modes  
Provides a scaled output of input signal with the fundamental removed

#### SYNC

Provides TTL compatible output relative to the source oscillator frequency

#### X CLK

TTL compatible input for external 10 MHz counter reference. Automatic switching to external signal when present

#### X AXIS

0 to 5 VDC signal corresponding to the source oscillator frequency or levels in the Sweep mode. 1000 ohm output impedance

#### Y AXIS

0 to 5 VDC signal corresponding to the displayed measurement value and entered plot limits, 1000 ohm output impedance

#### PENUP

TTL compatible output for plotter pen control

#### IEEE-488 Bus

Complies with IEEE-488. Implements AH1, SH1, T6, TE0, L4, LE0, SR1, RI1, PP0, DC1, DT1, C0 and E1

### Options

<b>-01</b>	Rear Panel Input/Output
<b>-11</b>	400 Hz High Pass Filter
<b>-12</b>	Psophometric (CCITT) Band-Pass Filter
<b>-13</b>	CCIR Band-Pass Filter
<b>-15</b>	A Weighting Filter
<b>-16</b>	B Weighting Filter
<b>-17</b>	C Weighting Filter
<b>-18</b>	Audio Band-Pass Filter
<b>-19</b>	C-Message Filter

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