

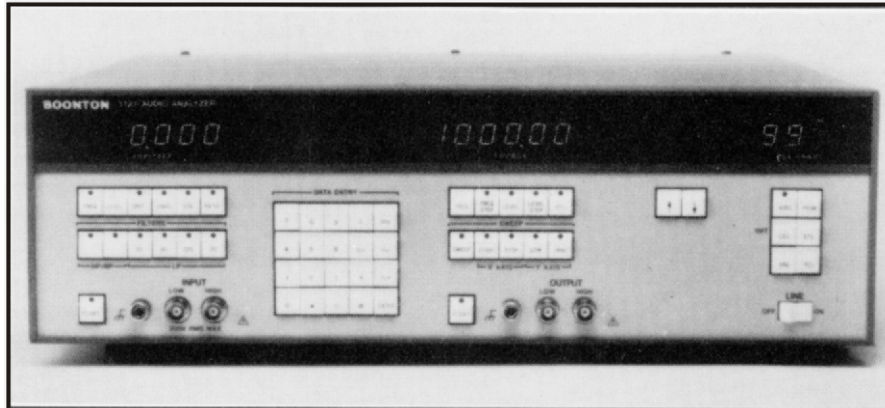
BOONTON

AUDIO TEST INSTRUMENTS

Audio Analyzer Model 1121



- Frequency Range, 10 Hz to 200 kHz.
- Low distortion audio source for testing systems, amplifiers, receivers and components.
- Measurement level, 300 μ V to 300 V fs.
- Non-volatile memory for instant recall of up to 99 complete front panel setups.



Description

The Model 1121 Audio Analyzer is an enhanced version of our very successful Model 1120. The Model 1121 incorporates: selectable output impedances of 50, 150 and 600 ohms; 16 volt rms output; additional 0.3 millivolt full scale measurement range, and quasi-peak detection. The 1121 can be used as a direct replacement in present 1120 applications. The instrument automatically tunes and autoranges for maximum accuracy and resolution. Distortion, frequency response, AC and DC voltage measurements are a single keystroke away. With a built in low distortion audio source, the instrument is ideally suited to stimulus response applications. Microprocessor control of source and analyzer allows the instrument to perform swept measurements.

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

Specifications

Frequency Measurement

Range: 5 Hz to 200 kHz.

Resolution:

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.

Accuracy: Timebase accuracy + 1 count.

Sensitivity: 5.0 mV in the Frequency mode.
50.0 mV in the Distortion and SINAD modes.

Timebase

Type: 10 MHz TCXO.

Accuracy: ± 1 ppm yr.

AC Level Measurement

Ranges: (full scale) 300.0 V, 30.00 V, 3.000 V, 300.0 mV, 30.00 mV, 3.000 mV, and 0.300 mV.

Overrange: 33% except on 300 V range.

Accuracy:

$\pm 1\%$, 50 Hz to 50 kHz, 1 mV to 300 V, 0.5% typ.
 $\pm 2\%$, 20 Hz to 100 kHz, 1 mV to 300 V, 1.0% typ.
 $\pm 3\%$, 10 Hz to 100 kHz, 1 mV to 300 V, 1.5% typ.
 $\pm 4\%$, 10 Hz to 100 kHz, 0.3 mV to 300 V, 2.0% typ.

DC Level Measurement

Ranges: (full scale)
300.0 V, 30.00 V, and 3.000 V.

Overrange: 33% except on 300 V range.

Accuracy: $\pm 1.0\%$ or 6 mV, whichever is greater.

Distortion Measurement

Fundamental Frequency Range: 10 Hz to 100 kHz usable to 140 kHz.

Resolution:

0.00001% for <0.11000% THD.
0.0001% for <1.1% THD.
0.001% for <11% THD.
0.01% for <100% THD.

Display Range: 0.00001% to 100.0% (-140.00 to 0.00 dB).

Accuracy:

± 1 dB; 20 Hz to 20 kHz.
 ± 2 dB; 10 Hz to 100 kHz.

Input Voltage Range: 50 mV to 300 V.

Distortion Measurement Range: (the higher of)

0.01% (-80 dB) or 10 μ V; 10 Hz to 20 kHz, 80 kHz BW.
0.02% (-74 dB) or 20 μ V; 10 Hz to 50 kHz, 220 kHz BW.
0.032% (-70 dB) or 40 μ V; 10 Hz to 50 kHz, 500 kHz BW.
0.056% (-65 dB) or 50 μ V; 50 kHz to 100 kHz, 500 kHz BW.

SINAD Measurement

Fundamental Frequency Range: 10 Hz to 100 kHz usable to 140 kHz tuned to the source frequency setting.

Display Range: 0.00 to 140.00 dB

Accuracy: ± 1 dB; 20 Hz to 20 kHz.
 ± 2 dB; 10 Hz to 100 kHz.

Input Voltage Range: 50 mV to 300 V.

SINAD Measurement Range:

80 dB or 10 μ V; 10 Hz to 20 kHz, 80 kHz BW.
74 dB or 20 μ V; 10 Hz to 50 kHz, 220 kHz BW.
70 dB or 40 μ V; 10 Hz to 50 kHz, 500 kHz BW.
65 dB or 50 μ V; 50 kHz to 100 kHz, 500 kHz BW.

Signal to Noise Measurement

Frequency Range: 10 Hz to 100 kHz usable to 140 kHz.

Display Range: 0.00 to 140.00 dB

Accuracy: ± 1 dB.

Input Voltage Range: 50 mV to 300 V.

Residual Noise: (the higher of)

85 dB or 10 μ V; 80 kHz BW.
85 dB or 20 μ V; 220 kHz BW.
85 dB or 40 μ V; 500 kHz BW.

AUDIO TEST INSTRUMENTS

Audio Analyzer Model 1121 (continued)



Common Mode Rejection Ratio

CMRR:

> 70 dB; 20 Hz to 1 kHz, $V_{in} < 3 V$.
> 45 dB; 1 kHz to 20 kHz, $V_{in} < 3 V$.

Limits:

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 $\pm 1\%$ 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 max.

Audio Filters

30 kHz Low Pass Filter Accuracy: 30 kHz ± 2 kHz. Roll-off: Third-order Butterworth; 60 dB/decade.

80 kHz Low Pass Filter Accuracy: 80 kHz ± 4 kHz. Roll-off: Third-order Butterworth; 60 dB/decade.

220 kHz Low Pass Filter Accuracy: 220 kHz ± 20 kHz. Roll-off: Third-order Butterworth; 60 dB/decade.

Source Specifications

Frequency

Range: 10 Hz to 140 kHz.

Resolution:

0.001 Hz; 10.000 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 140.000 kHz.

Accuracy: 10 ppm + timebase accuracy + 1 count.

Timebase

Type: 10 MHz TCXO.

Accuracy: ± 1 ppm/yr.

Output Level

Range: (open circuit)
0.01 mV to 16.0 V rms

Resolution:

0.01 mV; 0 mV to 30 mV
0.1 mV; 30 mV to 300 mV
1.0 mV; 300 mV to 3 V
5.0 mV; 3 V to 16 V

Accuracy: (0.6 mV to 16 V)

$\pm 0.5\%$ of setting + 0.05% of Range
10 Hz to 50 kHz; typically 0.3%
 $\pm 1.0\%$ of setting + 0.05% of Range
50 kHz to 100 kHz; typically 0.6%
 $\pm 1.5\%$ of setting + 0.1% of Range
100 kHz to 140 kHz; typically 1.0%

Flatness: (into 50 ohms)

$\pm 0.5\%$; 30 mV to 8 V, 10 Hz to 50 kHz, 1 kHz ref.
 $\pm 1.0\%$; 30 mV to 8 V, 10 Hz to 100 kHz, 1 kHz ref.
 $\pm 1.5\%$; 30 mV to 8 V, 10 Hz to 140 kHz, 1 kHz ref.

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.

Impedance:

50 ohms $\pm 2\%$
150 ohms $\pm 1\%$
600 ohms $\pm 1\%$

Power Requirements: 80 VA; 100, 120, 220 or 240 V, 50 to 400 Hz.

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, and 18 in (45.8 cm) deep.

Accessories

Included: Spare input/output fuses, line fuses.

Accessories Available:

Rack-mounting kit, P/N 95004491A
Rack-mounting kit with ears and handles, P/N 95004492A
Chassis slide kit, P/N 95004401A
Single binding post to BNC(M), P/N 95401801A
BNC(F) to phono plug, P/N 95401901A
Phone jack to BNC(M), P/N 95402001A
2-conductor shielded balanced line (36"), P/N 95402136A
Audio XLR connector to three banana plugs, P/N 95402201A

Options:

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

Supplemental Information

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 $\pm 6\%$; 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	Msrmnt rate
Frequency:	<1.0 sec	4 rdgs/sec
Level:	<1.0 sec	10 rdgs/sec
Distortion:	<1.0 sec	8 rdgs/sec
SINAD:	<1.0 sec	8 rdgs/sec
S/N:	<2.0 sec	1 rdg/sec

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.

IEEE-488 Bus: Complies with IEEE-488. Implements AH1, SH1, T6, TE0, L4, LE0, SR1, RL1, PP0, DC1, DT1, C0 and E1.

CE Mark: Declares Conformity to European Community (EC) Council Directives: 89/336/EEC/93/68/EEC, 73/23/EEC/93/68/EEC & Standards: EN55011, EN50082-1, EN61010-1.