Boonton

Data Sheet

1121A Audio Analyzer

Taking performance to a new peak

Audio Analyzer Model 1121A

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.

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

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 (Frequency mode) 50.0 mV (Distortion & 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 0.3000 mV
Overrange	33% except on 300 V range
Accuracy	
± 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	
Ranges (full scale)	300.0 V, 30.00 V, and 3.000 V
Overrange	33% except on 300 V range
Accuracy	±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)

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

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	
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

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
Input Voltage Range	50 mV to 300 V
Residual Noise* (the higher of)	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
Common Mode Rejection Ratio CMRR	
>70 dB	20 Hz to 1kHz, V in <3V
>45 dB	1 kHz to 20 kHz, V in <3V
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 ± 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

30 kHz Low-Pass Filter Accuracy	30 kHz ± 2 kHz. Rolloff: Third-order Butterworth; 60 dB/decade
80 kHz Low-Pass Filter Accuracy	80 kHz ± 4 kHz. Rolloff: Third-order Butterworth; 60 dB/decade
220 kHz Low-Pass Filter Accuracy	220 kHz ± 20 kHz. Rolloff: 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	20 ppm + timebase accuracy + 1 count

Output Level

Range (open circuit)	0.01 mV to 16.0 Vrms
Resolution	
0.01 mV	0 mV to 30 mV
0.1 mV	30 mV to 300 mV
1.0 mV	300 mV to 3V
5.0 mV	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%

Supplemental Information

Power Requirements	100, 120, 220 or 240 VAC 50 to 400 Hz, 80 VA
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 (using IEEE-488 burst mode)	Simultaneous Frequency and level Changes <12 ms
Level Transition	<10 ms

Analyzer Measurement Speed

	First rdg	Measurement 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 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

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

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

Options

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

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