BOONTON

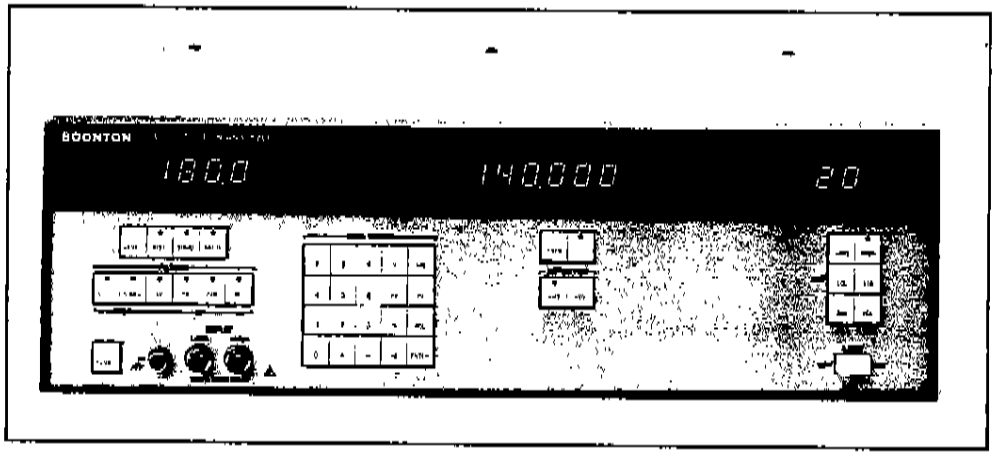
AUDIO TEST INSTRUMENTS

Distortion Analyzer

Model 1130

GPIB

- Distortion measurements from 10 Hz to 140 kHz
- 3 mV sensitivity
- Ultra-low residual distortion and noise
- SINAD, frequency, and ac/dc level measurements
- Average or RMS detection
- Programmable notch filter
- Standard and optional filters
- IEEE-488 bus interface standard



Description

The Model 1130 Distortion Analyzer provides all the functions necessary to fully characterize audio signals in one compact, easy-to-use instrument. All functions are automatically ranged for maximum display resolution and accuracy. The 1130 features a fully differential or single-ended input for tests such as in bridged amplifiers and power supplies. The differential input also serves to reduce the effect of ground loops on measurement accuracy.

Distortion

The 1130 measures distortion automatically at any frequency from 10 Hz to 140 kHz. No tuning is required. Instead, the 1130 measures the frequency of the fundamental, tunes a sharp notch filter to reject the fundamental, and measures and displays the total harmonic distortion and noise. To facilitate accurate measurements, the instrument has very low internal noise and distortion, typically less than 0.001% or 3µV for an 80 kHz bandwidth. Distortion may be displayed in linear units (%, mV, or V) or logarithmic units (dB, dBm, or dBV).

Versatile Filter Selection

Three low-pass filters, 30 kHz, 80 kHz, and 220 kHz, are supplied as standard. Nine optional filters are also available to meet the requirements of U.S.A. and European telephone and radio communications, recorders with Dolby noise suppression, and audio amplifier measurements.

SINAD And Frequency

SINAD measurements (signal to noise and distortion) are made by manually coarse-tuning the notch filter to the fundamental frequency. If the fundamental frequency is unknown, it can be measured by the 1130 to 1 ppm accuracy and 5-$^1/_2$ digits resolution.

Programmable Notch Filter

The ability to manually tune the notch filter is an important feature when noise is to be measured in the presence of an interfering tone, such as the holding tone used to set compressor/expandor circuits in telephone applications. The programmable notch filter is also useful when making quantitizing error measurements in digital audio applications.

Level

In addition to distortion, SINAD, and frequency measurements, the 1130 measures and displays AC levels to 300 Vrms with 1% accuracy and DC levels to 300 V with accuracy to 0.6%.

Ratio Measurements

Any measured function, with the exception of frequency, can be displayed as the ratio to any previous measurement. For example, when making a frequency response measurement, an AC level measured at a reference frequency, say, 1 kHz, can be used as the reference in the ratio mode and all subsequent levels at other frequencies are diplayed relatively in terms of % or dB.

Another example of the use of the ratio mode is determining the percentage of AC ripple on a DC power supply. By using the measured DC level as a reference, subsequent AC levels of ripple can be displayed in percent.

Choice of Detection Modes

The 1130 provides a choice of detection modes. Either rms or average detection may be selected to meet the requirements of a particular application.

Measurement Speed

Any measurement can be displayed within 1 second and additional measurements are available at a rate of 4 to 10 readings per second, depending on the selected function.

Programmable and Easy-To-Use

As a stand-alone instrument or part of an ATE system, the ability to store up to 99 complete panel setups in non-volatile memory and then recall them in any order by simply entering the program location makes often-repeated tests an easy task. All panel functions are duplicated by a full-function IEEE-488 bus interface.

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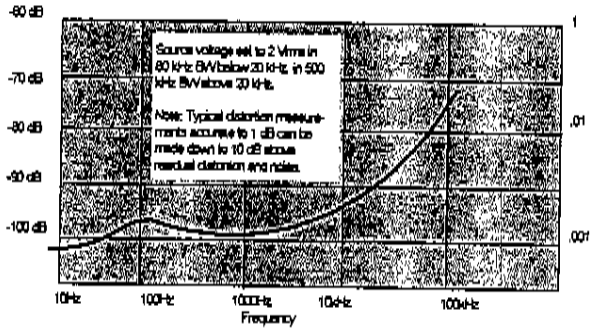
AUDIO TEST INSTRUMENTS

Distortion Analyzer
Model 1130 (continued)

GPIB



TYPICAL RESIDUAL DISTORTION AND NOISE OF MODEL 1130

Specifications

Frequency
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

Sensitivity: 3.0 mV

Accuracy: Timebase ± 1 count
Timebase: ± 1ppm/year, 10 MHz TCXO

AC Level
Ranges, full scale: 3.000, 30.00, 300.0 mV, 3.000, 30.00, 300.0 V

Overrange: 20% except on 300 V range

Accuracy:
± 1.0%, 1 mV-300 V, 50 Hz-50 kHz
± 2.0%, 1 mV-300 V, 20 Hz-100 kHz
± 3.0%, 1 mV-300 V, 10 Hz-100 kHz

Flatness, ref. 1 kHz:
±0.5%, 1 mV-300 V, 50 Hz-50 kHz
±1.0%, 1 mV-300 V, 20 Hz-100 kHz
±2.0%, 1 mV-300 V, 10 Hz-100 kHz

DC Level
Ranges, full scale: 3.000, 30.00, and 300.0 V

Overrange: 20% except on 300 V range

Accuracy: ±0.3% ±10 counts

Distortion:
Fundamental Frequency: 10 Hz to 100 kHz, usable to 140 kHz

Fundamental Level: 10 mV to 300 V, typically 3 mV

Accuracy:
±1 dB, 20 Hz-20 kHz
±2 dB, 10 Hz-100 kHz

Resolution:
0.0001% for <1.100%
0.001% for <11.00%
0.01% for <100.0%

Residual Noise And Distortion (the greater of):
0.01% (-80 dB) or 10 µV, 10 Hz-20 kHz, 80 kHz BW;
0.02% (-74 dB) or 20 µV, 20 kHz-50 kHz, 220 kHz BW;
0.056% (-65 dB) or 50 µV, 50 kHz-100 kHz, 500 kHz BW

SINAD: Identical to distortion except notch filter is in Hold and can only be tuned manually. Reading displayed in dB.

Input
Type: Fully differential or single-ended.

Impedance: 100 kΩ± 1% with <300 pF each side to ground

Protection: Common mode hardware limited. Fuse protection for peak levels >425 V.

CMRR: >70 dB, 20 Hz-1 kHz, Vin <3 V
>45 dB, 20 Hz-20 kHz, Vin <3 V

CMRR Limits, CM + Vin (diff.):
<4.25 V pk, 3 V range
<42.5 V pk, 30 V range
<425 V pk, 300 V range

Filters, Standard:
30 kHz LP: 30 kHz ± 2 kHz, 60 dB/decade

80 kHz LP: 80 kHz ± 4 kHz, 60 dB/decade

220 kHz LP: 220 kHz ± 20 kHz, 60 dB/decade

Measurement Speed:	First Reading	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

Rear Panel Connectors
Monitor: Provides scaled output of input signal in AC Level mode, scaled output of input signal with fundamental removed in Dist or SINAD mode. 600Ω output impedance.

X CLK: TTL-compatible input for external 10 MHz counter reference, automatically switched when external signal is present.

Input Power: 100, 120, 220, 240 V ± 10%, 50 to 400 Hz, 40 VA

Operating Temperature: 0 to 55°C

Physical
Dimensions: 5.85" H x 17.75 W x 18 D (14.9 cm x 45.1 x 45.8)

Weight: 21 lbs (9.55 kg)

Accessories
Supplied: Spare input fuses

Available: Rack-mounting kit (Ears only), P/N 95004491A
Rack-mounting kit (Ears and Handles), P/N 95004492A
Single binding post to BNC(M), P/N 954018
BNC(F) to phone plug, P/N 954019
Phono jack to BNC(M), P.N 954020
2-conductor shielded balanced line (36"), P/N 954021
Audio XLR connector to three banana plugs, P/N 954022

Options:
-01 Rear Panel Input
-11 400 Hz High Pass Filter.
-12 Psophometric (CCITT) Band Pass Filter.
-13 CCIR Filter.
-14 CCIR/ARM Filter.
-15 A Weighting Filter.
-16 B Weighting Filter.
-17 C Weighting Filter.
-18 Audio Bandpass Filter.
-19 C-Message Filter.

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.

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