

# PRODUCT DATA

**Modular Precision Sound Analyzer — 2260 Investigator™  
Including BZ 7201, BZ 7202 and BZ 7206 Sound Analysis Software**



2260 Investigator is a hand-held, programmable sound analyzer based on standard PC architecture and file system. You can change 2260 Investigator's function by simply changing the application software. Three of the applications available are BZ 7201 for full octave analysis, BZ 7202 for full and 1/3-octave analysis and BZ 7206 for extended range, 8 Hz–20 kHz, full and 1/3-octave analysis.

2260 Investigator has many useful features including on-line marking, data exclusion, and automatic logging with events. Software options include automatic event-sensitive sampling and data recording, thus making the whole system more efficient. 2260 Investigator also connects to a laptop PC or a DAT recorder for recording sound, and its serial port can be connected to a modem for remote operation.

**2260 A, B, F**

- USES**
- Environmental noise assessment
  - Octave band analyses (BZ 7201)
  - Octave or 1/3-octave band analyses (BZ 7202 and BZ 7206)
  - Noise monitoring
  - Appraisal of sound reduction efforts
  - Gathering field data for further analyses
  - Research and development

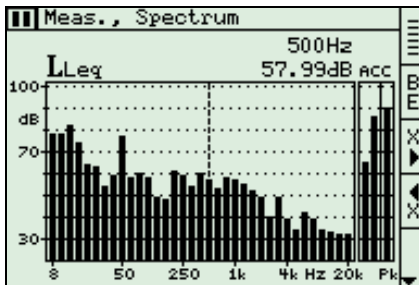
- FEATURES**
- IEC and ANSI Type 1 sound level meter
  - 8 Hz – 20 kHz frequency range in 1/3-octave band analysis (BZ 7206 only)
  - On-line annotation and data exclusion
  - Control of sound recording on a PC
  - Automatic event logging
  - Logging rates down to 100 ms (BZ 7206 only)
  - Interface to SONY® DAT recorders
  - Remote operation via modem link
  - Automatic Charge Injection Calibration (CIC) check
  - Broadband and spectral statistics

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## Introduction

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*Fig. 1 A typical 2260 spectrum display using BZ 7206 software*



2260 Investigator is a precision sound analyzer platform, and is supplied with Sound Analysis Software BZ 7210. To expand the functionality of 2260 Investigator, you can load Sound Analysis Software BZ 7201, Enhanced Sound Analysis Software BZ 7202, or Enhanced Sound Analysis 20 kHz Software BZ 7206.

The Investigator's advanced hardware and software specifications make it into a flexible instrument that can cover your current sound analysis needs. It is able to expand to cover your future needs – simply by switching between different software applications. The application software is supplied on PC cards.

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## Attended Measurements in the Field

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In many cases it is necessary to have an operator on-site. Changing conditions might mean that the measurement setup has to be altered or refined, and that representative samples have to be taken. Identification and marking of events, together with visual confirmation of noise sources are easier and more precise on-site during the measurement than afterwards.

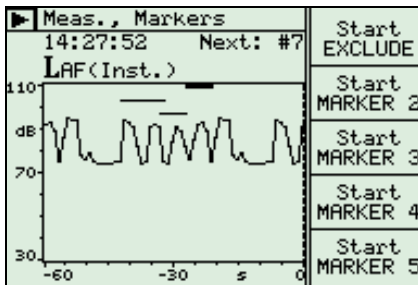
In addition to marking the events, it is often necessary to record the sound together with the measurement. Replaying the recorded sound is then used to document the type of event.

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## Markers

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Fig. 2 2260 Investigator screen showing three of the markers



Marker “soft” keys allow you to identify specific measurement conditions. There are four markers plus an “EXCLUDE” marker. You can name these marker keys to aid in identifying what type of condition is present. The marker duration can be edited on-screen up to one minute after the occurrence has taken place. The markers are saved at the same time as your measurement data and, if sound recording is activated, a .wav file is saved on your PC (see below). The markers can be seen on a PC when the data has been transferred to 7815 or 7820.

Markers can be selected in any order and for any duration. You can set all the markers to finish automatically after a pre-defined time or set to continue until you stop each one.

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## Sound Recording

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Fig. 3 An example of the Measurement Setup screen

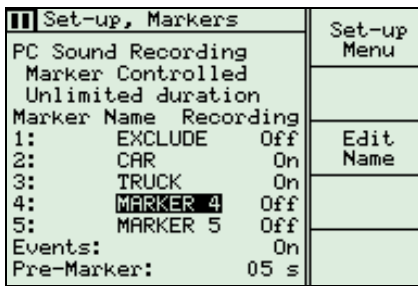


Fig. 4 The Evaluator Type 7820 Sound Recorder Setup



### PC Sound Recording

To be sure of what had caused a marked event, you can record sound directly onto your PC's hard drive.

With Evaluator Type 7820, or Explorer Type 7815, installed on your PC, you can use 2260 Investigator to control sound recording on the hard disk while making measurements. The only limit to duration is the size of the hard disk. Sound is recorded on one channel with the option to record commentary on the second channel (this will double the size of the files).

Sound recording can be tagged to one or more markers. There is a 60 s sound buffer in the PC to permit editing of markers up to 1 minute after the occurrence has taken place. Recordings are time stamped and stored as .wav files. After transferring the measurement data from 2260 to 7815/20, the data are automatically merged with the sound recordings. The sound recordings are then marked in the profile display of the 7815/20 and can be replayed. You use the cursor position in the profile display to decide which part of the recording you want to hear.

## DAT Recording

You can also use the DAT recording facility offered by 2260 Investigator, where the microphone's signal is fed directly to tape. 2260 can remotely trigger the DAT to start and stop recording. From stand-by mode, the DAT recorder starts recording within 1–2 s.

DAT recording can be set to occur during an event or during the entire measurement.

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## Event Logging

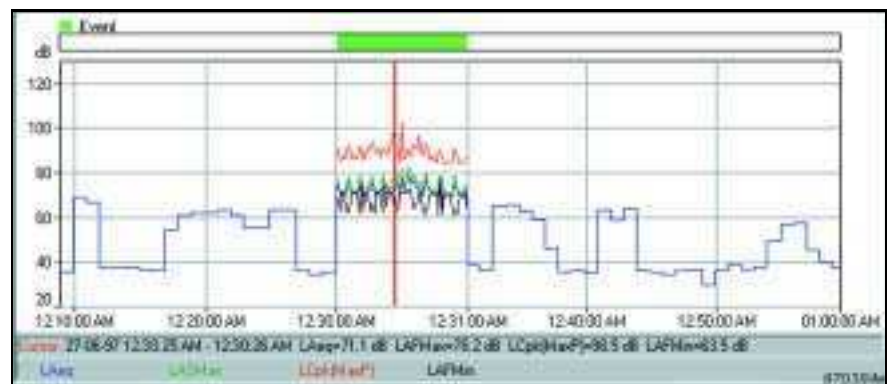
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You can start single measurements manually or automatically repeat sequences of a single measurement. You can also select “Logging” or “Event Logging” modes. These modes allow 2260 Investigator to measure background sound levels using one set of parameters (logging) and, when triggered by an event, use another set for the duration of the event (event logging).

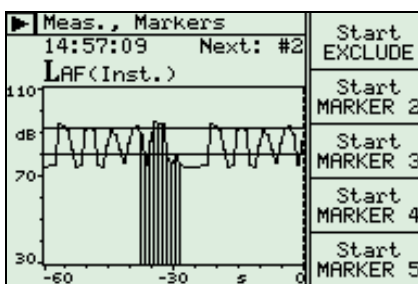
For example, you might set an event trigger start threshold to be 92 dB. As long as the level is below this value, 1 minute logging is in operation (see Fig. 5). As soon as the level goes above this (for example a compressor starts), the sampling rate is increased to 1 second intervals (event logging) and continues until the level drops below the stop threshold value. In this way you have a higher resolution record of the noise levels during the event.

You can set sound recording to activate during the event, and use the five marker keys to add more detailed background information if necessary.

*Fig. 5 Example results from an event logging file as displayed by Evaluator Type 7820 software. You can see the timebase change from 1 minute to 1 second intervals during the event and the event marker (green bar) that can be used by Evaluator for post-processing logged data*



*Fig. 6 2260 Investigator screen showing a logged profile with an event*



## Event Threshold

To prevent transients causing a large number of events, a time limit (in 1 s intervals) can also be imposed on the threshold. For an event to be “logged” it must exceed the threshold for more than the pre-set time. To ensure that the start of the event is not missed, measurement data is also delayed. Triggering can also be started remotely via the RS–232 interface, by sending the appropriate start/stop command, by using a remote control connected to 2260 Investigator, or by pressing a “soft” key.



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## Unattended Monitoring and Remote Access

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Fig. 7 2260 Outdoor Gear



Noise monitoring in out-of-the-way places need no-longer be a problem. 2260 Outdoor Gear Type 3592 offers security and weather-protection for 2260 Investigator. Safe and dry in its robust, heat reflecting, bright yellow case, the analyzer will operate unattended for more than 3 days. For longer periods, the battery can be changed without interrupting measurements. You can also save yourself a site visit by using the modem dial-up facility to collect your results.

The system consists of a weatherproof case, outdoor microphone kit, microphone extension cable, microphone tripod or mast, sealed lead-acid battery, charger for battery, DAT recorder (not supplied by Brüel & Kjær), and cables for interconnection. The Outdoor Gear system is modular, allowing you to assemble a monitoring system that meets your exact requirements.

Evaluator Type 7820 software on your PC controls the communication process and allows measurement files to be downloaded directly to your PC's hard disk, thus freeing space for more results. The modem interface is standard RS-232; you can connect either a land-line modem or a mobile phone with a digital interface. The Type 3592 case has a space for the modem/mobile phone, and is transparent to radio waves.

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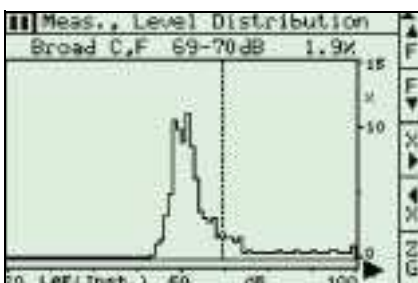
## Measurement Parameters

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Fig. 8 Multi-D screen showing real-time simultaneous display of broadband parameters and Elapsed Time



Fig. 9 Statistics screen showing a level distribution curve. The cursor is at the 69 dB to 70 dB interval, showing there are 1.9% of the samples in the interval



However many noise parameters (discrete, spectral and statistical) you select to measure with 2260 Investigator, they will all be measured concurrently thanks to the Multi-D™ technique. Serial measurements, which are expensive and time consuming, are not necessary. Multi-D exploits the power of the real-time digital signal processor (DSP) and allows you viewing access at any time to all the parameters measurable by 2260 Investigator. While viewing a spectrum, you can switch over to see how any of the other parameters are developing, for example, the current values of  $L_N$  (spectral or broad-band) or  $L_{Ceq}-L_{Aeq}$ . Such analysis techniques are advantageous when the sound source is complex and you need on-the-spot tonal information, for example when choosing hearing protection aids. When you've made your measurements, you can store the final results in a file to view or analyse later.

Measurements can be started manually or automatically. The automatic mode uses Investigator's nine timers, clock and calendar. You simply select how often the analyzer is to be "woken up" to make and store the required measurement data and the analyzer does the rest.

You can see from the specifications that 2260 Investigator can measure an impressive array of parameters based on various combinations of time and frequency weightings, filtering, and detection of peaks, etc. During measurements, the A-weighted, and C- or L-weighted sound signals are sampled by two 18-bit A/D convertors and processed by the real-time DSP. The DSP continuously calculates the current values for the whole array of selected sound parameters which you can display immediately and store later when the measurement is completed.

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## Calibration Features

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### *Internal Calibration*

This uses a stable, internal electrical reference signal to directly excite the preamplifier output. The whole measurement chain, except the microphone and preamplifier, is calibrated in this way.

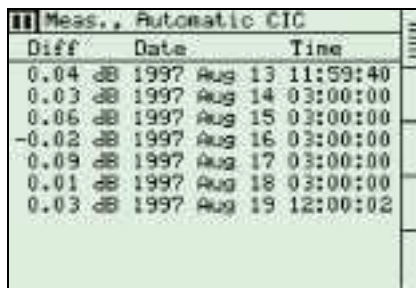
### *External Calibration*

This requires the microphone to be coupled to a stable reference sound source, such as Brüel&Kjær's Sound Level Calibrator Type 4231 or Pistonphone Type 4228, or the Multifunction Acoustic Calibrator Type 4226. This method calibrates everything in the measurement chain.

### *Initial Calibration*

Each analyzer "remembers" its initial calibration together with the serial number of its microphone and will report any deviation from this initial calibration. An Accredited Initial Calibration (2260 CAI) is done only at the factory. If you need one, or need to renew the one in your analyzer, contact your Brüel & Kjær representative.

Fig. 10 The automatic Charge Injection Calibration screen



Diff	Date	Time
0.04 dB	1997 Aug 13	11:59:40
0.03 dB	1997 Aug 14	03:00:00
0.06 dB	1997 Aug 15	03:00:00
-0.02 dB	1997 Aug 16	03:00:00
0.09 dB	1997 Aug 17	03:00:00
0.01 dB	1997 Aug 18	03:00:00
0.03 dB	1997 Aug 19	12:00:02

### *Charge Injection Calibration*

Analysis software BZ 7201, BZ 7202, and BZ 7206 use 2260 Investigator's CIC (Charge Injection Calibration) facility. CIC allows the analyzer to monitor the measurement chain right from the microphone diaphragm.

When you perform an internal or external calibration, a reference CIC is also automatically made and the result stored as a reference. Later you may initiate a CIC and compare the new result to the reference. A stable CIC ratio assures stable operation of microphone, cable, preamplifier and the remaining measurement system, giving you a good indication that your measurements are valid.

A CIC may be initiated manually or automatically. You can see from Fig.10 how an automatic CIC has been set to occur at the start and end of a measurement period, and at 03:00 every day during a week of logging. The difference column shows the difference between the current CIC measurement and the reference measurement stored the last time an external calibration was made. In the example the CIC values are all within 0.1 dB of the reference value, indicating stable conditions.

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## Post-processing Software and Applications

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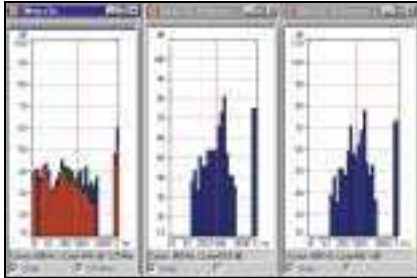
With up to 20 MB internal memory, 2260 Investigator can store a large amount of data. To make it easier for you to examine the results of the measurements, Brüel & Kjær offers a number of Windows-based software application packages.

### *Predictor™ Type 7810*

Predictor is for the calculation or prediction of environmental noise levels. Calculations are based on a knowledge of the noise sources and a description of the propagation of the noise from source to receiver and are made according to national and international standards. An acoustic model is built up from a map of the area and sound power measurements from sound intensity software BZ 7205 measurements or

source specifications. Once made, the model can be checked and improved by importing sound pressure measurements from 2260 Investigator running Sound Analysis Software BZ 7201, BZ 7202, BZ 7206 or BZ 7210 and comparing measurements with the calculated values.

Fig. 11 Spectrum graphs from different measurement files displayed by Noise Explorer Type 7815



#### Noise Explorer™ Type 7815

Noise Explorer is software for displaying and reporting noise measurements made with a number of Brüel & Kjær hand-held instruments, including 2260 Investigator running BZ 7201, BZ 7202, BZ 7203, BZ 7205, BZ 7206, and BZ 7210. As well as displaying the data as graphs, spectra or statistics curves, Noise Explorer has a range of export features allowing you to export your measurement data to other programs or send to a printer. Noise Explorer has the facility to let the operator record and replay sound events to aid post-processing.

#### Evaluator™ Type 7820

Evaluator has similar display options to Noise Explorer. It is specifically designed to calculate Rating Levels (a single figure evaluation of environmental noise normally based on the  $L_{Aeq}$  with various penalties) according to the standards and legislation you follow. Using Evaluator with measurement data produced by 2260 Investigator, you can quickly arrive at Rating Level figures. For noise reduction analysis, noise levels can be edited to give you on-screen indications of “what if” situations. The facility to record sound events is also available with this software.

Fig. 12 Evaluator Type 7820 calculating the rating level

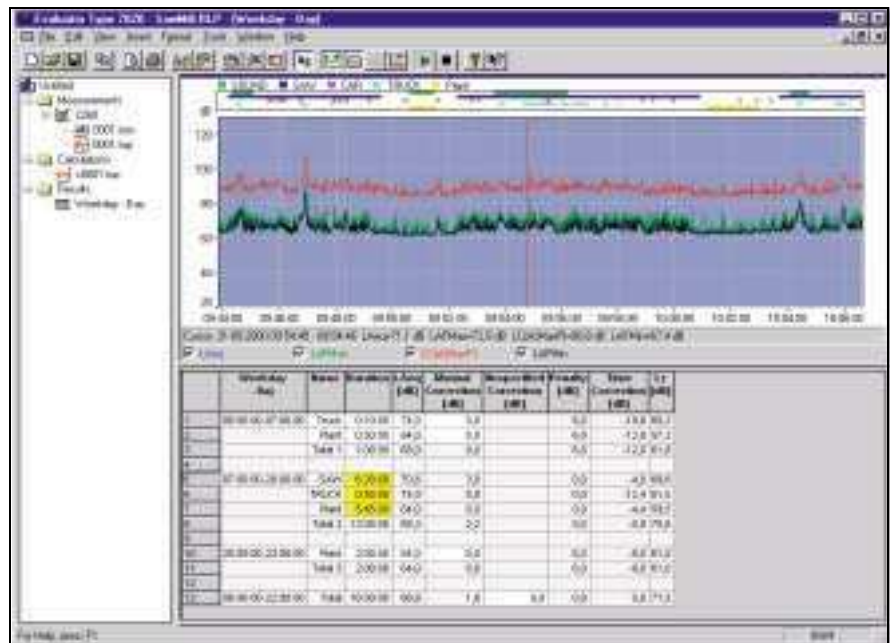
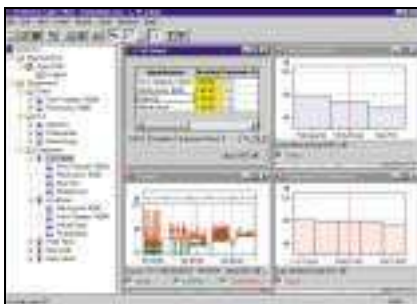


Fig. 13 Protector Type 7825 can show the noise exposure for an entire plant



#### Protector™ Type 7825

Protector is software for post-processing, simulating and archiving noise exposure data. Protector works with the family of Brüel & Kjær hand-held sound level meters and analyzers including Type 2260. Protector allows you to quickly download sample noise profiles for specific locations or persons, which Protector can then use to calculate noise exposure for people or positions under investigation. Protector calculates noise exposure according to ISO 9612.2. For situations where only work point noise measurements are available, and workers move about, Protector can combine workpoint measurements with a profile of the persons movements, to simulate their personal noise exposure.

## More About the Investigator Type 2260 Platform

*2260 Investigator is a unique concept within the field of hand-held noise measurements. A range of software can be installed into an analyzer platform and dedicated PC software is available for post-processing the data*

### Examples of Other Applications


Basic Sound Analysis Software BZ 7210 is pre-installed on all 2260 types making them Type 1 Sound Level Meters with real-time 1/3-octave frequency analysis and broadband statistical distributions.

Building Acoustics Software BZ 7204 converts 2260 Investigator into a versatile building acoustics analyzer. It measures level and reverberation time spectra, and calculates sound reduction indices according to national and international standards. Room Acoustics Software BZ 7207 is for reverberation time measurements only.

Noise Profile BZ 7203 effectively converts Type 2260 into an electronic level recorder that measures and logs noise levels over a 110 dB dynamic range. It also has extensive capabilities for on-the-spot analysis including measurement annotation.

Sound Intensity Software BZ 7205 and the sound intensity probe make your 2260 Investigator into a complete hand-held sound intensity measuring system. The system produces on-the-spot analyses of sound intensity and sound power for small as well as large objects. It is also ideal for measuring the sound reduction of single building elements or for locating faults.

## Compliance with Standards

	CE-mark indicates compliance with: EMC Directive and Low Voltage Directive. C-Tick mark indicates compliance with the EMC requirements of Australia and New Zealand
<b>Safety</b>	EN 61010-1 and IEC 61010-1: Safety requirements for electrical equipment for measurement, control and laboratory use. UL3111-1: Standard for Safety – Electrical measuring and test equipment
<b>EMC Emission</b>	EN 50081-1: Generic emission standard. Part 1: Residential, commercial and light industry. CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits. FCC Class B Limits. <b>Note:</b> the above is only guaranteed using accessories listed in this Product Data Sheet.
<b>EMC Immunity</b>	EN 50082-1: Residential, commercial and light industry. RF immunity implies that sound level indications of 40 dB or greater will be affected by no more than $\pm 0.5$ dB. EN 50082-2 (1995): Industrial environment. RF immunity implies that sound level indications of 55 dB or greater will be affected by no more than $\pm 0.5$ dB. <b>Note:</b> the above is only guaranteed using accessories listed in this Product Data Sheet.
<b>Temperature</b>	IEC 68-2-1 & IEC 68-2-2: Environmental Testing. Cold and Dry Heat. Operating Temperature: $< 0.5$ dB $-10^{\circ}\text{C}$ to $+50^{\circ}\text{C}$ ( $+14^{\circ}\text{F}$ to $+122^{\circ}\text{F}$ ) Storage Temperature: $-25^{\circ}\text{C}$ to $+70^{\circ}\text{C}$ ( $-13^{\circ}\text{F}$ to $+158^{\circ}\text{F}$ )
<b>Humidity</b>	IEC 68-2-3: Damp Heat: 90% RH (non-condensing at $40^{\circ}\text{C}$ ( $104^{\circ}\text{F}$ )) Effect of Humidity: $< 0.5$ dB for $30\% < \text{RH} < 90\%$ (at $40^{\circ}\text{C}$ ( $104^{\circ}\text{F}$ ) and 1 kHz)
<b>Mechanical</b>	Non-operating: IEC 68-2-6: Vibration: $0.3$ mm, $20$ m/s <sup>2</sup> , 10–500 Hz, IEC 68-2-27: Shock: $1000$ m/s <sup>2</sup> IEC 68-2-29: Bump: 1000 bumps at $250$ m/s <sup>2</sup>
<b>Calibration</b>	Initial factory calibration traceable in conjunction with ISO 9001



# Specifications BZ7201 with 2260 Investigator

Specifications apply to 2260 Investigator fitted with the supplied microphone and input stage, and running BZ7201 software

## STANDARDS

Conforms with the following:

- IEC 60651 (1979) Type 1 plus Amendment 1
- IEC 60804 (1985) Type 1 plus Amendment 2
- IEC 61260 (1995) Octave Bands Class 0
- ANSI S1.4-1983 Type 1
- ANSI S1.43-199X Type 1 (Draft 1993)
- ANSI S1.11-1986 Octave Bands, Order 4, Type 0-B, Optional Range

## SUPPLIED MICROPHONE

**Type 4189:** Prepolarized Free-field  $\frac{1}{2}$ " Microphone

**Nominal Sensitivity:**  $-26 \text{ dB} \pm 1.5 \text{ dB re } 1 \text{ V/Pa}$

**Capacitance:** 14 pF (at 250 Hz)

## INPUT STAGE

ZC0026

**Extension Cables:** Up to 100m between the input stage and the Type 2260 can be driven by the input stage

## CALIBRATION

**Initial calibration** is stored for comparison with later calibrations.

**Acoustic:** Using Multifunction Acoustic Calibrator Type 4226, Pistonphone Type 4228 or Sound Level Calibrator Type 4231

**Electrical (internal):** Uses internally generated electrical signal combined with a keyed-in value of microphone sensitivity

**CIC (Charge Injection Calibration):** Injects internally generated electrical signal in parallel with the microphone diaphragm

- A reference CIC is done automatically during External or Internal calibration and stored for later comparison with a new CIC
- A manual CIC can be done whenever no measurement is in progress
- An automatic CIC can be part of a logging measurement, where the CIC repetition rate can be set to be up to 4 times in a 24 hr. period.
- An automatic CIC starts at a "logical" break in a measurement sequence, shortening the following measurement period by 15 s

## MEASURING RANGES

**Linear Operating Range:** 80 dB adjustable to give full-scale readings from 70 dB to 130 dB in 10 dB steps

**Max. Peak Level:** 3 dB above full scale reading

**Upper Limit (RMS) for Crest Factor=10:** 17 dB below full scale reading

**Passive Attenuation:** Microphone attenuator ZF0023 (included) effectively increases all full-scale readings by 20 dB

## OCTAVE BAND FILTERS

**Octave Band Centre Frequencies:** 31.5 Hz to 8 kHz

## DETECTORS

**Overload detector** which monitors the overload outputs of all the frequency weighted channels

**Parallel detectors** on every measurement:

**A-weighted** broadband detector channel with three exponential time weightings (Fast, Slow, Impulse), one linearly averaging detector and one peak detector

**C- or L-weighted** (switchable) as above for A-weighted

**Octave band filters**, pre-weighted either A-, C- or L-, each with a detector channel containing one linearly averaging detector and one exponentially averaging detector switchable between Slow or Fast

## INHERENT NOISE LEVEL

(Combination of electrical noise and microphone thermal noise at 20°C). Typical values with supplied microphone of nominal sensitivity:

Weighting	Electrical Noise (2260)	Thermal Noise (4189)	Combined Noise
"A"	12.3 dB	14.6 dB	16.6 dB
"C"	14.0 dB	15.3 dB	17.7 dB
Lin. 5 Hz – 20 kHz	19.2 dB	15.3 dB	20.7 dB

## MEASUREMENTS

V = frequency weightings C or L

X = frequency weightings A, C or L

Y = time weightings S, F

N = number

## For Display and Storage (Broadband):

Start Date	Start Time	Measur. No.
Stop Date	Stop Time	Overload %
Elapsed Time	No. of Pauses	Underrange %
Event No.	Event Sample	
Level Distribution	Cumulative Distribution	
$L_{Apk(MaxP)}$	$L_{Vpk(MaxP)}$	$L_{AE(ASEL)}$
#Peaks A>L	#Peaks V>L	$L_{Alm}$
$L_{Aeq}$	$L_{Veq}$	$L_{Alm-L_{Aeq}}$
$L_{VIm}$	$L_{Veq-L_{Aeq}}$	$L_{AITm3}$
$L_{ASTm3}$	$L_{AFTm3}$	$L_{VITm3}$
$L_{VSTm3}$	$L_{VFTm3}$	$L_{AITm5}$
$L_{ASTm5}$	$L_{AFTm5}$	$L_{VITm5}$
$L_{VSTm5}$	$L_{VFTm5}$	$L_{AlMax}$
$L_{ASMax}$	$L_{AFMax}$	$L_{AlMin}$
$L_{ASMin}$	$L_{AFMin}$	$L_{VIMax}$
$L_{VSMax}$	$L_{VFMax}$	$L_{VIMin}$
$L_{VSMin}$	$L_{VFMin}$	$L_{XYN3}$
$L_{XYN1}$	$L_{XYN2}$	$L_{AEP,d}$
$L_{XYN4}$	$L_{XYN5}$	

## For Display and Storage (Spectrum):

$L_{Xeq}$	$L_{XYMax}$	$L_{XYMin}$
$L_{XYN1}$	$L_{XYN2}$	$L_{XYN3}$
$L_{XYN4}$	$L_{XYN5}$	
Level		
Distribution	Cumulative Distribution	

# Specifications BZ7201 with 2260 Investigator (cont.)

## Only for Display as Numbers or Bar graphs (Broadband)

L <sub>AS(SPL)</sub>	L <sub>AF(SPL)</sub>	L <sub>AI(SPL)</sub>
L <sub>VS(SPL)</sub>	L <sub>VF(SPL)</sub>	L <sub>VI(SPL)</sub>
L <sub>AS(Inst)</sub>	L <sub>AF(Inst)</sub>	L <sub>AI(Inst)</sub>
L <sub>VS(Inst)</sub>	L <sub>VF(Inst)</sub>	L <sub>VI(Inst)</sub>
L <sub>AST3</sub>	L <sub>AFT3</sub>	L <sub>AIT3</sub>
L <sub>VST3</sub>	L <sub>VFT3</sub>	L <sub>VIT3</sub>
L <sub>AST5</sub>	L <sub>AFT5</sub>	L <sub>AIT5</sub>
L <sub>VST5</sub>	L <sub>VFT5</sub>	L <sub>VIT5</sub>
L <sub>Apk(Peak)</sub>	L <sub>Vpk(Peak)</sub>	

## For Storage During Logging (Spectrum)

Nothing or

All parameters or

All parameters without statistics or

6 Major Parameters:

L <sub>Aeq</sub>	L <sub>Cpk(MaxP)</sub> (or L <sub>Lpk(MaxP)</sub> if L is selected)
L <sub>AFMax</sub>	L <sub>Ceq</sub> (or L <sub>Leq</sub> if L is selected)
L <sub>AFMin</sub>	L <sub>Alm</sub>

## For Storage During Logging (Broadband)

Nothing or

All parameters or

All parameters without statistics or

L<sub>eq</sub> (pre-weighting A, C or L as selected)

## Only for Display as Numbers or Spectra (Spectrum Bands)

L <sub>XY(SPL)</sub>	L <sub>XY(Inst)</sub>
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The broadband Level Distribution, Cumulative Distribution and Statistics L<sub>XYN1-5</sub> are based upon sampling L<sub>XY(Inst)</sub> every 10 ms into 0.2 dB wide classes over 80 dB

Octave Band Level Distributions, Cumulative Distributions and L<sub>XYN1-5</sub> are based on sampling L<sub>XY(Inst)</sub> every 64 ms into 1 dB wide classes over a range of 80 dB

## MEASUREMENT CONTROL

### Measurement Types:

- *Manual* – manually controlled single measurement
- *Sequence* – repetition of a single measurement up to 9999 times (results stored with or without statistical data). Measurement time selectable from 1 s to 100 hours in 1 s steps
- *Logging* – a single measurement with a selectable duration of 1 s to 100 days in 1 s steps. Logging duration divided into logging intervals of 1 s to 100 hours in 1 s steps
- *Logging with Events* – as *Logging*, but with the ability to measure a different set of parameters and timebase when an event trigger is recognised

### Elapsed Time:

When not in Logging mode, elapsed time resets/starts and pauses/continues according to the respective command. In Logging Mode, elapsed time continues in real-time, regardless of pauses in a measurement

## TRIGGERS

Four types of event trigger are available:

- *Level* – monitors L<sub>AF(Inst)</sub> every 1 s. Event triggered when L<sub>AF(Inst)</sub> exceeds the set level for set period (both user-defined for 1 dB/1 s increments)
- *Softkey* – using <Start Event> and <Stop Event> softkeys
- *External* – +5V on pin9 of serial interface
- *Remote* – start and stop commands sent over the serial interface

All triggers can have pre- and post-trigger time intervals of up to 15 s (in 1 s increments) allocated to them

## GPS DATA

A position can be attached to a measurement job by inputting data from a GPS (Global Positioning System) receiver via the Serial Interface

**Receiver Standards Supported:** NMEA 0183 ver. 2.20, optional corrected to Differential GPS using RTCM 104 ver. 2.1

**Baud Rate:** 4800 bps

## TIMERS

Up to nine independent timers can be specified. Each timer “wakes-up” the analyzer at a specified date and time and initiates a measurement in accordance with pre-defined set-ups. Timed measurement can be repeated up to 999 times. Timers from different software applications can be mixed

## BACK ERASE

Up to the last 15 s of data can be erased, except when logging

## MARKERS

One data exclusion marker and four user-definable markers for on-line annotation of sound categories heard during the measurement (logging only). Markers can be edited, while measuring, up to 60 s after the sound is heard

## CONTROL OF SOUND RECORDING

Sound recording (.wav files on a PC using 7815 or 7820) can be controlled from 2260 via RS-232 interface and Aux output connected to the sound card on the PC

## MEASUREMENT DISPLAYS

**SLM:** One main and five secondary parameters can be specified plus one analogue bar with zoom facilities

**Cumulative Distribution** for one of the spectrum bands, or broadband plus one analogue bar

**Level Distribution** for one of the spectrum bands, or broadband. Class width can be specified. Also with one analogue bar. Zoom facilities provided

**Profile:** The last 15 s of L<sub>AF(Inst)</sub> plus one analogue bar for manual or measurement sequence type or the last 60 s with markers for logging measurements

**Spectrum:** Spectrum + two broadband bars plus one peak bar. Zoom facilities provided.

The four graphical displays also have cursor read-out facilities

**CIC:** Periodic CICs viewed during or after a measurement

## STORAGE SYSTEM

**Internal Hard Disk:** Up to 20 MB for application software, user set-ups and data

**Application Card** for installation of application software

**External Memory Card** for store/recall of measurement data (SRAM or SanDisk ATA Flash Cards)

**MS-DOS®** compatible file system (from ver. 3.3)

## SERIAL PRINTER/OUTPUT

Set-ups and measurement data can be printed on an IBM® Proprinter® (or compatible), Portable Printer Type 2322 or 2318. The formats can be screen dumps, tables or graphs. Measurement data can be output in spreadsheet format or as a binary file for post-processing on a PC

## HELP AND USER LANGUAGES

Concise context-sensitive help throughout in English, German, French, Italian, Spanish or Czech

## CLOCK

Back-up battery powered clock. Accuracy better than 1 minute per month

## Specifications BZ7201 with 2260 Investigator (cont.)

<p><b>INPUT STAGE CONNECTION</b> Connector: 10-pin LEMO</p> <p><b>AUX OUTPUTS (2 independent)</b> Can be set to: <b>LAF(Inst.):</b> 0 to 4V DC signal updated every 100 ms <b>Reference:</b> 4V square-wave for output calibration <b>Meas. Status</b> for triggering external devices during measurements (including SONY TCD-D7/D8 and TCD-D100 DAT) <b>Signal</b> from amplified frequency weighted signal (A, C/L) <b>Event</b> from amplified frequency weighted signal (A, C/L) during events only <b>Event Status:</b> as Meas. Status, but only during events <b>Limited Event Status:</b> as Event Status, but with a maximum specified duration (1s to 100mins.)</p> <p><b>AC INPUTS/OUTPUTS(2)</b> <b>As Output:</b> Buffered, unweighted microphone signal <b>Output Impedance:</b> <math>2 \times 200 \Omega</math> <b>Maximum Load:</b> <math>47 \text{ k}\Omega \parallel 200 \text{ pF}</math> (short-circuit protected) <b>As Input:</b> Alternative to microphone input <b>Connector:</b> 3-pin LEMO (balanced input)</p>	<p><b>SERIAL INPUT/OUTPUT</b> Conforms to EIA ITIA574 (RS232), coupled as data terminal equipment (DTE) <b>Connector:</b> 9-pin D-type male <b>Baud Rates:</b> 1200, 2400, 4800, 9600, 19200, 38400, 115200 <b>Word Length:</b> 8 bits, no parity or stop bits <b>Handshake:</b> None, XON/XOFF, RTS/CTS</p> <p><b>PCMCIA INPUT/OUTPUT</b> Computer with PCMCIA/JEIDA standards release 1.0.</p> <p><b>SETTLING TIME</b> <b>From Power On:</b> approximately 35 s</p> <p><b>BATTERIES</b> <b>Type:</b> 6×LR14/C-size 1.5V alkaline <b>Lifetime (at 20°C):</b> 5 to 9 hours continuous operation</p> <p><b>EXTERNAL DC POWER SUPPLY</b> <b>Voltage:</b> regulated or smoothed 10 to 14V, max. ripple 100 mV <b>Power:</b> 3.5W, current: 300 mA, Inrush current: 1000 mA <b>Socket:</b> <math>\varnothing 5.5 \text{ mm}</math> with <math>\varnothing 2 \text{ mm}</math> pin (positive)</p> <p><b>WEIGHT AND DIMENSIONS</b> 1.2 kg (2.6 lb.) with batteries <math>375 \times 120 \times 52 \text{ mm}</math> (<math>14.8 \times 4.7 \times 2.0</math>")</p>
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## Specifications BZ7202 with 2260 Investigator

<p>Specifications for BZ 7202 are the same as for BZ 7201 plus the <math>\frac{1}{3}</math>-octave capability as noted below <b>Note:</b> When using BZ 7202, you must select either octave or <math>\frac{1}{3}</math>-octave before measurements begin</p> <p><b>STANDARDS</b> Conforms with the following:</p>	<ul style="list-style-type: none"><li>• IEC 61260 (1995)/EN 61260: 1995 Octave and <math>\frac{1}{3}</math>-octave Bands Class 0</li><li>• ANSI S1.11-1986 Octave and <math>\frac{1}{3}</math>-octave Bands, Order 4, Type 0-B, Optional Range</li></ul> <p><b><math>\frac{1}{3}</math>-OCTAVE BAND FILTERS</b> <b>Centre Frequencies:</b> 16 Hz to 12.5 kHz</p>
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## Specifications BZ7206 with 2260 Investigator

<p>Specifications for BZ7206 are the same as BZ7201 plus the <math>\frac{1}{3}</math>-octave capability, a wider frequency range for octave band measurements and fast logging of <math>L_{AF}(\text{Inst.})</math>, as noted below.</p> <p><b>STANDARDS</b> Conforms with the following: IEC 61260 (1995)/EN 61260: 1995 Octave and <math>\frac{1}{3}</math>-octave Bands Class 0 ANSI S1.11-1986 Octave and <math>\frac{1}{3}</math>-octave Bands, Order 3, Type 0-C, Optional Range</p> <p><b>OCTAVE BAND FILTERS</b> <b>Centre Frequencies:</b> 16 Hz to 16 kHz</p>	<p><b><math>\frac{1}{3}</math>-OCTAVE BAND FILTERS</b> <b>Centre Frequencies:</b> 8 Hz to 20 kHz</p> <p><b>SAMPLING FOR STATISTICS</b> The octave or <math>\frac{1}{3}</math>-octave Band level Distribution, Cumulative Distribution and statistics <math>L_{XYN1-5}</math> are based on sampling <math>L_{XY}(\text{Inst.})</math> every 100 ms into 1 dB wide classes over a range of 80 dB</p> <p><b>FAST LOGGING</b> Broadband <math>L_{AF}(\text{Inst.})</math> may be stored every 100 ms during background logging and/or during event logging</p>
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# Ordering Information

Note: for upgrades and kit options, contact your Brüel & Kjær representative

Type 2260 A: Modular Precision Sound Analyzer with Sound Analysis Software BZ 7201  
Type 2260 B: Modular Precision Sound Analyzer with Enhanced Sound Analysis Software BZ 7202  
Type 2260 F: Modular Precision Sound Analyzer with Enhanced Sound Analysis 20 kHz Software BZ 7206  
BZ 7201: Sound Analysis Software  
BZ 7202: Enhanced Sound Analysis Software  
BZ 7206: Enhanced Sound Analysis 20 kHz Software

## Accessories Included

BZ 7210: Basic Sound Analysis Software  
Type 4189: Prepolarized Free-field ½" Microphone  
ZC 0026: Input Stage  
ZF 0023: 20 dB Capacitive Attenuator  
UA 1236: Protective Cover  
DH 0696: Wrist Strap  
KE 0342: Shoulder Bag (with room for 2260 and 4231)  
6×QB 0009: 1.5 V LR 14/C size alkaline cells

## Optional Accessories

### CALIBRATION

Type 4226: Multifunction Acoustic Calibrator  
Type 4228: Pistonphone  
Type 4231: Sound Level Calibrator (fits in KE 0342)  
2260 CAI: Accredited Initial Calibration of Type 2260  
2260 CAF: Accredited calibration of Type 2260  
2260 CAP: Accredited calibration with pre-calibration of Type 2260

### INTERFACING

Type 7815: Noise Explorer – data viewing software  
Type 7820: Evaluator – data viewing and calculation software  
Type 7825: Protector – software for calculation of Personal Noise Exposure  
Type 2322: Portable Printer  
AO 1442: 9-pin to 25-pin PC or serial printer interface cable  
UL 1003: 20 MB ATA Flash Memory Card

### MAINS POWER SUPPLIES

ZG 0386: EU Version  
ZG 0387: UK Version  
ZG 0388: US Version

### MEASURING

Type 3592: Outdoor Measuring Gear (see Product Data BP 1744)  
AO 0440: AC input/output cable  
AO 0441: 3 m Microphone Ext. Cable  
AO 0442: 10 m Microphone Ext. Cable  
AO 0543: 2260 to Jack Cable  
AO 0586: Cable from 2260 to Audio input on a PC  
AQ 1698: Cable for 12 V Supply  
AQ 1700: Remote Control Cable for SONY TCD – D7/D8  
KE 0371: Carrying Case for 2260 and accessories  
QB 0051: 12 V Battery  
UA 0237: Large Round Windscreen  
UA 0459: Small Round Windscreen  
UA 1317: Microphone Holder  
UA 1404: Outdoor Microphone Kit  
UA 0522: Headphones Adaptor  
UA 0587: Tripod  
UA 0801: Small Tripod  
ZG 0404: Battery Charger, 100 – 240 V AC  
ZH 0631: Event Hand-switch

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