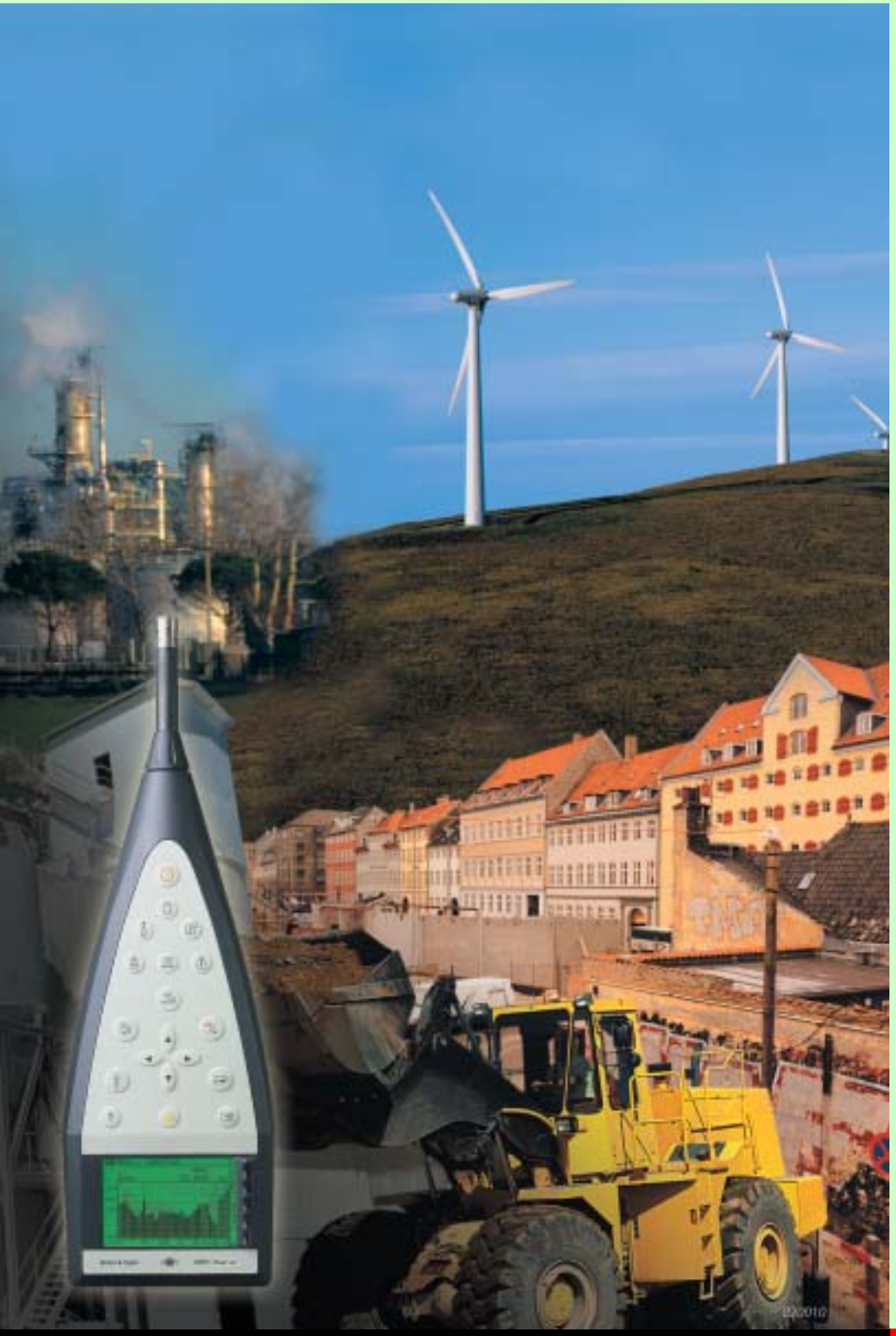
PRODUCT DATA

Modular Precision Sound Analyzer— 2260 Observer™
Including BZ7219 Sound Analysis Software
and BZ7220 Room Acoustics Software



2260 Observer is a state-of-the-art sound level meter and sound analyzer. It's a hand-held instrument capable of doing all the measurements and analyses that are typically used when assessing community noise and noise at the work place. 2260 Observer complies with the new sound level meter standard IEC 61672 as well as the previous IEC standards (60651 and 60804), and the latest ANSI standards.

All broadband parameters and statistical values are measured in parallel, so you will never miss a beat: all parameters are there – you just choose what you want to examine, now or later. Additionally, and simultaneously, real-time analysis in 1/1- or 1/3-octave bands is carried out. Broadband and spectral data can all be logged to obtain a time history (profile) for later analyses.

As an option to these standard facilities, you can add measurements of reverberation time. Using this option, acceptance test of rooms, noise reduction in workplaces and similar tasks are carried out conveniently. Reverberation time can be measured using impulsive noise (e.g., using a starting pistol), or you can use the built-in generator and a sound source.

2260 Observer can be upgraded to include the full range of advanced applications from the 2260 Investigator range of products, for example sound intensity, two-channel building acoustics, and FFT analysis.

2260 Observer

Brüel & Kjær

USES

- ❍ Environmental noise assessment
- ❍ Octave or 1/3-octave band analyses
- ❍ Noise monitoring
- ❍ Appraisal of sound reduction efforts
- ❍ Gathering field data for further analyses
- ❍ Research and development
- ❍ Reveration time measurement (BZ 7220 only)

FEATURES

- ❍ IEC and ANSI Type 1 /Class 1 sound level meter
- ❍ 6.3 Hz – 20 kHz frequency range in 1/3-octave band analysis
- ❍ On-line annotation and data exclusion
- ❍ Control of sound recording on a PC
- ❍ Remote operation via modem link
- ❍ Measures reverberation time with impulse or interrupted noise excitation (BZ 7220 only)
- ❍ Displays reverberation time and decay curves (BZ 7220 only)
- ❍ Calculates broadband average reverberation time (BZ 7220 only)

Introduction

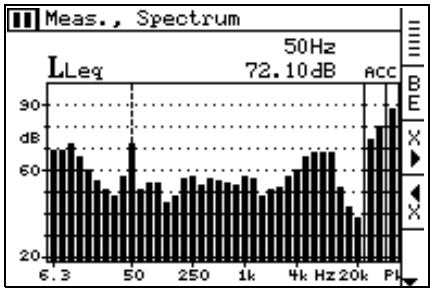


Fig. 1
Typical 2260 spectrum display using BZ 7219 software

2260 Observer is based on a versatile hand-held analyzer platform. As standard, the analyzer is delivered with software that makes the instrument very well suited for most of the tasks relevant to assessment of environmental noise. This software is also useful in any other contexts where broadband level measurements or 1/1- or 1/3-octave band analyses of sound is needed. The frequency range covered in 1/3-octaves is 6.3 Hz to 20 kHz.

2260 Observer can be extended to allow measurements of reverberation time in 1/1- or 1/3-octaves. Additionally, as described later, it is even possible to upgrade the instrument to cover advanced two-channel applications such as intensity measurements and building acoustics.

Making Measurements

Basically, making measurements is a simple matter of starting, pausing, stopping and storing. However, with the plethora of parameters and setup options offered by 2260 Observer, you will enjoy the ability to define setups and store them under a name of your choice. This is useful for recurring tasks as well as special assignments. 2260 Observer also lets you define your own displays, that is, you define which of the many parameters you want to see on-screen and which you will only need for later analyses. Whenever a measurement is stored, all parameters are stored, except those you have explicitly deselected.

Many measurements are made with an operator on-site. Documenting measurement conditions and acquiring representative samples, requires an operator in most cases, as does the visual identification of sound sources. With 2260 Observer you can make on-line annotations of your measurement by attaching named markers to a profile. Furthermore, the actual sound can be recorded on a PC for identification and attached to the profile, when the profile is transferred to a PC.

Markers and Sound Recording

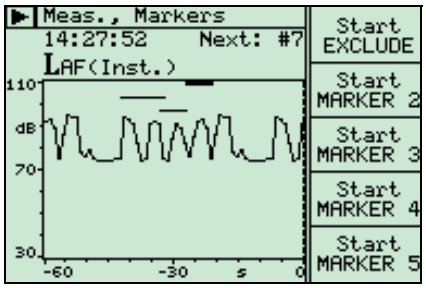


Fig. 2
2260 Observer screen showing three of the markers

Markers are set on the fly. There are four markers that can be named, for example to identify sound sources, and an additional “exclude” marker to mark unwanted sound and exclude it from later processing. Markers can be selected in any order and for any duration. You can set all the markers to finish automatically after a predefined time or set to continue until you stop each one. The markers are saved with the measurement and are transferred with the measurement to post-processing software on a PC.

If sound recording is activated, using 7820 Evaluator™, 7825 Protector™ or 7815 Noise Explorer™, a .wav file can be recorded on the PCs hard disk at the same time as a marker is set. The recording is controlled from 2260 Observer.

When, at a later stage, the measurement is transferred to the PC, the recordings are merged with the profile. The sound recordings are then marked in the profile display and can be replayed. You use the cursor position in the profile display to decide which part of the recording you want to hear. See Fig. 8.

Remote Access

Fig. 3
Outdoor Gear Type 3592

Noise monitoring in out-of-the-way places no longer needs to be a problem. Outdoor Gear Type 3592 offers security and weather protection for 2260 Observer. 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, and battery charger. The Outdoor Gear Type 3592 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.

Measurement Parameters

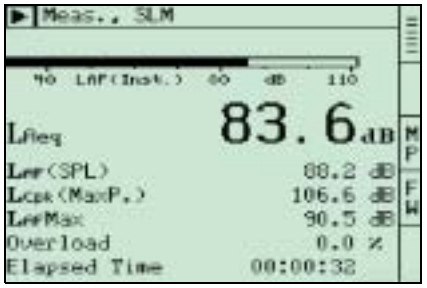


Fig. 4
Screen showing real-time simultaneous display of broadband parameters and Elapsed Time

However many sound parameters (discrete, spectral and statistical) you select to measure with 2260 Observer, they will all be measured concurrently. Serial measurements, which are expensive and time consuming, are not necessary. 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 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.

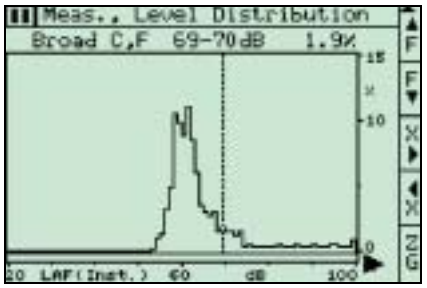


Fig. 5
Statistics screen showing a level distribution curve. The cursor is at the 69 dB to 70 dB interval, showing there are 1.9% of the samples in the interval

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 Observer'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 Observer 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 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.

Reverberation Time Measurements

Measurements of reverberation time are often used for noise reduction in the workplace and determination of room corrections. 2260 Observer's optional reverberation time module BZ 7220 is an ideal solution for these applications.

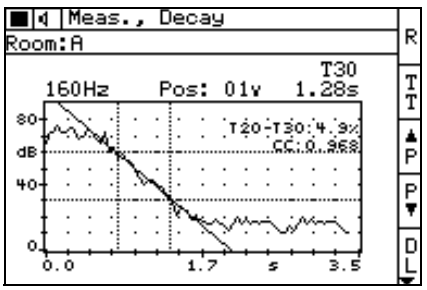


Fig. 6
Decay curve as shown on 2260 Observer's display

The reverberation time can be measured using the impulsive noise method. In this case you need only to carry the 2260 Observer and a starting pistol to, for example, a factory hall. Impulse decays are computed in all frequency bands simultaneously by backwards integration (Schroeder method). Alternatively, the built-in generator can be used in combination with a power amplifier and a loudspeaker source, thus allowing measure-

ments using the interrupted noise method. In conditions of high background noise, serial measurements are supported.

A broadband average reverberation time can be computed from the bands you select and viewed on-screen.

Post-processing Software

With its 32 MB internal memory, 2260 Observer can store a large amount of data. To make it easy and efficient for you to examine the results of the measurements, and to make further analyses such as rating level or exposure calculations, Brüel & Kjær offers a number of Windows®-based software application packages. Each of the software packages is described in a separate product data sheet.

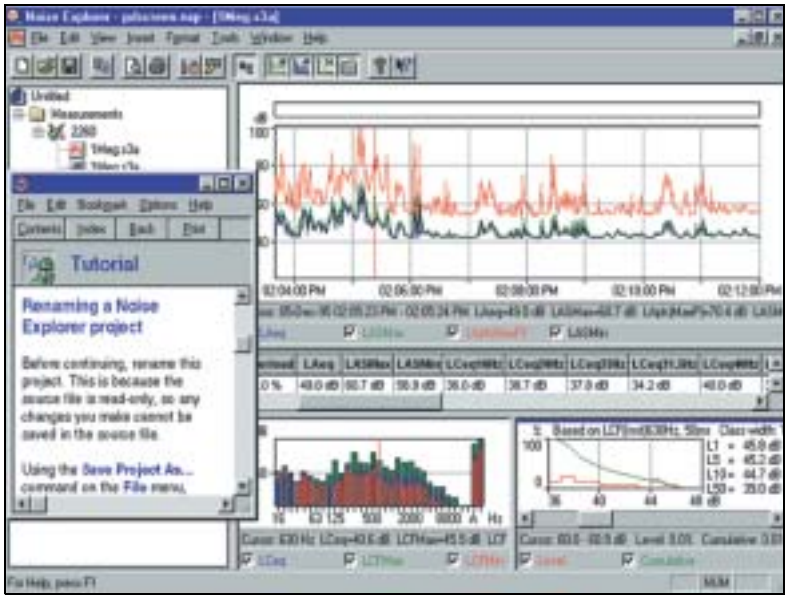


Fig. 7
Spectrum graphs from different measurement files displayed by Noise Explorer Type 7815

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 Observer. 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 Observer, 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. 8
Evaluator Type 7820 calculating the rating level

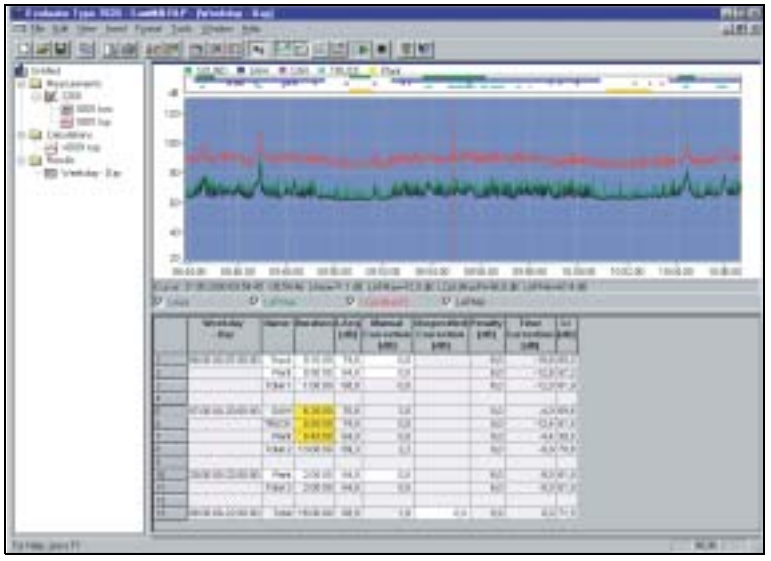
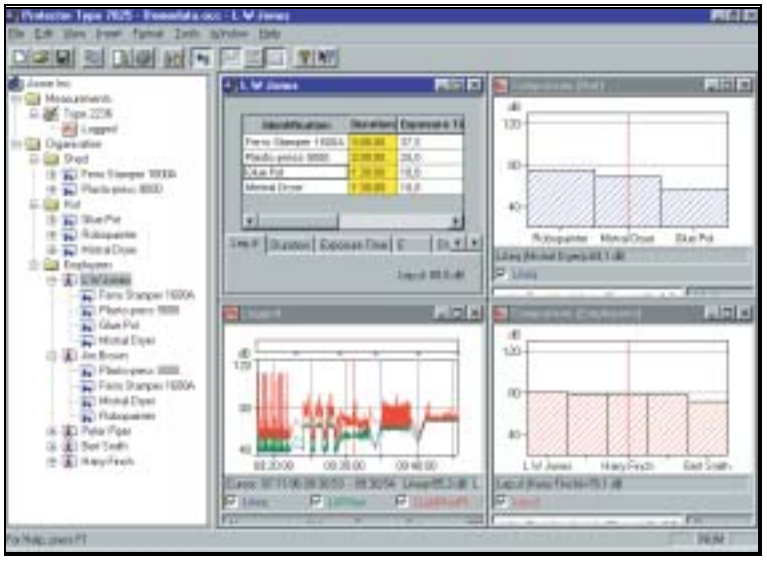


Fig. 9
Protector Type 7825 can show the noise exposure from an entire plant



Protector™ Type 7825

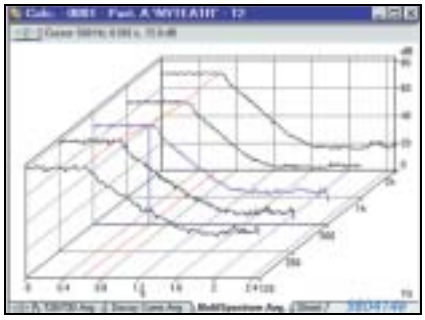
Protector is software for post-processing, simulating and archiving noise exposure data. Protector works with the family of Brüel & Kjær dose meters, sound level meters and analyzers including 2260 Observer. Protector allows you to quickly download sample noise profiles for specific locations or persons, 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.

Qualifier™ Type 7830/31

Qualifier Type 7831 is for post-processing of reverberation time data. When data are transferred from 2260 Observer you see the same results as in the instrument, including selected standard and the setup parameters. Reverberation times can be modified by drawing a new slope line across a displayed decay curve. Reverberation-time measurements can be averaged in two ways:

- Averaging of reverberation times (T20 and T30) or
- Averaging of decay curves (multispectra), also called ensemble averaging. This method produces an average decay curve (multispectrum) for each frequency band

Fig. 10
Qualifier Type 7830 documenting reverberation time measurements



Upgrade Path

2260 Observer always comes with Sound Analysis Software BZ 7219 pre-installed. The Room Acoustics Software BZ 7220 is an option that can be installed on the Observer at a later time by the user.

In addition, 2260 Observer can be upgraded to a 2260 Investigator (described in separate data sheets). Investigator is a 2-channel platform for which a range of additional applications is available:

- Enhanced Sound Analysis, including event detection and event logging (100 ms intervals) as well 10 ms logging of L_{AF}
- Building Acoustics, including measurements of airborne and impact sound insulation in one or two channels
- Sound Intensity measurements for sound power measurements and noise source location
- Narrow-band analyses (Fast Fourier Transform (FFT)) of sound and vibration with built-in pure tone detection according to several standards
- Noise Profile Software for logging noise parameters within a 110 dB dynamic range

Compliance with Standards

CE, C-Tick	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
Safety	EN 61010–1 and IEC 61010–1: Safety requirements for electrical equipment for measurement, control and laboratory use. UL 3111–1: Standard for Safety – Electrical measuring and test equipment
EMC Emission	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. **Note:** the above is only guaranteed using accessories listed in this Product Data Sheet.
EMC Immunity	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 ± 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 ± 0.5 dB. **Note:** the above is only guaranteed using accessories listed in this Product Data Sheet.
Temperature	IEC 60068–2–1 & IEC 60068–2–2: Environmental Testing. Cold and Dry Heat. Operating Temperature: <0.5 dB –10°C to +50°C (+14°F to +122°F) Storage Temperature: –25°C to +70°C (–13°F to +158°F)
Humidity	IEC 60068–2–3: Damp Heat: 90% RH (non-condensing at 40°C (104°F)) Effect of Humidity: <0.5 dB for 30% < RH < 90% (at 40°C (104°F) and 1 kHz)
Mechanical	Non-operating: IEC60068–2–6: Vibration: 0.3 mm, 20 m/s^2, 10–500 Hz, IEC 60068–2–27: Shock: 1000 m/s^2 IEC 60068–2–29: Bump: 1000 bumps at 250 m/s^2
Calibration	Initial factory calibration traceable in conjunction with ISO 9001

Specifications – Type 2260 Observer with BZ 7219 Software

Specifications apply to 2260 Observer fitted with the supplied microphone and input stage, and running BZ7219 software

STANDARDS
Conforms with the following:
- IEC 60651 (1979) Type 1 plus Amendments 1 and 2
- IEC 60804 (2000) Type 1
- IEC 61672 (Draft March 2001) Class 1
- IEC 61260 (1995) Octave Bands and 1/3-octave Bands Class 0
- ANSI S1.4-1983 Type 1 plus ANSI S1.4A– 1985 Amendment
- ANSI S1.43-1997 Type 1
- ANSI S1.11-1986 Octave Bands and 1/3-octave Bands, Order 3, Type 0-C, Optional Range

SUPPLIED MICROPHONE
Type 4189: Prepolarized Free-field 1/2" Microphone
Nominal Sensitivity: –26 dB ± 1.5 dB re 1 V/Pa
Capacitance: 14 pF (at 250 Hz)

INPUT STAGE
ZC 0026
Extension Cables: Up to 100 m 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 Sound Level Calibrator Type 4231, Multifunction Acoustic Calibrator Type 4226 or Pistonphone Type 4228
Electrical (internal): Uses internally generated electrical signal combined with a keyed-in value of microphone sensitivity

MEASURING RANGES
Linear Operating Range: 80 dB adjustable to give full-scale readings from 80 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 ZF 0023 (included) effectively increases all full-scale readings by 20 dB

OCTAVE and 1/3-OCTAVE BAND FILTERS
Octave Band Centre Frequencies: 8 Hz to 16 kHz
1/3-octave Band Centre Frequencies: 6.3 Hz to 20 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
Lin. 3 Hz–20 kHz	26.4 dB	15.3 dB	26.7 dB

CORRECTION FILTERS
Sound Incidence: Built-in filters for correction of frontal/random sound incidence

Windscreens: Built-in filters for correcting the influence of Protective Cover UA 1236, Windscreen UA 0459 (65 mm) and UA 0237 (90 mm)

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

For Display and Storage (Spectrum)

L_{Xeq}	L_{XYMax}	L_{XYMin}

Only for Display as Numbers or Bargraphs (Broadband)

$L_{AS(SPL)}$	$L_{AF(SPL)}$	$L_{AI(SPL)}$
$L_{VS(SPL)}$	$L_{VF(SPL)}$	$L_{VI(SPL)}$
$L_{AS(Inst)}$	$L_{AF(Inst)}$	$L_{AI(Inst)}$
$L_{VS(Inst)}$	$L_{VF(Inst)}$	$L_{VI(Inst)}$
L_{AST3}	L_{AFT3}	L_{AIT3}
L_{VST3}	L_{VFT3}	L_{VIT3}
L_{AST5}	L_{AFT5}	L_{AIT5}
L_{VST5}	L_{VFT5}	L_{VIT5}
$L_{Apk(Peak)}$	$L_{Vpk(Peak)}$	

For Storage During Logging (Broadband)
Nothing or
All parameters or
All parameters without statistics or
6 Major Parameters:

L_{Aeq}	$L_{Cpk(MaxP)}$ (or $L_{Lpk(MaxP)}$ if L is selected)
L_{AFMax}	L_{Ceq} (or L_{Leq} if L is selected)
L_{AFMin}	L_{AIm}

For Storage during Logging (Spectrum)
Nothing or
All Parameters or
L_{eq} (pre-weighting A,C, or L as selected)

Only for Display as Numbers or Spectra (Spectrum Bands)

$L_{XY(SPL)}$	$L_{XY(Inst)}$

The Broadband Level Distribution, Cumulative Distribution and Statistics LXYN1-5 are based upon sampling $L_{XY(Inst)}$ every 10 ms into 0.2 dB wide classes over 80 dB

MEASUREMENT CONTROL
Measurement Types:
- Manual – manually controlled single measurement
- Automatic – with preset measurement time
- 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

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

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 predefined setups. 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)

CONTROL OF SOUND RECORDING
Sound recording (.wav files on a PC using Type 7815, 7820 or 7825) 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 analog bar with zoom facilities
Cumulative Distribution: Broadband plus one analogue bar
Level Distribution: Broadband. Class width can be specified. Also with one analogue bar. Zoom facilities provided
Profile: The last 15 s of $L_{AF(Inst)}$ plus one analog bar for manual measurement 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

STORAGE SYSTEM
Internal Hard Disk: Up to 32 MB for application software, user setups and data
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

INPUT STAGE CONNECTION
Connector: 10-pin LEMO

AUX OUTPUTS (2 independent)
Can be set to:
$L_{AF(Inst.)}$: 0 to 4 V DC signal updated every 100 ms
Reference: 4 V square-wave for output calibration
Meas. Status for triggering external devices
Signal from amplified frequency weighted signal (A, C/L)

AC INPUTS/OUTPUTS (2)
As Output: Buffered, unweighted microphone signal
Output Impedance: 2 × 200 Ω
Maximum Load: 47 kΩ || 200 pF (short-circuit protected)
As Input: Alternative to microphone input
Connector: 3-pin LEMO (balanced input)

SERIAL INPUT/OUTPUT
Conforms to EIA ITIA 574 (RS–232), coupled as data terminal equipment (DTE)
Connector: 9-pin D-type male
Baud Rates: 1200, 2400, 4800, 9600, 19200, 38400, 115200
Word Length: 8 bits, no parity or stop bits
Handshake: None, XON/XOFF, RTS/CTS

PCMCIA INPUT/OUTPUT
Computer with PCMCIA/JEIDA standards release 1.0

SETTLING TIME
From Power On: approximately 35 s

BATTERIES
Type: 6 × LR14/C-size 1.5 V alkaline
Lifetime (at 20°C): 5 to 9 hours continuous operation

EXTERNAL DC POWER SUPPLY
Voltage: regulated or smoothed 10 to 14 V, max. ripple 100 mV
Power: 3.5 W, current: 300 mA, Inrush current: 1000 mA
Socket: Ø 5.5 mm with Ø 2 mm pin (positive)

WEIGHT AND DIMENSIONS
1.2 kg (2.6 lb.) with batteries
375 × 120 × 52 mm (14.8 × 4.7 × 2.0")

Specifications – Type 2260 Observer with BZ 7220 Software

Specifications apply to 2260 Observer fitted with the supplied microphone and input stage, and running BZ7220 software

SOUND LEVEL METER STANDARDS
Conforms with the following:
- IEC 60651 (1979) Type 1 plus Amendments 1 and 2
- IEC 61260 (1995) Octave Bands and 1/3-octave Bands Class 0
- ANSI S1.4-1983 Type 1 plus ANSI S1.4A– 1985 Amendment
- ANSI S1.11-1986 Octave Bands and 1/3-octave Bands, Order 3, Type 0-C, Optional Range

MEASUREMENT AND CALCULATION STANDARDS
Measurement and calculations can be made according to the following standards: ISO (3382, 354), DIN (52212), BS, NBE, SS, Sia, ÖNORM, NF, UNI, ASTM and NEN (5077)

UNDERRANGE INDICATION
Octave and 1/3-octave: 90 dB below upper limit for each range setting, corresponding to less than 0.5 dB error

FREQUENCY WEIGHTING
Lin frequency weighting
A-weighting Instantaneous Fast (displayed, not stored)

OCTAVE AND 1/3-OCTAVE BAND FILTERS
Octave Band Centre Frequencies: 63 Hz to 8 kHz
1/3-**Octave Band Centre Frequencies:** 50 Hz to 10 kHz
Real-time Frequency Range: 50 Hz to 10 kHz centre frequencies

INHERENT NOISE LEVEL
(Inherent noise is the combination of the electrical noise and the thermal noise from the microphone at 20°C.) Typical values using a microphone Type 4189 with a nominal sensitivity:
1/3-octaves: 2 dB at 1 kHz, 8 dB at 10 kHz
1/1-octaves: 6 dB at 1 kHz, 12 dB at 8 kHz

DETECTORS
The analyzer contains several detectors working in parallel on every measurement:
Octave Band Filters (8) or 1/3-octave Band Filters (24): Pre-weighted by Lin., each with a detector channel containing one linear averaging detector
Overload Detector: Monitors the overload condition
A-weighted: Broadband detector channel with Fast exponential time weighting

INTERNAL GENERATOR
Built-in pseudo-random noise generator
Spectrum: Selectable between Pink and White
Crest Factor:
Pink noise: 4.4 (13 dB)
White noise: 3.6 (11 dB)

Bandwidth: Follows measurement bandwidth
Lower limit: 50 Hz (1/3-Oct.) or 63 Hz (Oct.),
Upper limit: 10 kHz (1/3-Oct.) or 8 kHz (Oct.)
Output Level: Independent of bandwidth
Max.: $1V_{rms}$ (0 dB)
May be set in 1 dB steps 0 – 60 dB
When bandwidth is changed, the level for all bands is automatically adjusted to comply with the set output level
Turn-on time and Turn-off time: Equivalent to RT = 70 ms
Repetition Period: 175 s
Output Connector: Auxiliary 1 output
Control: See Measurement Control

EXTERNAL GENERATOR
Selectable as alternative to Internal Generator
For controlling external noise generator
Levels: 0 V (Generator off), 4.5 V (Generator on)
Rise-time and Fall-time: 10 µs
Control: See Measurement Control.

MEASUREMENTS
Instantaneous: For display, no storage
"Live" spectrum – L_{eq} with a short averaging time
Range: Follows setting in Levels and Reverberation Time
Generator: Turned on and off manually
Reverberation Time: T20 and T30 in octave or 1/3-octave bands
Decays are measured and stored, using averaging times between 8 and 96 ms, depending on bandwidth and decay time

Manual entry: After measurement, the value in each band, for each position, may be changed by user entry

Broadband average: The arithmetic average of the Reverberation Time for selected bands is calculated and displayed (not stored)

Impulse excitation: When level (say from starter pistol) exceeds user selected trigger level, the decay is recorded and backwards integration performed (Schroeder method)

Generator: Controlled automatically

Repetition: Decays can be repeated automatically up to 99 times (ensemble averaging)

Averaging: up to 25 T20 and T30 measurements can be averaged (arithmetic averaging)
T20 and T30 calculation: From slope in evaluation range
Slope estimation: Least squares approximation

Status indications: Overload, underrange, start time, T20–T30% Correlation Coefficient; extensive list of Status codes
RT range: Max. 30.00 s, min. 0.1–0.7s, depending on bandwidth

MEASUREMENT CONTROL
Manual or semi-automatic. Measurements are started manually and can be automatically stored on completion of measurement. The noise generator is turned on and off automatically
With Inst. spectrum on display, the generator can be turned on and off manually for checking
Selected frequency bands can be measured serially, i.e., one by one in automatic sequence

MEASUREMENT DISPLAYS
T2: Shows the spectrum of reverberation times (T20 or T30) measured in the receiving room. Also, decay curve can be shown for each centre frequency
Spectrum: Octave or 1/3-octave band spectrum. Y-axis can be zoomed
dB(A): Instantaneous level is shown as a column next to the spectrum, with cursor readout.The graphical displays have cursor read-out facilities

DISPLAY RESOLUTION
Levels: 0.1 dB
Reverberation Time: 0.01 s

DISPLAY
Update Rate: Instantaneous – typically 5 times per second

AUXILIARY OUTPUTS
Aux. 1: noise generator output
Aux. 2: 'Input' signal monitor output
can be set to either monitor 'Input' signal with variable attenuation from 0 to –80 dB in 1 dB steps, or can be switched Off to reduce power consumption

HELP AND USER LANGUAGES
Concise context-sensitive Help throughout in English, German, French, Italian, Spanish or Czech

Ordering Information

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

Type 2260 I	Modular Precision Sound Analyzer with Sound Analysis Software BZ 7219
Type 2260 J	Modular Precision Sound Analyzer with Sound Analysis Software BZ 7219 and Reverberation Time Software BZ 7220
BZ 7220	Reverberation Time Software

Accessories Included with Type 2260 I

BZ 7219	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
UA 0237	Large Round Windscreen
AO 1442	9-pin to 25-pin PC or Serial Interface Cable

Optional Accessories

CALIBRATION

Type 4226	Multifunction Acoustic Calibrator
Type 4228	Pistonphone
Type 4231	Sound Level Calibrator
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 7830	Qualifier – Reverberation Time Viewing and Calculation Software
Type 2322	Portable Printer
AO 1442	9-pin to 25-pin PC or serial printer interface cable
UL 1006	32 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
KE 0371	Carrying Case for 2260 and accessories
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
Type 4295	Omnisource
Type 4296	OmniPower Sound Source with Tripod
Type 2716	Power Amplifier
KE 0358	Flight Case
AO 0523	10 m Cable from 2260 to 2716
AQ 0621	Bridging Cable for 2716 output
AQ 0622	10 m Cable from 2716 to 4296

Brüel & Kjær reserves the right to change specifications and accessories without notice.

BP 1955 – 11 02/02 Rosendahls Bogtrykkeri

HEADQUARTERS: DK-2850 Nærum · Denmark · Telephone: +4545800500 · Fax: +4545801405 · http://www.bksv.com · e-mail: info@bksv.com
Australia (02)9450-2066 · Austria 0043-1-8657400 · Brazil (011)5182-8166 · Canada (514)695-8225 · China (86) 1068029906
Czech Republic 02-67021100 · Finland (0)9-755 950 · France (01)69907100 · Germany 06103/733 5-0 · Hong Kong 25487486 · Hungary (1)2158305
Ireland (01)803 7600 · Italy 02 57 68061 · Japan 03-3779-8671 · Republic of Korea (02)3473-0605 · Netherlands (31)318 559290 · Norway 66771155
Poland (22)858 9392 · Portugal (1)4711453 · Singapore (65) 377-4512 · Slovak Republic 421 2 5443 0701 · Spain (91)6590820 · Sweden (08)4498600
Switzerland (0)1 880 70 35 · Taiwan (02)7139303 · United Kingdom (0)1438 739 000 · USA 800 332 2040
Local representatives and service organisations worldwide

Brüel & Kjær