Declaration of Conformity

We, SINUS Messtechnik GmbH, Foepplstrasse 13, 04347 Leipzig, Germany, declare that the product

Boogie Sound Level Meter

Part Number: 904001.2

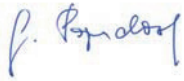
to which this declaration relates, is in conformity with the following European standards and other documents:

Specification complies with:	IEC 60651, type 2 IEC 60804, type 2
EMC	EN 50051-1 EN 50082-1

This product has been manufactured in compliance with the following internal documentation for manufacture and quality assurance from SINUS Messtechnik GmbH:

Manufacturing documents	- Quality assurance manual conforming to ISO 9001 - Testing rules for Electronic Boards - Testing rules for Final Test

This product was tested and found to comply with all specifications.



Leipzig, August 2003

Gunther Papsdorf
Managing Director

Manual

Mini – Sound Level Meter *Boogie*™

- Thank you for purchasing the Boogie sound level meter from SINUS Messtechnik GmbH.
- Please read this manual carefully before using the sound level meter. We advise practicing with some test measurements before performing important measurements.
- If you should have any questions on the operation or the application of the instrument please do not hesitate to contact us. You can also order our current catalog and spare parts from the address below.

Address:	**SINUS** Messtechnik GmbH Foepplstrasse 13 04347 Leipzig
FON:	+49-(0)341-24429-33
FAX:	+49-(0)341-24429-99
Email:	info@soundbook.de

Some Fundamentals of Sound

Audible sound is caused by barometric fluctuations in the freqency range from 16 to 16,000 cycles per second (16 Hz... 16kHz). These fluctuations are measured in the physical unit Pascal (Pa). The human ear can recognize sound pressures in the range from about 0.00002 Pa (threshold of hearing) to 100 Pa (threshold of pain). Due to this extremely wide range, a logarithmic measure – the decibel (dB) – is used for clarity. The dB value for the audibility threshold is 0 dB and for the pain threshold 140 dB.

The sensitivity of the human ear is frequency-dependent. Our ear is less sensitive to very low and very high frequencies than to middle frequencies (1 kHz). This characteristic of the human ear is simulated by the so-called A-filter in sound level meters. Many acoustic measurements such as traffic noise measurements are performed with A-weighted levels. The measured values are usually labeled with the suffix (A), e.g. 65 dB (A).
For measuring annoyance or even damage to hearing, a so-called average level is important in addition to the maximum sound level. This average level or “equivalent continuous sound pressure level” $\mathbf{L_{eq}}$ is used for evaluating heavily fluctuating levels.
When evaluating with Leq it must be considered that it does not take into account properties of sound that are perceived differently by different people. Thus, aircraft noise is often perceived to be more annoying than railroad noise and truck noise more annoying than motorcycle noise.
The reason for this is the different frequency distribution of sounds. When calculating levels, these properties can be taken into account by means of standard additions and reductions without the need to calculate frequency spectra.
Due to the logarithmic graduation of the dB-scale, two sound sources of the same loudness cause together exactly 3 dB more noise than each of them alone. The apparently paradoxical statement that
0 dB + 0 dB = 3 dB becomes understandable when bearing in mind that 0 dB does not correspond to 0 Pa, but to the human threshold of hearing.
A level shift of 3dB can just about be perceived by the human ear; a level reduction of 10 dB is necessary in order to halve the perceived loudness.

Equivalent Continuous Sound Level
This operating mode displays the equivalent continuous sound level (L_{eq}) over a given measurement period. The measurement is started and stopped with [**SET**], as for the maximum sound level mode. The measurement range must be selected before the measurement is started. During the measurement period the digital display shows the short-time L_{eq} over 1 s. After finishing the measurement, the L_{eq} for the measurement period is shown; if an overload occurred during the measurement, this is indicated by the arrow symbol.

Tip: In order to find the most suitable measurement range for $\mathbf{L_{pmax}}$ or $\mathbf{L_{eq}}$, a preliminary measurement should be made with Auto-range in the $\mathbf{L_p}$ operating mode.

Technical Data

Accuracy	Type 2 according to IEC 60651 / 60804
Measurement range	30 ... 130 dB (A)
Operating modes	- Sound level L_p - Maximum sound level L_{pmax} - Equivalent continuous sound level L_{eq}
Level ranges	30 ... 90 dB 50 ... 110 dB 70 ... 130 dB Autorange in L_p mode
Frequency weighting	A
Time weighting	Fast
Display	- Measured value with 3.5 digits - Bar graph in 5 dB steps - ◂ under-range and ▸ over-range indicator - Operating mode, measurement range - Battery status
Microphone	¼” electret
Calibration	Automatic to 93.5 ... 94.5 dB (use 93,9 dB with 511E calibrator)
Batteries	2 x R6, alkaline, NiMh, NiCd
Operating time	100 h (alkaline batteries)
Dimensions	170 mm x 62 mm x 30 mm
Weight	160 g (with batteries)

The [**SET**] button starts and stops all measurements except L_p.

Calibration
For calibration, a ¼" calibrator with a nominal level of 94 dB must be attached. After choosing the CAL operating mode, the expected level of 94 dB is shown. Please note that the ¼" adapter of the calibrator in connection with our microphone causes a slight shift in the sound level. By repeatedly pressing the [**RANGE**] button, the actual level of the calibrator can be set within the range 93.5 dB to 94.5 dB in 0.1 dB steps. The calibration is then started with [**SET**]. The mode display CAL blinks during the calibration and stops blinking when the calibration is finished.
The calibration is stored with [**SET**]; the calibration values also remain stored in the instrument when it is switched off.
All instruments are shipped calibrated ex works.

Instantaneous Sound Level
In the instantaneous sound level (L_p) operating mode, it is possible to choose between automatic (indicated by **AUTO**) and manual setting of the measurement range by repeatedly pressing the [**RANGE**] button. The selected measurement range is indicated by the limit values of the bar graph.
When the selected measurement range is not within these limits, no measurement value is displayed. This is indicated by the arrows ◂ = under-range indicator and ▸ = over-range indicator.

Maximum Sound Level
In this operating mode the maximum value of the instantaneous sound level (L_{pmax}) within a measurement period is calculated. The start and end of the measurement period are set by pressing the [**SET**] button. Before beginning the measurement, the desired measurement range must be selected with the [**RANGE**] button. During a measurement period, the bar graph shows the instantaneous value of the sound level and the digital display indicates the current maximum value. After stopping the measurement with [**SET**], the maximum value remains visible. If an overload occurs during the measuring time, it will be indicated again after stopping the measurement, in which case the measurement is invalid.

For certain situations, medical specialists and legislation have laid down limits for the acceptable continuous sound pressure level L_{eq}(A) . When new roads or railroads are planned, these rules must be complied with. For example, in German residential areas, noise levels of 65 dB (A) during the day and 55 dB (A) at night must not be exceeded. The WHO even recommends lower values of only 55 dB (A) during the day and 45 dB (A) at night. These values are often grossly exceeded in many places in Germany and other highly industrialized countries.
Exposure to a continuous sound pressure level of more than 85 dB is considered to be a health risk. Literature references about sound can be found under www.sinusmess.de.

Sound Level Measurement with Boogie

Boogie enables you to measure sound levels easily and to assess them objectively. The instrument is easy to operate because of the built-in microprocessor which allows Boogie to be employed even by inexperienced users.
Boogie always works with a built-in A-filter and the time weighting "Fast". In addition to the instantaneous value of the sound level $\mathbf{L_p}$ and the maximum value $\mathbf{L_{pmax}}$ in a time period, Boogie can also measure $\mathbf{L_{eq}}$ by integrating over a time period. This mode of operation is usually only found in bigger and more expensive instruments.
Therefore, Boogie is the ideal instrument for measuring:

- traffic noise
- industrial noise
- neighborhood noise
- leisure noise
- occupational noise

Type 2 accuracy according to IEC 60651 and IEC 60804 guarantees reliable measurement results for the user. The accuracy of measurements can be considerably increased by calibrating the instrument before performing the measurements.
Boogie can not be used for legally binding measurements in Germany because legislation stipulates that for this type of measurements a calibrated sound level meter of type 1 must be used.
However, modern type 2 devices such as Boogie provide measurement results exact enough for assessing noise situations in many cases.

Delivery

When unpacking, please check that the following items are present:
- Boogie sound level meter
- W3 windscreen
- 2x R6 batteries
- Instruction manual
- Packing carton (can be used for storage)

Please contact your dealer immediately if any item is missing.

Optional accessories:

Windscreen	800254.7
Hand strap	800480.5
Batteries	800479.0
¼“ calibrator 511E	800351.5

Preparing for Measurement

After unpacking the unit the 2xR6 batteries must be inserted. Pay attention to the correct polarity when inserting the batteries.
However, a wrongly inserted battery will not cause any damage.
As an optional accessory, a hand strap is available to prevent the unit from accidentally being dropped during longer measurements. Boogie is a precision measuring instrument and should always be handled with care. In particular, the microphone and the display are sensitive components.
For outdoor measurements, the windscreen should be placed over the microphone to reduce wind noise, which may otherwise produce false measurement results.
If a calibrator is available, the instrument should be calibrated before each measurement and ideally the sensitivity should be checked again with the calibrator after each measurement.
Either primary cells (alkaline, zinc-carbon) or rechargeable batteries (NiCd, NiMh) of R6 (AA) format can be used. The ultra low power technology of the built-in microprocessor allows an extremely long operating time with a single set of batteries.
However, the batteries should be removed from the unit if it is not to be used for three months or longer: discharged batteries may leak and the leaking electrolyte can cause damage to the instrument.

Operation

Function of Buttons

The instrument is switched on / off by holding the [**MODE**/POWER] button pressed for longer than one second. After switching on, a functional test of the display is performed, i.e. all segments of the display are visible simultaneously for a short time.
Afterwards the instrument is in the L_p and Autorange operating mode, which is indicated by **AUTO**.
The measurement range can be selected by pressing the [**RANGE**] button. The minimum and maximum values of the current range are displayed in the bar graph.
The [**MODE**] button changes the mode. The current operating mode is shown in the display:

AUTO	= L_p with Autorange
MAX	= L_{pmax}
LEQ	= L_{eq}
CAL	= calibration