



The Nor121 Analyser

- for any Environmental or Building Acoustic measurement



- A lightweight, rugged and hand-held analyser with 80 or 120dB dynamic range, single or dual channel capability, built-in hard disk and PC-card slot. Displays and menus can be set in several languages.
- With the Nor121 you can measure and record more than 1300 functions and parameters - there is a function for every need!
- For the environmental noise detection, the Nor121 fits in everywhere! Semi-permanent noise monitoring, permanent noise monitoring or just regular measurements there and then - with or without frequency analysis, annoyance recorder function, pure tone detection and determination, you name it.
- Sound reduction and reverberation time - in two channels! The Nor121 makes any building acoustic field measurement without the need for a PC.
- As for all Norsonic analysers, many of the features in the Nor121 are optional and can be added upon order or as retrofit whenever required. In this way you don't pay for features never used.
- The Nor121 can be what you want it to be for you, with its multitude of possibilities combined with the ability to create user-defined setups. *Made to measure - by you!*

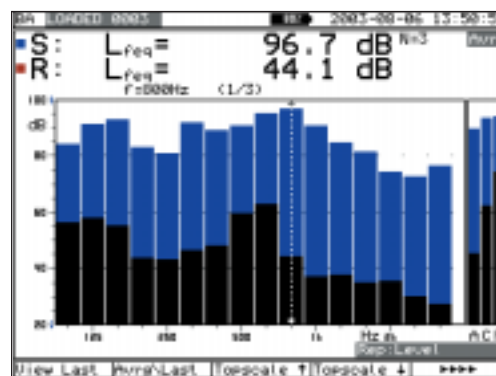


Building Acoustic mode

- Single or dual channel capabilities
- Reverberation time measurements using triangle or least-square-fit methods
- Internal rating calculations for airborne and impact sound insulations
- Built-in noise generator with white, pink and 1/1 - 1/3 octaveband filtered noise
- Serial frequency scanning
- Background noise corrections
- Microphone corrections
- The Nor121 may optionally form the measurement part of a wireless building acoustic system (Nor1516)
- Internal hard disk and standard PC card for the storage of data
- Results can be exported via the PC slot, RS-232 serial or the Centronics parallel ports
- Powered by long life rechargeable batteries or from external 11-18 V supply

Since the introduction of the successful Nor121 instrument, environmental noise measurements has been the main feature. However, as many of our customers are making a lot of different types of measurement, there is no surprise they told us to continue our tradition of letting one instrument be able to do all kind of measurements!

Hence, a building acoustics extension is the logical next step. Sound insulation between rooms; façade insulation with noise or traffic as the source; impact noise insulation; reverberation time calculations based on noise or impulse excitation; even the final index that says it all - the R_w or the $L_{n,w}$ - they can all be found inside the handheld casing of the Nor121.



2-ch. Source and Receiving room levels

The Nor121 is designed to be a two-channel analyser when working in building acoustics mode, but it works well as a single channel analyser too. If you already own a Nor121 and want to upgrade it to include the building acoustics extension, the second channel may be installed during the upgrade process - or later, if that is more suitable.

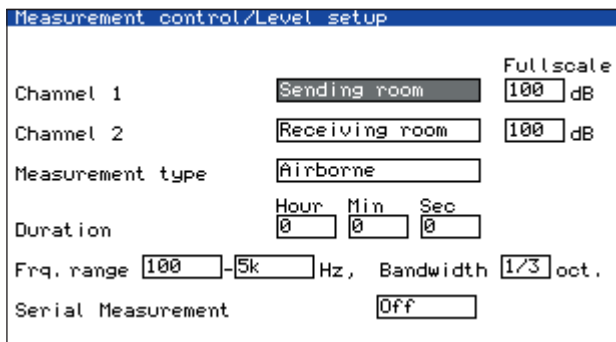
Built-in Noise Generator

The building acoustics mode features a built-in noise generator with white and pink broadband noise. Sometimes, however, this is not enough. From time to time you will come across measurement sessions where you simply cannot get enough energy out to obtain a usable signal-to-noise ratio in the receiving room.

Enter the serial analysis feature with bandpass filtered noise. Not a new thing to our customers, in fact this has been a feature available in every building acoustics measurement system designed by Norsonic since we started doing this back in the mid-seventies.

One of the strong points lies in that the Nor121 lets you combine parallel (real time) and serial analysis. If you start out doing a parallel analysis and find that some frequency bands do not provide results good enough, you may retake a measurement in those frequency bands only, one at a time! The frequency bands that proved good enough when you did the parallel measurement are retained, while those in need for more output power are measured again.

The results of the serial measurements will then replace the bad results and you end with a successful measurement without spending more time than strictly needed! Alternatively, you may choose to measure all frequency bands as an automated serial scan.



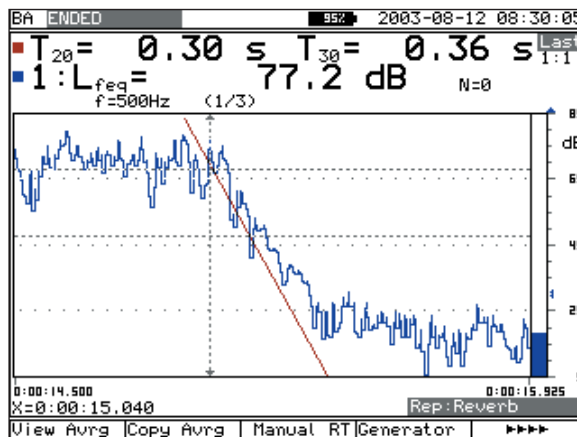
MeasurementControl/Level setup menu

Reverberation Time

In the Nor121 reverberation time measurements are made using either impulse or noise excitation - the choice is yours. Even here, you have the possibility to combine parallel and serial measurements by applying bandpass filtered noise.

The decay curves captured are shown as level vs. time curves in the Nor121 display. The level range from -5 to -25 or -35dB below the noise excitation level (or the maximum

impulse level) is used for the calculation and the result is then normalised to a 60dB range. However, if you prefer to use the T_{15} (-5 to -20dB) or if you need to include the EDT (Early Decay Time) these are also available for you.



Reverberation time decay

Traditionally, we have stuck to the use of a triangular weighting function when calculating the reverberation time. This method gives a better repeatability than most, if not all, other methods. However, for a number of reasons (including the requirements set by some standards) you may want to use the least square fit method, so as an alternative we've included that.

Individual registers and reports

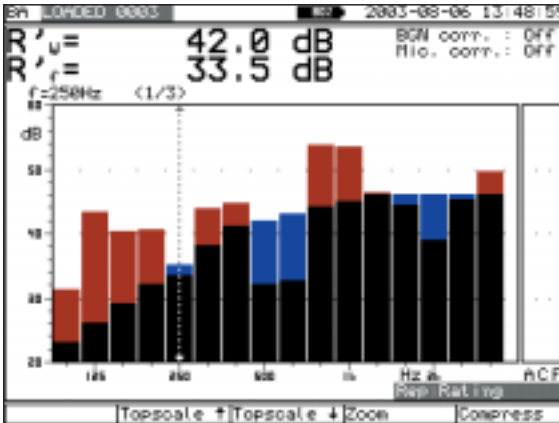
There is a Last register for each channel (Last is the register where the most recent measurement resides) and an Average register where the measurements can be averaged together to provide room averaged values.

In addition, you will find individual reports within each of the registers containing the measured and calculated results for Level, Reverberation Time, Background Noise Level, and Rating.

Frq/Netw 1/3	Leq Sending	Leq Receiving	Leq Diff	
315Hz	91.7 dB	46.2 dB	45.5 dB	
400Hz	88.8 dB	48.1 dB	40.7 dB	
500Hz	90.6 dB	59.6 dB	31.0 dB	
630Hz	95.3 dB	62.7 dB	32.6 dB	
800Hz	96.7 dB	44.1 dB	52.6 dB	
1kHz	90.8 dB	36.9 dB	53.9 dB	
1.25kHz	84.5 dB	37.3 dB	47.2 dB	
1.6kHz	81.3 dB	34.9 dB	46.4 dB	
2kHz	74.4 dB	35.3 dB	39.1 dB	
2.5kHz	72.6 dB	29.8 dB	42.8 dB	
3.15kHz	76.7 dB	27.3 dB	49.4 dB	
4kHz	72.0 dB	20.5 dB	51.5 dB	
5kHz	66.7 dB	18.8 dB	47.9 dB	
A-netw	89.4 dB	45.0 dB	44.4 dB	
C-netw	93.4 dB	62.0 dB	31.4 dB	
F-netw	93.9 dB	74.1 dB	19.8 dB	

Average Level resulting table

Although the Nor121 often will play the role of a data acquisition unit, it is important to be able to verify the measurements while you're still on-site. Therefore the Nor121 also calculates the $R'w$, $L'n,w$ etc. for you. The results are shown in the display - you won't need a separate computer for this. Any retakes can then be made there and then. Time and money saved again!



Resulting $R'w$ graphical display

Freq/Netw 1/3	R'	Ref- R'
160Hz	40.2 dB	
200Hz	40.5 dB	
250Hz	33.5 dB	1.5 dB
315Hz	43.9 dB	
400Hz	44.6 dB	
500Hz	32.0 dB	18.8 dB
630Hz	32.6 dB	18.4 dB
800Hz	53.6 dB	
1kHz	53.3 dB	
1.25kHz	46.3 dB	
1.6kHz	44.4 dB	1.6 dB
2kHz	38.8 dB	7.2 dB
2.5kHz	45.2 dB	0.8 dB
3.15kHz	49.7 dB	
4kHz	49.9 dB	
5kHz	45.4 dB	

Rated R' calculation table

A Self-contained Solution

If you order, or later upgrade your Nor121, to have two fully operating channels, all the building acoustics measurements are made dual channel. However, you may run the system as a single channel building acoustics system as well.

In dual channel operation everything is dual. You can have the Nor121 show the absolute level as measured by both channels simultaneously - in the same graph for easy comparison, or you can inspect the receiving room level and the level of an initial background noise measurement.

Memory and postprocessing

If you are in need of the individual datasets used to create the average values, these are still available after transferring

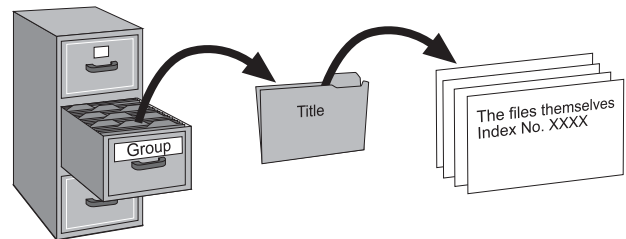
the measurement file to a PC running the NorBuild (Sound Insulation Calculations) software package Nor1028 - available separately - as all the individual results are stored separately in the Nor121. The NorBuild software will also produce final reports on paper in accordance with the requirements in the building acoustic Standards (ISO 717/1 and /2 as well as national versions).

You may store complete measurement sets, and instrument setups, for future use on the Nor121 hard disk or on a PC card. This means that you do not have to run through a setup process every time somebody else used the instrument for something different.

To make memory management simpler you may even create your own group of folders containing everything you do, thereby keeping your stuff apart from your colleagues'.

The memory structure consists of Groups containing different Titles which in turn contains the files denoted by their Index No. This is what enables you to create your very own memory area. You may then put all your measurements and setups here to make them reside in an area separated from the rest of the memory.

You may, of course, even use this feature to other things as well, such as to build up a project-based memory structure or whatever your needs may be.



Nor121 storage principle

Wireless Building Acoustics – no need for microphone cables between the rooms

The unique wireless building acoustic system Nor1516 require one or two measurement units in addition to a control station. Each unit may be placed in individual rooms and will communicate using wireless technology. The Nor121 may be used as one measurement unit in this system. Hence, the trouble with microphone extension cables and loudspeaker cable between the source and receiving room now belongs to the past. (See separate Nor1516 Product Data for further details.)



Environmental mode

- Records the sound signal itself
- Parallel measurement reports with six levels of nesting each having individual time settings plus profile and event based data
- Real time frequency analysis in octave and third octave bands (0.1-20 000 Hz in single channel mode, 6.3-5 000 Hz in dual channel mode)
- Statistical LN calculations including percentile spectra
- Measures all time constants and the A, C and Linear weightings simultaneously
- Optional 120dB dynamic range avoids the need for range setting
- Pure tone detection mode
- Full size graphics display with backlight
- Advanced trigger functions
- Comprehensive marker functions with user selectable data labels
- Noise event analysis
- Operator voice comments stored on hard disk
- Accepts weather data from approved meteorological station and integrates the results into the measurement files
- Allows the measurement in broadband and frequency domain of structural vibration levels.
- Internal hard disk and standard PC card for the storage of data
- Results can be exported via the PC slot, RS-232 serial or the Centronics parallel ports
- Powered by long life rechargeable batteries or from external 11-18 V supply

The Nor121 is report oriented

This means that it has been designed to provide you with reports on the environmental noise level rather than being just another sophisticated sound level meter.

In environmental mode, the Nor121 can measure the following parallel reports:

The Time Profile Report

The (time) profile is the basis of any Nor-121 measurement. The Profile time resolution can be set from 10ms to a hundred hours, with a step size of 5ms for resolution settings below 1s. For resolution settings of 1s and above the step size is 1s. Profile lets you log a multitude of functions as they vary with time. Many of these functions can even be logged as octave or third octave spectra.

The Global Report

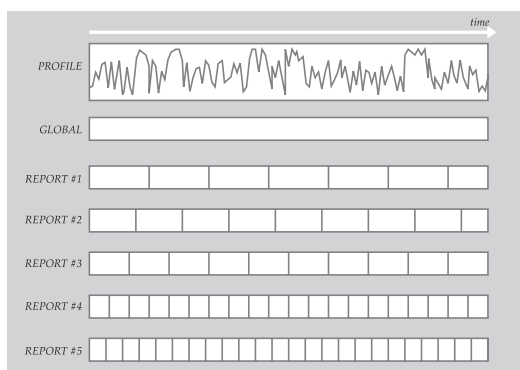
The Global report yields a single set of measurement values describing the entire measurement. Such values will typically be the L_{EQ} , the SPL_{max} , the SPL_{min} etc. of the entire measurement as well as an octave or third octave spectrum. This is equivalent to the way a traditional sound level meter works.

The Periodic Reports 1-5

The Periodic Reports 1-5 can be set up by you to provide more information than the Global, yet less than the Profile.

Consider the following example: Assume that the analyzer is set up for a 24 hours measurement with a Profile resolution set to 1 second. The Global will then provide the overall values for the measurement and the Profile will provide very detailed information.

Further assume that we want to generate reports splitting the 24 hour period into day and night; business hours, evening and night; hourly reports, 30 minutes reports and finally even 15 minutes reports. For this we will use the Periodic Reports 1-5. If we set Periodic Report 1 to 12 hours which we then may refer to as either resolution or period length; Periodic Report 2 to 8 hours; Periodic Report 3 to 1 hour; Periodic Report 4 to 30 minutes and Periodic Report 5 to 15 minutes we have achieved this.



Note that we have not packed the Profile data into hourly reports etc. The Periodic Report 1-5 live their own lives with their own functions defined separately.

The Periodic Reports 2-5 may even use data from the optional secondary channel. By choosing the resolution of Periodic Report 2 equal to Global, and Periodic Report 5 resolution equal to Profile, but both reports based on measured data from the Ch.2, the Periodic Report 2 and 5 will yield as Global and Profile Reports for channel 2 data.

	Hour	Min	Sec	ms	Input ch
Global	24	0	0		1
Report 1	1	0	0		1
Report 2	1	0	0		2
Report 3	0	5	0		1
Report 4	0	0	1		1
Report 5	0	0	0	125	2
Profile	0	0	0	125	1
Event	0	0	0	25	1
Synchro	On				

MeasurementControl/Resolution selection menu

Extensive pause and continue functions are available. When paused the instrument will produce the time profile for the latest twenty seconds of the measurement. The time cursor can then be moved backwards in one-second steps before the measurement is resumed. Data acquired later than the adjusted time cursor position (i.e. data appearing to the right of the time cursor) will be erased from the measurement. Note that this applies to any statistics activated as well.

You may also resume (and hence prolong) terminated measurements. The duration may be synchronised with the real time clock (the time of day) to maintain that measurements keep ending e.g. every hour on the hour, regardless of time elapsed between termination and resumption.

Measurement functions

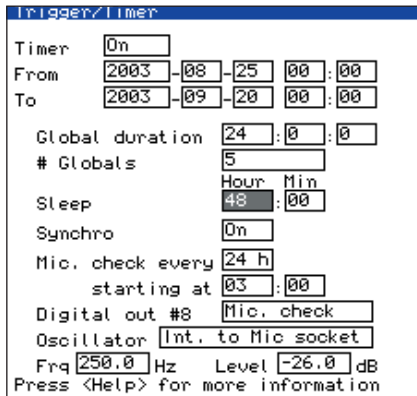
The Nor121 is able to measure and calculate more than 1300 different functions. However, they are all based on one of the following six data types:

- SPL The Instantaneous Sound Pressure Level
- L_{MAX} The Maximum Sound Pressure Level
- L_{MIN} The Minimum Sound Pressure Level
- L_{EQ} The Integrated Equivalent Sound Pressure Level
- L_E The Sound Exposure Level
- L_{PEAK} The Maximum Peak Level

To form a function you combine a data type with a time constant: F, S, I; and a spectral weighting function: A, C, Flat, octave or third octave band frequency analysis.

Timer

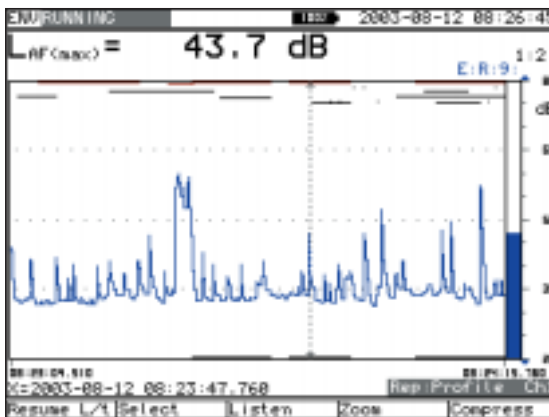
The Nor121 has a built-in timer to enable delayed start and to enable that measurements shall take place in certain parts of the day/week etc. In this way the Nor121 may restrict its monitoring activities to take place only during business hours etc.



Trigger/Timer selection menu

Source coding, adding markers to the measurement

While measuring with the Nor121 you may tag or code sources as they happen. A one-digit code (0-9) can be keyed in to later serve as an identification of the type of noise. This can also be referred to as adding a marker to the measurement. The source codes are therefore called markers in the Nor121 menus.



In the level vs. time display the markers applied to the measurement are indicated by lines.

In the Nor121 markers come in two flavours, as single or toggle type markers. The single type markers add a marker (of the number you pressed) to the current profile period, while the toggling type remains on and therefore will be assigned to all the periods elapsing until the same marker key is pressed again.

This setup menu also provides the option to decide whether any of the markers also should be used as extra trigger controls for events and sound recordings.

Name	Type	Δt (s)	Event	Rec
0: Annoyance	Single	-2	On	On
1: Train	Toggle	0	Off	Off
2: Aeroplane	Toggle	-1	Off	Off
3: Car	Toggle	-1	Off	Off
4: Bus	Toggle	-1	On	Off
5: Motorcycle	Toggle	-2	Off	On
6: Truck	Toggle	-1	On	Off
7:	Single	0	Off	Off
8: See notes	Single	-1	Off	Off
9: Unexpected	Toggle	-2	On	On

Setup/Marker menu

You may introduce an automated time shift for the starting moment of a marker. The incident that you want to tag will in most cases have started already when you finally manage to press the marker key. A typical example could be a dog's barking.

Heard from your remote unit lately?

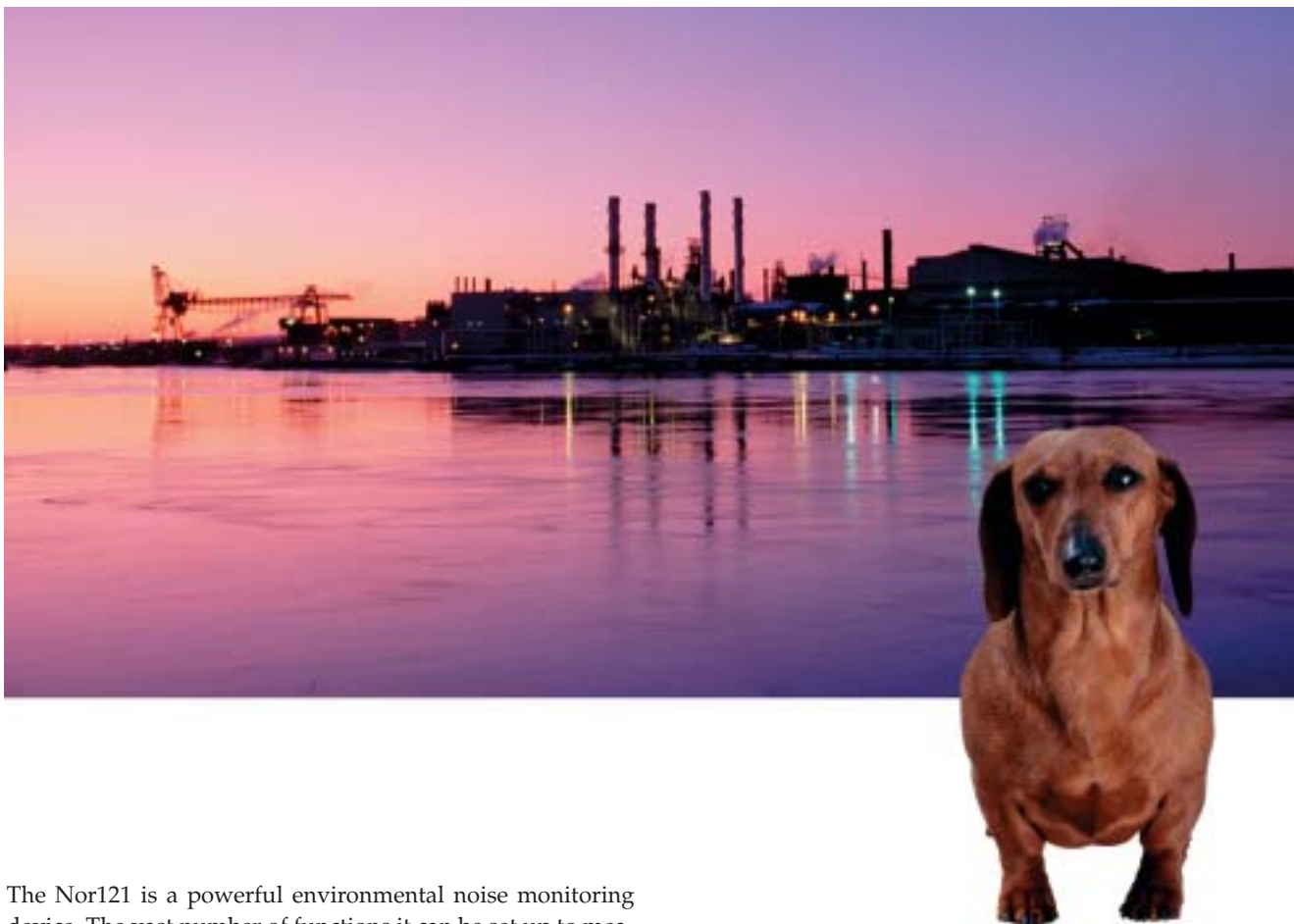
Imagine an environmental noise monitoring system sending you SMS messages to inform you about the measured noise level throughout the day. Or, reporting the status of its batteries.

You know the system is working, because it just told you so. No longer will you have get in your car and drive, maybe for hours, just to check that everything is working as supposed to.



All this takes is the Nor121, a GSM modem and a weather-proof enclosure like our Nor-1506 system designed for semi-permanent use.

Noise from the factory again... or was it a dog this time?



The Nor121 is a powerful environmental noise monitoring device. The vast number of functions it can be set up to measure is one side of it, but just as important is the sophisticated event handling system and the built-in timer function.

For the Nor121 an event is a significant change in the sound level for more than a minimum period of time. The amount of level change required is predefined by you. Whenever an event occurs the instrument will log certain user-defined functions with a higher time resolution to provide more detailed information.

The concept is to go for the details whenever important and correspondingly reduce the amount of information received the rest of the time.

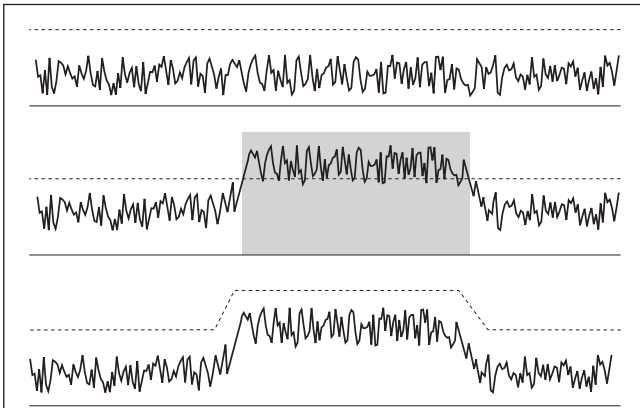
Furthermore, the criteria used to determine when an event is assumed to have terminated, may be set to something completely different from the start criteria and to make sure you get the whole picture you may set the trigger to be effective up to five seconds before the trigger condition is fulfilled.

Recording the Sound Itself

Setting up the analyser for recording of the sound itself is similar to event handling in the sense that you specify the criteria for sound recording to take place, in a menu almost identical to the event setup menu. In addition, you may set the recording to follow the event setup, i.e. whenever an event occurs sound recording is started.

By connecting a pair of headphones to the rear panel Signal out terminal you may listen to the recorded sound. Since the instrument provides a large dynamic range, a gain setting has been added to enable convenient volume setting when listening to the recorded sound.

Did we mention that you may even record what took place up to five seconds before the sound recording was supposed to start?



The Nor121 event setup includes the possibility of relative trigger, so that a single threshold may be used 24 hours a day. The relative trigger is specified as an offset from the measured level value of one of the measured functions.

If the threshold is kept constant and the background level remains unchanged, no unintended triggering will take place (top). However, a significant change in the background level may ruin this (middle) unless the threshold is made dynamic by adapting to the current situation (bottom). This is called relative trigger. You may select which function to serve as the relative trigger condition.

Voice notes

During the measurement process, or even before you start the measurement, you may add voice notes to a measurement in a similar way as you use a dictaphone. The separate comment microphone, placed in the upper right corner of the front panel, records the audio speech when the Comment key is pressed.

This special microphone is not connected to the measurement chain in any way, so the only possible interference with the measurement signal will be if the measurement microphone is placed closed to the Comment microphone. As an alternative, an initial voice note may be recorded prior to the start of the measurement, hence, no interference with the measurement microphone will be possible.

An annoyance recorder eliminating the need for a separate DAT recorder

Annoyance recorders have proven to be a very cost effective method of investigating domestic noise complaints, particularly those occurring outside normal office hours. To date systems have been based on Digital Audio Tape recorders connected to a conventional sound level meter and as such often have complicated set up and calibration procedures. Any error in these procedures could easily result in the failure to collect the evidence of the alleged offence.

A novel approach to these systems is embodied in the Nor121 through its digital recording of the actual sound at the same time as the measurement; hence there is no longer a need for a separate DAT recorder; everything is within your analyzer.

All calibration and range settings automatically relates to both the measurement and recording part of the system greatly simplifying the set up. There is even a default "annoyance recorder mode" that can be accessed directly on switch on.

The instrument is housed within a tamper proof case and the only external components are the measurement microphone, mains connections and the plaintiffs hand switch. The hand switch has been specifically designed to make it suitable for use by subjects with limited manual dexterity and will activate the audio record for a predetermined period; the default setting is 60 seconds but may be set for any period between 1 second and 24 hours. The default set up also provides for a 5 second pre-trigger recording allowing the vital information occurring just before the switch was pressed to be recorded.



Normal operational mode of the system provides for the logging of 5-minute period measurements being made each having the Leq,t and a range of Ln values supported by a 5 minute full third octave frequency analysis. In addition a 1 second Leq,t profile is logged and on this profile markers are provided to show when the plaintiff pressed the record switch to activate the record mode. This then opens a separate event file which contains the audio record along with a 125 millisecond Leq,t profile of each third octave band. All the necessary information is then available to allow the source to be both identified and quantified.

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Environmental postprocessing software

All measured data stored in the Nor121 may easily be transferred to your PC using the parallel or serial interfaces. Alternatively, if the data is stored on a PC card, this may be put directly into the PC slot. In both cases, the Nor1020 NorXfer transfer software package is required.

For further postprocessed analysis of the environmental measurements, the Nor1026 NorReview software package offers a wide range of report and calculation facilities. (See separate Product Data sheets for both products.)

Pure Tone mode features

- High-resolution FFT analysis with less than 2 Hz line separation
- Perform real-time Pure Tone calculation
- Calculations made in accordance with the German DIN 45 641 Standard
- Postprocessed Pure Tone calculations on previous measured Nor121 environmental mode signal recordings
- Detects moving puretones
- On/Off selections for calculations below hearing threshold
- User defined lower level for puretone calculations

A multitude of environmental noise measurement results require compensation for the presence of pure tones. According to some national Standards, possible pure tones are found simply by inspecting the one-third octave band spectrum and look for single bands having more than 5dB higher level than the adjacent frequency bands.

Other national Standards, however, such as the German TA-Lärm require that a detailed FFT analysis is carried out.

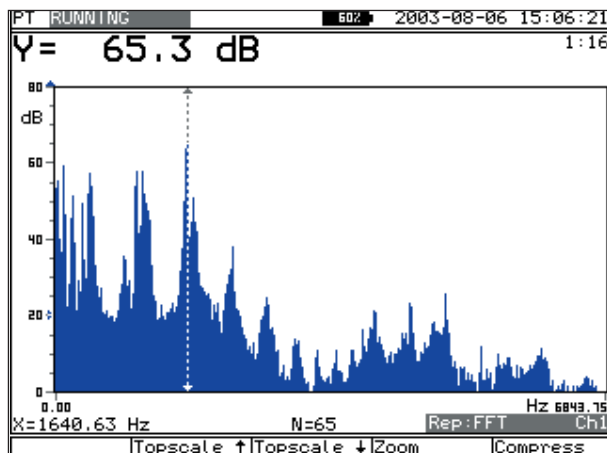
The optional Pure Tone FFT mode will enable you to analyse the noise in accordance with the German requirements. As a spin-off, any measurement task requiring the autospectrum of a full frequency range FFT with a better than 2Hz line separation is supported

The measured noise spectrum is shown as a normal FFT spectrum during the acquisition process. The calculation of any pure tone presence is carried out while the measurement is running.



The detected pure tones are available in a table which even provides the necessary compensation values.

On demand, the Nor121 may even perform pure tone analysis on signal recordings earlier measured and stored with the normal environmental mode.



Pure Tone FFT analysis

Frq	ΔL	ΔL_{FG}	L_{TFG}
114.26 Hz	22.5 dB	22.5 dB	58.3 dB
200.68 Hz	8.5 dB	16.6 dB	53.0 dB
228.52 Hz	20.3 dB	21.1 dB	53.0 dB
1012.21 Hz	24.6 dB	29.1 dB	65.6 dB
1640.63 Hz	17.9 dB	18.1 dB	69.6 dB
1725.59 Hz	16.7 dB	30.1 dB	69.6 dB
344.24 Hz	11.7 dB	11.7 dB	50.9 dB
1091.31 Hz	7.3 dB	9.2 dB	65.6 dB
2211.91 Hz	9.8 dB	9.8 dB	42.5 dB
862.79 Hz	4.7 dB	4.7 dB	42.8 dB

PT ENDED 60% 2003-08-06 15:08:13

$K_T = 6.0 \text{ dB}$ N=100 Rep: Pure-toneCh1

Resulting Pure Tone calculations in a numerical table

Specifications

OVERALL PERFORMANCE

The overall performance of the Nor-121 with a suitable microphone and preamplifier, corresponds to the Sound Level Meter Standards IEC 60651 Type 1, IEC 60804 Type 1, IEC 61672 Type 1, ANSI S 1.4 - 1983 Type 1 and ANSI S1.43 - 1997 Type 1. (Type 0 with suitable microphones) The filter characteristics meet Filter Standard IEC-61260 class 1 for analogue and digital filters as well as the ANSI S 1.11 - 1986 Type 1D

Dimensions: (WxHxD) 36x5,5x20 [cm], 36x6,5x20 [cm] with feet
Weight: 2,9 kg with battery

ANALOGUE INPUTS

No. of channels: 1 (optionally 2)

Microphone input: 7-pin LEMO connectors

Preamplifier voltage: $\pm 20V$, 3mA

Polarisation voltage: 0 or 200V selectable, $\pm 1\%$

INPUT AMPLIFIER

Measurement range: 0.3 μ V-7V RMS ($\pm 11V$ peak). Corresponds to SPL values from -10dB to +137dB (140dB peak) with a mic. sensitivity of 50mV/Pa

High pass filters: Selectable 1st order network at 0.03 Hz (-3dB) or 3rd order Butterworth filter at 16Hz (-3dB).

SELF NOISE LEVELS

Mic. input, spectral weighting networks;

90dB FSD. A: 13dB,

C: 16dB, **Flat** (HP filter on): 19dB

ANALOGUE OUTPUTS

AC outputs (two) selectable for AC signal ch.1, AC Signal ch.2, Noise Generator, Recording or Voice Note playback

ANALOGUE TO DIGITAL CONVERTER

Frequency range: 0.125Hz-16kHz for octave bands, 0.1Hz-20kHz for third-octavebands

Filter response: The octave and third-octave filters meet the requirements of IEC61260 class 1, ANSIS1.11-1986 Type 1D order III and IEC 225

Spectral weighting networks: A, C and Flat. The Flat spectral weighting network response has a 1st order digital HP filter at selectable as 0.1, 1.0, 6.3 or 20Hz (-1dB).

LEVEL DETECTOR

Primary indicator range: 55-130dB with crest factor <3 (20-130dB with the high dynamic extension). 55-120dB with crest factor <10

Linearity range: 85dB (115dB with the high dynamic optional extension)

Pulse range: 88dB (118dB with the high dynamic optional extension)

Reference frequency: 1000Hz

Reference SPL: 114.0dB re.20 μ V

DISPLAY

Type: 133x101mm STN monochrome, transreflective display with switchable backlight (which has a timer set in a menu)

Picture resolution: 320x240 pixels [hwx] - 1/4 VGA standard

MEASUREMENT STORAGE

Memory card: PCMCIA type 1 or 2 flash card or IBM Microdrive (max.2 GB)

Hard disk: 8 Gbyte.

I/O Digital interfaces: RS-232C (two) (115200 baud), a general digital I/O socket (containing 8 configurable digital outputs, 4 configurable digital inputs and external trigger) and Centronics parallel interface.

SIGNAL GENERATOR

Signal types: Pseudo-random noise or sine wave

Spectrum types: Pink, octave or third octave noise

GENERAL

Power requirements: 11-15Vdc, 4-10W depending on measurement task

Batteries: 4_D-cell type NiMh rechargeable batteries 9Ah

Charger: Built-in microprocessor controlled battery monitor and charger. Charging time 2.5 hours with instrument switched off and 12-14 hours if charging takes place when instrument is switched on

Operating time: Typically 14 h.

Warm-up time: <30 sec. for 0.1dB accuracy

Enclosure class: IP20.

ENVIRONMENTAL

Temperature range

Storage: -30 to +60°C, gradient 15°C/hour.

Operating: -10 to +50°C, gradient 15°C/hour. A certain warm-up time is required at low temperatures before the hard disk can be accessed

All specifications subject to change without notice



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Ordering information

Standard basic version: Environmental Analyser with parallel A-, C- and Flat-networks, parallel F, S and I time constants, internal Hard Disk Drive (8 GB), PCMCIA, RS-232 and Centronix interfaces.
Includes: Battery Nor-338, Charger Nor-337, Nor-1201 Preamplifier, Nor-1225 Microphone, Nor-1410 Preamplifier Cable (2m), Nor-1434 Windscreen, Nor-1267 Tripod Adaptor plate, Nor-1463 RS-232 cable, Nor-1477 AC-output cable, and Nor-1488 Parallel cable

AVAILABLE OPTIONS

Opt. 0A: 1/1-octave (0.125-16000 Hz) real-time analysis

Opt. 0B: 1/3-octave (0.1-20000 Hz) real-time analysis (Requires opt. 0A)

Opt.1: True audio recording of noise signal and operator voice notes

Opt.2: High dynamic range (>120dB) for noise monitoring purposes

Opt.3A: Noise generator output with white, pink, 1/3- and 1/1-octave noise for building acoustic applications. (Requires option 0A/0B)

Opt.4: Reverberation time calculations. (Requires option 0A/0B)

Opt.5: 2-channel level and reverberation time measurements

Opt.6: Sound Insulation Index calculations (Rw etc.) based on level and reverberation time measurements (Requires opt. 3A and 4)

Opt.7: Pure-tone FFT mode

Opt.8: Event-analysis with advanced trigger features (even for recording of the sound itself if option 1 is installed)

Opt.9: Timer function for automatic sequencing of unattended measurements

Opt.10: Statistical Ln calculations with cumulative and probability functions on spectral weighting networks (and on frequency bands when option 0A/0B is installed)

Opt.11: Connection and read-in of results from Reinhart MWS9 Weather Station

connected to RS-232 interface into a separate periodic Weather-Report

Opt. 13: SMS control and report feature

Representative: