CHAPTER

25 Parameters Measured

This chapter describes the different acoustic parameters which can be measured, displayed and stored using the Model 831.

Basic Sound Level Measurements

Frequency Weighting

See "SLM Page" on page 4-4

Each of the sound level parameters measured at one time will be frequency weighted as set by the user from the Settings Pages. The frequency weighting for RMS and Impulse averaged sound levels will be the same, selected independent from the frequency weighting for peak detection.

RMS and Impulse Weighting

The Model 831 measures RMS and Impulse averaged sound level values using one of the following user-selected frequency weightings:

- A-Weighting
- C-Weighting
- Z-Weighting

Peak Weighting

The Model 831 measures peak sound level values using one of the following user-selected frequency weightings:

- A-Weighting
- C-Weighting
- Z-Weighting

RMS Averaging

The exponential averaging time for RMS sound levels is set to one of the following:

- Slow
- Fast

An impulse detector is also available.

Sound Level Metrics Measured

In Table 25-1 "Sound Level Metrics Measured" the symbol X is used to represent the user-selected RMS and Impulse frequency weighting (A, C or Z) and the symbol Y is used to represent the user-selected peak frequency weighting (A, C or Z). The symbol V represents the time weighting Fast, Slow or Impulse.

	Selected RMS Averaging				
Metric	**Fast**	**Slow**	**Impulse**	**Peak**	**Integrated**
Instantaneous Sound Level	L_{XF}	L_{XS}	L_{XI}	L_{Ypeak}	
Maximum Sound Level	L_{XFmax}	L_{XSmax}	L_{XImax}	$L_{Ypeak(max)}$	
Minimum Sound Level	L_{XFmin}	L_{XSmin}	L_{XImin}		
Equivalent Level			L_{XIeq}		L_{Xeq}

Table 25-1 Sound Level Metrics Measured

1/1 and/or 1/3 Octave Frequency Spectra

The Model 831 can perform just 1/1 or 1/3 octave real-time frequency spectra measurements or they can both be measured simultaneously. These spectra will be made using a user-selected frequency weighting (A, C or Z). The averaging time is the same as that selected for the sound level measurements (Fast, Slow or Impulse).

Spectral data is displayed on both the Live and Overall Pages, but only the Overall Data can be stored.

Live Page

From the Live Page, the graphic shows the instantaneous SPL value for all frequencies and the bar to the far right shows the summation value for the entire frequency band. The value corresponding to the cursor position is displayed numerically beneath the graph.

Overall Page

From the Overall Page, the graphic shows the energy equivalent level calculated over the measurement time period at each frequency band and, at the far right, for the summation of all frequency bands. The values displayed digitally beneath the graph represent the following data for the frequency band at the cursor position.

- Leq
- Lmax
- Lmin

Sound Exposure Metrics Measured

See Chapter 8 "Industrial Hygiene" on page 8-1

The Model 831 measures two separate and independent sets of sound exposure metrics.

The following parameters are user-selectable:

- Exchange Rate: 3, 4, 5 or 6 dB
- Threshold Enable: Yes or No
- Threshold Level: Numeric entry
- Criterion, Level and Hours: Numeric entries

In Table 25-2: "Sound Exposure Metrics Measured" the symbol X is used to represent the user-selected RMS and Impulse frequency weighting (A, C or Z) and the symbol Y is used to represent the user-selected peak frequency weighting (A, C or Z).

The symbol V is used to represent the user selected time weighting (F, S or I)

Metric	Symbol
Sound Exposure Level, SEL	L_{XVE}
Average Sound Level, Lavg	L_{Xavg}
Time Weighted Average Level, TWA(x)	$TWA_{(8)}$
Noise Dose	DOSE
Projected Noise Dose	ProjDose
Daily Personal Noise Exposure, Lep,d	LXep,8
Sound Exposure, E	E_{XV}
Projected 8 Hour Sound Exposure	E_{XV8}
Projected 40 Hour Sound Exposure	E_{XV40}
SEA	SEA

Table 25-2:Sound Exposure Metrics Measured

Statistical Metrics Measured

Broadband Statistics

For setup of Ln Statistics, see "Ln Page" on page 4-8

Statistical sound level parameters are very useful for characterizing time-varying sounds such as environmental noise. A widely used parameter is Ln, which represents a sound level which is exceeded n% of the measurement time. For example, L_{90} is often used as a measure of the background noise since it is exceeded 90% of the time.

The Model 831 can calculate and display six different Ln statistical parameters using the frequency weighting (A, C or Z) and exponential averaging (Slow or Fast) selected when setting it up for a sound level measurement. These six values are user-selected over the range $L_{0.01}$ to $L_{99.99}$.

The SLM Utility-G3 software permits the distribution table from a saved measurement to be exported to a spreadsheet which could then be utilized to calculate any possible value of Ln over the range $L_{0.01}$ to $L_{99.99}$.

To determine broadband statistics, the sound level is sampled every 10 ms. into 0.1 dB wide amplitude classes over a 199 dB span. The resulting table, from which all values of Ln between $L_{0.01}$ to $L_{99.99}$ can be calculated, is referred to as the distribution table. This distribution table is saved whenever an overall measurement is saved.

Although the six percentage values are user-defined as part of the setup, these can be changed without resetting or stopping a measurement, in order to display different values of Ln.

Measurement History

When making automatic sequential measurements using the measurement history feature, a distribution table is saved for each measurement interval.

Spectral Statistics

When the spectral Ln mode has been enabled in the frequency spectrum setup, the Model 831 will measure and store spectral statistical data in addition to broadband statistical data.

Spectral statistics are similar to broadband statistics except that values of Ln are determined for every frequency band in the measured spectrum. To determine spectral statistics, the sound level in every frequency band is sampled every 100 ms. into 0.1 dB wide amplitude classes over a 199 dB span. The resulting table, from which all values of Ln between $L_{0.01}$ to $L_{99.99}$ can be calculated for each frequency band, is referred to as the spectral distribution table. Both the broadband and the spectral distribution tables are saved whenever an overall measurement is saved. As with the broadband distribution table, the SLM Utility-G3 software can export the spectral distribution table from a saved measurement to a spreadsheet which could then be utilized to calculate any possible value of Ln for the range $L_{0.01}$ to $L_{99.99}$ for all frequency bands.

Measurement History

When making automatic sequential measurements using the measurement history feature, and the spectral Ln mode has been enabled in the frequency spectrum setup, both the broadband and spectral distribution tables are saved for each measurement interval.

Exceedance Counters

See "Triggers Page" on page 4-11

The Model 831 has three exceedance event counters: two RMS event counters and three peak event counters. For each exceedance there is a threshold level, event counter and duration.

The thresholds L_{XV} or L_{Ypeak} are the levels that the parameter must exceed to increment the counter and duration. X is RMS frequency weighting, Y is peak frequency weighting and V is time weighting.

The Count is the number of times each parameter has exceed the preset level.

The duration is the total accumulated duration of all exceedances for a specific parameter.

Miscellaneous Parameters

S.E.A.

SEA is a time integration of peak levels that exceed 120 dB.

Time History (831-LOG Required)

See Chapter 10 "Time History" on page 10-1.

Measurement History (831-ELA Required)

See Chapter 11 "Measurement History" on page 11-1.

Event History (831-ELA Required)

See Chapter 12 "Event History" on page 12-1.