



## ***A Look at Environmental Noise, Part III: Obtaining Accurate Noise Measurements***

The first two articles in this series dealt with basic acoustics principles, explained when sound becomes “noise”, how it constitutes a nuisance and how various types of local ordinances attempt to quantify it. So now that we recognize what noise is and know what standard to apply, how do we measure to determine compliance with, or violation of, an ordinance?

### ***Sound Level Meters***

Let’s take a look at the type of instruments used to measure noise, generically referred to as *sound level meters*. For professional purposes, precision Type 1 meters (such as those manufactured by Brüel & Kjær or Larson Davis) are usually used. Precision meters are calibrated by the manufacturer and periodically returned for recalibration. They are also field calibrated before and after a measurement to make sure there has been no “drift” during the measurement.

A spectrum analyzer or *1/3-octave band analyzer* is another kind of meter, used to analyze the component frequencies of a measured sound to determine the predominant frequencies and/or to detect the presence of a tone.

We usually need to know the average sound level measured, *Leq*, and often need further analysis for *tiered noise ordinances* (see *A Look At Environmental Noise Part II: Nuisance Factors and Noise Ordinances*) so that we know what level was exceeded for the specified cumulative period (5 minutes, 10 minutes, etc.). Modern sound level meters have the ability to integrate sound levels and provide the statistical data we require at the touch of a button at any time during or after a measurement, and can store the data to be downloaded directly into a computer program later.

### ***Choosing the Right Settings***

First, you need to understand the nature of the sound you wish to measure. Sound level meters have built-in frequency *weighting filters*, as discussed in *A Look at Environmental Noise Part I: Some Basics on Noise and Weighting Filters*. The *A-weighting filter* is the one most commonly used in environmental noise studies. The *C-weighting filter* is used to detect low frequency noise levels (typically, from rotating machinery), and the *D-weighting filter* is used for high frequencies (notably aircraft noise).

Second, you need to know whether the noise you want to measure is *impact* (sudden) noise, or consists of a constant sound. The root-mean-square, *RMS*, detector in the meter can be set to *fast* or *slow* response. *Fast response* is the setting used to measure levels of short-lived sounds. *Slow response* provides much smoother data but without losing anything.

## *Practical Tips for Measurements*

- ⦿ *Always* calibrate the meter.
- ⦿ Most ordinances require a microphone height of 5'. Minimize reflected noise; keep at least 10' away from a major building façade, at least 5' from a smaller structure, such as a house, and don't measure in corners between reflective surfaces.
- ⦿ Keep at least 3' away from walls or major pieces of furniture in-side rooms and at least 4' away from windows or doors.
- ⦿ If holding the sound level meter, hold it at arm's length. If using a tripod, stand about 2' behind and to the side of the tripod to avoid interference.
- ⦿ Measure the distance to the noise source, and accurately record your measurement location. (A sound pressure level without distance is meaningless.)

## *Next Article*

The next article in this series will take a look at how to predict noise levels for proposed projects; what information we need to conduct the analysis, and how it's used.

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