

# REVERBERATION

Quest Technologies, a 3M company

## Scope, measurements, results



### Introduction

Reverberation is the distribution of sound in an enclosed space after the sound is removed or decayed.

If sound is not evenly dispersed, those within the enclosure could experience acoustical discomfort.

Similar to measuring the sound pressure level in an open environment, reverberation time is used to assess the characteristics of sound including the dampening of sound and the distribution of sound to ensure the sound is understood.

Quest Technologies SoundPro SE and DL 1/1 and 1/3 Models with the Reverberation Option measure, calculate, and display reverberation (also called RT60) results, taking the guesswork out of room acoustics. Even better, you can customize the methodology with impulse noise or interrupted noise, used to evaluate sound reflections and sound decay to the ISO 3382 standard.

### Environments

- Factories
- Classrooms
- Auditoriums
- Public Enclosures
- Transportation Terminals
- Churches
- Concert Halls
- Gymnasiums

### Scope

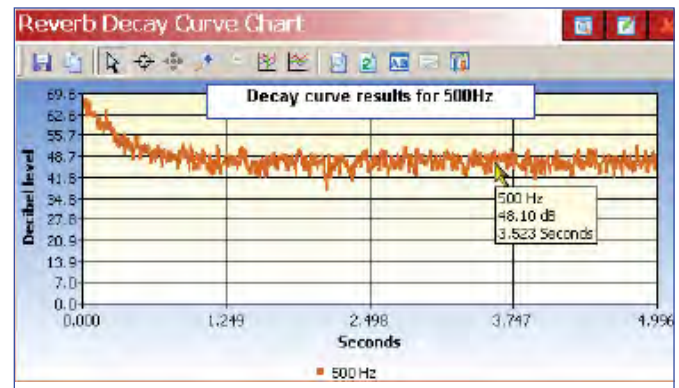
The SoundPro Reverberation Option adds a new measurement mode to quickly evaluate and measure sound decay in a space. If the reverberation time is too long, the voice is stifled, making it very difficult to understand the message. If the reverberation time is too short, this indicates a dry sound.

The Reverberation (RT60) results are used to ensure quality sound is evenly dispersed throughout a specific room. For music, a longer reverberation time is preferred as opposed to voice in which a shorter reverberation time is optimal. When testing, reverberation time is measured using either **interrupted noise** (pink noise from a dodecahedral speaker or a sound system) or **impulse noise** (from a starter pistol) method.

### Measurements & Software

#### Reverberation and QSP-II

QuestSuite™ Professional II offers greater flexibility in viewing and analyzing your reverberation data results with report printing and file system storage capability.



Frequency	T60	R <sup>2</sup>	T88	In U
63 Hz	1.88	0.774	T30	Y
125 Hz	1.86	0.475	T20	Y
250 Hz	1.31	0.826	T20	Y
500 Hz	1.54	0.855	T20	Y
1000 Hz	2.17	0.915	T20	Y
2000 Hz	2.03	0.945	T20	Y
4000 Hz	1.64	0.976	T20	Y
8000 Hz	1.31	0.972	T20	Y

## Reverb Key Features

- Choose interrupted or impulse noise, depending on which methodology suits your needs best.
- Easy setup features include automatic selection of measurement parameters or manual selection for more advanced users.
- The measurement of the decay curve will automatically detect the best  $T_{xx}$  value based on the measured decay (i.e.,  $T_{20}$ ) or a value can be selected.  $T_{60}$  is then calculated.
- User-selectable measurement results are viewable in 1/1 or 1/3 octave band charts.
- Digital readout displays  $T_{60}$  results in a tabular view, decay chart view, and a bar chart view.
- Spatial averaging is supported (storing measurements from multiple locations in the room. These are combined to compute an average room measurement).
- Flexibility in measurement calculation with support for both measurement and ensemble averaging.
- Measures in accordance with EN/IEC 61672, ANSI SLM standards and conforms to ISO 3382.
- Frequency range supported is 50Hz to 10KHz.

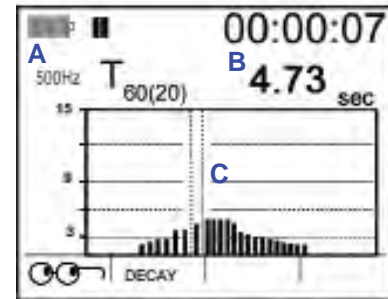
## Reverb Measurement Steps

- (1) Select Reverberation (reverb) setup options and RT60 measurement type. (Follow step 2 or 3 below, depending on the method.)
- (2) **Interrupted noise method:** Pump noise through room with existing sound system or portable sound system (dodecahedral). Allow level to stabilize. Then press Run key.
- (3) **Impulse noise method:** Press run key. Impulse the room with a broad spectrum impulsive noise (starter gun) at 110 dB.
- (4) The instrument automatically begins recording the sound decay and stops as the noise falls off. The RT60 measurement is calculated with the  $T_{xx}$  time (i.e.,  $T_{20}$ ) factored in and extrapolated to a 60 dB drop. (See Reverberation results screens.)

## Reverberation Result Screens

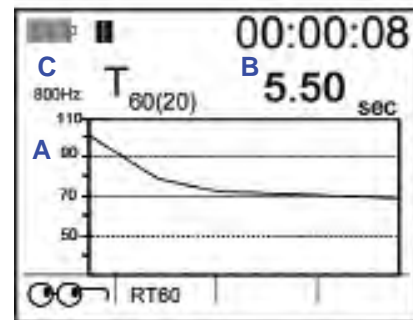
### RT<sub>60</sub> Summary Chart Results

The  $RT_{60}$  is displayed below for each octave band (when pressing the right/left arrows). The decay at 500Hz (see A) with a  $T_{60}(20)$  setting is 4.73 sec. (see B). The overall decay is displayed in the graphical chart (see C).



### Decay Curve Results

Sound pressure level (see A) and  $RT_{60}$  value (see B) for each band (see C) over time is viewable via a key press.



### Reverberation Tabular Results

Summary of the reverb decay curve results (see A) with regression line details (see B) and  $T_{xx}$  value (will change if using auto measurement. See C) for each band in a tabular format.

FREQ	A T60	B R	C T <sub>xx</sub>
50Hz	1.24	.988	T <sub>20</sub>
63Hz	1.21	.997	T <sub>20</sub>
80Hz	1.73	.995	T <sub>20</sub>
100Hz	1.95	.998	T <sub>20</sub>
125Hz	1.78	.999	T <sub>20</sub>



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For additional information please contact your authorized Quest Technologies dealer, or contact Quest Technologies at [quest.mail@mmm.com](mailto:quest.mail@mmm.com).

