

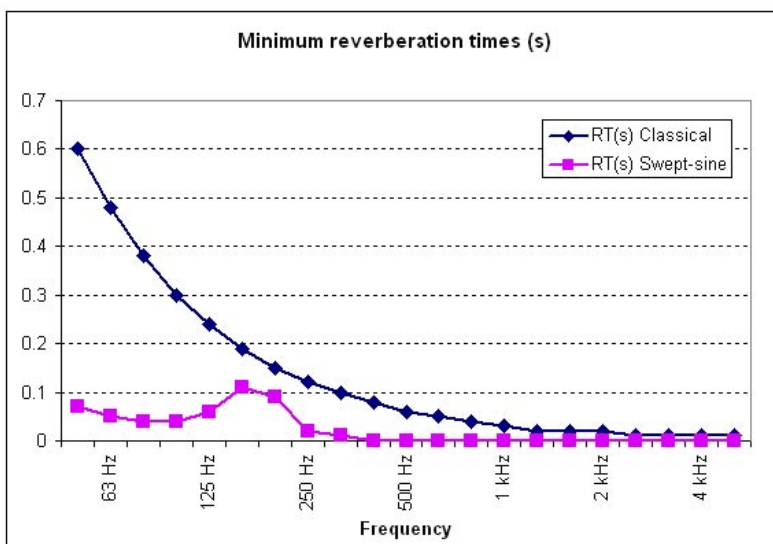


Measurement of Very Short Reverberation Times

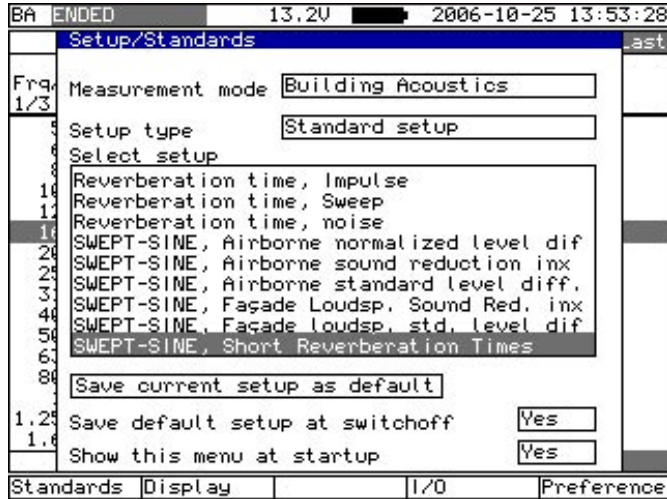
Measurement of short reverberation times, associated with small chambers, cars, etc. are normally impossible at low frequency bands by traditional techniques. This is due to internal decay times of the filters used that limit the shortest possible measurable decay.

Norsonic have overcome this problem by the combination of Swept-Sine technique and reverse filtering with specially crafted filters that both provide short decay times and conform to class 1 requirement of IEC 61260. The following graph and table present limits for minimum reverberation times that can be reliably measured by classical analysis methods (parallel and serial) and swept-sine method.

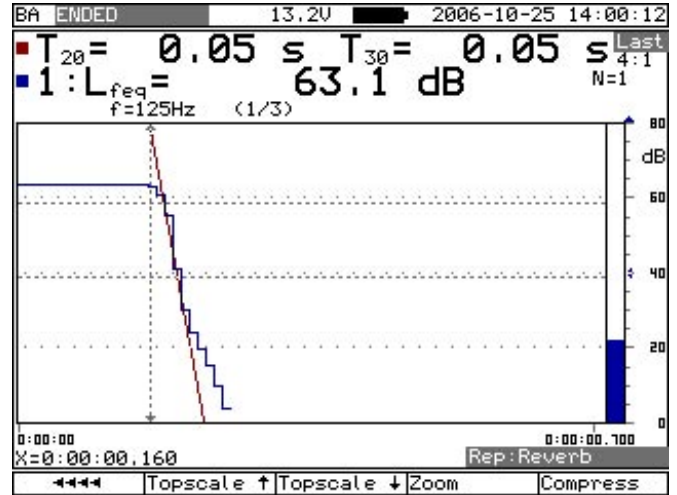
Frequency (Hz)	RT(s) Classical	RT(s) Swept-sine
50	0.6	0.07
63	0.48	0.05
80	0.38	0.04
100	0.3	0.04
125	0.24	0.06
160	0.19	0.11
200	0.15	0.09
250	0.12	0.02
315	0.1	0.01
400	0.08	0
500	0.06	0
630	0.05	0
800	0.04	0
1000	0.03	0
1250	0.02	0
1600	0.02	0
2000	0.02	0
2500	0.01	0
3150	0.01	0
4000	0.01	0
5000	0.01	0



The Nor121 instrument is easily set up for measurement of short reverberation times by pressing the Setup button, switching to Building Acoustics mode and choosing the standard setup "SWEPT-SINE, Short Reverberation Times "



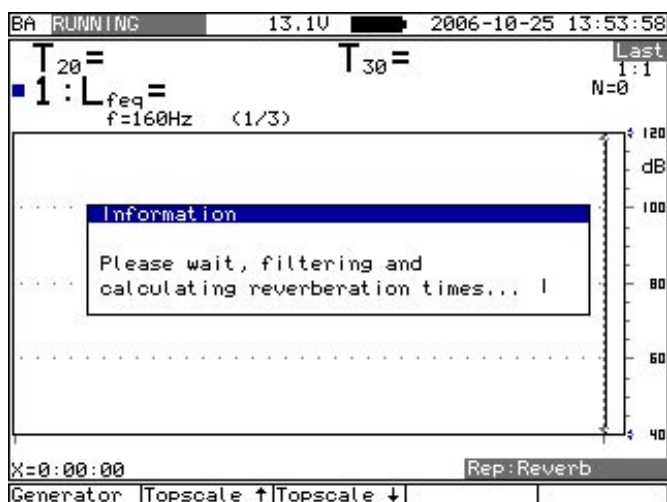
The same measurement procedure can be performed synchronously using both channels of Nor121 and the results are displayed both graphically in the form of the energy decay curve and as a numerical table:



The excitation signal used is the logarithmic Swept-Sine signal with 1.5 s length covering 1/3 octave frequency bands in the range 50Hz - 20kHz.

The measurement consists of two parts. The first part is the measurement of broadband impulse response using the swept-sine technique.

The second part is the reverse filtering of measured impulse response. The filtering operation is mathematically intensive and might take several seconds. During this period the following message is shown on the instruments display:



Frq/Netw		T ₂₀	T ₃₀	N=1		Last
1/3		Ch1	Ch1			
160Hz		0.10 s	0.11 s			
200Hz		0.06 s	0.08 s			
250Hz		0.03 s	0.03 s			
315Hz		0.03 s	0.02 s			
400Hz		0.00 s	0.00 s			
500Hz		0.00 s	0.00 s			
630Hz		0.00 s	0.00 s			
800Hz		0.00 s	0.00 s			
1kHz		0.00 s	0.00 s			
1.25kHz		0.00 s	0.00 s			
1.6kHz		0.00 s	0.00 s			
2kHz		0.00 s	0.00 s			
2.5kHz		0.03 s	0.02 s			
3.15kHz		0.03 s	0.02 s			
4kHz		0.03 s	0.02 s			
5kHz		0.00 s	0.00 s			