RT60 Reverb Time

in 1/3rd Octave Resolution

XL2 Audio and Acoustic Analyzer with M4260 Measurement Microphone

The XL2 Audio and Acoustic Analyzer measures the RT60 reverberation time in octave band resolution. This application notes shows how this functionality can be extended for measuring the reverberation time with increased 1/3 octave band resolution.

The XL2 Audio and Acoustic Analyzer measures RT60 according to IS0 3382 standard, specifying 6 octaves (mid frequencies 125Hz - 4kHz) or 18 x 1/3 octaves (mid frequencies 100Hz - 5kHz). Besides that the XL2 is even able to measure an extended RT60 frequency range from 63Hz to 8kHz. The standard test signal for octave band resolution measurements is broadband pink noise.

Basic Instruction

In order to extend the RT60 measurement from 1/1 octave to 1/3 octave resolution a specific set of band limited pink noise signals is utilized. Three separate measurements are taken providing the RT60 results at the 1/3 octave test frequencies. Then the three measurements are combined within the Excel file "NTi_Audio_XL2_RT60_third_octave_V1.0.xls" resulting in the 1/3 octave RT60 result.

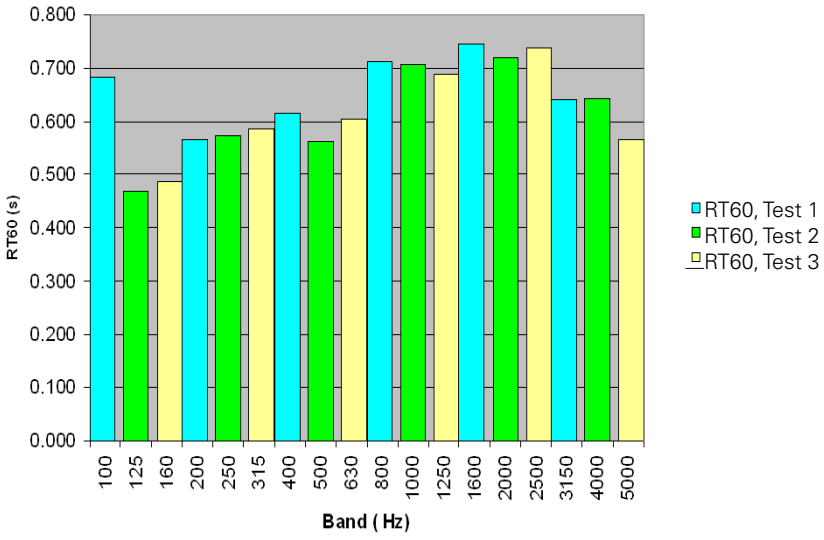


Chart: 1/3 octave RT60 test result

Requirements

- XL2 Audio and Acoustic Analyzer with M4260 Measurement Microphone
- Excel file "NTi_Audio_XL2_RT60_third_octave_V1.0.xls" (included with zip-file for download at the XL2 website)
- Minirator MR-PRO with 512 MByte memory with specific 1/3rd octave RT60 test signals, which are available for download on the MR-PRO support web site

Overview of RT60 test signals for 1/3 octave resolution:

- Rt_01_1l:
  pink noise spectra of the 1/3 octave bands
  100Hz, 200Hz, 400Hz, 800Hz, 1.6kHz, 3.15kHz
- Rt_01_2m:
  pink noise spectra of the 1/3 octave bands
  125Hz, 250Hz, 500Hz, 1.0kHz, 2.0kHz, 4.0kHz
- Rt_01_3h:
  pink noise spectra of the 1/3 octave bands:
  160Hz, 315Hz, 630Hz, 1.25kHz, 2.5kHz, 5.0kHz

The maximum file name length for MR-PRO *.wav files is 8 digits, e.g. "Rt_01_1l" is the abbreviation of pink noise, 1 second on/off cycle mode, with the lower 1/3 octave bands.

Instruction Step-by-Step

1. Select the RT60 test signal

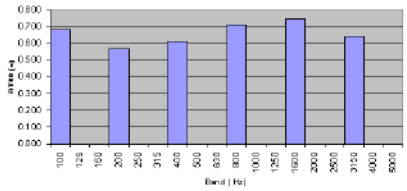
Different test signals with 1, 2, 5 and 10 seconds on/off time are available. We recommend choosing the test signal with a larger on/off time than the expected RT60 result, e.g. when expecting RT60 results in the range from 1-2 seconds, we suggest to select the test signal with 2 seconds on/off time.

2. Measurements

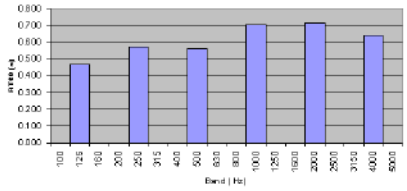
Select track "Rt_01_1l" at your Minirator and carry out the RT60 measurement with the XL2 Audio and Acoustic Analyzer. Detailed test instructions are listed in the XL2 user manual.

Store the test result in the internal XL2 memory.

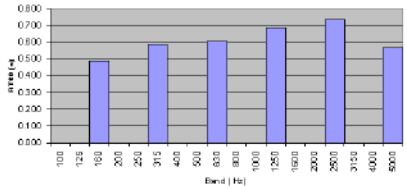
Carry out the same measurements with the other two tracks "Rt_01_2m" and "Rt_01_3h".



Result with first signal Rt_01_1l



Result with second signal Rt_01_2m



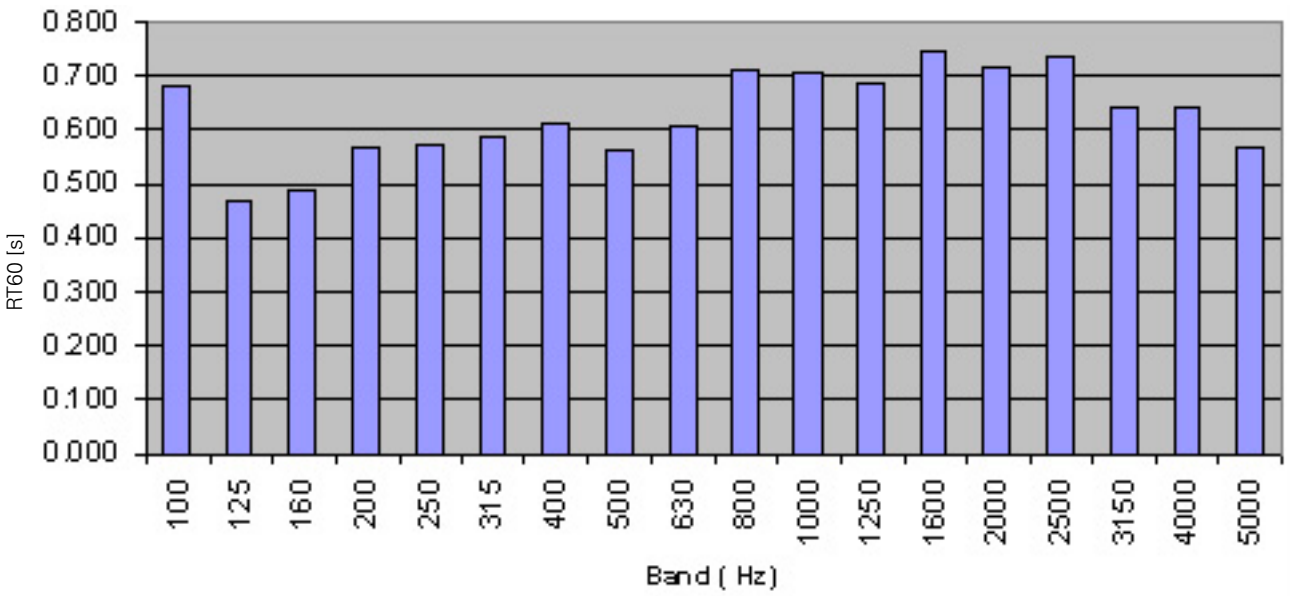
Result with third signal Rt_01_3h

3. Combine Measurements in Excel

- Connect XL2 to your PC and store the measurement results.
- Open the Excel file "NTi_Audio_XL2_RT60_third_octave_V1.0.xls"
- Select the RT60 result file containing the measurement result Rt_01_1l
- Copy measurement data
- Open excel sheet "Rt_01_1l"
- Select field A1 and paste data

Carry out the same with the other two results result "Rt_01_2m" -> excel sheet tab "Rt_01_2m" result "Rt_01_3h" -> excel sheet tab "Rt_01_3h"

4. Result: RT60 in 1/3 octave band resolution

The 1/3 octave RT60 result is shown in the tab "Graphic".

Combined RT60 Test Result with 1/3 octave band resolution: