

# Introduction to Audio and Video Techniques : Loudspeaker and Mixer XM1602

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## 1 First Experiment : Loudspeaker

In this experiment, you will measure the frequency response of a loudspeaker in an anechoic chamber using a specific measurement device : the Audio Precision.

1. Measure each speaker individually and interpret the frequency response.
2. Measure the global response of all speakers together. Interpret.

## 2 Second Experiment : Mixer

### 2.1 Plugging the device

1. Connect the analog output of the Audio Precision to the first channel of the mixer.
2. Connect the outputs of the mixer to the analog inputs of the Audio Precision.
3. Set the gain of channel 1 to the maximum limit of the green LED.

### 2.2 100 Hz Function

Plot the frequency response of the mixer. Then activate the 100 Hz switch and plot a new frequency response.

1. What kind of filter corresponds to the 100 Hz switch?
2. Calculate the cutoff frequency and the slope (dB / oct) of the filter.

### 2.3 Linearity measurement (at 1 kHz)

Plot the linearity curve of the mixer at a fixed frequency of 1 kHz. Configure the AudioPrecision so that it swipes the amplitudes between  $-80dBu$  and  $+24dBu$ .

1. What is the gain of the mixer with that configuration ?
2. Why is the linearity curve lower when the input level is weak ?
3. Why is the linearity curve lower when the input level is high ?
4. Calculate the signal to noise ratio.

### 2.4 THD+N Measurement (at 1 kHz)

Configure the AudioPrecision for an amplitude sweep between  $-50dBu$  et  $+24dBu$ . Set the analyzer to analyze the "THD+N Ratio" in the analyzer control panel. Select "THD+N Ratio" in Source 1 in the sweep panel. Plot the harmonic distortion curve at a 1 kHz frequency.

1. What is the THD ?
2. Explain the shape of the curve and compare it to the manufacture specifications. What can you conclude ?

### 2.5 Crosstalk measurement

Measure the crosstalk of the mixer. To to that, plot the frequency response of the left channel while swiping the frequencies on the right channel.

1. The manufacturer does not specify any crosstalk in the 20Hz - 20kHz range. What can you measure in practice ?
2. How would you qualify the measured crosstalk ? According to you, is there a nice channels separation ?