PROCEDURE INSTRUCTIONS

M-Noise™ Maximum Linear Peak SPL

DEFINITIONS

System Frequency Range: the manufacturer's stated operating frequency range of the device under test.

Playback Level: a level adjustment to the reference test signal which is applied before the signal arrives at the reference channel of the frequency analyzer.

Provisional Linear Frequency Response Level: a relatively low playback level used to establish the linear frequency response of the system. It is the level of the reference test signal which produces a coherence of nearly 100% when a microphone is placed close to the speaker.

Linear Frequency Response Confirmation Level: a playback level that is at least 3 dB louder than the Provisional linear frequency response level. If the change in the frequency response between the Provisional and Confirmation levels is less than the tolerance, then that is the Linear Frequency Response.

Compression Target Trace: the stored linear frequency response, offset by -2 dB.

Maximum Linear SPL of the loudspeaker: the peak and slow weighted SPL at the reference microphone position using the reference test signal when the maximum compression has been reached.

"Document": when used as a verb in this procedure means to record information in some way such that an audio professional who has access to the "documents" could replicate the procedure and get the same results. For example, "documenting" the microphone position could mean making a drawing, taking a picture, or writing a description in the notes field of a stored trace.

PROCEDURE

1. Verify that you have an unaltered version of M-Noise by performing a checksum of the downloaded .wav file (SHA or MD5) and compare to the checksum value listed at m-noise.org.

2. Store a trace showing that the sound pressure instrumentation is calibrated to a known reference.

3. Document the loudspeaker's operating frequency range assumed for the purposes of this test.

4. Look up the maximum electrical input and output voltages of all the devices to ensure the loudspeaker can be driven to its maximum linear output, typically at least +18 dBu, and sometimes as much as +24 dBu. For example, if the playback device produces a maximum of +16 dBu and the maximum input to the loudspeaker system is +24 dBu, insert a device between them to add 8 dB of gain. Do not change this gain during the procedure.

5. Document the loudspeaker position and the reference microphone position.

6. Put a calibrator on the microphone connected to the analyzer to ensure the expected maximum SPL will not clip the analyzer input. For example, if the calibrator produced 94 dB and the loudspeaker is expected to produce 134 dB peak, the signal must be at least 40 dB below clipping at the microphone input.

7. Using a "Y" cable, especially between devices made by two different manufacturers, is sometimes problematic. Instead do one of the following:

    a. If the analyzer allows it, derive the reference signal internally. Be aware this can add latency to the measurement path.

  b. Otherwise, using a processor, matrix the test signal to two outputs. Set one output to unity gain and use it as the reference signal for the analyzer. Add enough gain to the other output to achieve maximum output from the speaker. Do not change these gains during the procedure.

8. Scale coherence so it fills at least the top half of the measurement window.

9. Playback the M-Noise file.

10. Set the playback level of the M-Noise signal to the provisional linear frequency response level.

11. Store a trace of the frequency response at the provisional linear frequency response level.

12. Increase the playback level to the linear frequency response confirmation level (at least +3 dB) and store this trace.

13. Verify that the frequency response traces at both the provisional and confirmation levels match each other within the frequency range of the loudspeaker. The confirmation trace defines the linear frequency response of the system.

14. Offset the confirmation trace down 2 dB, hereafter referred to as the compression target trace.

15. Increase the playback level until the live measurement trace touches the compression target trace at one or more frequencies but does not go below the compression target trace.

Confirmation Trace Compression Target Trace Live Trace
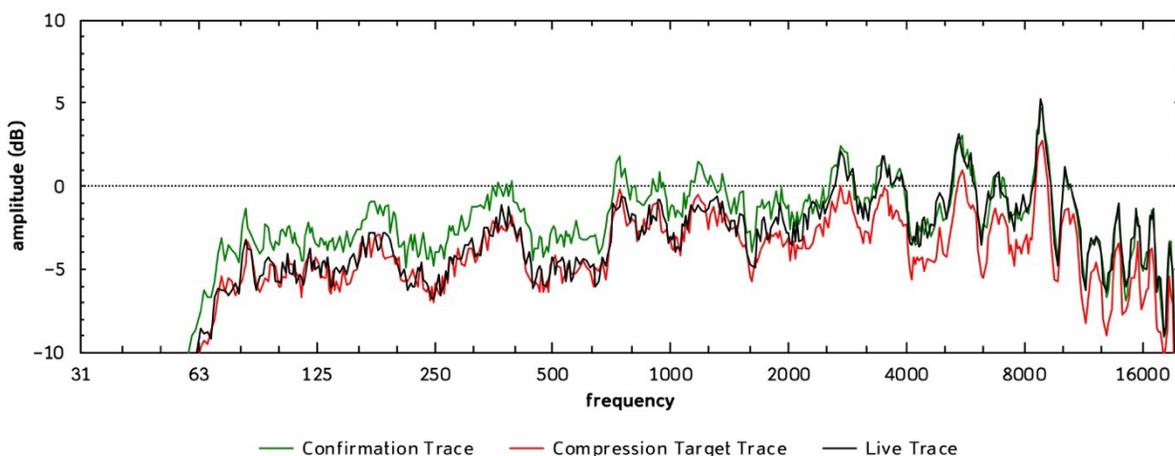
16. If the live trace is below the compression target trace anywhere within the loudspeaker's operating frequency range, reduce the playback level until the live trace is touching or above the compression target trace. This indicates 2 dB of compression has been reached.

17. Store the live trace for documentation.

18. Measure the peak and slow weighted RMS SPL. This is the Maximum Linear Peak SPL and maximum RMS SPL. Calculate the crest factor by subtracting the RMS SPL from the peak SPL. M-Noise has a crest factor of at least 17.5 dB in every 10 second interval.

19. Send the results to the loudspeaker manufacturer and request an updated datasheet.