

Soundcool's Meter Sub-module Specification

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This is a specification for meter sub-module used in many soundcool modules to visualize audio level in decibels.

User interface

Meter is used in various soundcool modules. For instance:

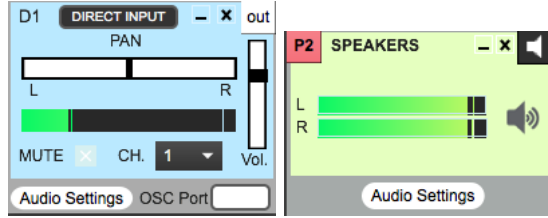


Figure 1: Direct Input and Speakers modules (from left to right)

Web Audio Implementation

Decibels (dB) is a relative measure of loudness. A useful dB measurement Decibels relative to Full Scale (dBFS) is anchored on the maximum peak level possible in a system. In Web Audio, this peak level is 1. Perceived loudness and amplitude of the wave share an exponential relationship:

$$dB = 20 * \log_{10}(a/a_0) \quad (1)$$

where a is the amplitude of the wave and a_0 is the peak amplitude. So equation (1) reduces to:

$$dB = 20 * \log_{10}(a) \quad (2)$$

Amplitude of the wave (a in equation above) is calculated by computing the root mean square (RMS) of a buffer of audio sample's time domain data.

$$a = \sqrt{\frac{\sum_{i=1}^n x_i^2}{n}} \quad (3)$$

where x_i is a float number in the range $[-1, 1]$ when there is no clipping. n is the length of the array set to 256.

So, the resulting range in decibels (dB) for an unclipped signals is $[-\infty, 0]$ since RMS ranges from $[0, 1]$.

References

- <http://teropa.info/blog/2016/08/30/amplitude-and-loudness.html>