

Column by Renzo van Riemsdijk (Masterenzo): Loudness, the button

You've probably seen it before, that button on your amplifier that says "loudness". Some manufacturers call it "contour" but it means exactly the same.

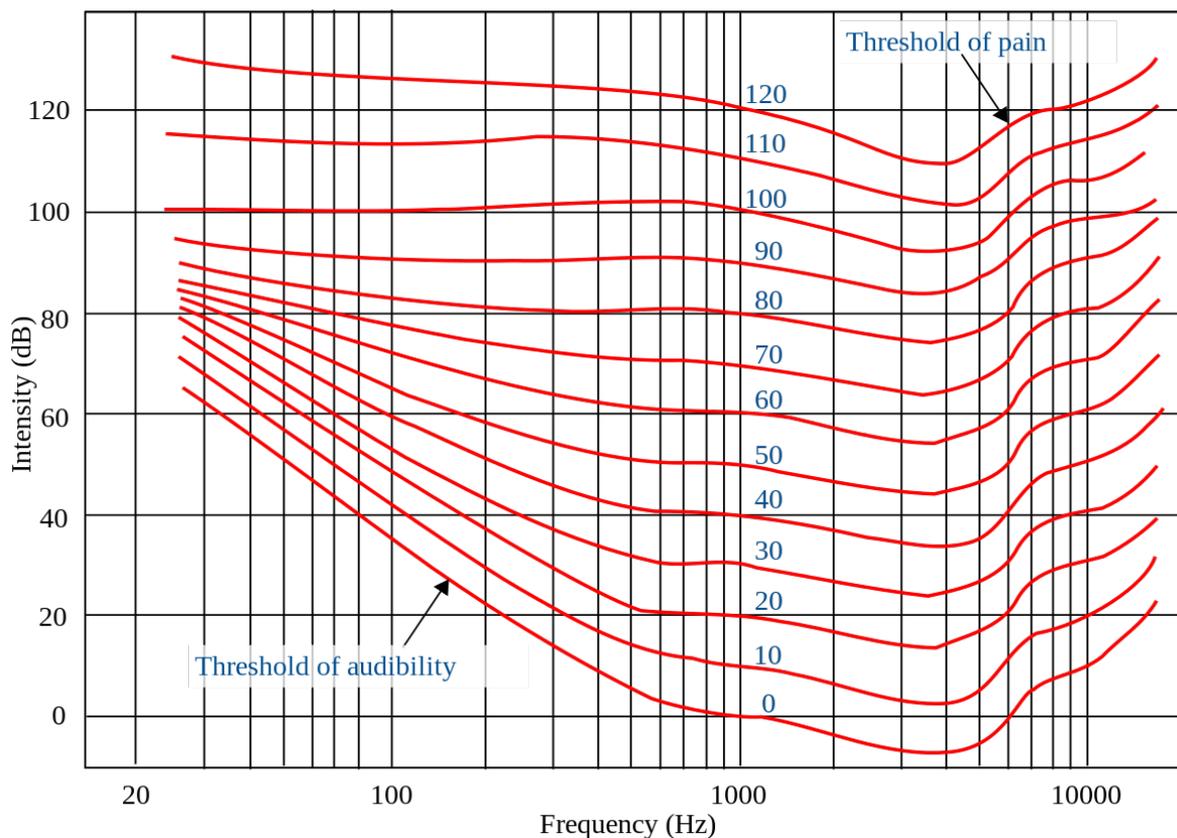
But what does that loudness button do and why is it on the front panel of your amplifier?

First of all some words about those shells on the sides of our head. Our ears represent an ingenious but beautiful system that enables us to hear sounds and music.

This perception of sound happens through transmission of vibrations via our eardrums. Those eardrums react differently to softer vibrations (low volume) than to more intense vibrations (higher volumes).

The sensitivity of our eardrums is far from linear. This means that a given tone at low volume is perceived differently than that exact same tone at a higher volume.

Scientists Harvey Fletcher and Wilden A. Munson already demonstrated this phenomenon way back in the thirties of the previous century. They researched the sensitivity of human hearing at different frequencies and sound pressure levels (intensity):



The image shows that the red lines representing the *loudness curves* are far from straight. But what do we see exactly?

The y-axis (from top to bottom) shows the volume in decibels while the x-axis represents the frequency in hertz. We can particularly notice that the loudness curves start at a fairly high intensity

(volume), subsequently go down to a lower intensity between 1000 and 10.000 Hz to ultimately end at relative high volume levels.

This shows that our ears are less sensitive to lower and higher frequencies at lower volumes. Lower and higher frequencies have to be played louder to perceive the same intensity as the midrange (where our ears are most sensitive). While the volume (intensity) rises the curves are getting flatter, meaning that this effect is less noticeable at higher volumes.

Fully straight horizontal lines would imply complete linearity of our hearing: at any given volume every frequency is perceived equally loud. But we humans are far from linear so:

Back to the knob.

You might have already guessed: the loudness button compensates for this reduced sensitivity of our hearing at lower volume levels.

When you push the loudness button you'll notice an increase of bass and treble in the sound. Actually, the loudness button can be seen as an equalizer with fixed settings of frequency and gain. Some manufacturers use a variable loudness contour on their amplifiers.

This loudness contour does come with a price however: like any type of equalization the loudness contour induces phase shifts in the signal, making it less "pure".

It's a bit far-fetched but this is partly reason for some high-end manufacturers to skip the loudness button on their products. You just have to turn up the volume to avoid the need of a loudness button.

By the way, this loudness button is not very accurate. At what volume is your music played linear when it's engaged? And what about the influence of our speakers and room? Do we actually enjoy listening to linear played music?

And do we rely on the loudness button on a daily basis at any volume level or is life better without it?

All these questions can be answered with one simple action: Push the button!

Renzo

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More info about mastering and about Masterenzo can be found on his [website](#).