

Concept behind the Leveliza

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I'm Jon Eveleigh from RC Audio Systems. As it is such a unique product I am often being asked to explain the concept behind our Leveliza and what it actually does, so in response I would like to take this opportunity to shed some light on it for people that have not already had a chance to see for themselves.

The Concept

I came up with the concept while sitting as engineer through numerous DJ events over many years.

At loud music events the sound level is critical to the show, slightly too loud and it can spoil the enjoyment, slightly too quiet and people won't get the full immersive effect of the music. This requires a very consistent control of the level.

Unfortunately many DJs (not all) produce a very inconsistent output level, with some tracks louder than others and a tendency for the level to drift during their set (often upwards and into the red).

In order to maintain consistent loudness at events I found that I needed to attend to the level myself fairly continuously during the events, and that compromised my ability to attend to other things, such as checking or repairing equipment, assisting and attending to artists, checking in with event and venue managers, going to the toilet, etc...

I tried every way I could think of to automate the level control, using limiters/levellers/automatic volume controllers/etc, but with the products that I could find the results were always sub optimal.

Issues I came across with the options I tried included audible pumping of the sound, loss of dynamic range in the sound, loudness dropping and raising according to bass content, loudness of differently mastered tracks varying within the same limiting envelopes depending on the compression in the tracks and the duty cycle of the music, quietest sections of tracks suddenly being gained up and then the louder drops suddenly being gained back - the exact opposite of how the artists intended the track to be played, etc.

My final conclusion was that, with the products I could find, any automated level control always resulted in an inferior sounding result for the show compared with an engineer continuously riding the gain. Yes, at times an automated level control was necessary, but it always came with the price in terms of the resulting sound being significantly inferior in level control and/or dynamic range, this was the price that had to be paid for an automated substitute for a human.

Being technically minded I decided to try and find a solution, if I couldn't find a product to do what I wanted I would just have to try and make one myself.

I had to specifically work out what I as a human engineer was doing to control the levels whilst stood at an event and then work out how to get some electronics to do the same.

Without going into too many details, I was:-

- Listening to how loud my ears perceived the music to be. Not considering peak or average or RMS voltage levels, just considering how loud my ears perceived the music to be.
- When considering level I was ignoring to some extent the sub content as this was not usually a factor in the perceived loudness of most music.



- Ignoring loud or quiet peaks and troughs because music is dynamic and a loud peak or trough is supposed to be loud or quiet, it is not supposed to be flattened out.
- Easing the fader up or down very slowly and imperceptibly if the average perceived loudness to my ears was becoming too loud or quiet.
- Pulling the fader down a lot quicker if the DJ suddenly played something far too loud, like an "emergency" response if you like.
- Understanding that sometimes there can be extended quieter sections in some tracks and so not suddenly pushing the fader up during a quiet section - it was recorded quieter in that section for a reason and that should not be compromised.

So, the challenge was to think about how an automated electronic system could broadly do the same as me in regard to the bullet points above.

Some very unique and original design work was required, especially in terms of developing an electronic circuit to perceive and interpret the loudness of complex music signals in the same way as human ears and brains do.

The result

The final design was a great success, such that from the first unit produced a few years ago right up to now I have not found any reason to need to change the circuit at all.

I have used Leveliza units at countless events myself, and even to this day it often surprises me at an event watching it at work how well it judges and rides the levels on unusual music tracks.

How does it compare to a human engineer? Almost 100% of the time it is just as good. Occasionally there might be a situation where it doesn't understand the music/signal as well as an intelligent human would, and therefore doesn't respond quite the same, but the response is still acceptable. On the other hand there are many occasions in which it responds better than a human as it is not distracted and never needs to walk away for other duties, etc. Also, a human's ears often tire after many hours of music and so later in an event a human engineer is unlikely to be judging the levels as well as he did at the beginning when his ears were fresher, and of course the Leveliza does not have that issue.

The audio path is very simple - signal balanced input with gain adjustment goes to an automated gain control which then goes to a balanced output. By the nature of its simplicity it does not significantly affect the sound in any way other than to reduce the gain as required.

The unique processing circuitry is not part of the audio path, it simply monitors and interprets the sound and activates the automated gain control as necessary.

Applications

The original application was to ride the DJ levels on our own sound systems at music events. It has proved so effective and useful to us now that I wouldn't choose to do such an event without one.

The obvious follow on application from this was to offer to make them for other similar sound system operators so they could benefit from them, especially knowing that riding DJ levels is such a big problem across the board for other sound systems too. So, for this reason we put them into production as a product. They have been a great success, there are systems all over the world using them now and, like us, many of them would not want to be without one now.



The next obvious application was to installed sound systems, especially in nightclubs and similar venues. These venues again have the issue of controlling DJ levels, but often they don't have the benefit of a duty engineer all the time and so have to rely on the compromise of an automated level control system of some sort. Why would you want to spend a small fortune on a top end system install and then make it sound bad by crushing the sound with conventional limiters/levellers/etc? The Leveliza can control the loudness level so much better and does not compress the audio signal at all, so you can have the perfect loudness all the time without any loss of quality or dynamic range. I don't know of another simple plug in unit that can do that like the Leveliza. They have been a great success in installs now too, and there are many nightclubs and music venues worldwide, including some of the most prestigious ones, that control their levels with our Leveliza.

Of course, other than fixed installs, the Leveliza is just as beneficial at multi stage events and festivals where some of the stages are often left without an engineer. At least with a Leveliza on each stage you can be sure that all the stages will keep to a consistent volume level which can be easily managed or adjusted, and the sound will always be uncompromised without compression, etc.

Other benefits for noise control

Many noise levels are measured and monitored on and off site with "A-weighting" (measured as dBA). A-weighting is a response curve applied to account for the approximate loudness as perceived by the human ear.

Although not specifically A-weighted, one of the characteristics of the Leveliza is that it tries to perceive loudness from a human's perspective, and so its perception of loudness is on average very similar to an A-weighted response.

The Leveliza is trying to maintain a consistent average perceived loudness, and in doing this it also has proved remarkably effective in maintaining consistent on and off site average measured dBA levels as well.

As a case study there was one high profile club which had a top end system, but their licence was under threat due to noise. The permitted level in the club was only just about enough for such a venue. They tried various different limiters and automatic level controls, but the sound had to be run right at the limit to be loud enough. When these control systems were applied the resulting sound was too quiet, spoiled and compressed, such that many artists/acts refused to perform and so in order for the events not be cancelled they had to back off the level control systems, and then of course they got in deeper trouble with the authorities.

As a last resort on recommendation they tried a Leveliza, and to their relief it solved their problems immediately. The offsite average levels were maintained consistently at the correct dBA threshold to the satisfaction of the authorities. At the same time the sound in the venue was louder as the Leveliza was allowing them their average levels to be right on the maximum threshold at all times, and as the Leveliza does not compress the sound the dynamic range was not limited and so the music sounded great and unspoiled. As a result the artists/acts were happy again with the sound in the venue and everyone was a winner. They were very grateful as without the Leveliza they were in serious trouble.

To conclude

The Leveliza is still a well kept secret, RC Audio Systems is a small company fairly unknown on the global audio scene. People that have bought or used the Leveliza know what a useful tool it is, and many would not want to do without it now. Almost all nightclubs and sound systems that have DJs performing would significantly benefit from a Leveliza, and at only about one third the price of a single DJ deck (like a CDJ3000) the Leveliza is of only nominal cost for the benefits it brings.

