

## AUDIO

# DaySequerra: Loudness Measurement And Control For TV

**Loudness has everything to do with how a human perceives it and little to do with what a reading says on a VU or PPM meter. There may be a correlation at certain frequencies but they are fundamentally different properties.**

Academically, loudness is very well understood with papers and research starting in the 1920s. Historically, audio level meters measure the amplitude of the audio signal - either the RMS (root mean square) voltage of an electrical signal or the sound pressure of an acoustical signal. Neither of these measurements, although widely accepted, provides accurate indications of how viewers will perceive the loudness of the audio programming.

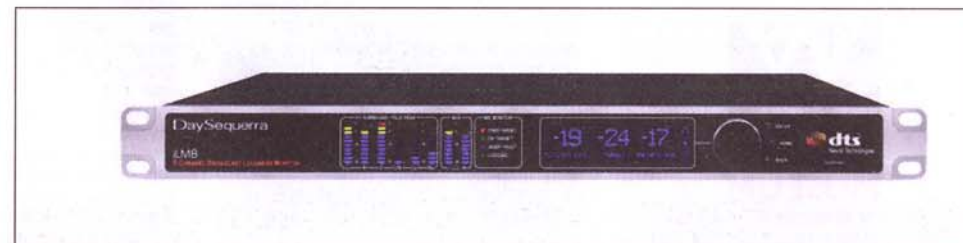
Loudness is a perceptual property of an audio signal when it is reproduced acoustically which is a complex non-linear function of amplitude, frequency and bandwidth. It's only recently that a concerted unified effort has been made to really understand the affects of loudness on TV viewers/listeners and to set some compliance standards, particularly ITU R-BS.1770/1, to which both manufacturers and TV stations should adhere.

There are only four, or so, recognised loudness models in existence of which ITU R-BS.1770/1-2 and the DTS Neural Loudness Measure (NLM) are two. The main reason why there are so few is that they are generally patented and licenced and this is expensive to do! The DTS NLM algorithm is modelled on human hearing and is probably the best model in existence, capturing the nuances of human hearing and accounting in detail for the differences between what is broadcast and what we actually hear - after all, our hearing is designed to hear other humans and not necessarily the LFE channel or 20kHz.

Sonifex Ltd is the UK distributor for DaySequerra loudness products. So why are DaySequerra loudness products so much better than the competitors'? The DTS Neural Loudness Control (NLC) uses a superior psycho-acoustic model than those used in other products, which more closely matches the tonal characteristics of the human ear, by using multiple critical bands (contact Sonifex for a whitepaper on the subject). It's also fast enough

to detect subtle shifts and has a 1.5 frame look ahead to soften loudness irregularities. It's certainly much better at representing the human ear than ITU BS.1770/1-2. ITU BS.1770/1-2 is a good approximation to a loudness model but it has a number of limitations: It has problems with dialogue without background music (e.g. the evening news), problems with the LFE content and its integration time is regarded as being too slow, which is corrected by blanking the measurement where these problems occur - not such a robust solution. So, whilst it's acceptable to use an ITU BS.1770/1-2 product to measure the loudness, to control the loudness you should use a better algorithm. And this is where the DaySequerra products are so much better. Because they use the DTS NLC algorithms for controlling loudness, they are being guided by a more accurate mechanism and so produce a better result. Because DTS NLC is better, the loudness control is more exact and more natural sounding. Your listeners will appreciate the more genuine sounding control that you'll be providing by using the DaySequerra loudness products. The DTS® NLC and NLM processes are exclusively licenced to DaySequerra dedicated hardware products so these superb algorithms can only be found in these hardware boxes.

The DaySequerra loudness products use a single band loudness control: Ideally, in a loudness controller you want to be able to regulate the programme volume without the listener losing any of the experience of the original. In radio, multi-band audio processors are used to compress and constrain the sound, 'squashing' it into a narrow bandwidth and substantially altering the original sound. TV processors are different to this and should leave the sound as untouched as possible - don't mess with the mix! It's why the DaySequerra loudness products use a single band loudness control, which is very fast acting without transitory intermodulation



distortion, so that they don't alter the tone of the broadcast. Additionally, an adaptive dead band keeps the content's dynamic range largely intact, allowing audio that's already within the accepted loudness range to pass through unaltered. A multiband processor shouldn't be used because it is, in effect, equalising the sound and altering the content. Now that processor speeds are fast enough, a single band control is more accurate and is able to maintain the dynamic range requirements and regulatory structure, maintaining transparency and reducing the dynamic range only as necessary to maintain the target loudness.

Choosing the correct product is ultimately about a respect for your listeners and their viewing/listening pleasure. It's easy to switch listeners off your station (and onto someone else's) with widely varying loudness levels,

especially when broadcasting advertising. Additionally, many countries either have implemented, or are about to implement, legislation to make it illegal to broadcast without carefully monitoring and controlling the loudness of programme output. The DaySequerra products offer the best loudness control available, providing both listener comfort and regulatory compliance in the one box.

*The best way to evaluate DaySequerra loudness products is with a listening test so that you can try them for yourself. Contact Sonifex to arrange a demo or for more product information.*

**By Marcus Brooke,  
Managing Director, Sonifex**