

Loudness Special

Audio Media presents a special section on the loudness issues of the moment. The rise of the broadcast standards, international legislation, guidelines, and implementation, and a technology overview....

The Rise of International Broadcast Standards

THOMAS LUND,
HD Development Manager
at TC Electronic builds
from the foundations of
the loudness furor, to the
present tense.

FOR AGES, sound was a natural phenomenon, only existing in the exact moment it was being played, but technology allowing for recording and reproduction has changed that once and for all. Now, beautiful audible moments may be captured and reproduced to enjoy at any time.

However, recorded audio can be extremely diverse, for instance resulting in two seemingly similar pieces of audio to be perceived very differently, especially when it comes to defining listening level. Even a playlist of rock songs of different ages creates systematic and annoying jumps in level. It is all music, and it may even be of the same musical genre, but many will probably have found themselves turning the volume up and down quite frequently due to loudness differences. Now, if we take a look at an even more diverse palette, including all types of music as well as audio for television such as drama,

film, promos and commercials, the difference in loudness becomes even more evident. Therefore, one of the most fundamental audio issues today is control of loudness.

With the transition to digital broadcast, unacceptable inter-program level jumps have become more frequent, for instance between programming and commercials or promos. Every day, millions of people adjust their volume controls over and over, so it is little wonder that it is usually the volume buttons on remote controls that get worn out first.

The actual way of controlling level in pro audio is responsible for these systematic jumps as well as for music CDs getting increasingly distorted. Level control procedures that focus solely on peak level or speech level have proven inadequate and led to the infamous Loudness Wars we're in. What it all comes down to

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THE RISE OF INTERNATIONAL BROADCAST STANDARDS

is that fundamentally, audio is precious and deserves to be reproduced respectfully; but luckily there is a solution at hand.

The Mother of Broadcast Standards

Since the above-mentioned problems are particularly evident in broadcast, it is no wonder that it is primarily within this field new loudness technology has been developed and is becoming increasingly standardised. Today, there are quite a few regional broadcast standards, but the fundamental one was defined by The International Telecommunication Union, also known as ITU BS.1770. Its latest incarnation is BS.1770-2, from 2011. This standard aims at measuring perceived loudness rather than focusing on peak level. But how can a subjective phenomenon, human perception of loudness, actually be measured? Studies based on substantial listening tests performed by independent organisations such as Communications Research Centre (CRC), McGill University in Montreal, and IRT in Munich have helped develop a simple method to measure audio level based on perceived loudness. Without getting into the technical details, the standard is based on an Leq measurement and so-called 'K'-weighting. Because of channel power summing, mono stereo and 5.1 signals may be measured using one and the same meter.

While users should concentrate on getting loudness right, they can't ignore overloads should they happen. BS.1770-2 is therefore complemented by a new and better way of detecting peak level, known as true-peak measurement. With a true-peak meter, music tracks that distort a downstream signal-path can also no longer fly under radar.

In combination, the loudness part and the true-peak part of BS.1770-2 is efficient at normalising broadcast programs, music tracks, films, and commercials, and also prevents distortion from building up in DA converters or in lossy data reduction systems.

The Offsprings

Apart from ITU's BS.1770-2 standard, there are a number of additional broadcast standards that typically apply to individual countries or regions. However, most of them now have BS.1770 in common. In this introduction to loudness and broadcast standards, we will limit the field to two offsprings: EBU R128 (Europe) and ATSC A/85 (US).

In short, The European Broadcast Union's standard, R128, was originally based on BS.1770, but in order to make it even more efficient to work with, and to align programmes across genres, EBU employed a gating scheme that focuses the measurement on moderately loud parts of a program. Suddenly, movies and classical music could be transparently aligned with e.g. pop music and commercials. The gating scheme works so well that it was implemented in the BS.1770-2 revision last year. R128 also

includes a suite of BS.1770-2 compliant tools, Momentary Loudness, Short-term Loudness, and Loudness Range, thereby forming a transparent loop from production to multi-platform distribution.

New recommended practices in the US, ATSC A/85, also builds on parts of the ITU standard, but not to the same extent as R128. While A/85 incorporates the K-weighted Leq approach as well as true-peak metering, the basic concept differs in that it assumes that the speech of a programme defines the average level, and therefore, it is the 'anchor point'. Across newly mixed movies, speech indeed is considered an anchor. However, the way speech is mixed in

movies is very different from how it's used in broadcast. Presented with the CALM Act, ATSC therefore had to retreat from speech measurement in promos and commercials. New annexes J and K from July 2011 reflects this change. The latest version of A/85 still references BS.1770-1 as a loudness model, but this will hopefully be remedied shortly. Otherwise, A/85 users will not be able to take advantage of the cross-genre advantages and transparency of BS.1770-2.

Nonetheless, no matter what ATSC decides, it is a positive development that loudness measuring is beginning to become standardised, and with the new standards at hand, production, post, and broadcast professionals now have a valuable and efficient set of tools to end the Loudness Wars. Cross-genre programme material can finally begin to co-exist transparently, and volume knobs and buttons can expect longer lives, while audiences will be able to get a more pleasant listening experience. In other words, everybody wins. **AM**

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