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INSIGHT FROM EBU TECHNICAL

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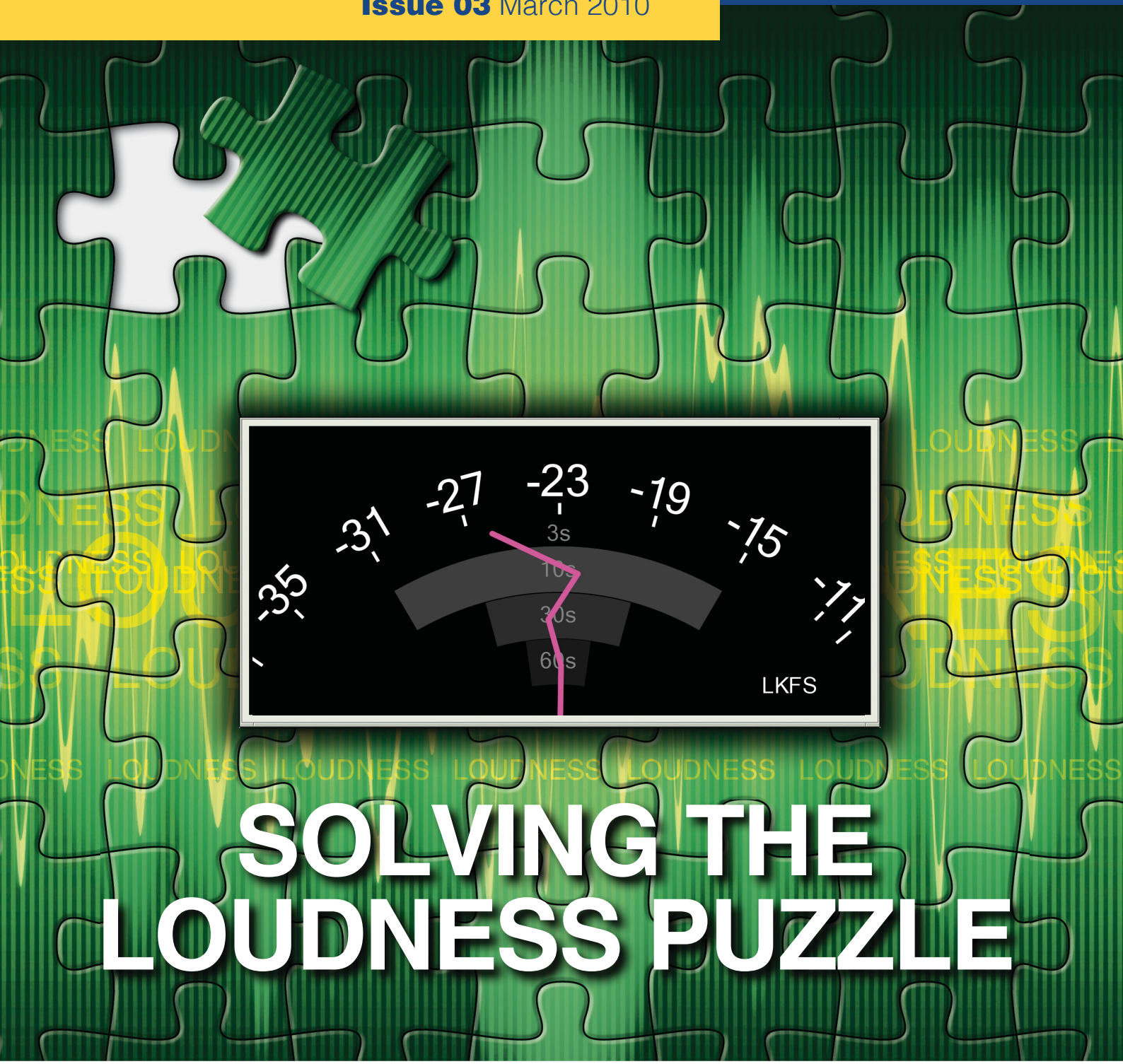

SOLVING THE LOUDNESS PUZZLE

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Loudness

Meters get 'EBU Mode'

The EBU Loudness Group P/LOUD has taken yet another step towards solving the Loudness puzzle. Besides the main task to fix the Loudness Target Level and the respective recommendation, the meter manufacturers in the group have nearly finished a detailed specification to align their equipment. The shift from PPM to Loudness metering is near. Florian Camerer (ORF), chairman EBU P/LOUD and Frans de Jong (EBU), coordinator EBU P/LOUD report on the work to date.

It is probably the largest and most active EBU Group ever. More than 150 participants and followers are working to address those annoying loudness differences within and between broadcast channels. After only six meetings and just over a year's duration, the P/LOUD Group is close to finishing its specs. And speed is needed, as the pressure is mounting across the globe to better align television programme sound. Consumers and regulators are pushing for a more sophisticated measurement of audio levels, to minimise the annoyance for the viewer/listener.

So what's the problem?

For many years audio metering and alignment has relied on so-called Peak Programme Meters (PPM). These were basically meant to prevent the audio levels going up too high, otherwise transmitters or recording devices would distort the signal. It was seen as a safeguard. At the same time the audio engineer would use his ears to judge how to 'ride the fader' to perceptually align the level between different programme elements. However, with the automation of broadcast processes (often replacing the audio engineer), the growing use of commercials and the availability of aggressive audio processing equipment, the trend has become to try to sound the loudest. Simply put, trying to hit the maximum allowed peak level as often as possible. This is a trend across the audio industry: in television broadcasting, radio and especially pop music production. The poor old PPM meter still does its job, but is unable to show the engineer what is actually going on regarding loudness. It was simply not designed to.

The Loudness Meter

The solution sounds simple: create a better meter - one that 'listens' like our ears. The problem is that our ears are complex, and connected to our brains, which means perception of loudness is dependent on many factors, including one's taste and mood. However, it is possible to build a meter that approximates our perceptions much better than a PPM does. Thanks to work in the ITU, there is an accepted base specification on how to measure loudness: ITU-R BS.1770. Actually, it works a bit similar to a VU (Volume Unit) meter, that is, it is integrating the energy of the audio more than it is following the peaks, as the PPM does. However, for practical implementation, more is needed than ITU-R BS.1770 alone. For example, the spec does not define a gating function, which means that content with a lot of low level audio will register low on a loudness reading. Meter manufacturers need to decide on many more parameters, such as what scales are used, what integration times are available, etc.

This is why the EBU P/LOUD Group asked all participating manufacturers (which includes all the well-known meter manufacturers) to agree on a specification of what their meters will adhere to. The result is the so-called 'EBU mode', which all agreed to support. When an audio engineer sets a meter to 'EBU mode', it can be assured to read the same value as a colleague's using a loudness meter from another vendor set to 'EBU mode'. Obviously, there is enough freedom in the spec to allow manufacturers to compete on other functionality, design of the user interface and meter ergonomics.

Meter needs level

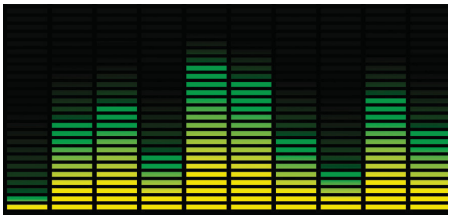
There is little use for a speedometer, if you don't have a speed limit. Similarly, the main task of the EBU P/LOUD Group is to recommend the Loudness Target Level to be used by broadcasters. That the value will be around -23 LKFS (the 'unit' of loudness referenced to digital full scale) was clear from the onset, but fixing the level without knowing the gating approach is not really possible. So, last November and December, P/LOUD participants performed subjective listening tests to help decide what gating approach and level to recommend. First results analysis indicated a relative gate of around -8 to -10 dB would be a good candidate, but a firm conclusion was not yet available at the time of writing.

People need guidelines

Besides deciding on the target level and

Top 3 Promises of Loudness Normalisation

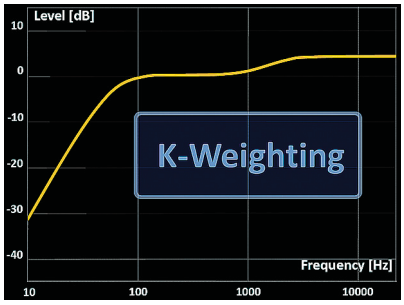
1. Better quality audio
2. Less audience annoyance
3. More dynamic range for creative use



01. An EBU P/LOUD Group meeting
02. Richard van Everdingen (Dutch Broadcast Loudness Committee) summarising the results of the Distribution Subgroup
03. Loudness metering is based on the so-called 'K-weighting' curve, which is roughly based on human perception of how loud various frequencies are perceived at an average listening level.

01

02



03

gate, the Group's other focus is now on creating Practical Guidelines to help broadcasters implement Loudness metering and normalisation in their facilities. The active participation of many hands-on audio engineers in the Group and the experience they have already gained in using the new meters and normalisation techniques provide an excellent basis to assist colleagues in other broadcast organisations.

There is another set of guidelines, which is already nearly finished. It is targeted at distribution organisations, such as cable rebroadcasters, to help make sure interchannel loudness differences can be addressed and level differences in home equipment can be minimised. Work in this area is covered by a P/LOUD subgroup on distribution. The results of this work will also be included in updates to 'EBU Tech 3333 - EBU HDTV Receiver Requirements'.

Managers need information

With the Loudness work maturing, the need to keep management informed on what is happening increases as well. In several countries, meetings with broadcast executives are being organised to update them on future changes in audio level handling. Early feedback from the field shows that managers are eager to apply loudness measurement and normalisation to reduce viewer complaints. However, there also seems to be a bit of uncertainty on how commercial agencies can best be included. Within P/LOUD that is already happening anyway, as several ad agency representatives have recently joined the Group, and more are expected to follow. Loudness awareness is becoming more and more mainstream – hopefully to the benefit of audiences.

In summary, the EBU P/LOUD Group is well on track to finish its work. It is thanks to the combined participation of all key players, such as equipment manufacturers and broadcasters, hands-on expertise from seasoned audio engineers, and in-depth knowledge from research institutions, that the EBU Loudness Group flourishes and Loudness Nirvana comes closer.

> there is enough freedom in the spec to allow manufacturers to compete on other functionality, design of the user interface and meter ergonomics

Peak Meters Types

Quasi Peak Programme Meters (QPPM) are often referred to as 'PPM'. These meters are actually not measuring the real peaks, as they have a built-in reaction time, typically 10ms. The EBU QPPM is defined in EBU Tech 3205.

Sample Peak Meters identify the highest sample value in a piece of audio. These are very popular as straightforward meters in NLEs and other non-core audio (software) products. Their accuracy is deceptive because audio is typically sampled not only at its peaks.

True Peak Meters measure the real peaks of a signal, as they take into account the fact that the reconstruction filter for sampled audio typically creates higher peaks than the samples. The difference can be up to about 3 dB compared to sample peak meters.