# 10 things you need to know about...

EBU R 128
– the EBU loudness recommendation

1 **EBU R 128** is at the core of a true audio revolution: audio levelling based on loudness, not peaks.

Audio signal normalisation based on peaks has led to more and more dynamic compression and a phenomenon called the 'Loudness War'. The problem arose because of misuse of the traditional metering method (Quasi Peak Programme Meter – QPPM) and the extended headroom due to digital delivery. Loudness normalisation ends the 'Loudness War' and brings audio peace to the audience.

2 **ITU-R BS.1770** defines the basic measurement, **EBU R 128** builds on it and extends it.

BS.1770 is an international standard that describes a method to measure loudness, an inherently subjective impression. It introduces 'K-weighting', a simple weighting curve that leads to a good match between subjective impression and objective measurement. EBU R 128 takes BS.1770 and extends it with a gating function (see point 3), the descriptor Loudness Range (LRA; see point 4) and the Target Level: -23 LUFS (Loudness Units referenced to Full Scale; see also points 5 and 10). A tolerance of ± 1 LU is generally acceptable.

3 Gating of the measurement is used to achieve better loudness matching of programmes which contain longer periods of silence.

Longer periods of silence lead to a lower measured loudness level. After subsequent loudness normalisation such programmes would end up too loud. In EBU R 128 a relative gate of 8LU (Loudness Units; 1LU is equivalent to 1dB) below the ungated loudness level is used to eliminate these low level periods from the measurement. Thus, better loudness matching is achieved.

4 The descriptor '**Loudness Range**' (LRA) is a tool to assess if a programme fits the tolerance of the transmission chain and target audience and if dynamic compression is needed.

'Loudness Range' estimates the distribution of loudness of a programme with statistical tools. A broadcaster can establish a maximum LRA value for specific genres and transmission platforms. LRA can also be used to check for dynamic transparency of a signal chain. A detailed description of LRA is given in EBU Tech Doc 3342.

5 A separate document about 'Loudness Metering' (EBU Tech Doc 3341) defines the framework for a loudness meter compliant with '**EBU mode**'.

There are three time constants which differ in the integration time: Momentary (400ms), Short-term (3s) and Integrated (from start to stop; the whole programme/item). These three meters are abbreviated M, S and I. The result of a loudness measurement is a Loudness Level, abbreviated L_K, the value is expressed in 'LUFS' (Loudness Units referenced to Full Scale). 'M' and 'S' are commonly used in stereophony for 'Mid' and 'Side'. To distinguish the integration times 'Momentary' and 'Short-term', the versions 'ML_K' and 'SL_K' (as well as 'IL_K') may be used.

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LUFS
EBU +9 Scale
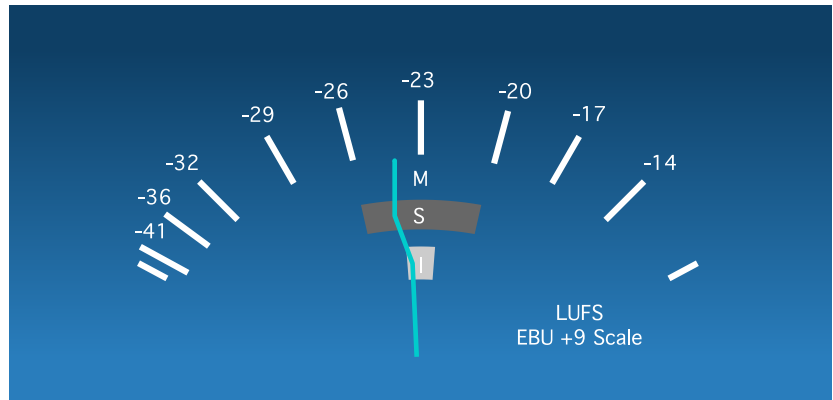
6 All major audio meter manufacturers participated in the EBU group PLOUD.
They co-developed '**EBU mode**'.

Equipment implementing 'EBU mode' is being introduced at increasing speed. The joint work of manufacturers of audio metering equipment as well as experienced sound engineers ensures that loudness meters will be compliant with 'EBU mode'. The work within PLOUD is a prime example of such a collaboration between users and vendors.

7 Loudness normalisation is applicable for the whole signal chain.

The concept of EBU R 128 is applicable in all areas of audio production, from acquisition, live broadcasting and post-production to ingest, file-based workflows, playout (master control), transmission, archiving and distribution (re-broadcasting). The five documents by the EBU group PLOUD cover all these areas.

8 **EBU R 128** lies also at the heart of the Distribution Guidelines.

EBU Tech Doc 3344 represents a major step towards equal loudness for all possible sources of audio signals arriving at the consumer's home. This also includes specifications for set-top boxes and AV-Receivers.

9 The transition to loudness normalisation need <u>not</u> be a brutal switch ...

Current mixing techniques (with a Peak Meter) can still be used with subsequent adjustment of the result. Loudness Metering is nevertheless encouraged. Analysis of past productions and mixing techniques with a loudness meter gives a good indication of compatibility and the necessary changes. Audio engineers will quickly realize the extended dynamic possibilities. EBU Tech Doc 3343 gives practical guidelines for the new way of working with audio levels.

10 Metadata is important too.

Loudness-normalised content has, if applicable, the loudness metadata parameter set to a value of -23. If loudness normalisation to this Target Level is not achievable practically, loudness metadata must be set to the actual loudness level.

The PLOUD Group is part of the EBU Expert Community on Audio (ECA).
For more information, visit: http://tech.ebu.ch/loudness