

EBU

OPERATING EUROVISION AND EURORADIO

R 128 s3

LOUDNESS IN RADIO



SUPPLEMENT 3 TO R 128

Geneva
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Loudness in Radio

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After the introduction and successful adoption of recommendation **EBU R 128** [1], the uptake in **Radio** has been slower. There is a need to give specific guidance for an audio levelling solution in Radio based on **loudness**.

The **key concept** is the clear differentiation between the *production* and the *distribution* realm.

The EBU considering that:

- a) *the majority of European TV broadcasters produces its programmes according to EBU R 128 with a Target Level of -23.0 LUFS (for tolerances refer to [1]);*
- b) *many European Radio broadcasters have been delaying the adoption of loudness normalisation due to often shared processes and responsibilities between the programme and technical department. Furthermore, the distribution landscape is more heterogenous with different levelling schemes for legacy and current solutions (FM, DAB, Streaming etc.);*
- c) *there is no unanimous use of MPX (multiplex) power limiting according to ITU-R BS.412 [2] for FM distribution, resulting in vastly different loudness levels of Radio stations across Europe;*
- d) *many Radio broadcasters still rely considerably on this FM distribution path;*
- e) **Online Streaming** *has become an important distribution path for Radio broadcasters;*
- f) *and that the exchange of content between Radio, TV and Online distribution is increasingly daily practice for many broadcasters, exposing different levelling schemes;*

Recommends for production that:

- g) *Radio broadcasters should clearly distinguish between **production** and **distribution** of content and apply levelling strategies accordingly;*
- h) *programmes shall be produced or prepared according to EBU R 128 and EBU Tech 3343 [3], that is with an average loudness level of -23.0 LUFS¹. The True Peak Level of a programme shall not exceed -1 dBTP;*
- i) *that, consequently, internal and external programme exchange shall be performed with these key values in place (-23.0 LUFS and -1 dBTP);*
- j) *that legacy programmes should be loudness normalised to -23.0 LUFS prior to play-out, either through creating a new file or through the use of Loudness Metadata;*

¹ Broadcasters should urge manufacturers of audio editing equipment and Content Management Systems to implement the necessary loudness tools, such as automatic clip-based loudness normalisation.

The EBU further recommends for distribution that:

- k) by default, Radio stations should aim to broadcast their programmes according to **EBU Tech 3344 [4]**, that is at a Distribution Loudness Level of **-23.0 LUFS**;
- l) for legacy analogue distribution paths (for example, the FM system), the alignment of the studio level to the carrier deviation may subsequently be adapted to approximately reach the same perceived loudness level as before;
- m) alternatively, the Distribution Loudness Level may be adapted without changing the legacy alignment;
- n) generally, a Distribution Loudness Level deviating from **-23.0 LUFS** should be chosen within the range of **-20.0** to **-16.0 LUFS**;
- o) for digital distribution paths signal conditioning independent of FM processing should be used in order to avoid the disadvantages of MPX power and peak limiting and to use the full headroom according to **EBU Tech 3344**;
- p) broadcasters should perform Radio Streaming in accordance with **EBU R 128 s2 [5]**;
- q) once receiver devices provide sufficient headroom and gain to enable satisfactory playback levels even in noisy environments², broadcasters with a higher Distribution Loudness Level should return to using **-23.0 LUFS**;
- r) the True Peak Level in distribution shall not exceed the values specified in **EBU Tech 3344**;
- s) and that any further audio processes, systems and operations concerning the production and distribution of Radio programmes should be made in compliance with **EBU Tech 3401 [8]**.

References

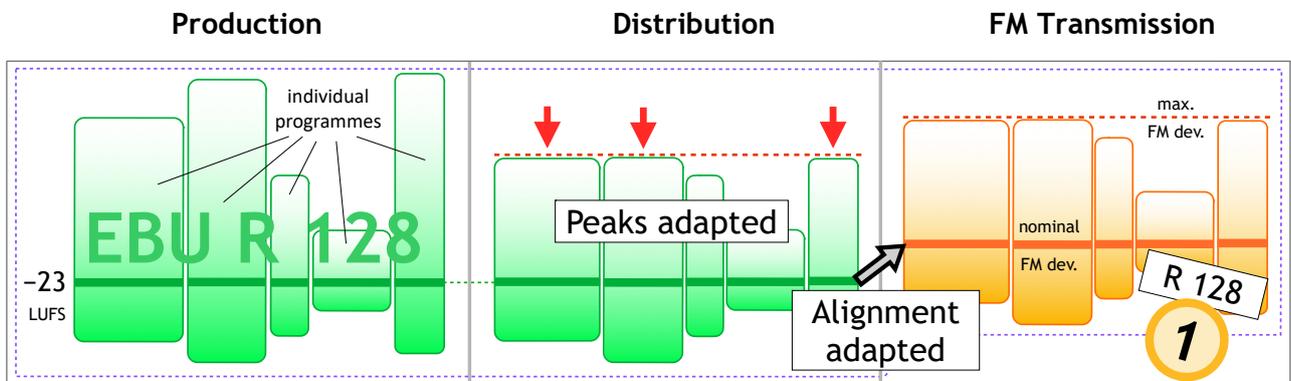
- [1] [EBU R 128](#) 'Loudness normalisation and permitted maximum level of audio signals'
- [2] [ITU R BS.412](#) 'Planning standards for terrestrial FM sound broadcasting at VHF'
- [3] [EBU Tech 3343](#) 'Guidelines for Production of Programmes in accordance with EBU R 128'
- [4] [EBU Tech 3344](#) 'Guidelines for Distribution and Reproduction in accordance with EBU R 128'
- [5] [EBU R 128 s2](#) 'Loudness in Streaming'
- [6] [CENELEC EN 50332-3](#) 'Sound system equipment: headphones and earphones associated with personal music players - maximum sound pressure level measurement methodology - Part 3: measurement method for sound dose management'
- [7] [IEC 62368-1](#) 'Audio/video, information and communication technology equipment - Part 1: Safety requirements'
- [8] [EBU Tech Doc 3401](#) 'Guidelines for Radio production and distribution in accordance with EBU R 128'

² It is anticipated that this will take place after 2022 when CENELEC EN 50332-3 [6] and IEC 62368-1 [7] will effectively be enforced.

Explanation of the Benefits of Loudness Normalisation in Radio

To highlight the benefits of loudness normalisation, two different levelling schemes of a Radio station using the *FM distribution* path are illustrated.

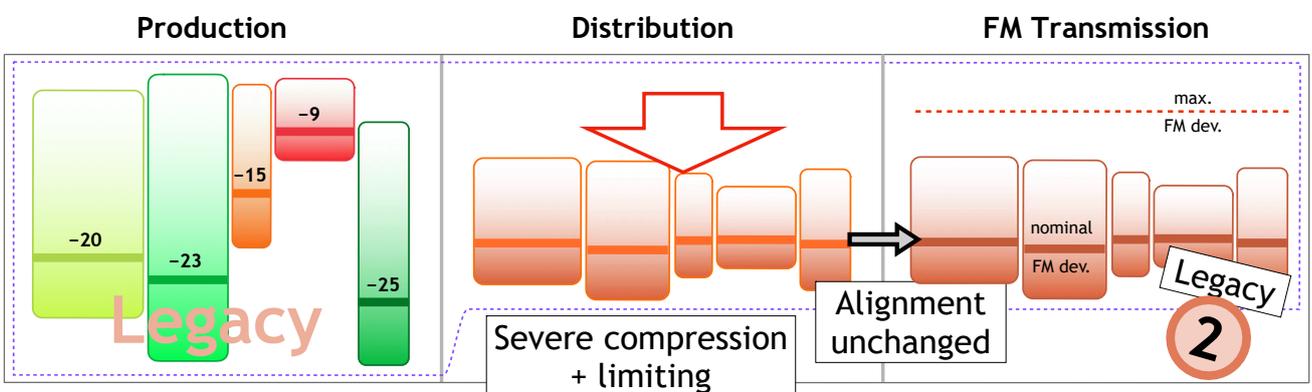
In **Figure 1**, note how applying loudness normalisation in *Production* reduces the degree of compression and peak limiting applied. The Distribution Loudness Level is also -23.0 LUFS, the alignment to nominal FM carrier deviation is adapted (R 128 **1**).



Levelling Scheme for a Radio station using R 128 compliant loudness normalisation at -23 LUFS in Production and Distribution with adapted alignment for FM (R 128 **1**). Mild peak limiting and/or dynamics processing is performed where needed (see the red arrows)

Figure 1: Radio levelling Scheme (R 128)

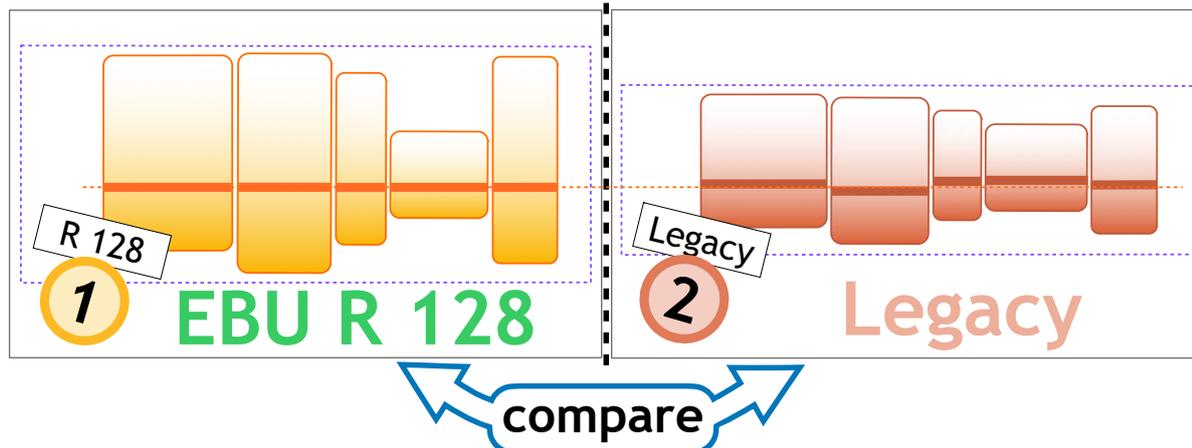
In **Figure 2**, the same sequence of programmes is all over the place regarding loudness levels, which are tamed through severe compression and limiting. The Distribution Loudness Level and the alignment stay unchanged (Legacy **2**). Both cases result in the same loudness level on the receiver side.



Levelling Scheme for a Radio station using no normalisation in production with legacy processing and alignment for FM. The resulting average loudness is the same as in Figure 1. Severe peak limiting and compression lead to a less dynamic, more squashed sound (Legacy **2**).

Figure 2: Radio levelling Scheme (Legacy)

In **Figure 3** the two outcomes are compared side by side. Note the difference in the dynamic properties: R 128 **1** shows a more open sound and a perfectly consistent loudness level.



Comparing the two FM levelling schemes (R 128 **1** vs. Legacy **2**), the same loudness level is achieved but R 128-compliant loudness normalisation reduces transmission processor aggressiveness & enables a more dynamic, open sound

Figure 3: Comparison between the two FM Levelling Schemes