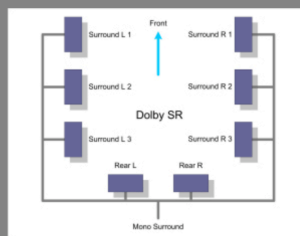


Filmitootmise tehnoloogiad

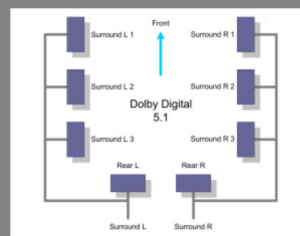
Tarmo Rajaleid

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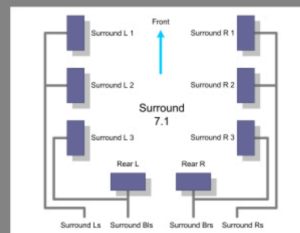
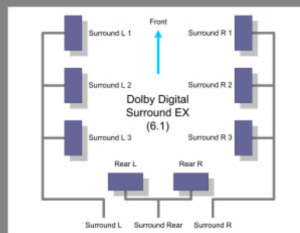
Kinoheli formaadid



Dolby SR (one surround channel)



Dolby Digital 5.1 (two surround channels)



<http://www.proav.de/index.html?http&&www.proav.de/audio/surround02.html>

http://www.hometheaterhifi.com/volume_9_2/feature-article-curves-6-2002.html

http://en.wikipedia.org/wiki/Dolby_Digital

[http://en.wikipedia.org/wiki/DTS_\(sound_system\)](http://en.wikipedia.org/wiki/DTS_(sound_system))

<http://www.barco.com/en/Auro11-1/exhibitors-tab-1?>

<http://www.dolby.com/us/en/brands/dolby-atmos.html>

<http://listen.dts.com/pages/dts-x?tracking=DTSX>

http://www.thu.ee/~raaleid/BFF6077_Filmitootmise_tehnoloogia/Lugemismaterjalid/Helistuudio%20loengu%20materjalid/Kalibreerimine/

Kino helitugevuse standard

- ▣ Vasak, keskmine ja parem kanal
 - **85 dBc** SPL Dolby Pink Noise (-20dBFS) kalibreeritud (C-weighted, slow)
- ▣ Surround kanalid on -3 dB vaiksemad
 - **82 dBc** SPL Dolby Pink Noise (-20dBFS) kalibreeritud (C-weighted, slow)
- ▣ LFE Subwoofer kanal
 - +10 dB (“in-band gain”) tugevam võrreldes keskmise kanaliga sagedusalas kuni 120 Hz

Dolby X-Curve

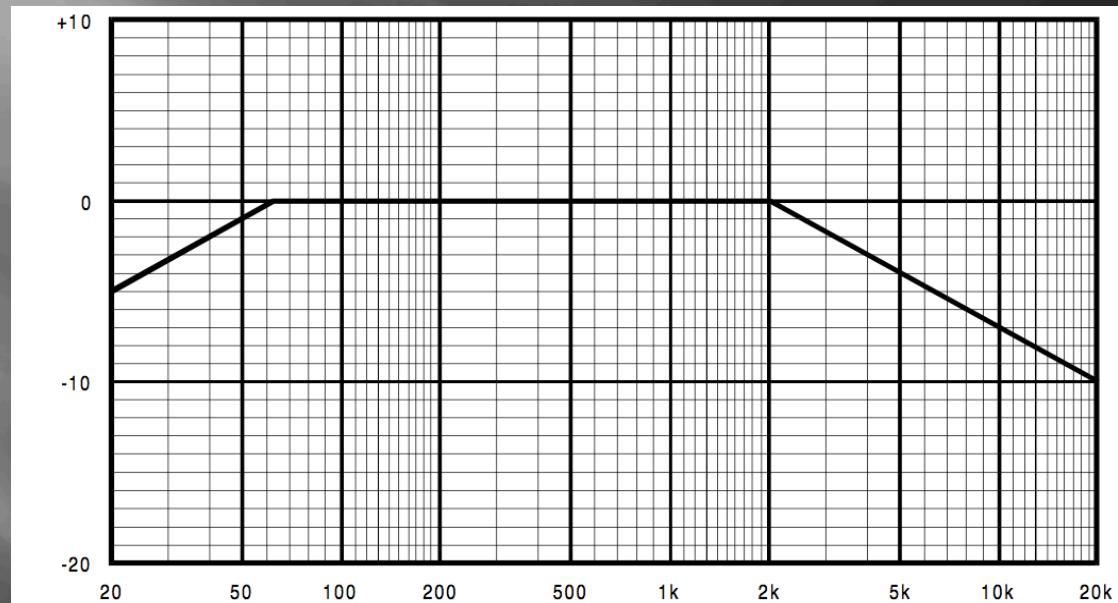


Figure 4-4 Standard X-Curve

http://www.hometheaterhifi.com/volume_9_2/feature-article-curves-6-2002.html

Kino ja televisiooni heli monitooring

- Kino heli kokkusalvestuse ajal L/C/R monitoride tugevus **85 dB SPL**
- Televisiooni heli kokkusalvestuse ajal L/C/R monitoride tugevus **79 dB SPL**
- Üldine soovitus:
 - Dialoogi miksimisel hoida kinoheli puhul keskmist taset ca **-27 kuni -25 dBFS**
 - Televisiooni heli puhul dialoog ca **-23 dBFS** vastavalt EBU R128-le
 - Üldiselt võib miksida **kõrva järgi**, kui ruumi kuulamistugevus on standardi järgi paigas.
 - Efektid (plahvatused, mürtsud) võivad minna lühiajaliselt kuni **-1 dBFS** välja.
- Kinosaalis peaks Dolby CP750 protsessori tugevus olema **7.0 (Reference Level) = 85 dB SPL** (sama mis helistuudios miksimisel)

EBU R128 helinivoo standard

- EBU R128 - Loudness Normalisation And Permitted Maximum Level Of Audio Signals
- <https://tech.ebu.ch/loudness>
- http://www.tlu.ee/infomaterjalid/BFF6077_Helisteotmise_tehnoloogia/Lugemismaterjalid/Helistuudio%20loengu%20materjalid/EBU_R128_Loudness_helinivoo%20standard/

EBU R128 helinivoo standard

- ▣ Terve programmi integreeritud keskmine helinivoo (Programme Loudness Level) peab olema normaliseeritud **-23.0 LUFS**
- ▣ Otseaadete puhul on lubatud erinevus normist ± 1.0 LU (Loudness Unit)
- ▣ Maksimaalne TRUE PEAK LEVEL on **-1 dBTP**.

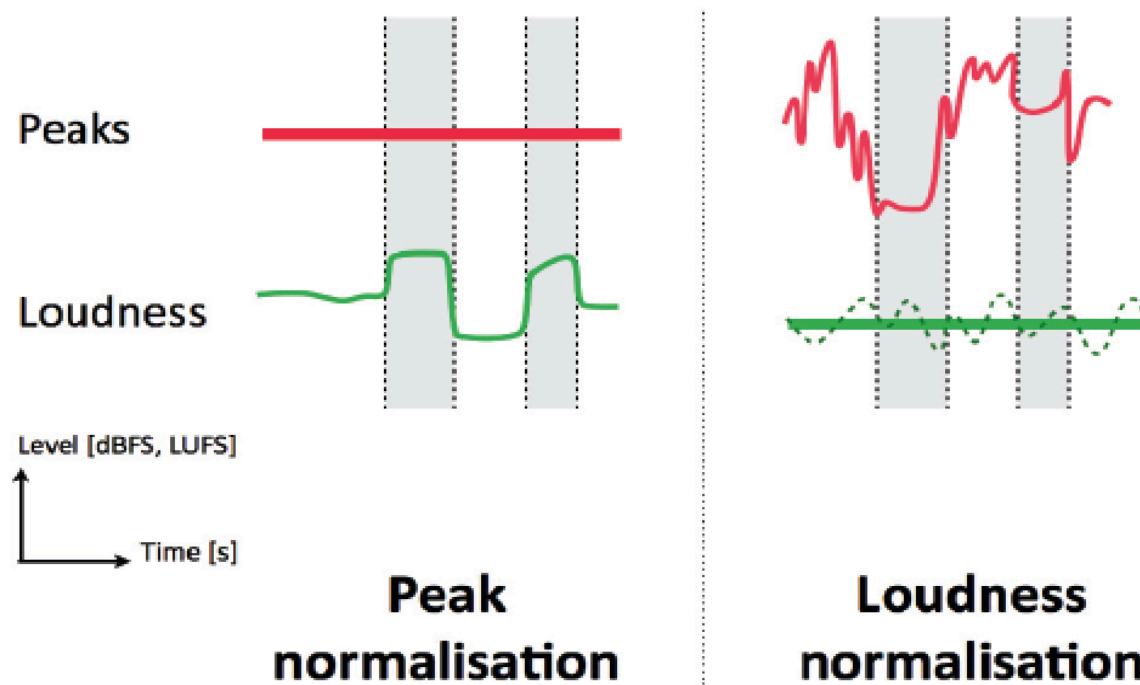


Figure 4: Peak level normalisation vs. Loudness level normalisation of a series of programmes

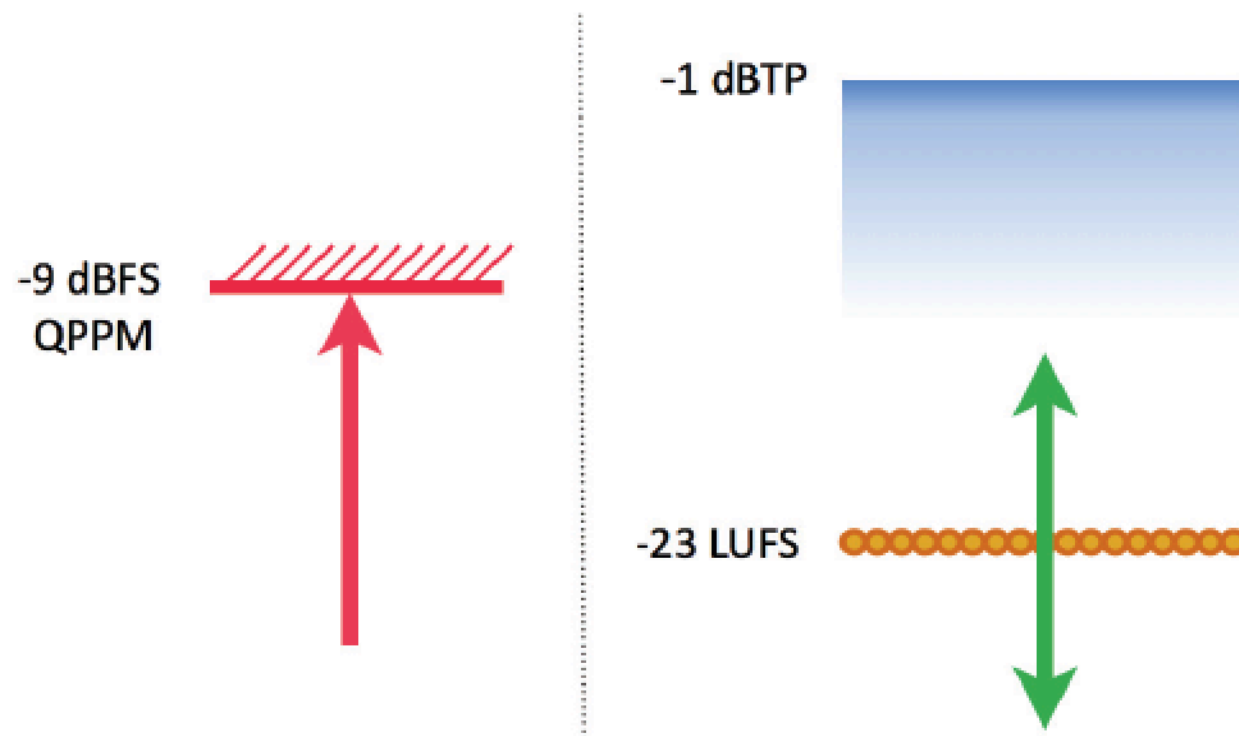


Figure 5: Quasi-Peak Level normalisation ('safety ceiling') vs. Loudness Level normalisation

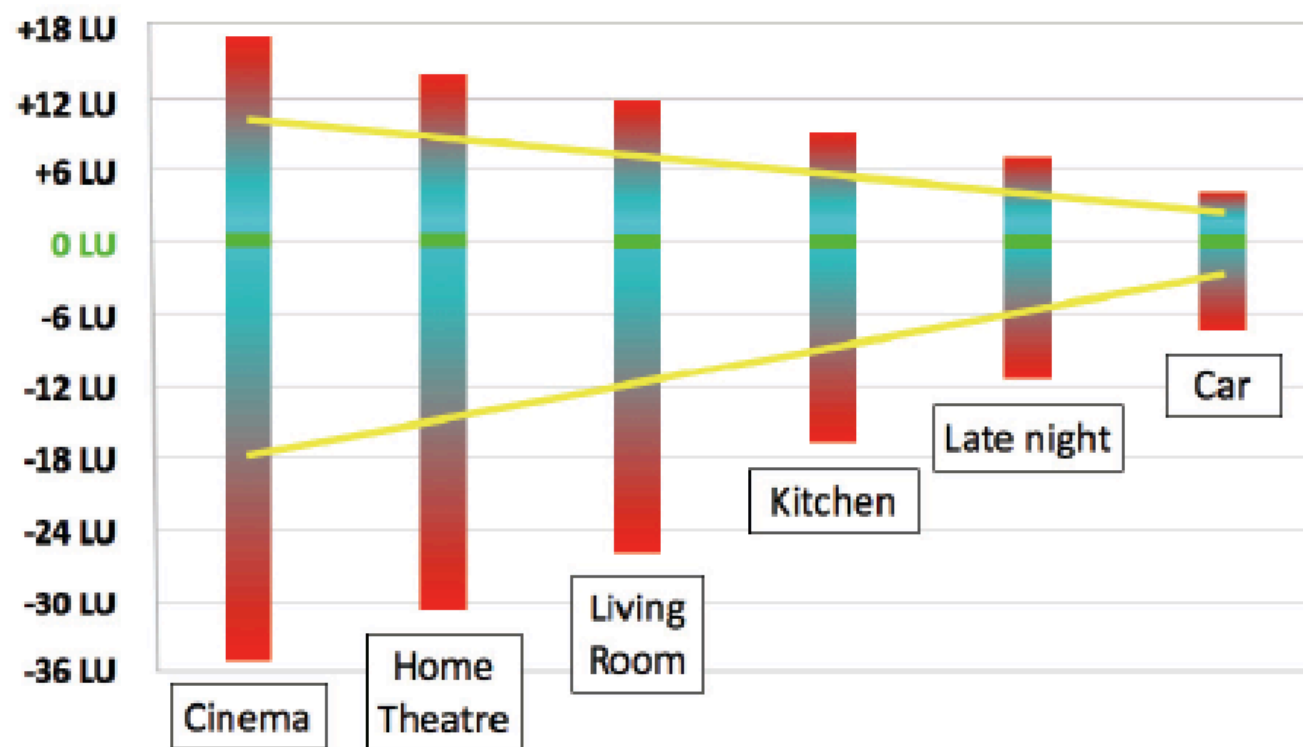


Figure 6: Different examples for Loudness Range depending on the replay environment