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Fact Sheet

Peak vs. RMS in movies and TV commercials

The regulations (FCC in the United Sates and the DOT in Canada), require that only the peak intensity be stated and that it should not exceed a certain level. This is for all forms of broadcast audio media including television shows, commercials, and movies. The regulation makes no mention of the average (or RMS "root mean square"). The reason why the peak intensity was chosen rather than RMS intensity was to prevent spillover from one carrier frequency to an adjacent one. Specifying and limiting the peak intensity will control the spillover issue. This is really the primary reason why we have any regulation on this issue; this is not a noise control issue. In listening to speech or music, it is the average intenisty (or RMS) that defines how loud we perceive something to be, and not the peak intensity.

The technique that is used is called compression, and depending on the jargon of a particular industry it is also also known as automatic volume control (AVC). Compression brings the level of the average intensity up to within a few decibels of the peak intensity. For speech, the difference between the peak and the average is about 12 decibels. This is called the crest factor. With compression, one can reduce the crest factor to several decibels - the speech sounds louder (higher average) but the peak is the same. Compression brings the RMS level up to just below the peak intensity level. Television commercials and movies do this routinely. Compressed commercials have a higher RMS level (with the crest factor of maybe only 4 to 5 dB vs. 12 dB) than the normal TV show, but the same peak intensity. Therefore movies and commercials tend to be more compressed than real life speech, and tend to sound louder.

Movie projectionists do not typically have the capability to undo the compression (ie., bring the average down to a level that is about 12 decibels quieter than the peak), although there is inexpensive expansion circuitry that can easily do this. A side effect of a compressed signal is that the difference between the quietest elements and the loudest ones is not as great. In movies, we have quiet love scenes and loud action scenes; with compression there still is a difference between the scenes, but it is less. Assuming no expansion circuitry is available, the interested projectionist can use his or her overall master volume control to manually make the soft scenes soft and the louder scenes louder. Therefore the projectionist has some global control over the scene-by-scene volume, but unless he has a degree in audiology, he cannot change the compression that allows the movie (and commercial) industries to make everything louder.

There are no commerically available hearing aids with "wide dynamic range expansion" that would effectively undo the compressed transmission of television commercials and movies in theatres, but such a hearing aid, or hearing aid program, could be used to resolve this issue.

For more information, visit www.canadianaudiology.ca