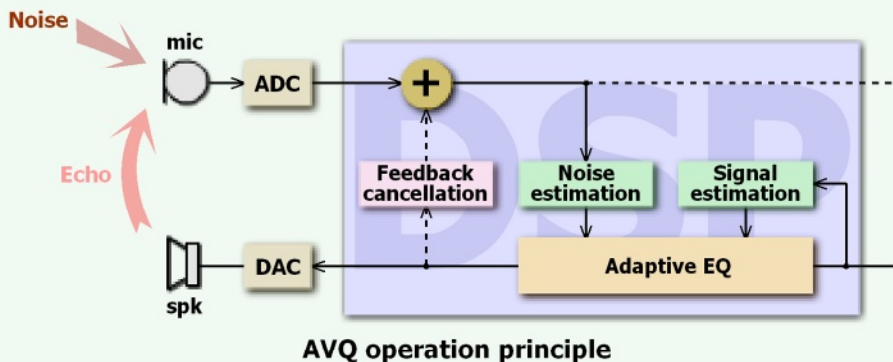


Automatic Volume and eQualization control

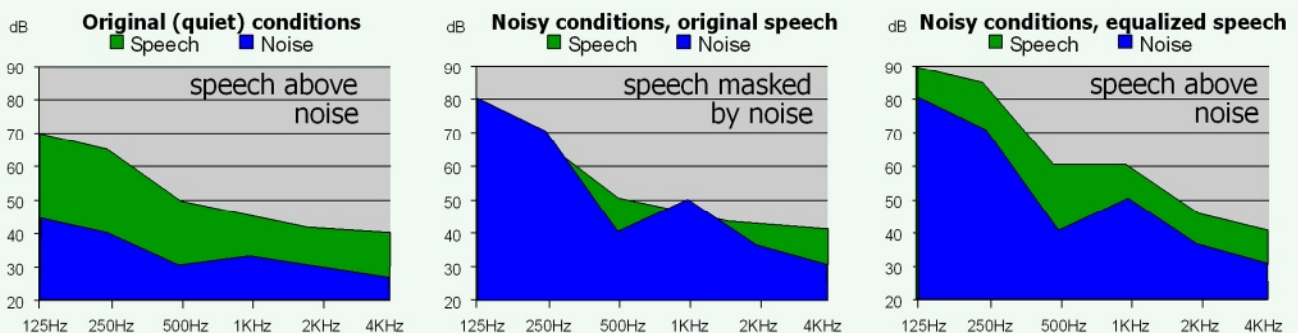
Comfortable reproduction of music or speech in conditions with varying ambient noises requires constant changes in sound level (with changes in noise level) and equalization (with changes in noise spectrum). For example, volume and equalization set for a standing car will not be adequate when the car is moving. In its turn, adjusted for moving car conditions, the sound may again become unintelligible when air-conditioning is switched on or windows are open. Today, the user has to change the sound volume manually which is uncomfortable and, in some cases such as a hands-free car kit, even dangerous. Suitable manual frequency equalization is almost never possible due to a large number of parameters to be controlled "on the fly".

Automatic Volume and Equalization control (AVQ) technology amplifies and equalizes sounds according to ambient noise characteristics providing equal perceptual loudness, intelligibility and sound coloration in conditions where noise level and spectrum are changing dynamically. The technology is suitable for both speech and music. It significantly improves user experience in such applications as mobile phones, hands-free car kits, Bluetooth headsets, portable music players, car radios, and other mobile voice and audio applications.

A microphone (already present in communication devices) is used to monitor the current noise conditions. The microphone signal is analyzed and the ambient noise parameters are extracted. Acoustic Echo Cancellation technology may be used to remove parts of the speaker signals present in the microphone signal due to acoustic coupling between the two. Simultaneously, the current signal parameters are analyzed and fed into the



equalization block. This block dynamically amplifies parts of the signal spectrum masked by noise ensuring equal intelligibility and perceptual loudness in variable noise condition.



AVQ and other technologies

Although it can be used standalone, Automatic Volume and Equalization control is also integrated with other Alango technologies into one Voice Communication Package (VCP). Besides AVQ the package also includes acoustic echo cancellation, stationary and transient noise suppression, dynamic range compressor, speech enhancement, (optional) adaptive dual microphone and several others.