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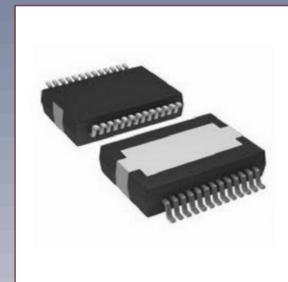
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Background

- Hearing loss caused by high Sound Pressure Levels (SPL)
 - Ascendance of the threshold of audibility
 - MP3, MP4 players with earphones, used by teenagers
 - Devices can provide high SPLs (effective class-D amplifiers inside)
 - Equivalent SPL projected to 8 hours, which causing hearing damage is: 85dBA
 - Human ear accommodates to the changed and higher SPLs in 10-15 minutes
 - Danger can arise in different shows, concerts also
- Increased noise levels and noise contamination
 - Caused by the powerful amplifiers which can reach high SPLs
 - Noisy and crowded environment
 - Indirectly effected higher SPLs
 - Minimal desired Signal To Noise Ratio (SNR)
- In the age of tubes/valves
 - No commonly used amplifiers which can provide high SPLs
- Decay of hear among elder people
 - Loss of higher frequencies is typical
 - It worsens the intelligibility of speech

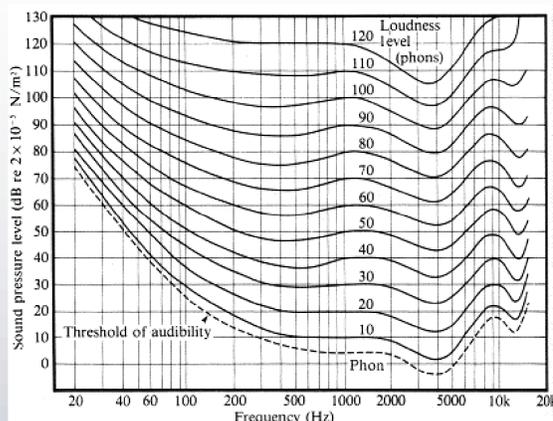


Challenge

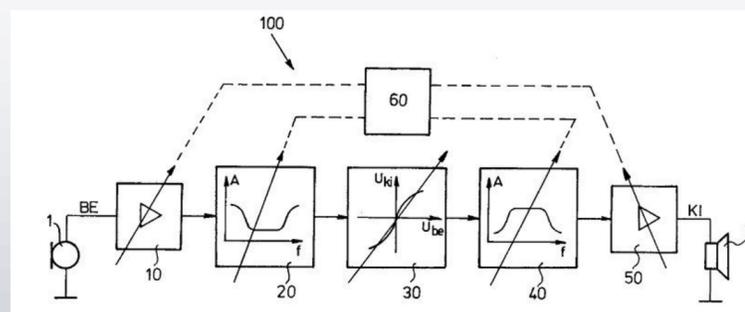
- Create a device which can provide the desired sensation of volume
- Low measurable SPL
- Should not tone the sound, not distort audibly
- Bring on the higher frequencies from the lost range to the lower range -> to heard by hearing damaged people

Brief description of the invention

- Simply feasible electronic device
- Natural sound experience is obtainable, with low SPL
- Affects advantageously the SPL/Sound Perceptual ratio by psycho-acoustic considerations
- There exist procedures, by help of them the sensation of volume can be raised, without increasing the measurable SPL: methods, which use the Equal-loudness contours amplify differently different frequencies:



- The line of our research was different:
- The increased volume sensation is obtainable, without sound quality fall, by setting up an overtone range likely to the ear distortion
- The device tries to imitate precisely the psycho-acoustic parameters about the volume sensation of human ear
- Generates frequency dependent overtone enrichment, modifies the ratio of even and odd overtones correlate with the base harmonic, as a function of dynamics, signal level and frequency
- Parameters are measurable, adjustable, reproducible



Further targets, challenges

- We should perform tests to precisely determine the parameters
- Lay down the parameters for hearing handicapped persons
- Might decrease the official SPL limit values, set up a new weighting/measuring method with respect of the nonlinearity of human hearing

Possible applications

- Prevent the nowadays increased hearing loss, caused by the world-wide spreading music listening with headphones
- Use the module beneficially in hearing aid (sensation of lost frequencies)
- The invention can largely assist in the research of the nonlinear distortion behavior of human hearing
- Can be used in every electronic device, where the sound amplification is desired
- Can be connected to the already exists analogue or digital instruments, like a docking module

IP Status: Patent pending

Patent : 110798-13773E/SZT, „Emberi fül torzítását modellező eszköz, valamint eljárás hangjel feldolgozására”

Research Team

The main idea was coming from Kálmán Máthé

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References

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- Patent : 110798-13773E/SZT, „Emberi fül torzítását modellező eszköz, valamint eljárás hangjel feldolgozására” (Patent Pending)

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