The resulting sound of the combined target band arid the transposed source band may thus appear confusing and unpleasant to the listener, as an identifiable relationship between the sound of the target band and the transposed source band is no longer present in the combined sound.

Another inherent problem with the transposer algorithm of the prior art is that it does not take the presence of speech into account when transposing the signal. If voiced-speech signals are transposed according to the prior art algorithm, formants present in the speech signals will be transposed along with the rest of the signal. This may lead to a severe loss of intelligibility, since formant frequencies are an important key feature to the speech comprehension process in the human brain. Unvoiced-speech signals, however, like plosives or fricatives, may actually benefit from transposition, especially in cases where the frequencies of the unvoiced-speech signals fall outside the perceivable frequency range of the hearing-impaired user.

~~According to the invention, a hearing aid is devised, said~~Herein disclosed is a hearing aid having a signal processor comprising means for splitting an input signal into a first frequency band and a second frequency band, a first frequency detector capable of detecting a first characteristic frequency in the first frequency band, a second frequency detector capable of detecting a second characteristic frequency in the second frequency band, means for shifting the signal of the first frequency band a distance in frequency in order to form a signal falling within the frequency range of the second frequency band, at least one oscillator controlled by the first and second frequency detectors, means for multiplying the signal from the first frequency band with the output signal from the oscillator for creating the frequency-shifted signal falling within the second frequency band, means for superimposing the frequency-shifted signal onto the second frequency band, and means for presenting the combined signal of the frequency-shifted signal and the second frequency band to an output transducer, the means for shifting the signal of the first frequency band being controlled by the means for determining the fixed relationship between the first frequency and the second frequency.

According to the invention, a hearing aid is devised, said hearing aid having a signal processor comprising: means for splitting an input signal into a first frequency band and a second frequency band, a first frequency detector capable of detecting a first characteristic

frequency in the first frequency band, a second frequency detector capable of detecting a second characteristic frequency in the second frequency band, at least one oscillator controlled by the first and second frequency detectors, means for shifting the signal from the first frequency band by multiplying said signal with the output signal from the oscillator for creating a frequency-shifted signal falling within the second frequency band, means for superimposing the frequency-shifted signal onto the second frequency band, and means for presenting the combined signal of the frequency-shifted signal and the second frequency band to an output transducer, characterized in means for determining the presence of a fixed relationship between the first characteristic frequency and the second characteristic frequency in order to verify that the first characteristic frequency and the second characteristic frequency are both harmonics of the same fundamental frequency, and said means for shifting the signal of the first frequency band being controlled by the means for determining the fixed relationship between the first frequency and the second frequency.

By taking the relationship between the first frequency and the second frequency into account when transposing audio signals, a higher fidelity of the processed signals is achieved.

~~The invention also concerns~~Also disclosed is a method of transposing audio frequencies in a hearing aid. The method involving the steps of obtaining an input signal, detecting a first dominating frequency in the input signal, detecting a second dominating frequency in the input signal, shifting a first frequency range of the input signal to a second frequency range of the input signal, superimposing the frequency-shifted first frequency range of the input signal to the second frequency range of the input signal according to a set of parameters derived from the input signal, wherein the step of detecting the first dominating frequency and the second dominating frequency incorporates the step of determining the presence of a fixed relationship between the first dominating frequency and the second dominating frequency, the step of shifting the first frequency range being controlled by the fixed relationship between the first dominating frequency and the second dominating frequency.

The invention also concerns a method of shifting audio frequencies in a hearing aid, said method involving the steps of: obtaining an input signal, detecting a first dominating frequency in the input signal, detecting a second dominating frequency in the input signal, shifting a first frequency range of the input signal to a second frequency range of the input signal, superimposing the frequency-shifted first frequency range of the input signal to the second frequency range of the input signal according to a set of parameters derived from the input signal, characterized in determining the presence of a fixed relationship between the first dominating frequency and the second dominating frequency in order to verify that the first dominating frequency and the second dominating frequency are both harmonics of the same fundamental frequency, and, shifting the first frequency range being controlled by the fixed relationship between the first dominating frequency and the second dominating frequency.

By utilizing a fixed relationship between the first and the second detected frequency for controlling the transposition of the hearing aid signals, a more comprehensible reproduction of the transposed signals is obtained.

Further features and embodiments arc disclosed in the dependent claims.

The invention will now be explained in greater detail with reference to the drawings, where

fig. 1 is a block schematic of a prior art frequency transposer for a hearing aid,

fig. 2 is a frequency graph illustrating the operation of the prior art frequency transposer,

fig. 3 is a frequency graph illustrating the problem of transposing a signal according to the prior art,