CLAIMS

1. A noise reduction circuit with monitoring functionality for a headphone having at least one speaker driver, the circuit comprising:

a microphone configured to convert ambient sound into a corresponding electrical ambient signal, the microphone being disposed adjacent to the speaker driver's diaphragm;

an active noise reduction path configured to provide active noise reduction of the ambient sound based on the corresponding electrical ambient signal;

a vocal signal compensation path configured to restore attenuated signals within the vocal range of the corresponding electrical ambient signal to increase audibility of vocal signals of the ambient sound; and

a switching device arranged to selectively deliver the corresponding electrical ambient signal to the active noise reduction path or to the vocal signal compensation path.

2. A noise reduction circuit according to claim 1, wherein the vocal signal compensation path comprises a vocal clarity compensator configured to enhance the frequency response of the attenuated signal within the vocal range.

3. A noise reduction circuit according to claim 2, wherein the vocal clarity compensator includes a band pass filter and a signal amplifier coupled to the band pass filter's output.

4. A noise reduction circuit according to claim 2, wherein the vocal clarity compensator includes more than one band pass filter cascaded in parallel.

5. A noise reduction circuit according to claim 2, wherein the vocal clarity compensator includes a high pass filter.

6. A noise reduction circuit according to claim 2, wherein the frequency response is dependent on both construction and design of earcups of the headphone, the frequency response being between 200 Hz and 1 KHz of the vocal range.

7. A noise reduction circuit according to claim 1, further comprising a microphone amplifier arranged to amplify the corresponding electrical ambient signal, and wherein the switching device is arranged to receive the amplified corresponding electrical ambient signal.

8. A noise reduction circuit according to claim 1, wherein the active noise reduction path includes an active-noise cancellation filter.

9. A noise reduction circuit according claim 1 wherein the microphone is arranged to face the user.

10. A noise reduction circuit according to claim 1, wherein the microphone is arranged at the front of the speaker driver's diaphragm.

11. A headphone comprising the noise reduction circuit of claim 1.

CLAIMS

1. A noise reduction circuit with monitoring functionality for a headphone having at least one speaker driver, the circuit comprising:

a microphone configured to convert ambient sound into a corresponding electrical ambient signal, the microphone being disposed adjacent to the speaker driver's diaphragm and within an earcup of the headphone;

an active noise reduction path configured to provide active noise reduction of the ambient sound based on the corresponding electrical ambient signal;

a vocal signal compensation path configured to restore attenuated signals within the vocal range of the corresponding electrical ambient signal to increase audibility of vocal signals of the ambient sound; and

a switching device arranged to selectively deliver the corresponding electrical ambient signal to the active noise reduction path or to the vocal signal compensation path; wherein the vocal signal compensation path comprises a vocal clarity compensator configured to enhance the frequency response of the attenuated signal within the vocal range.

2. A noise reduction circuit according to claim 1, wherein the vocal clarity compensator includes a band pass filter and a signal amplifier coupled to the band pass filter's output.

3. A noise reduction circuit according to claim 1, wherein the vocal clarity compensator includes more than one band pass filter cascaded in parallel.

4. A noise reduction circuit according to claim 1, wherein the vocal clarity compensator

includes a high pass filter.

5. A noise reduction circuit according to claim 1, wherein the frequency response is dependent on both construction and design of earcups of the headphone, the frequency response being between 200 Hz and 1 KHz of the vocal range.

6. A noise reduction circuit according to claim 1, further comprising a microphone amplifier arranged to amplify the corresponding electrical ambient signal, and wherein the switching device is arranged to receive the amplified corresponding electrical ambient signal.

7. A noise reduction circuit according to claim 1, wherein the active noise reduction path includes an active-noise cancellation filter.

8. A noise reduction circuit according claim 1 wherein the microphone is arranged to face the user.

9. A noise reduction circuit according to claim 1, wherein the microphone is arranged at the front of the speaker driver's diaphragm.

10. A headphone comprising the noise reduction circuit of claim 1.

11. A noise reduction circuit according to claim 1, wherein the switching device is operable by a user.

12. The noise reduction circuit as in claim 1, wherein the active noise reduction path

includes an active-noise cancellation filter configured to produce a filtered noise signal.

13. The noise reduction circuit as in claim 12 further comprising:

another switching device arranged to select either the filtered noise signal from the active-noise cancelation filter or the restored attenuated signal from the vocal clarity compensator; and

an adder for combining the selected filtered noise signal or the restored attenuated signal, depending on the selection of the first and second switching devices, with audio from an audio source to produce a combined signal for the at least one speaker driver.