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(54) Title: NOISE CANCELLATION AND NOISE REDUCTION APPARATUS**(57) Abstract**

This invention relates to a method and an apparatus for reducing ambient noise for use with a headset or a boom headset attached to a boom microphone device or the like. The apparatus can include a sensor microphone to detect a background noise signal, a desired input audio transmission, and signal processing means for canceling the noise signals to create an inverted antinoise signal within an acoustical waveguide located adjacent to the earphone of headset. The method for reducing noise according to this invention is provided by an open loop circuit allowing the input audio signal from an operator or caller to be transmitted to the user's ear without the disturbance of unwanted ambient noise. The method provides adjustments to the gain/or and phase of a noise signal for canceling the noise component detected, within an acoustical waveguide to produce a quiet zone for the desired audio speech to be transmitted. The apparatus can also include a noise cancellation microphone transmitter system having a first and second microphone arranged such that the first microphone receives a desired speech input and the background noise present in the vicinity of the speech, and the second microphone receives substantially only the background noise. The background noise from the second microphone is converted into a corresponding electrical signal and subtracted from a signal corresponding to the speech and background noise obtained from the first microphone so as to produce a signal representing substantial the speech. The active noise cancellation and noise reduction system is enhanced with the following features: an automatic audio microphone transmission by sensing speech (a "VOX" circuit), transmitting portion of microphone signal to earcup speaker by an increased gain sidetone channel ("sidetone"), and converting an active noise cancellation microphone to a standard omni-directional microphone by removing the voice microphone from the circuit design and increasing the gain of the noise microphone amplifier. The first and second microphones may be utilized as a directional microphone according to this invention when a far field response is desired. The method of the invention also relates to the use of a two terminal microphone configuration.

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