

(12) **United States Patent**
Reuss et al.

(10) **Patent No.:** **US 7,359,504 B1**
(45) **Date of Patent:** **Apr. 15, 2008**

- (54) **METHOD AND APPARATUS FOR REDUCING ECHO AND NOISE**
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- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 868 days.
- (21) Appl. No.: **10/309,695**
- (22) Filed: **Dec. 3, 2002**
- (51) **Int. Cl.**
H04M 9/08 (2006.01)
- (52) **U.S. Cl.** **379/406.02; 379/406.01**
- (58) **Field of Classification Search**
379/406.01-406.16
See application file for complete search history.

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(57) **ABSTRACT**

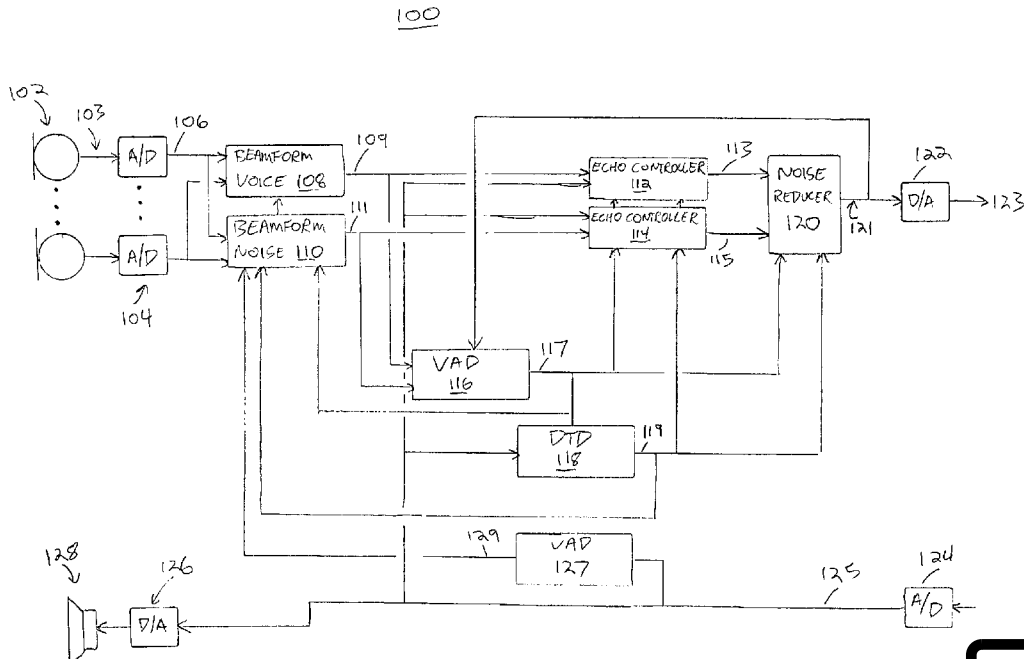
The present invention provides a solution to the needs described above through a method and apparatus for reducing echo and noise. The apparatus includes a microphone array for receiving an audio signal, the audio signal including a voice signal component and a noise signal component. The apparatus further includes a voice processing path having an input coupled to the microphone array and a noise processing path having an input coupled to the microphone array. The voice processing path is adapted to detect voice signals and the noise processing path is adapted to detect noise signals. A first echo controller is coupled to the voice processing path and a second echo controller is coupled to the noise processing path. A noise reducer is coupled to the output of the first echo controller and second echo controller.

24 Claims, 4 Drawing Sheets

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IPR PETITION
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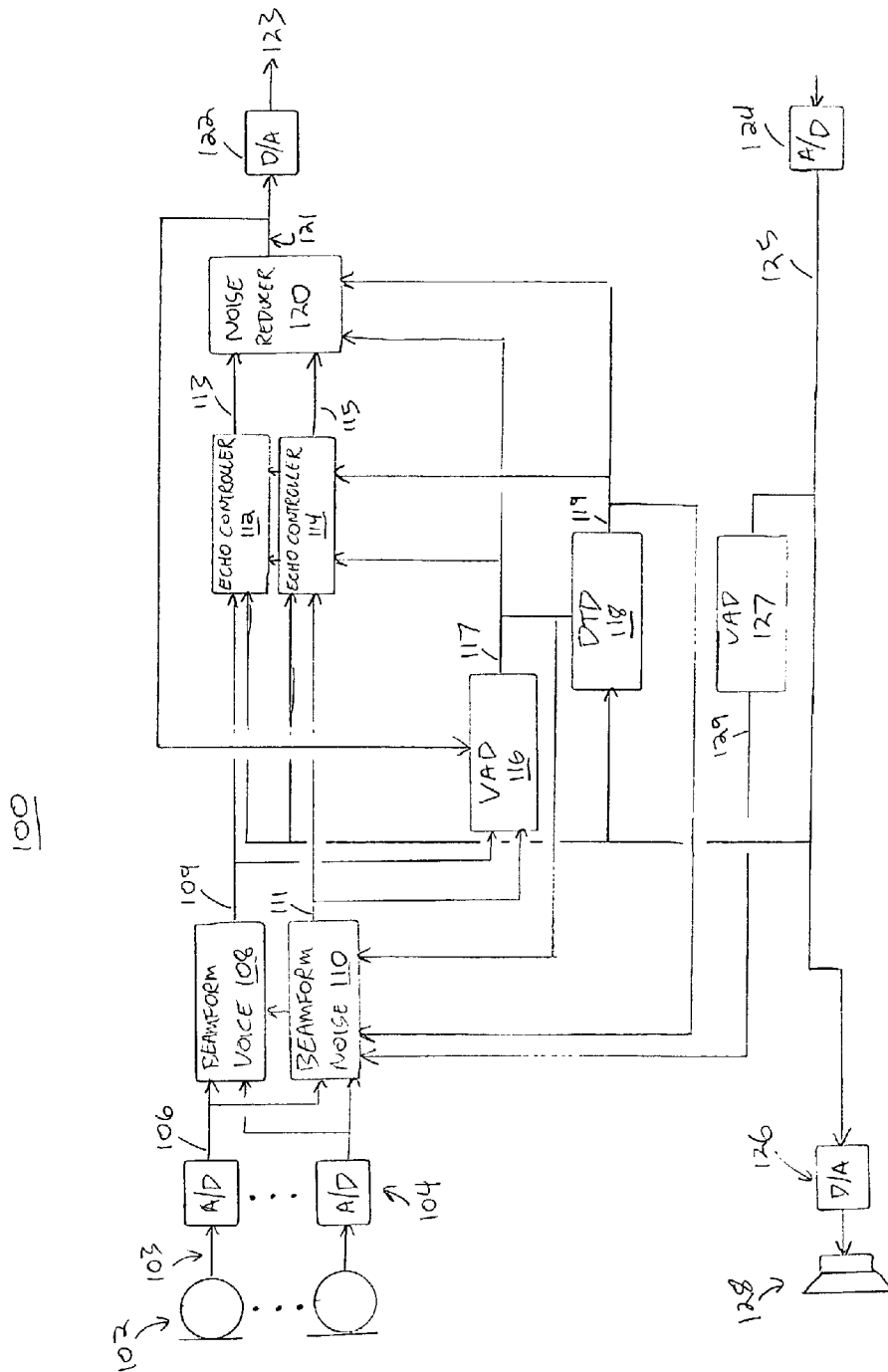


FIGURE 1

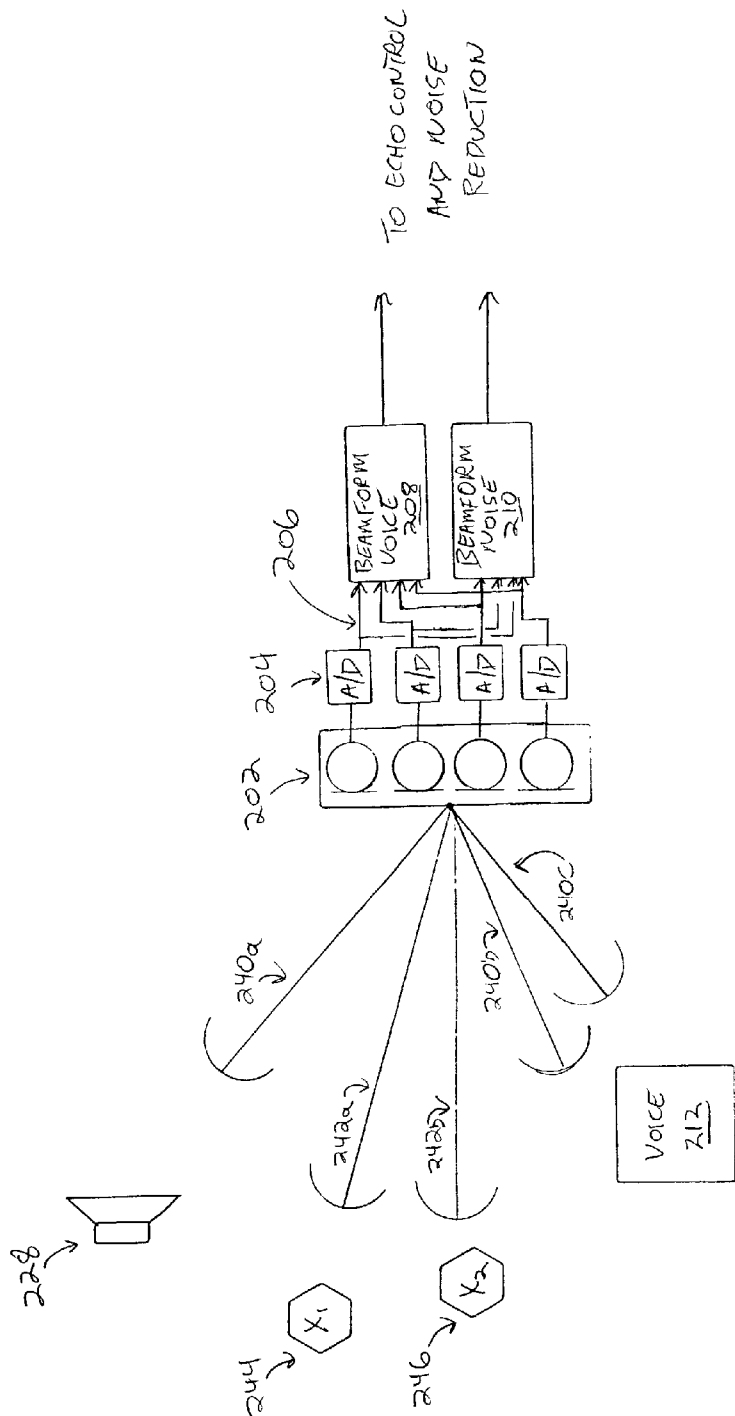


FIGURE 2

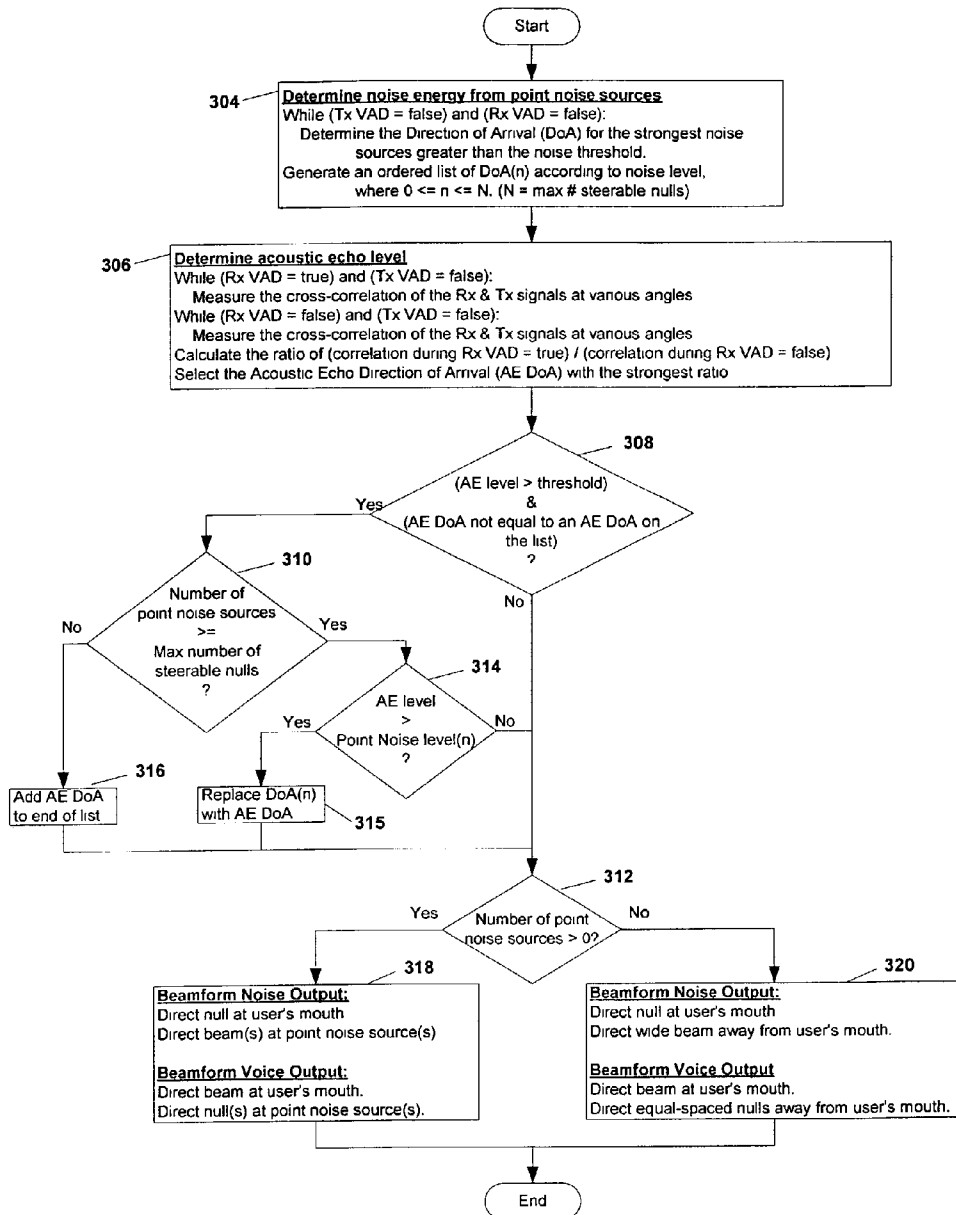


Figure 3

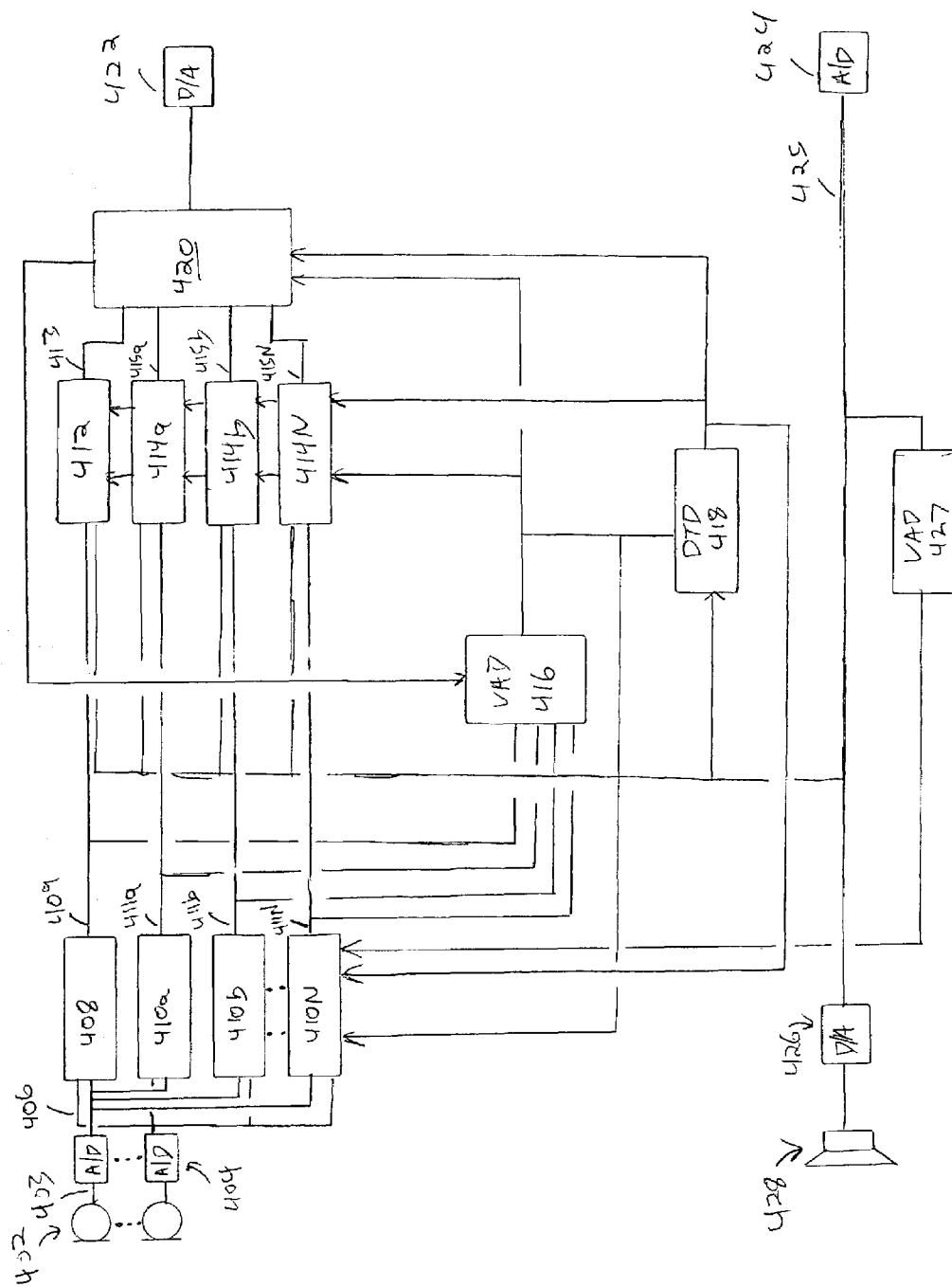


FIGURE 4

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