



US007171008B2

(12) **United States Patent**  
**Elko**

(10) **Patent No.:** **US 7,171,008 B2**  
(45) **Date of Patent:** **Jan. 30, 2007**

(54) **REDUCING NOISE IN AUDIO SYSTEMS**

(75) Inventor: **Gary W. Elko**, Summit, NJ (US)

(73) Assignee: **MH Acoustics, LLC**, Summit, NJ (US)

(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 852 days.

5,515,445 A	5/1996	Baumhauer, Jr. et al. ....	381/92
5,602,962 A	2/1997	Kellermann	
5,687,241 A	11/1997	Ludvigsen .....	381/68.4
5,878,146 A	3/1999	Andersen .....	381/312
6,272,229 B1	8/2001	Baekgaard .....	381/313
6,292,571 B1	9/2001	Sjursen .....	381/312
6,339,647 B1	1/2002	Andersen et al. ....	381/312

**FOREIGN PATENT DOCUMENTS**

JP	06303689	10/1994
JP	2001124621	5/2001
WO	WO 95 16259	6/1995

*Primary Examiner*—Vivian Chin  
*Assistant Examiner*—Douglas Suthers  
(74) *Attorney, Agent, or Firm*—Steve Mendelsohn

(21) Appl. No.: **10/193,825**

(22) Filed: **Jul. 12, 2002**

(65) **Prior Publication Data**

US 2003/0147538 A1 Aug. 7, 2003

**Related U.S. Application Data**

(60) Provisional application No. 60/354,650, filed on Feb. 5, 2002.

(51) **Int. Cl.**

**H04R 3/00** (2006.01)

**H04R 1/02** (2006.01)

(52) **U.S. Cl.** ..... **381/92; 381/91; 381/122**

(58) **Field of Classification Search** ..... 381/97,  
381/91, 92, 122, 95, 317–318, 313, 320–321,  
381/94.1–3, 13

See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

5,325,872 A 7/1994 Westermann ..... 128/897

(57) **ABSTRACT**

Two or more microphones receive acoustic signals and generate audio signals that are processed to determine what portion of the audio signals result from (i) incoherence between the audio signals and/or (ii) audio-signal sources having propagation speeds different from the acoustic signals. The audio signals are filtered to reduce that portion of one or more of the audio signals. The present invention can be used to reduce turbulent wind-noise resulting from wind or other airjets blowing across the microphones. Time-dependent phase and amplitude differences between the microphones can be compensated for based on measurements made in parallel with routine audio system processing.

**55 Claims, 13 Drawing Sheets**

1200

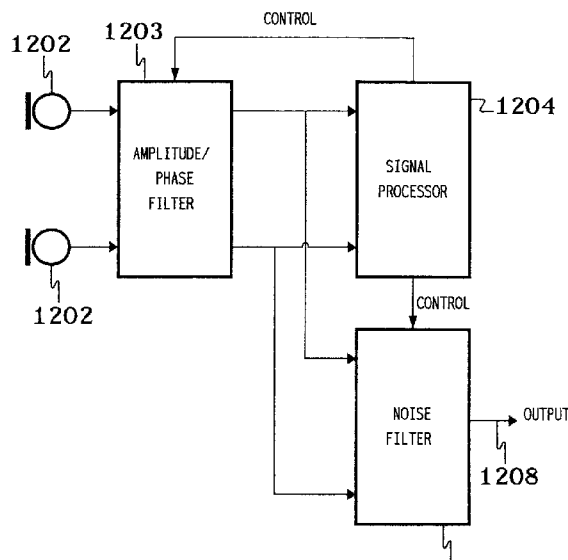


Fig. 1

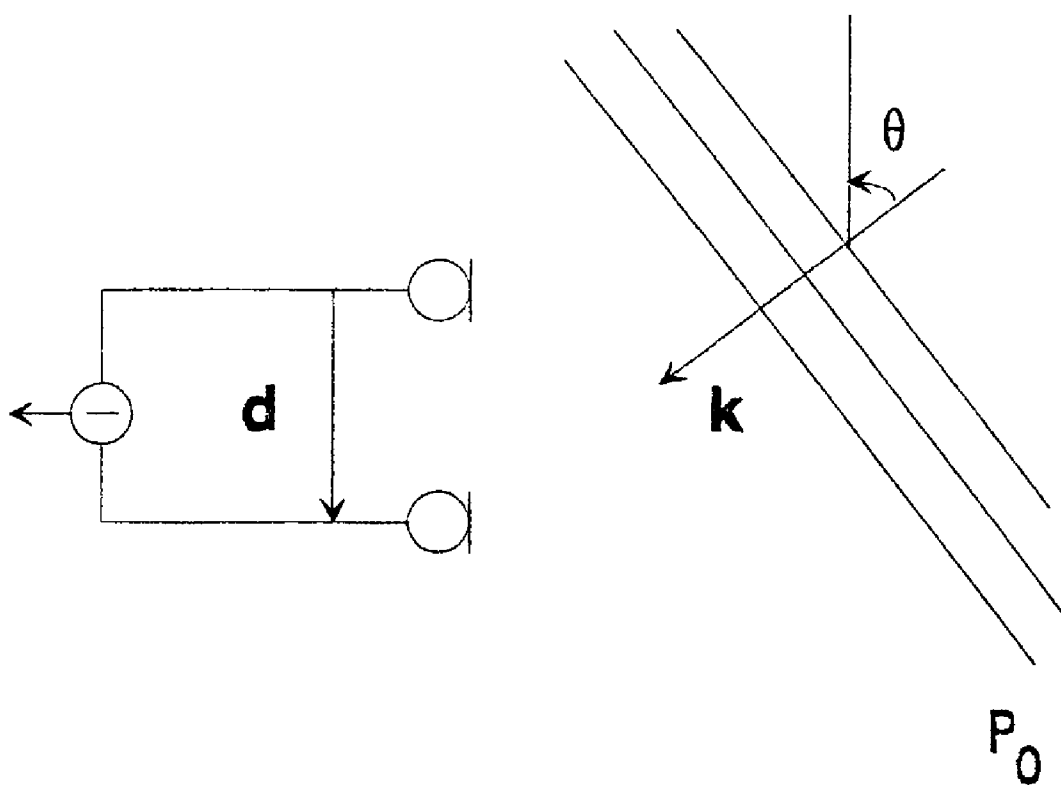


Fig. 2

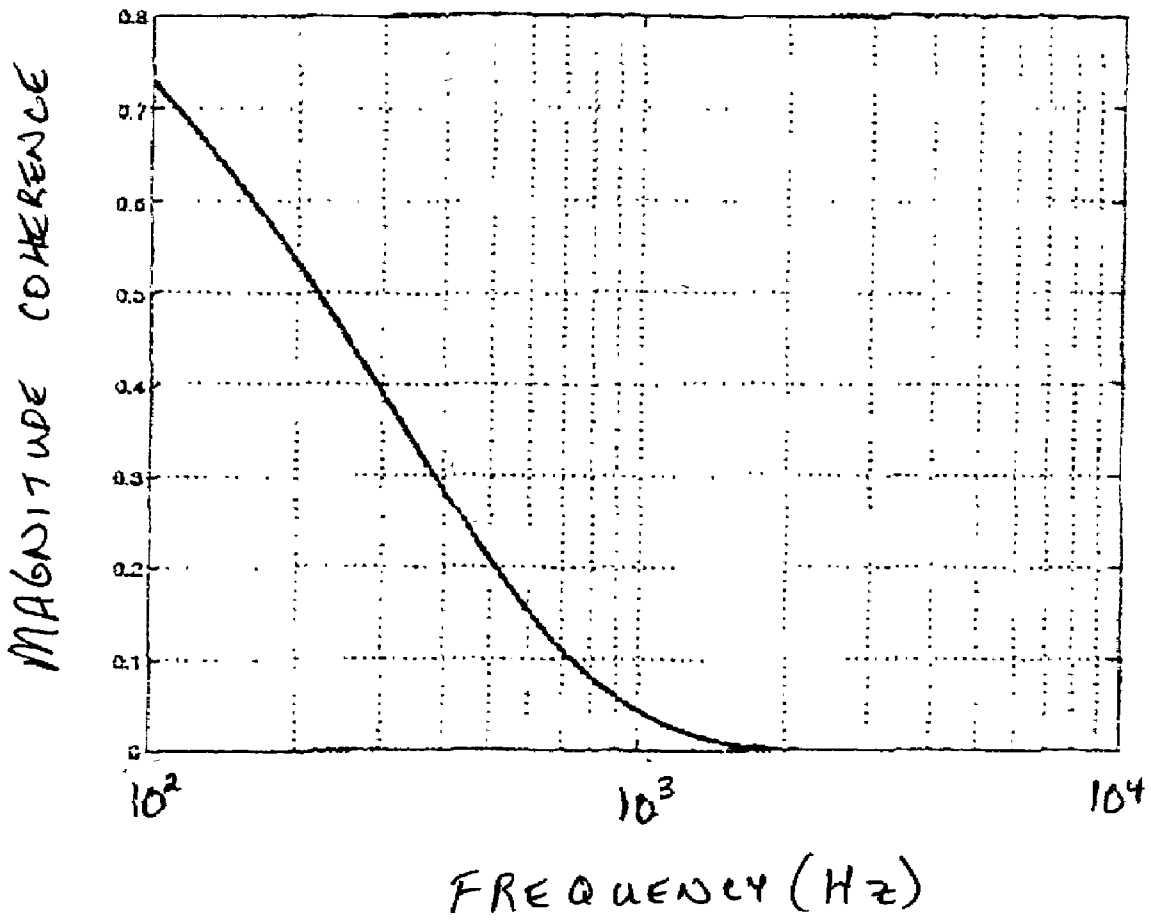


Fig. 3

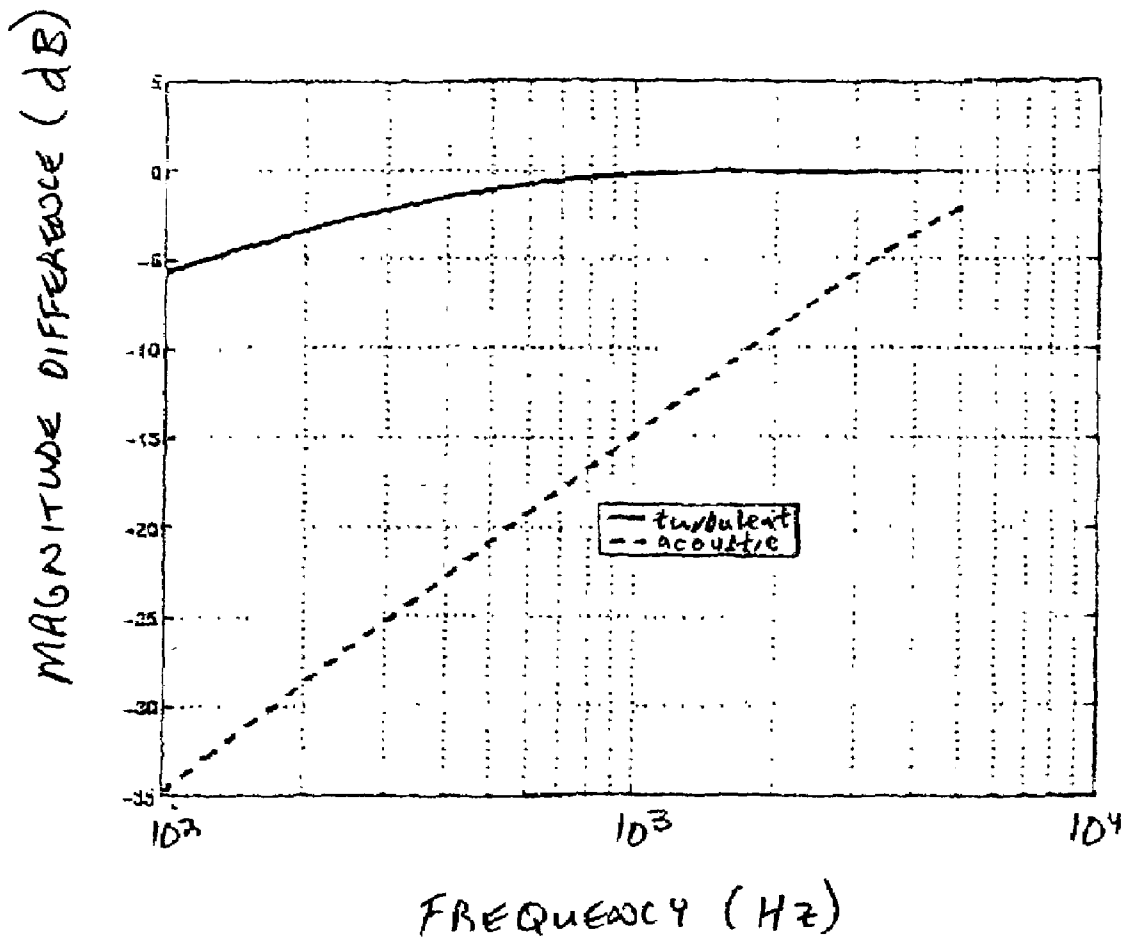
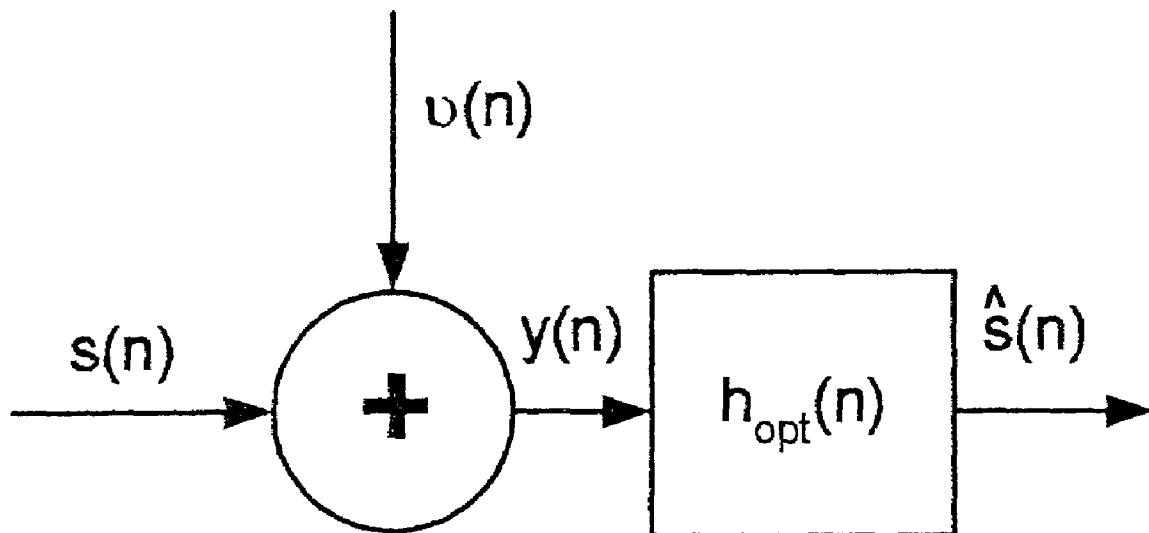


Fig. 4



# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.