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Hanna et al.

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- (54) **SIMULTANEOUS SIGNAL ATTENUATION MEASUREMENTS UTILIZING CODE DIVISION MULTIPLEXING**
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- (52) U.S. Cl. **702/74; 702/79**
- (58) Field of Search 702/10, 69, 74, 702/79, 108, 110, 122, 124-126, 176-178, 783, 189, 193, 194, 196, 197; 600/309, 386, 310; 370/320, 535, 536, 203, 206; 375/316, 322, 329, 332, 346

(56) References Cited

U.S. PATENT DOCUMENTS

4,800,885 A	1/1989	Johnson	128/633
4,819,752 A	4/1989	Zelin	128/633
4,848,901 A	7/1989	Hood, Jr.	356/41
4,930,140 A	5/1990	Cripps et al.	375/1
4,972,331 A	11/1990	Chance	364/550
5,122,974 A	6/1992	Chance	364/550
5,193,543 A	3/1993	Yelderman	128/633
5,204,874 A *	4/1993	Falconer et al.	370/209
5,277,181 A	1/1994	Mendelson et al.	128/633
5,320,098 A	6/1994	Davidson	128/630
5,343,818 A	9/1994	McCarthy et al.	128/633
5,349,952 A *	9/1994	McCarthy et al.	356/41

5,349,953 A *	9/1994	McCarthy et al.	600/323
5,387,259 A	2/1995	Davidson	128/630
5,460,182 A	10/1995	Goodman et al.	128/664
5,766,127 A	6/1998	Pologe et al.	600/310
5,769,791 A	6/1998	Benaron et al.	600/473
5,772,597 A	6/1998	Goldberger et al.	600/473
5,774,213 A	6/1998	Trebino et al.	356/320
5,782,758 A	7/1998	Ausec et al.	600/336
5,785,658 A	7/1998	Benaron et al.	600/473
5,800,348 A	9/1998	Kaestle	600/322
5,805,583 A	9/1998	Rakib	370/342
5,807,261 A	9/1998	Benaron et al.	600/473
5,891,022 A	4/1999	Pologe	600/323
5,891,024 A	4/1999	Jarman et al.	600/323
5,919,134 A *	7/1999	Diab	600/323
5,921,921 A *	7/1999	Potratz et al.	600/323
5,934,277 A	8/1999	Mortz	128/633
5,995,858 A	11/1999	Kinast	600/323
6,097,712 A *	8/2000	Secord et al.	600/323
6,229,856 B1	5/2001	Diab et al.	375/316
6,269,267 B1	7/2001	Brady et al.	607/5

* cited by examiner

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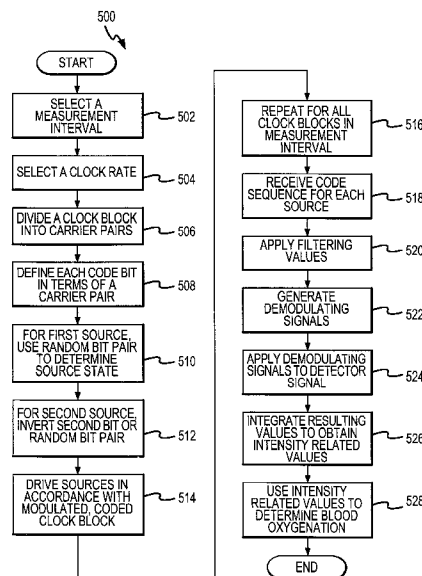
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(57) ABSTRACT

A pulse oximeter (100) includes two or more light sources (102) for transmitting optical signals through an appendage (103) of patient. The sources (102) are operated to transmit code division multiplexed (CDM) signals. That is, the sources (102) are driven by drives (104) in response to signals from a digital processing unit (116) such that the sources (102) are modulated using different code sequences. The code sequences are preferably non-periodic and may be orthogonal to one another. The use of such CDM signals provides certain advantages related to noise reduction.

24 Claims, 5 Drawing Sheets



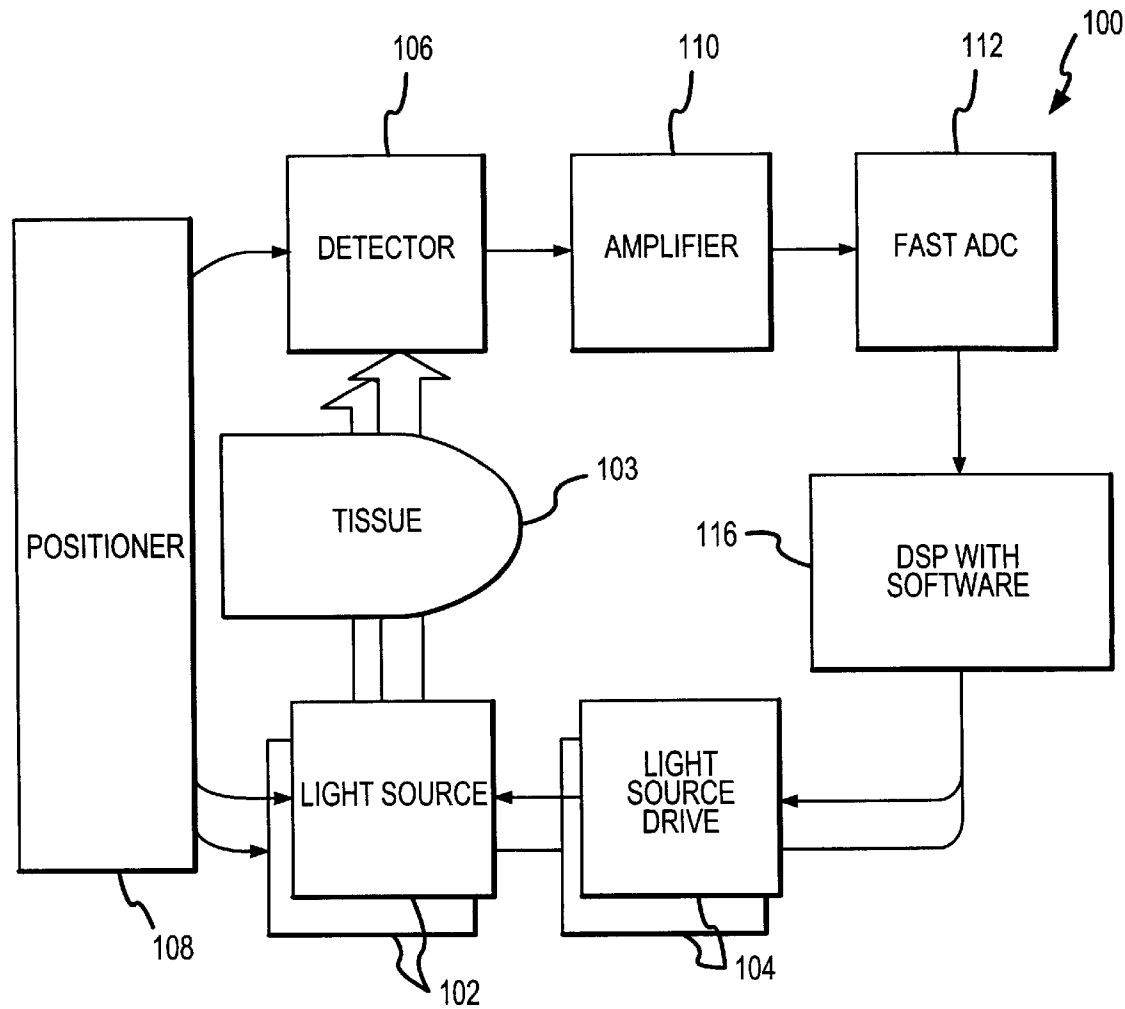


FIG.1

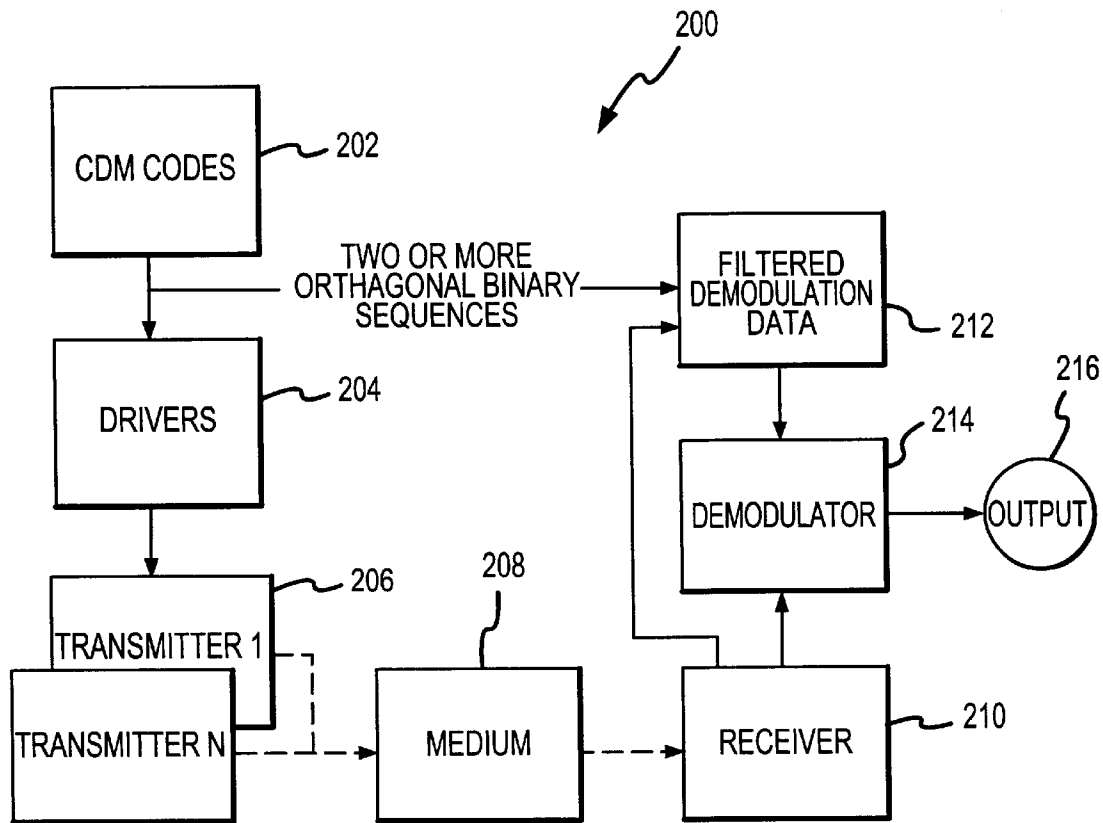


FIG.2

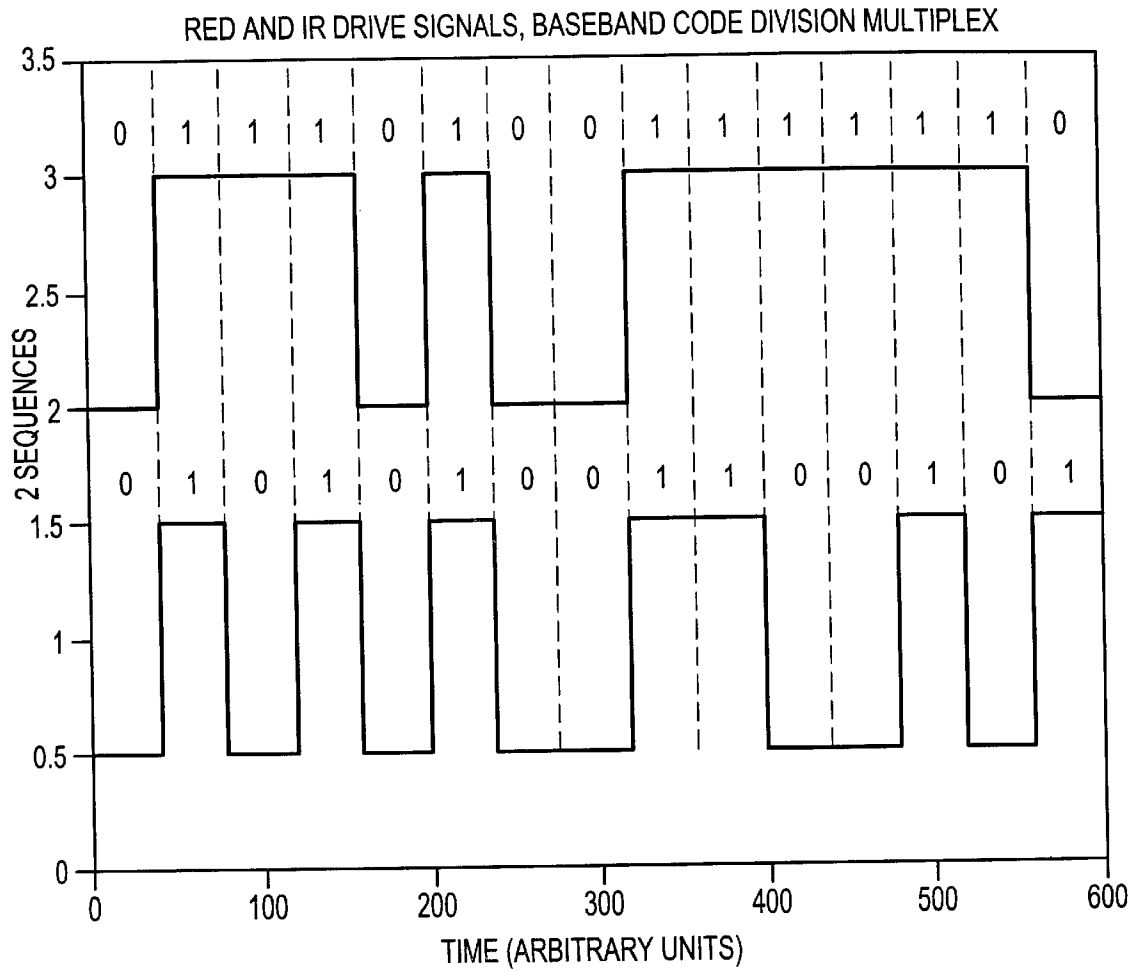


FIG.3

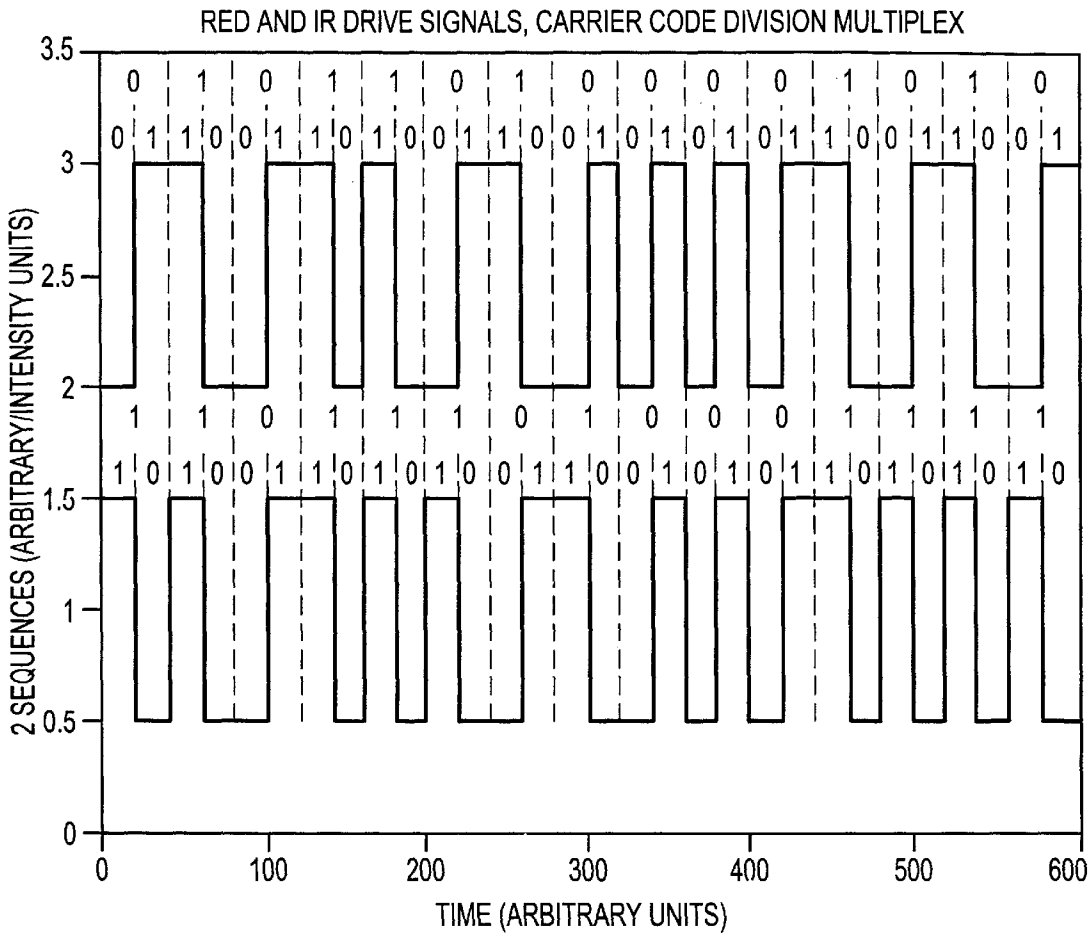


FIG.4

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