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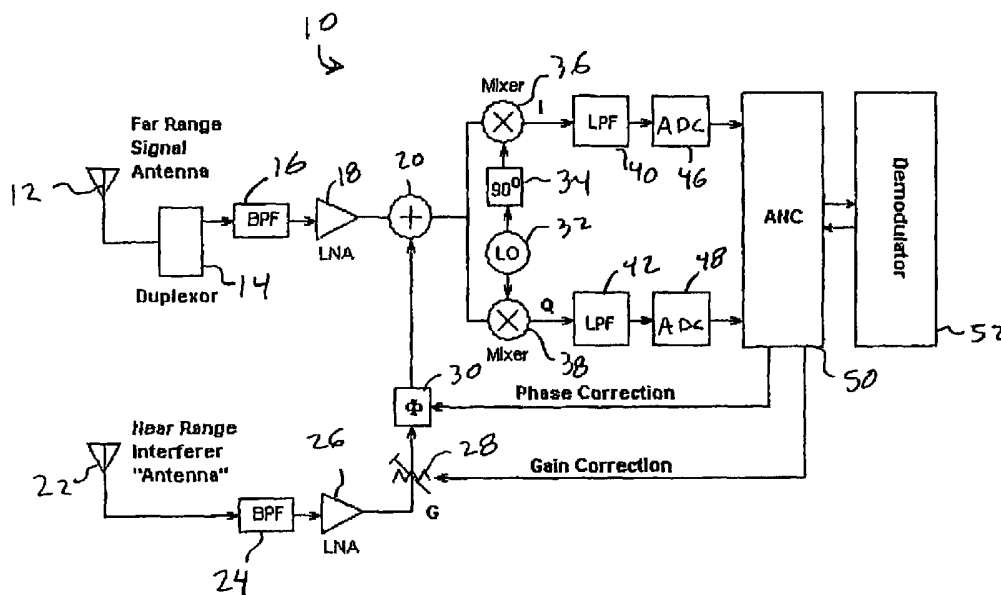
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(54) Title: ADAPTIVE NOISE REDUCTION SYSTEM FOR A WIRELESS RECEIVER



(57) Abstract: A receiver with reduced near field noise is described. The receiver has a far range receiving section configured to sense a desired signal that includes near field noise. The receiver further includes a near range receiving section configured to sense a near field noise reference signal. An adaptive noise canceller (ANC) of the receiver is configured to detect the magnitude of an error vector from the far range receiving section. The ANC is configured to adjust the phase and gain of the near field noise reference signal in response to the magnitude of the error. Accordingly, the ANC can generate a corrected near field noise reference signal that is added to the desired signal with an adder. The near field noise is canceled by the addition of the corrected near field noise signal. The ANC uses a least mean square technique to determine the amount of correction needed.

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— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04B1/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 736 455 A (MATSUE HIDEAKI ET AL) 5 April 1988 (1988-04-05)	1-11, 17, 18, 20-22, 25, 26
Y	* Abstract * column 2, line 54 -column 3, line 10; claims 1,10; figures 2,3	12-16, 19, 23, 24
X	EP 0 289 617 A (KOKUSAI DENSHIN DENWA CO LTD) 9 November 1988 (1988-11-09)	1-11, 17, 18, 20-22, 25, 26
Y	* Abstract * page 6, line 34 -page 7, line 6; figure 1	12-16, 19, 23, 24

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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- *Z* document member of the same patent family

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 125 108 A (TALWAR ASHOK K) 23 June 1992 (1992-06-23)	1-11,17, 18, 20-22, 25,26
Y	* Abstract * column 1, line 26 -column 2, line 11; figures 1,2	12-16, 19,23,24
X	US 5 818 517 A (REED CHRISTOPHER JOHN ET AL) 6 October 1998 (1998-10-06)	1-11,13, 14, 16-18, 20-26
Y	* Abstract * column 2, line 51 -column 3, line 23; figures 2-5	12,15, 19,23,24
Y	EP 0 680 154 A (NIPPON ELECTRIC CO) 2 November 1995 (1995-11-02) * Abstract * page 8, line 49 -page 9, line 9; figures 4,5	12-16, 19,23,24

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA 03/00848

Patent document cited in search report	A	Publication date	Patent family member(s)	Publication date
US 4736455	A	05-04-1988	JP 1970089 C	18-09-1995
			JP 6105897 B	21-12-1994
			JP 62219835 A	28-09-1987
			JP 62219836 A	28-09-1987
			JP 1970090 C	18-09-1995
			JP 6105898 B	21-12-1994
			JP 62233942 A	14-10-1987
			JP 1970091 C	18-09-1995
			JP 6105899 B	21-12-1994
			JP 62233943 A	14-10-1987
			JP 2031726 C	19-03-1996
			JP 7061023 B	28-06-1995
			JP 62147818 A	01-07-1987
			CA 1257658 A1	18-07-1989
			DE 3685645 D1	16-07-1992
			DE 3685645 T2	21-01-1993
			EP 0228786 A2	15-07-1987
<hr/>				
EP 0289617	A	09-11-1988	JP 1017519 A	20-01-1989
			JP 63105532 A	10-05-1988
			DE 3788797 D1	24-02-1994
			DE 3788797 T2	28-04-1994
			EP 0289617 A1	09-11-1988
			WO 8803340 A1	05-05-1988
			US 4893350 A	09-01-1990
<hr/>				
US 5125108	A	23-06-1992	CA 2036482 A1	23-08-1991
			GB 2242102 A ,B	18-09-1991
<hr/>				
US 5818517	A	06-10-1998	NONE	
<hr/>				
EP 0680154	A	02-11-1995	JP 2541503 B2	09-10-1996
			JP 7297733 A	10-11-1995
			EP 0680154 A2	02-11-1995
			US 5524023 A	04-06-1996
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