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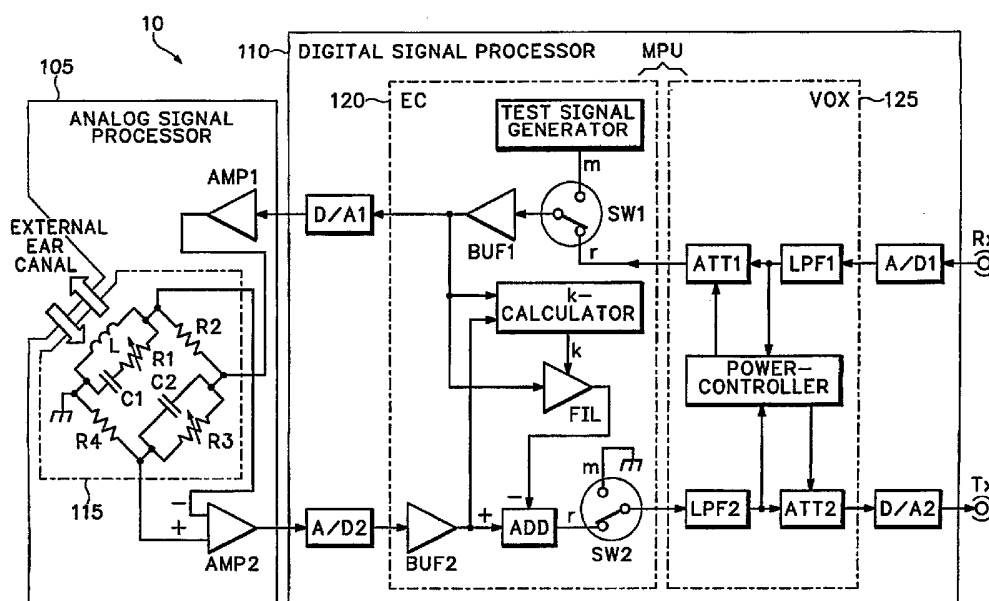
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[Continued on next page]

(54) Title: TWO-WAY COMMUNICATIONS DEVICE HAVING A SINGLE TRANSDUCER



(S7) Abstract: Embodiments of the invention provide a small and economical two-way communications device that has both an excellent echo-cancellation function that substantially suppresses echoes over the entire frequency range and an excellent voice-operated exchange function that provides natural switching of conversation sounds while protecting against unnatural disconnection or echoes during conversation, even when a reception signal and a transmission signal are superimposed in a single transducer.



Published:

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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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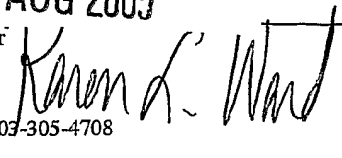
27 October 2005

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/37409

A. CLASSIFICATION OF SUBJECT MATTER IPC(7) : H04M 1/00,9/00,9/08 US CL : 379/406.01 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) U.S. : 379/406.01-406.16,433,420.01-420.04; 381/317,318,71.1-71.4,150,151,190,380,163 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 practicable, search terms used)																				
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1"> <thead> <tr> <th>Category *</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>US 6,415,034 B1 (HEITANEN) 02 July 2002 (2.07.2002), Col 5 line 25-Col 7 line 23</td> <td>1-3,5-7,11-13,19,22</td> </tr> <tr> <td>---</td> <td></td> <td></td> </tr> <tr> <td>Y</td> <td></td> <td>4,8-10,14-18,20-21,23-27</td> </tr> <tr> <td>Y</td> <td>US 6,480,610 B1 (FANG et al.) 12 November 2002 (12.11.2002), Col 4 line 14 to Col 5 line 30</td> <td>4,8-10,14,20,21,23-27</td> </tr> <tr> <td>Y</td> <td>US 6,357,292 B1 (SCHULTZ et al) 19 March 2002 (19.3.2002), Col 27 line 55 to Col 28 line 30</td> <td>15-18</td> </tr> </tbody> </table>			Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	US 6,415,034 B1 (HEITANEN) 02 July 2002 (2.07.2002), Col 5 line 25-Col 7 line 23	1-3,5-7,11-13,19,22	---			Y		4,8-10,14-18,20-21,23-27	Y	US 6,480,610 B1 (FANG et al.) 12 November 2002 (12.11.2002), Col 4 line 14 to Col 5 line 30	4,8-10,14,20,21,23-27	Y	US 6,357,292 B1 (SCHULTZ et al) 19 March 2002 (19.3.2002), Col 27 line 55 to Col 28 line 30	15-18
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<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.																				
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"P" document published prior to the international filing date but later than the priority date claimed																				
Date of the actual completion of the international search 13 June 2005 (13.06.2005)		Date of mailing of the international search report 29 AUG 2005																		
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230		Authorized officer Curtis A Kuntz Telephone No. 703-305-4708 																		

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/37409

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation Sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1-27

Remark on Protest

☐
☐

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/37409

BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

This application contains claims directed to more than one species of the generic invention. These species are deemed to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In order for more than one species to be examined, the appropriate additional examination fees must be paid. The species are as follows:

GROUP I: Claims 1-27 are drawn to a two-way communications device with a digital processing section implemented to remove echo from the transmitted signal.

GROUP II: Claims 28-43 are drawn to a two-way communications device with a digital processing section that selectively switches between transmission and reception modes

GROUP III: Claims 44 and 45 are drawn to a two-way communications device with a piezoelectric device supported by an echo canceller

The species listed above do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, the species lack the same or corresponding special technical features for the following reasons: Each group is drawn to a different technical feature. The features being various improvements upon the already known two way communications device disclosed in applicant's admitted prior art (Specification page 1 line 28 to page 3 line 10).