An analog-to-digital converter (10) employs a series of comparators (12, 14, 16 and 18). Each comparator includes at least one inverter consisting of a CMOS transistor pair including a P-channel transistor (22) and N-channel transistor (24). The threshold levels of the transistors (22, 24) are modified using focused ion beam implantation techniques to provide the comparators with monotonically increasing transition levels.
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INTERNATIONAL SEARCH REPORT

According to International Patent Classification (IPC) or to both National Classification and IPC

| IPC^4: | H 03 M 1/36, H 01 L 29/78 |

II. FIELDS SEARCHED

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched^8

III. DOCUMENTS CONSIDERED TO BE RELEVANT^9

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<tr>
<th>Category ^8</th>
<th>Citation of Document, ^11 with indication, where appropriate, of the relevant passages ^12</th>
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<td>Y</td>
<td>GB, A, 2021346 (PHILIPS) 28 November 1979 see abstract; page 3, line 103 - page 5, line 112; figures 1-4</td>
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^* Special categories of cited documents: ^10
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"C" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

^"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"A" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search 13th April 1989

Date of Mailing of this International Search Report 04 SEP. 1989

International Searching Authority

EUROPEAN PATENT OFFICE

Signature of Authorized Officer

P.C.G. VAN DER PITTEN
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<td>US, A, 4420743 (RCA) 13 December 1983 see column 5, line 14 - column 7, line 14; figures 4-7</td>
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<td>Electronic Design, volume 36, no. 16, 14 July 1988, (Hasbrouck Heights, N.J., US), F. Goodenough: &quot;Focused ions build small, 4-bit, 1-GHz ADC&quot;, page 34 see the whole article</td>
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<td>1988 Symposium on VLSI Technology, Digest of Technical Papers, 10-13 May 1988, San Diego, (US), A.E. Schmitz et al.: &quot;A 4-bit, 1GHz analog-to-digital technology using focused ion beam implants and sub-half micrometer CMOS/SOS&quot;, pages 67-68 see the whole article</td>
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FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

V. OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹

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

1. □ Claim numbers ........... because they relate to subject matter not required to be searched by this Authority, namely:

2. □ Claim numbers ........... 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. □ Claim numbers ........... because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING ²

This international Searching Authority found multiple inventions in this international application as follows:

Please see Form PCT/ISA/206 dated May 9th, 1989.

1. □ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. □ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. □ 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 claim numbers:

4. □ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest
□ The additional search fees were accompanied by applicant's protest.
X No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (supplemental sheet (2)) (January 1983)
This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 29/08/89. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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For more details about this annex: see Official Journal of the European Patent Office, No. 12/82