United States Patent [19]

Nakabayashi et al.

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[45] **Date of Patent: Dec. 4, 1990**

[54] **CONTENT ADDRESSABLE MEMORY WITH FLAG STORAGE TO INDICATE MEMORY STATE**

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[73] Assignee: **Mitsubishi Denki Kabushiki Kaisha,** Tokyo, Japan

[21] Appl. No.: **283,293**

[22] Filed: **Dec. 12, 1988**

[30] **Foreign Application Priority Data**

Mar. 1, 1988 [JP] Japan 63-49092

[51] **Int. Cl.**[5] **G11C 15/00**

[52] **U.S. Cl.** **365/49;** 365/189.01; 364/200; 364/900

[58] **Field of Search** ..... 365/49, 189.01, 189.07; 364/200 MS File, 900 MS File

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,670,858	6/1987	Almy	365/49
4,888,731	12/1989	Chuang et al.	365/49

FOREIGN PATENT DOCUMENTS

1118906	12/1978	Canada .
2853926	6/1979	Fed. Rep. of Germany .
57-74889	5/1982	Japan .
74889	5/1982	Japan .

OTHER PUBLICATIONS

T. Ogura et al., "A 4 kb Associative Memory LSI", 55083-78, pp. 45-52.

C. V. Ramamoorthy et al., "A Design of a Fast Cellular Associateive Memory for Ordered Retrieval", pp. 800-815, IEEE Trans. on Computers, vol. C-27, No. 9, Sep. 1978, pp. 800-815.

Hiroshi Kadota et al., "An 8-Kbit Content-Addressable and Reentrant Memory", IEEE Journal of Solid State Circuits, Oct. 1985, vol. SC-20, No. 5, pp. 951-956.

J. Of Institute of Electronics: "4 Kb Associative Memory LSI", by Takeshi Ogura et al., Dec. 1983, pp. 45-52.

IEEE Transactions on Computers: "A Design of a Fast Cellular Associative Memory of Ordered Retrieval", by C. V. Ramamoorthy et al., vol. C-27, No. 9, 9/78, pp. 800-815.

IEEE J. of Sol.-St. Circuits: "An 8-kbit Content-Addressable and Reentrant Memory", by H. kadota et al., vol. SC-20, No. 5, Oct. 1985, pp. 951-956.

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[57] **ABSTRACT**

A content addressable memory device capable of correct retrieval operation comprises a flag bit column **(12)** provided in a memory cell array. The flag bit column **(12)** stores a flag signal indicating whether a word is in a data written state or an empty state for each word in a data array **(2)**. In the retrieval operation, the data written in the data array **(2)** and a flag bit column **(12)** are simultaneously retrieved, providing a correct retrieval result. In addition, since the flag bit column **(12)** is provided in the memory cell array, it can be controlled in a manner similar to controlling the data array **(2)**.

10 Claims, 13 Drawing Sheets

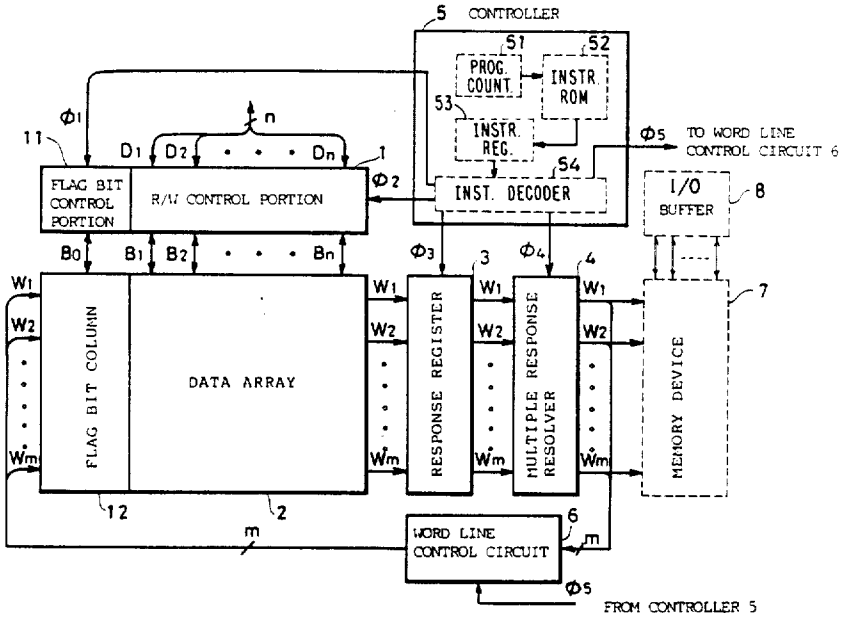

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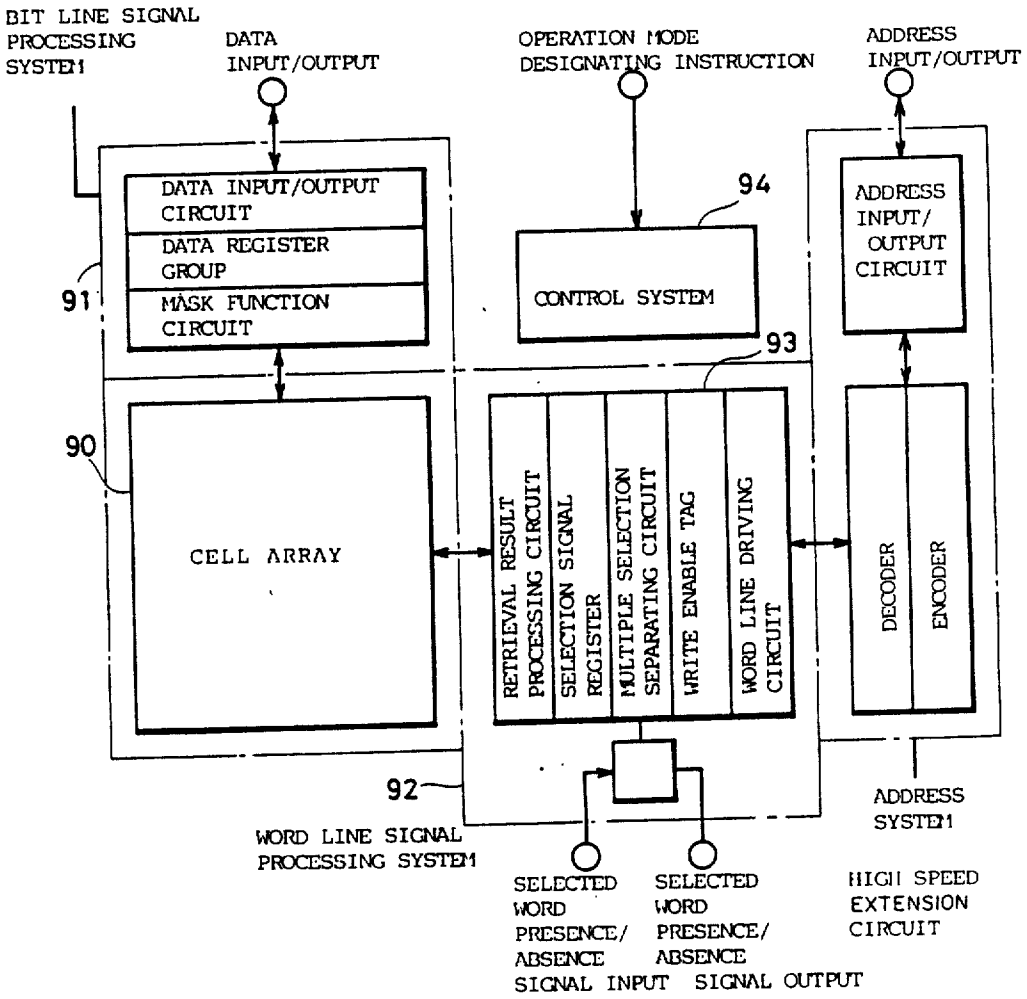
FIG.1 PRIOR ART



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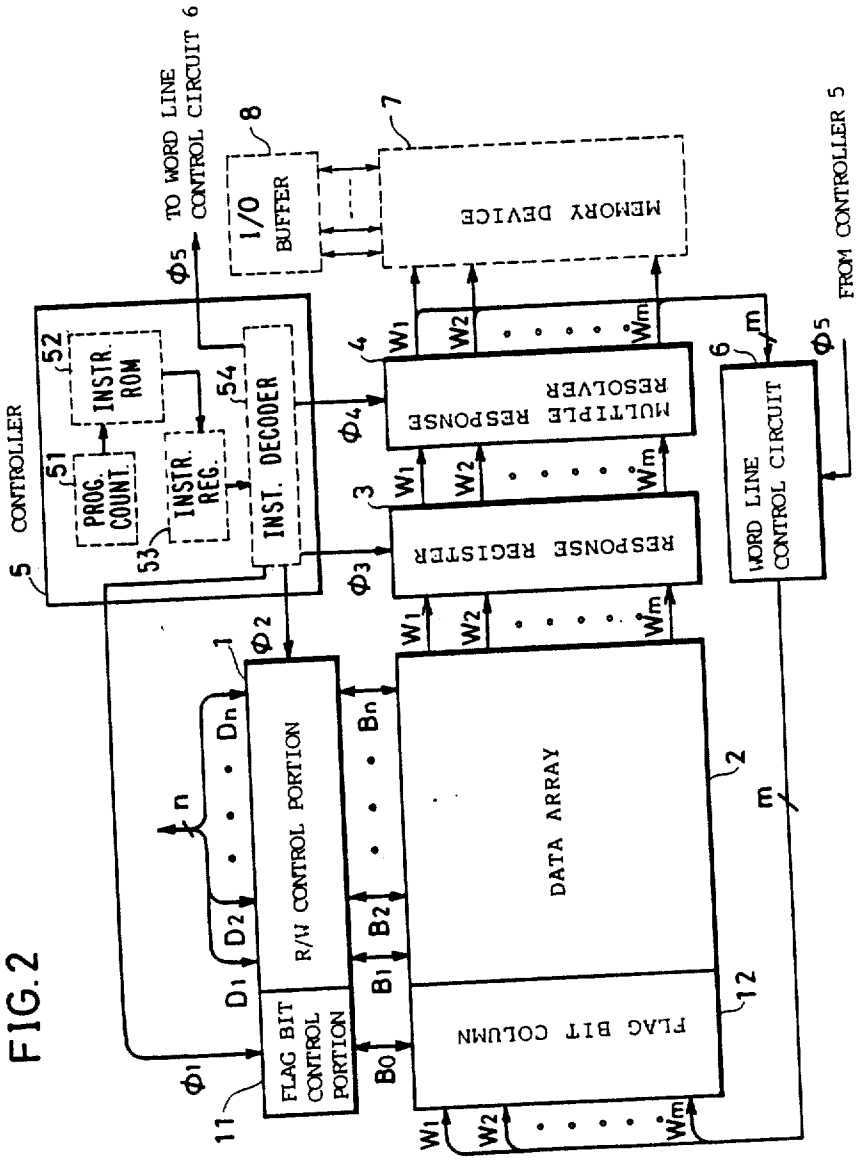

FIG. 2

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FIG. 3A

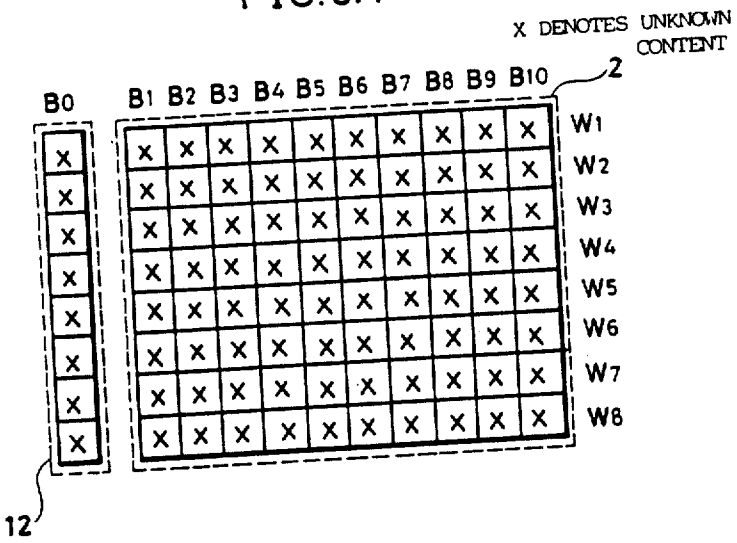

FIG. 3B

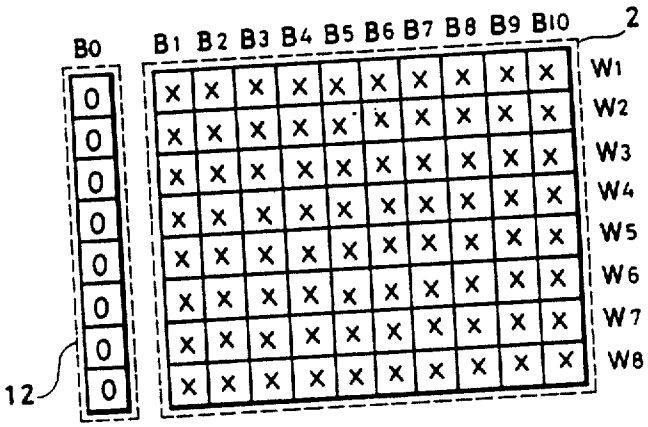

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FIG.3C

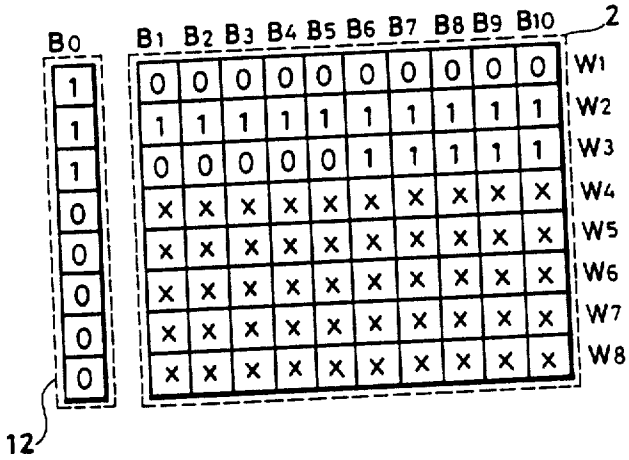
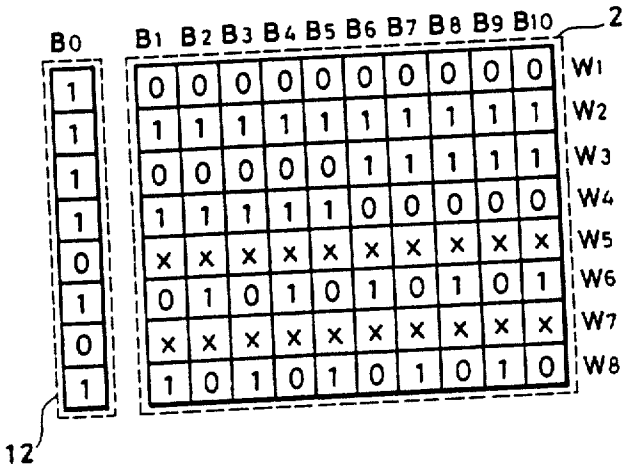


FIG.3D



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