

United States Patent [19]

[11] Patent Number: **6,115,280**

Wada

[45] Date of Patent: ***Sep. 5, 2000**

[54] SEMICONDUCTOR MEMORY CAPABLE OF BURST OPERATION

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[*] Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

[21] Appl. No.: 08/833,178

[22] Filed: Apr. 4, 1997

Related U.S. Application Data

[63] Continuation of application No. 08/547,341, Oct. 24, 1995, abandoned.

Foreign Application Priority Data

Nov. 1, 1994 [JP] Japan 6-268925

[51] Int. Cl.⁷ G11C 7/00

[52] U.S. Cl. 365/78; 365/236; 365/189.2; 365/230.03

[58] Field of Search 365/236, 230.03, 365/189.12, 240, 189.02, 230.02, 78, 233

References Cited

U.S. PATENT DOCUMENTS

4,899,310 2/1990 Baba et al. 365/78 X
5,200,925 4/1993 Morooka 365/219

5,220,529 6/1993 Kohiyara et al. 365/78 X
5,463,591 10/1995 Aimoto et al. 365/189.12 X
5,535,172 7/1996 Reddy et al. 365/189.12 X
5,561,633 10/1996 Yamano 365/230.03 X

FOREIGN PATENT DOCUMENTS

3-58386 3/1991 Japan .
3-76094 4/1991 Japan .
4-184791 7/1992 Japan .
5-144269 6/1993 Japan .

OTHER PUBLICATIONS

"IBM Prepares Synch SRAM Entries," Electric News, Jun. 6, 1994, p. 70.
Child, "RISC and Pentium drive demand for SRAMs that are fastest of the fast," Computer Design, Mar. 28, 1994, pp. 47-48.

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[57] ABSTRACT

A semiconductor memory for operating in burst mode. The memory has a memory cell array divided into a plurality of memory blocks, a plurality of (e.g., 2) output registers each including a plurality of output data retaining blocks corresponding to the multiple memory blocks, and a burst counter unit. The output registers alternately receive data transferred from the memory cell array. In accordance with the result of counting by the burst counter unit, the data retained in the output registers is output alternately in bursts, whereby the speed of data read operation in the memory is boosted regardless of the operating speed of the memory cell array therein.

12 Claims, 16 Drawing Sheets

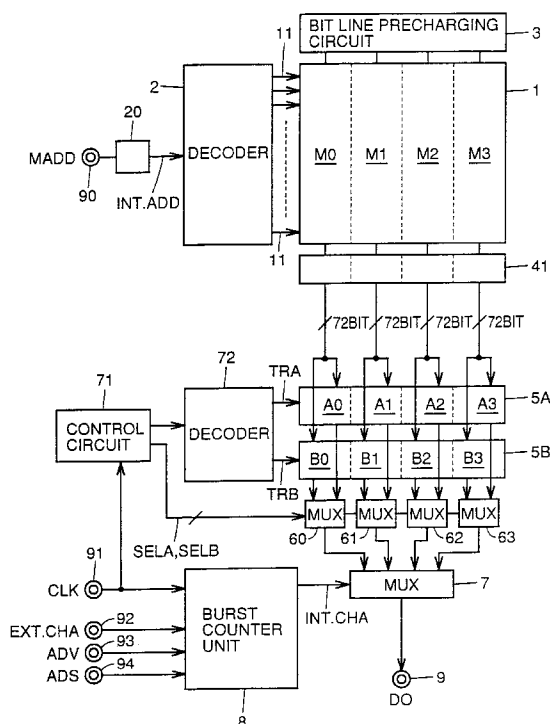
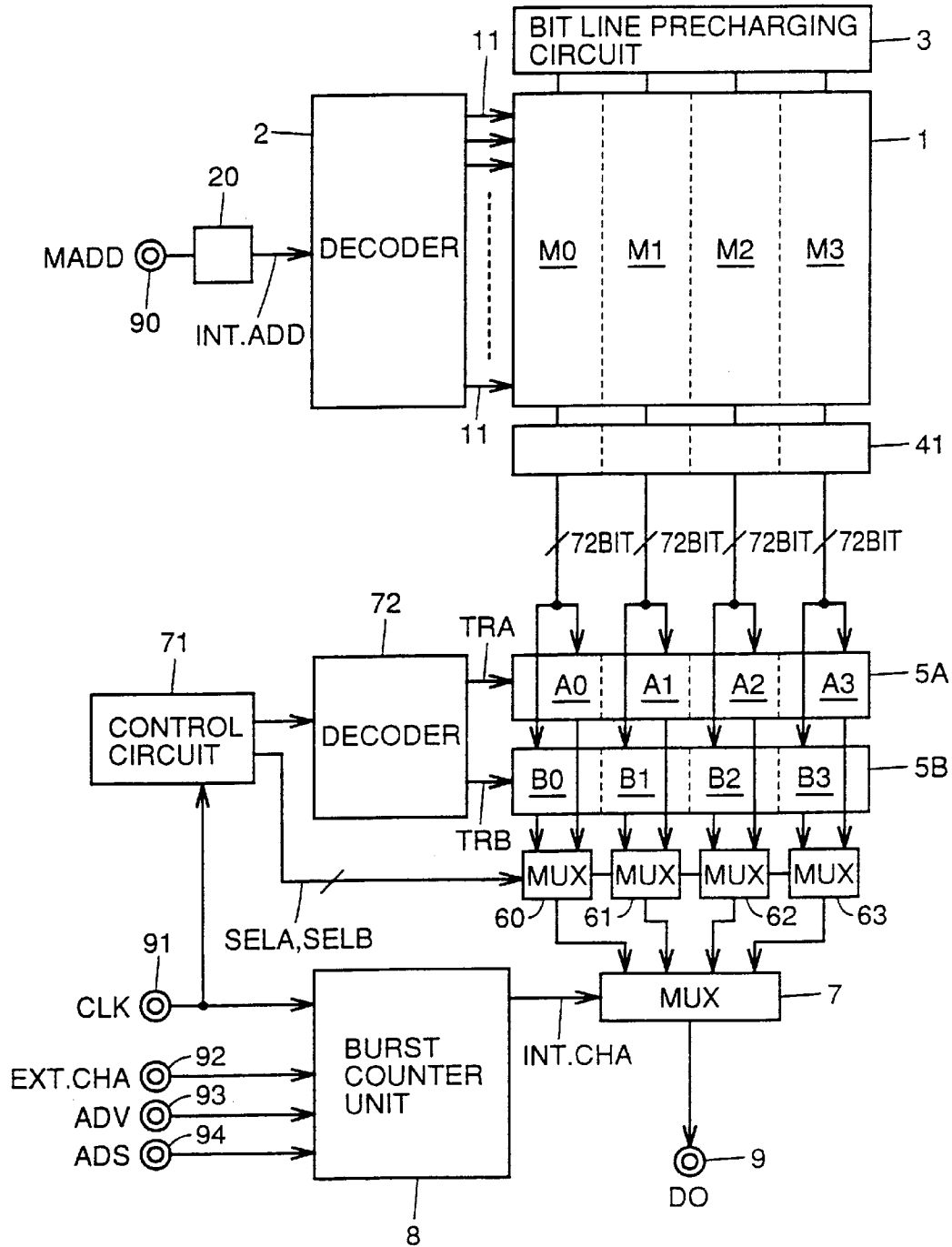


FIG. 1



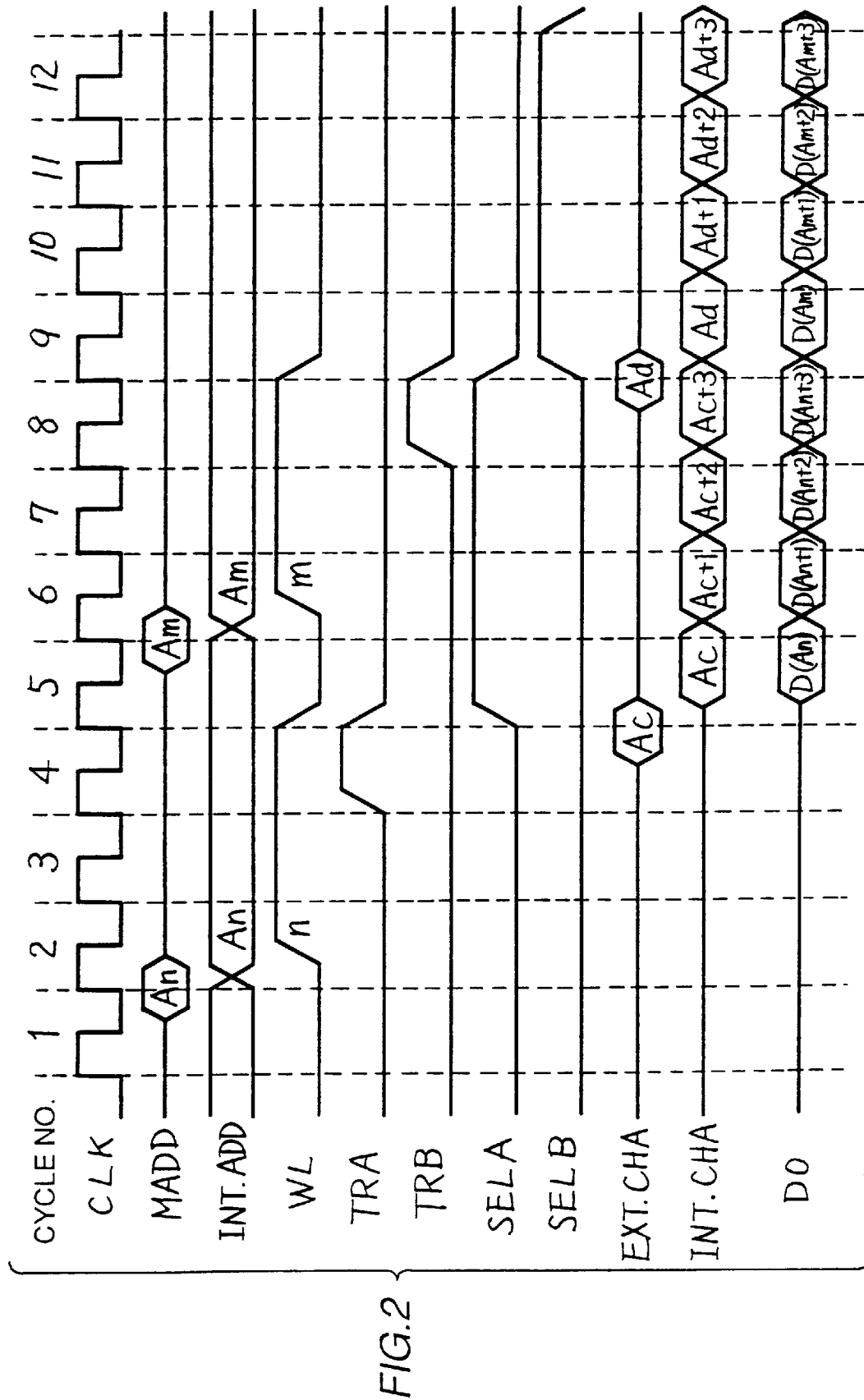
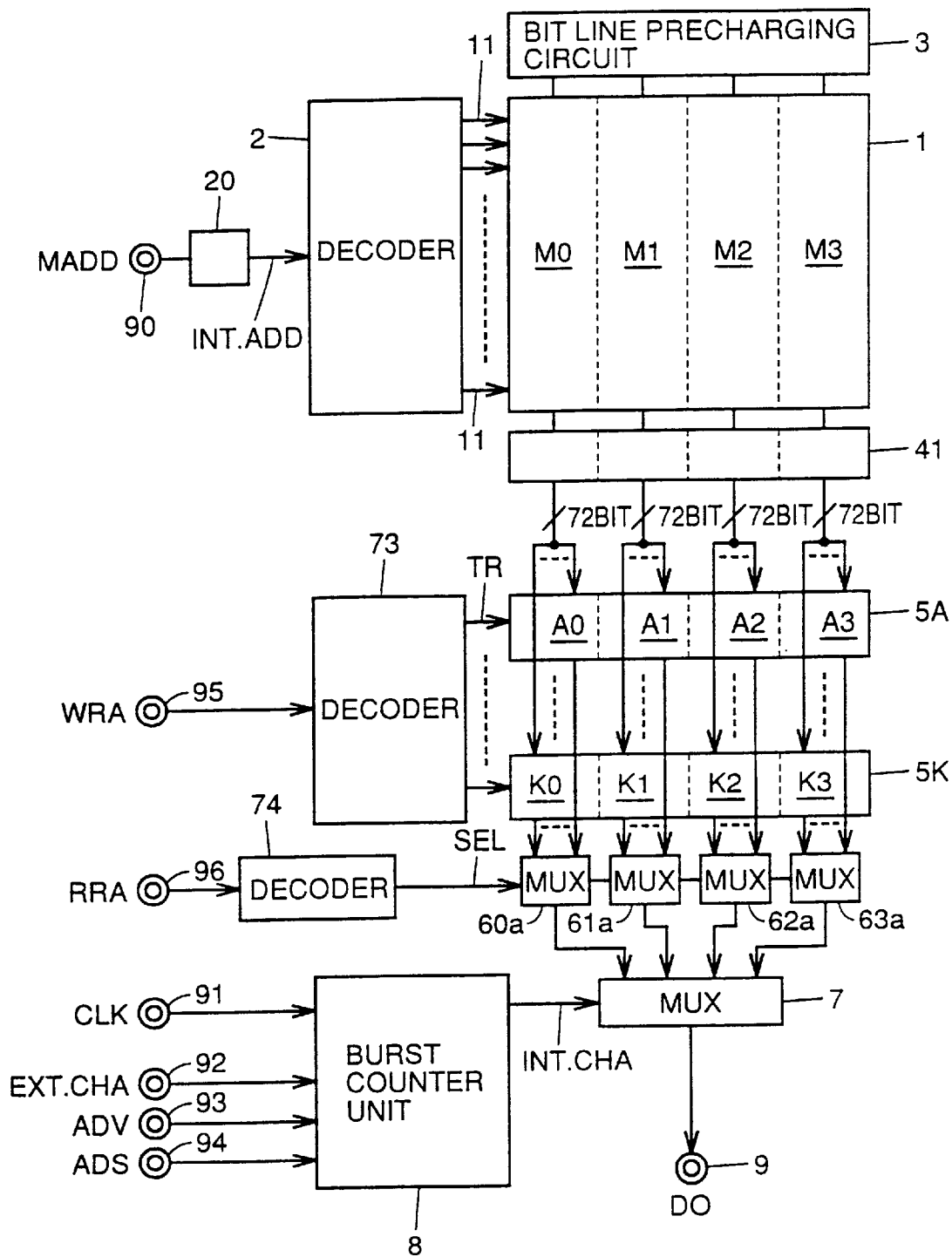


FIG. 3



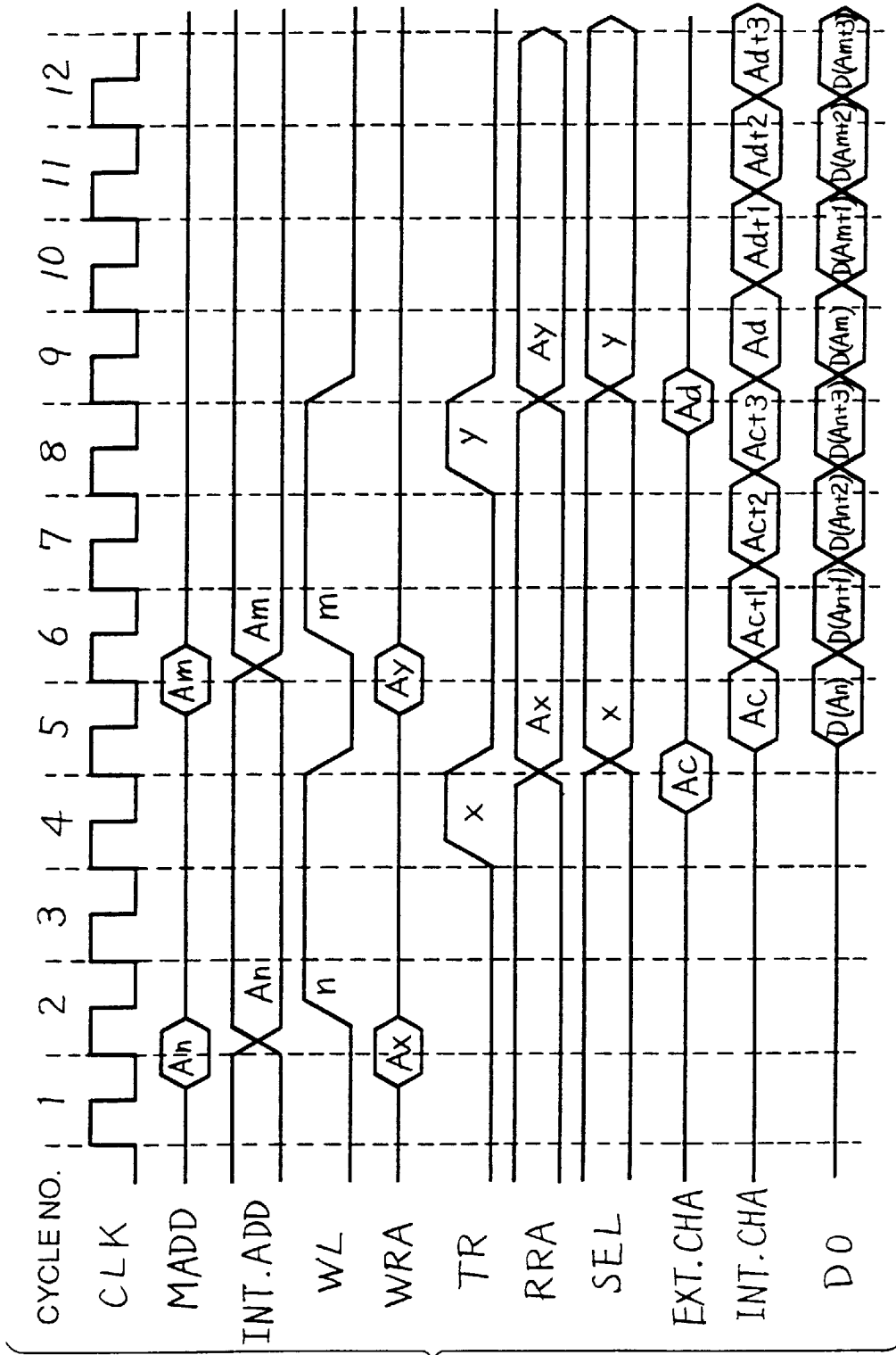


FIG. 4

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