



US005383148A

United States Patent [19]

[11] Patent Number: **5,383,148**

Testa et al.

[45] Date of Patent: **Jan. 17, 1995**

- [54] **SINGLE IN-LINE MEMORY MODULE**
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- [73] Assignee: **Sun Microsystems, Inc., Mountain View, Calif.**
- [21] Appl. No.: **279,824**
- [22] Filed: **Jul. 25, 1994**

Attorney, Agent, or Firm—Blakely Sokoloff Taylor & Zafman

[57] ABSTRACT

A full width single in-line memory module (SIMM) for dynamic random access memory (DRAM) memory expansions is disclosed. A printed circuit board having a multiplicity of DRAM memory elements mounted thereto is arranged in a data path having a width of 144 bits. The SIMM of the present invention further includes on-board drivers to buffer and drive signals in close proximity to the memory elements. In addition, electrically conductive traces are routed on the circuit board in such a manner to reduce loading and trace capacitance to minimize signal skew to the distributed memory elements. The SIMM further includes a high pin density dual readout connector structure receiving electrical traces from both sides of the circuit board for enhanced functionality. The SIMM is installed in complementary sockets one SIMM at a time to provide memory expansion in full width increments. Finally, symmetrical power and ground routings to the connector structure insure that the SIMM cannot be inserted incorrectly, wherein physically reversing the SIMM in the connector slot will not reverse power the SIMM.

Related U.S. Application Data

- [63] Continuation of Ser. No. 115,438, Sep. 1, 1993, abandoned, which is a continuation of Ser. No. 886,413, May 19, 1992, Pat. No. 5,270,964.
- [51] Int. Cl.⁶ **G11C 13/00**
- [52] U.S. Cl. **365/52; 365/244**
- [58] Field of Search **365/52, 189.01, 230.01, 365/244**

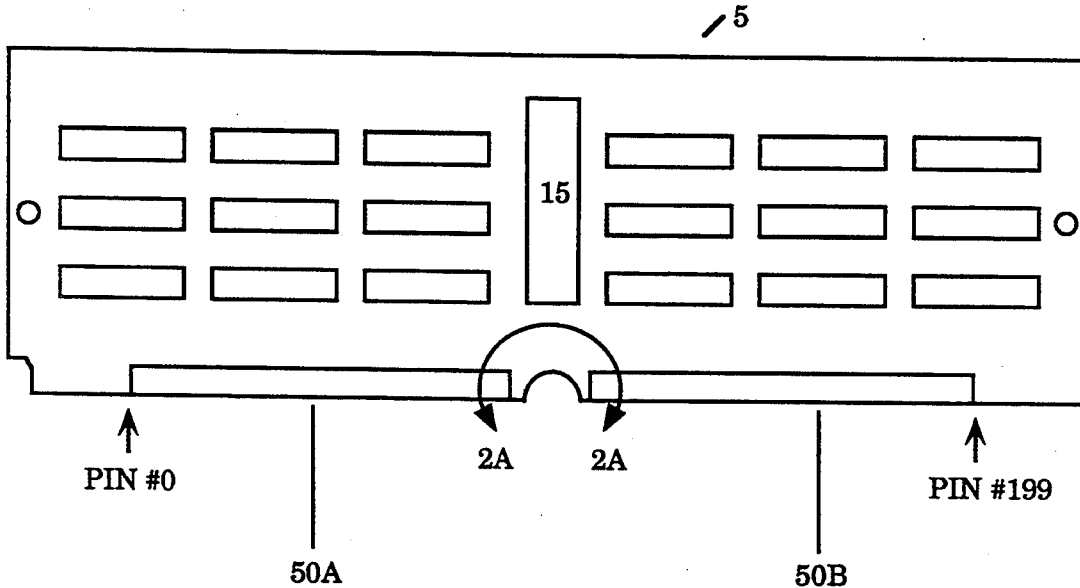
References Cited

U.S. PATENT DOCUMENTS

- 4,850,892 7/1989 Clayton et al. 439/326
- 4,891,789 1/1990 Quattrini 365/63
- 5,270,964 12/1993 Beztolsheim et al. 365/52

Primary Examiner—Terrell W. Fears

11 Claims, 6 Drawing Sheets



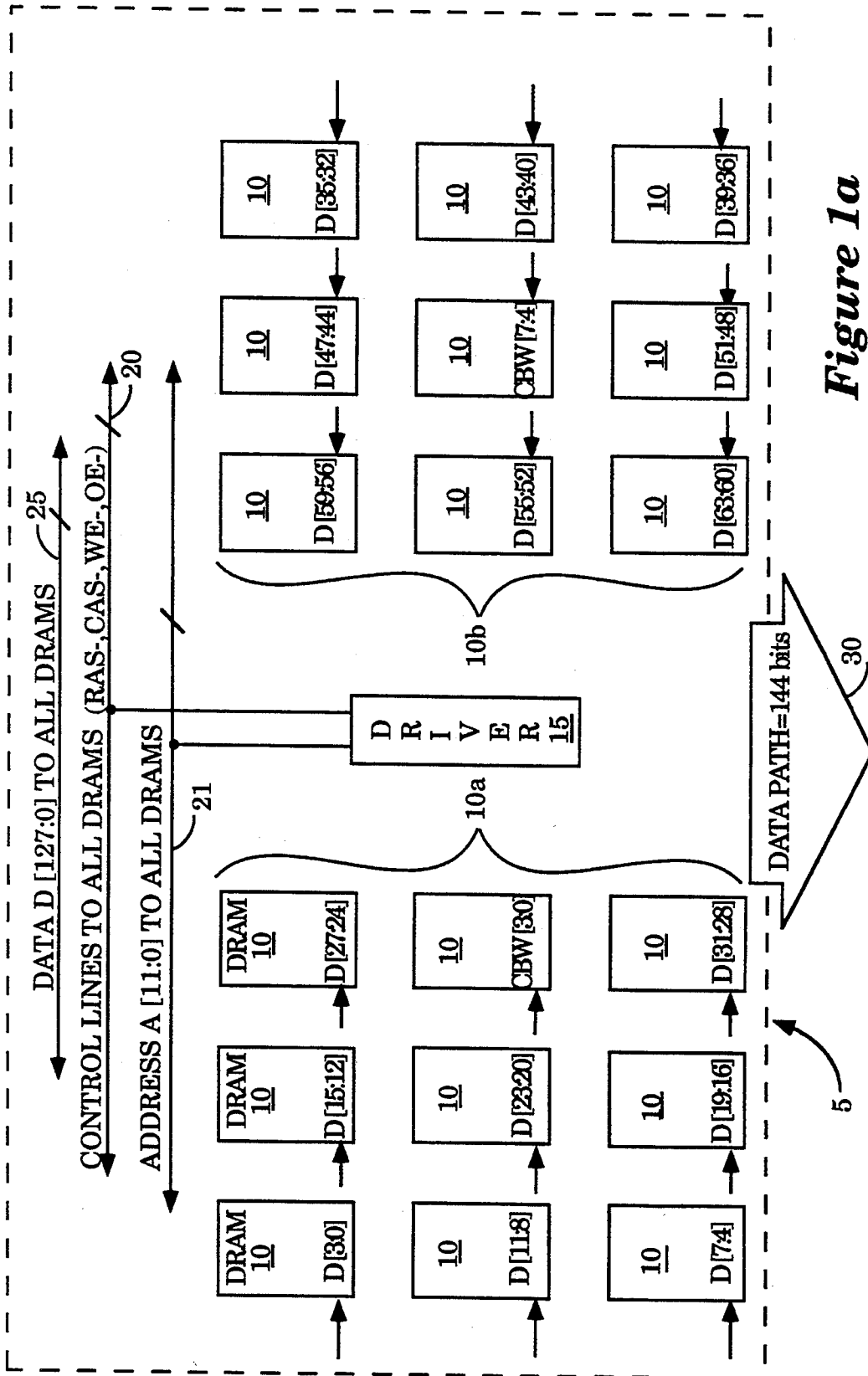


Figure 1a

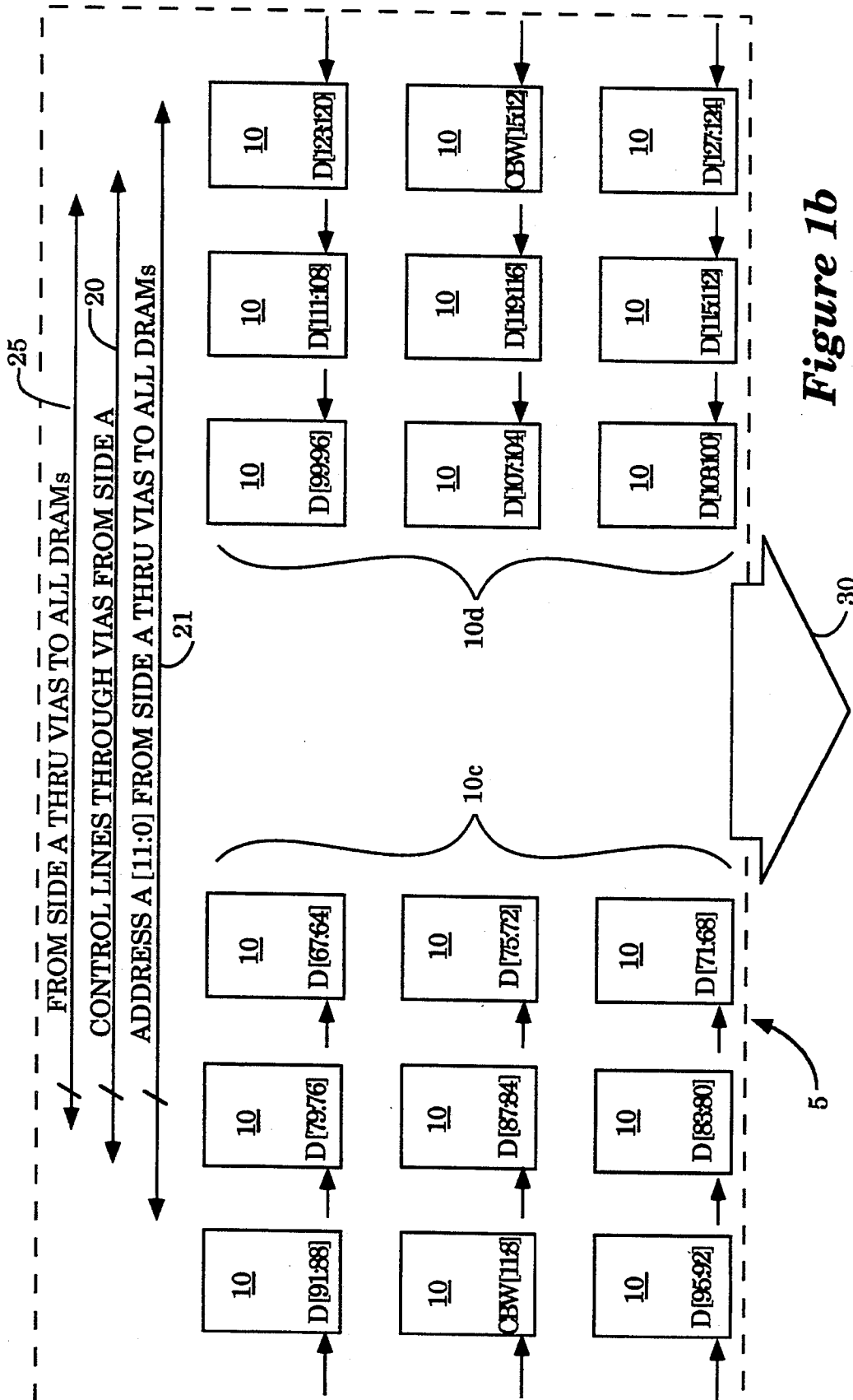


Figure 1b

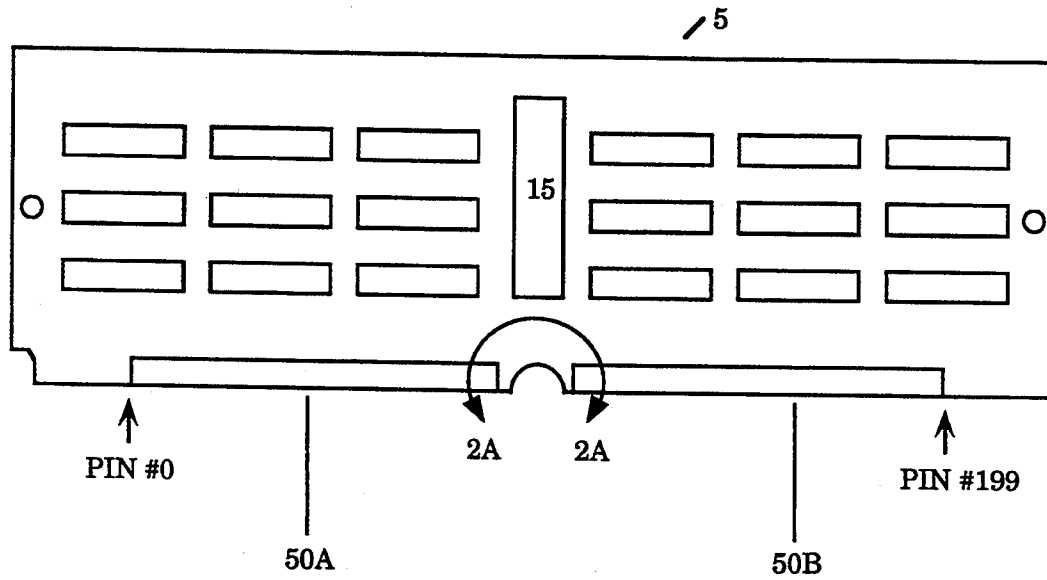


Figure 2a

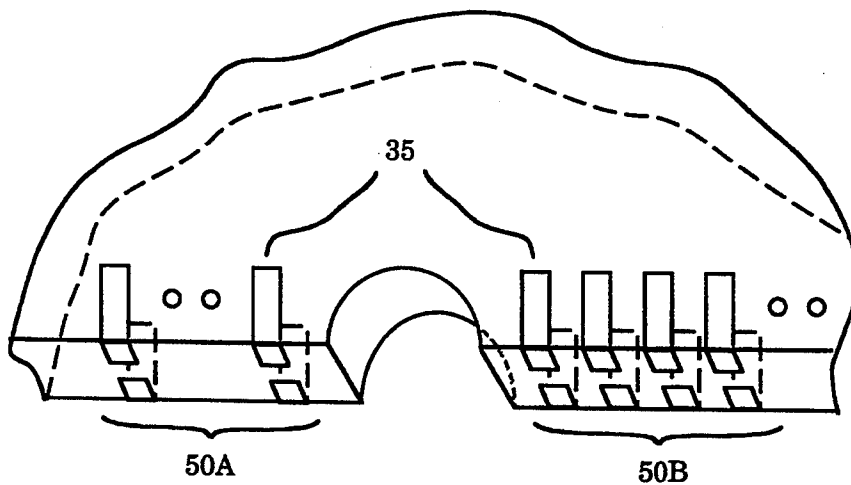


Figure 2b

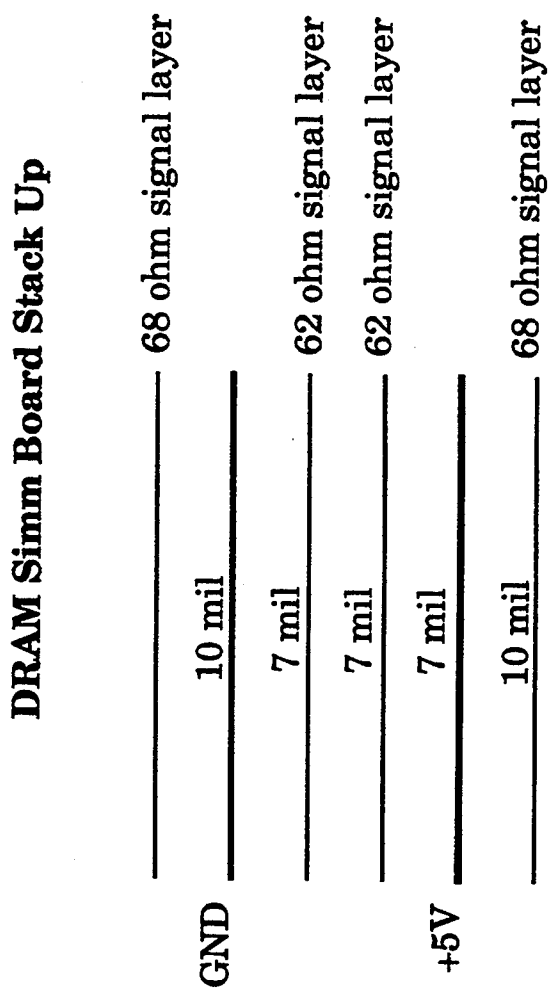


Figure 3

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