

[54] **DISK ARRAY SYSTEM FOR PROCESSING AND TRACKING THE COMPLETION OF I/O REQUESTS**

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Related U.S. Application Data

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 [52] **U.S. Cl.** **710/5**; 711/114; 714/6
 [58] **Field of Search** 710/3, 5, 9, 27, 710/57; 709/235; 711/4, 201, 114; 714/6, 5, 7; 395/500.46

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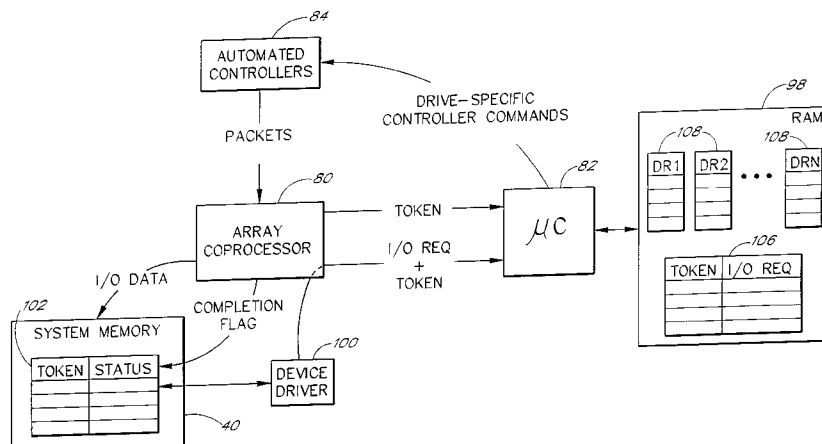
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[57] **ABSTRACT**

A high-performance RAID system for a PC comprises a controller card which controls an array of ATA disk drives. The controller card includes an array of automated disk drive controllers, each of which controls one respective disk drive. The disk drive controllers are connected to a microcontroller by a control bus and are connected to an automated coprocessor by a packet-switched bus. The coprocessor accesses system memory and a local buffer. In operation, the disk drive controllers respond to controller commands from the microcontroller by accessing their respective disk drives, and by sending packets to the coprocessor over the packet-switched bus. The packets carry I/O data (in both directions, with the coprocessor filling-in packet payloads on I/O writes), and carry transfer commands and target addresses that are used by the coprocessor to access the buffer and system memory. The packets also carry special completion values (generated by the microcontroller) and I/O request identifiers that are processed by a logic circuit of the coprocessor to detect the completion of processing of each I/O request. The coprocessor grants the packet-switched bus to the disk drive controllers using a round robin arbitration protocol which guarantees a minimum I/O bandwidth to each disk drive. This minimum I/O bandwidth is preferably greater than the sustained transfer rate of each disk drive, so that all drives of the array can operate at the sustained transfer rate without the formation of a bottleneck.

23 Claims, 9 Drawing Sheets



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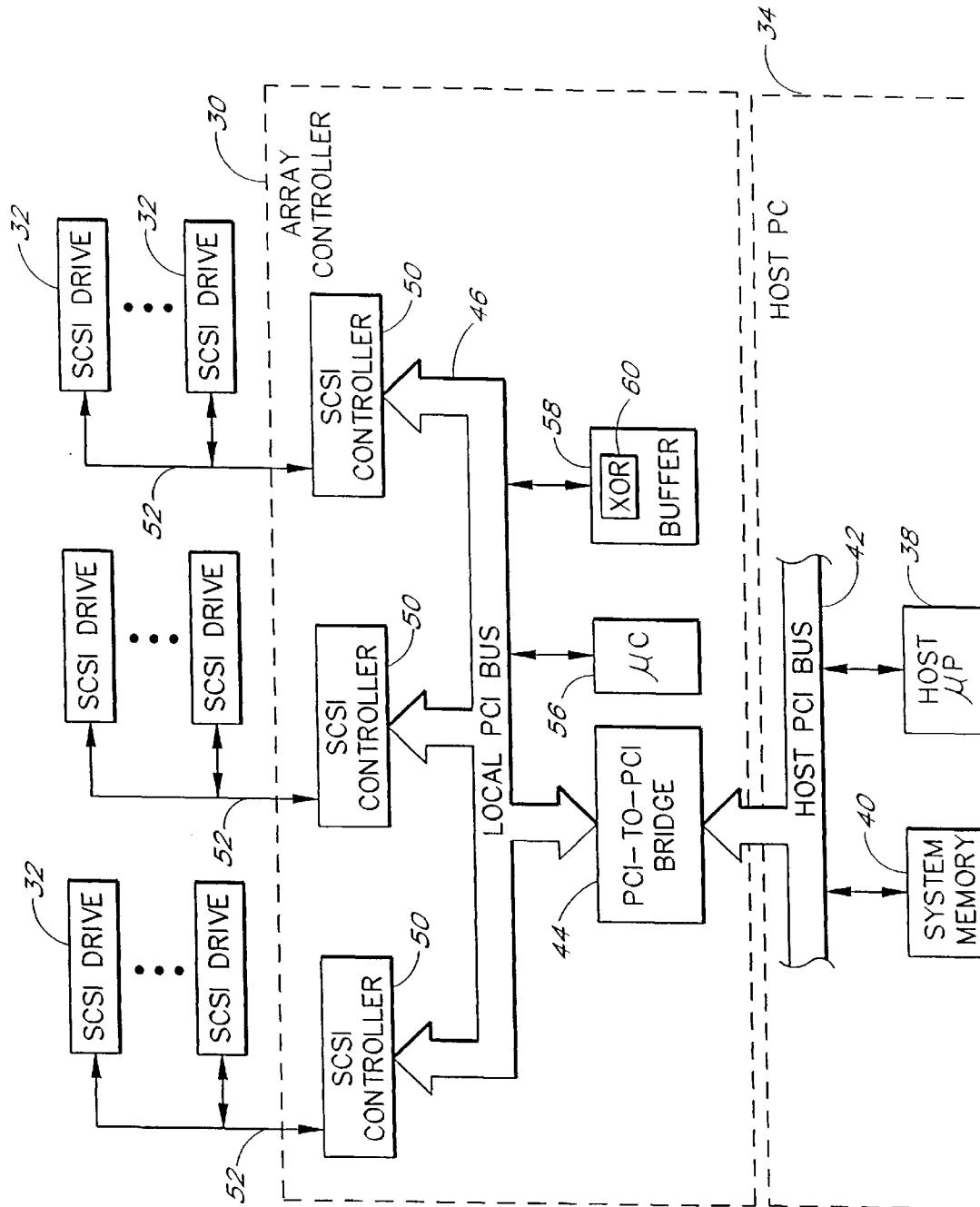


FIG. 1
(PRIOR ART)

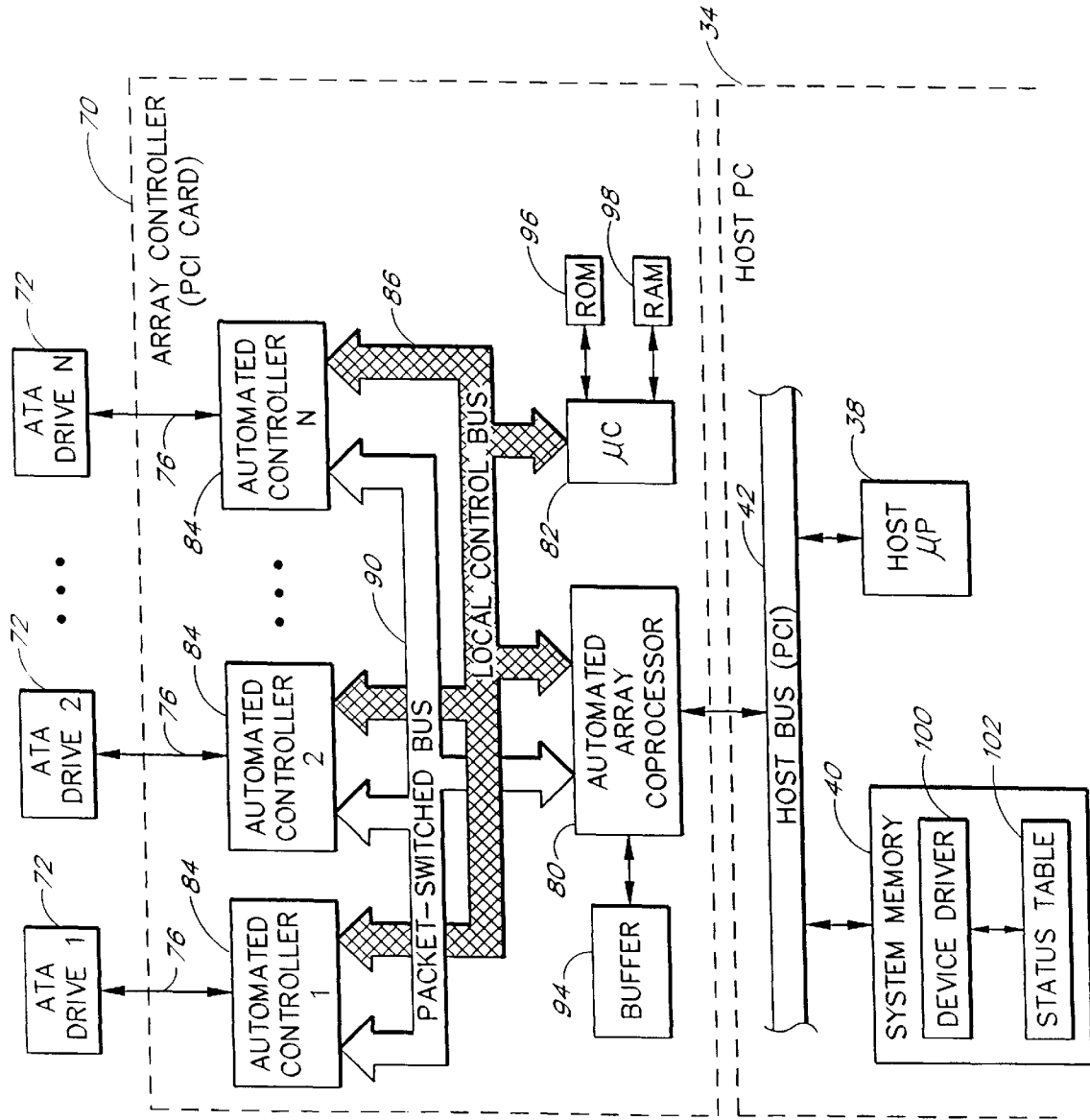


FIG. 2

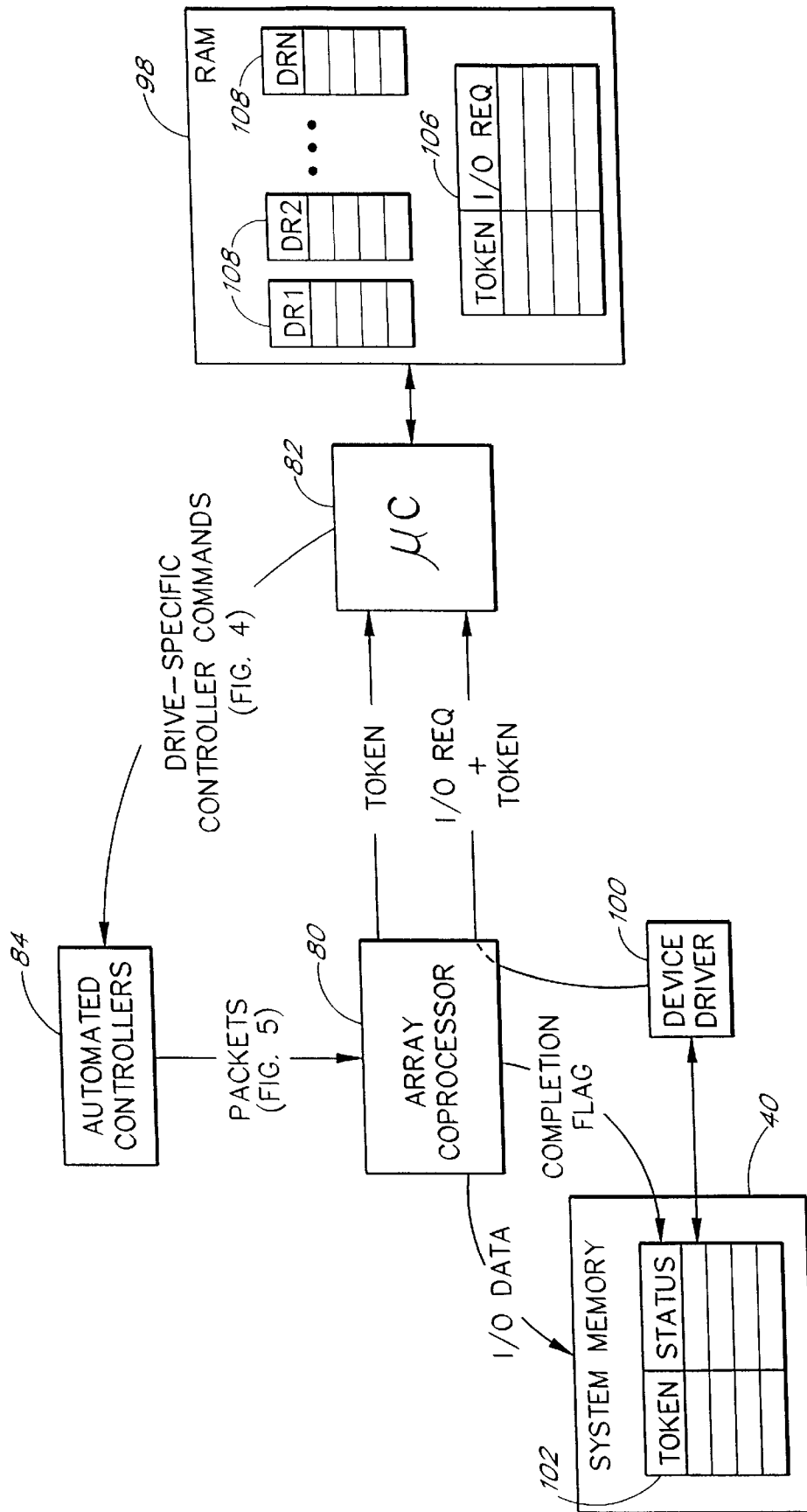


FIG. 3

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