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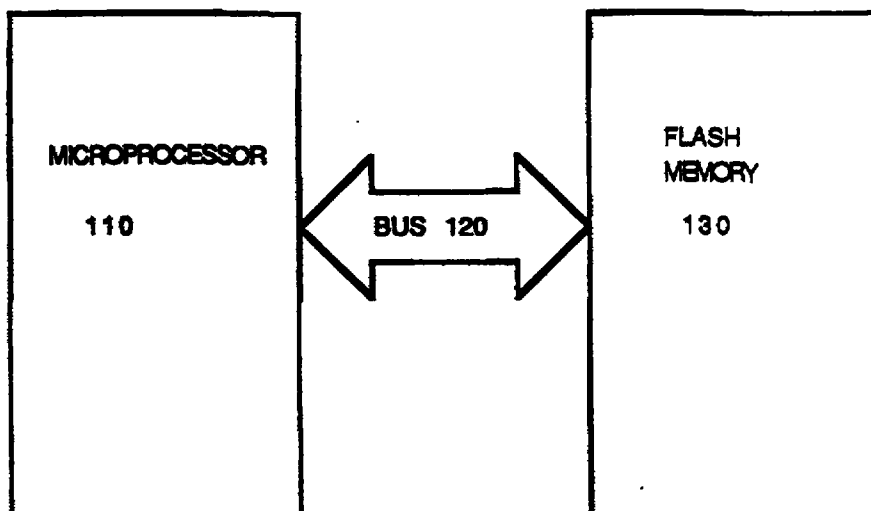
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(54) Title: FLASH MEMORY BASED MAIN MEMORY

## (57) Abstract

A flash memory chip that can be switched into four different read modes is described. Computer systems and hierarchies that exploit these modes are also described. In the first read mode, asynchronous flash mode, the flash memory is read as a standard flash memory. In this mode, the reading of the contents of a first address must be completed before a second address to be read can be specified. In the second read mode, synchronous flash mode, a clock signal is provided to the flash chip and a series of addresses belonging to a data burst are specified, one address per clock tick. Then, the contents stored at the addresses specified for the burst are output sequentially during subsequent clock ticks in the order in which the addresses were provided. Alternately, if a single address is provided to the flash chip when it is in the synchronous mode, the subsequent addresses for the burst will be generated within the flash chip and the data burst will then be provided as output from the flash chip. In the third read mode, asynchronous DRAM (dynamic random access memory) mode, the flash memory emulates DRAM. Thus, row and column addresses are strobed into the flash memory using row and column address strobe signals. The flash memory then converts the row and column addresses internally into a single address and provides as output the data stored at that single address. Furthermore, although the flash memory does not need an extended precharge period or to be refreshed, when in the asynchronous DRAM mode, the flash memory responds to precharge periods and refresh cycles as would a DRAM. Therefore, when in the asynchronous DRAM mode, the flash memory can be controlled by a standard DRAM controller. In the fourth read mode, synchronous DRAM mode, the features of the second and third modes are combined to yield a flash memory that emulates a synchronous DRAM.

## SYSTEM 100



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