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(54) METHOD AND APPARATUS TO CONTROL COMPUTER SYSTEM POWER

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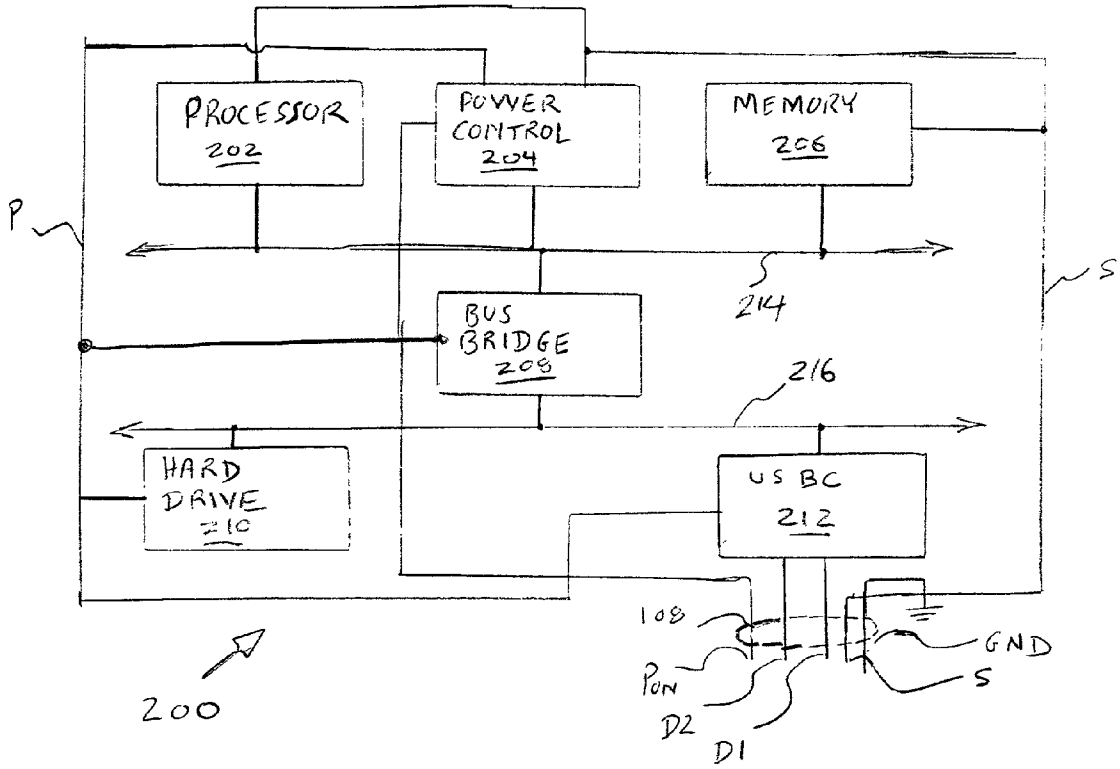
(57) ABSTRACT

A system includes a power supply adapted to supply power to a device on a peripheral bus at least when the computer system is in a reduced power state. The system also includes a power control circuit adapted to receive a power control signal from the device at least when the computer system is in the reduced power state. The power control circuit transitions the computer system from the reduced power state as a result of receiving the power control signal.



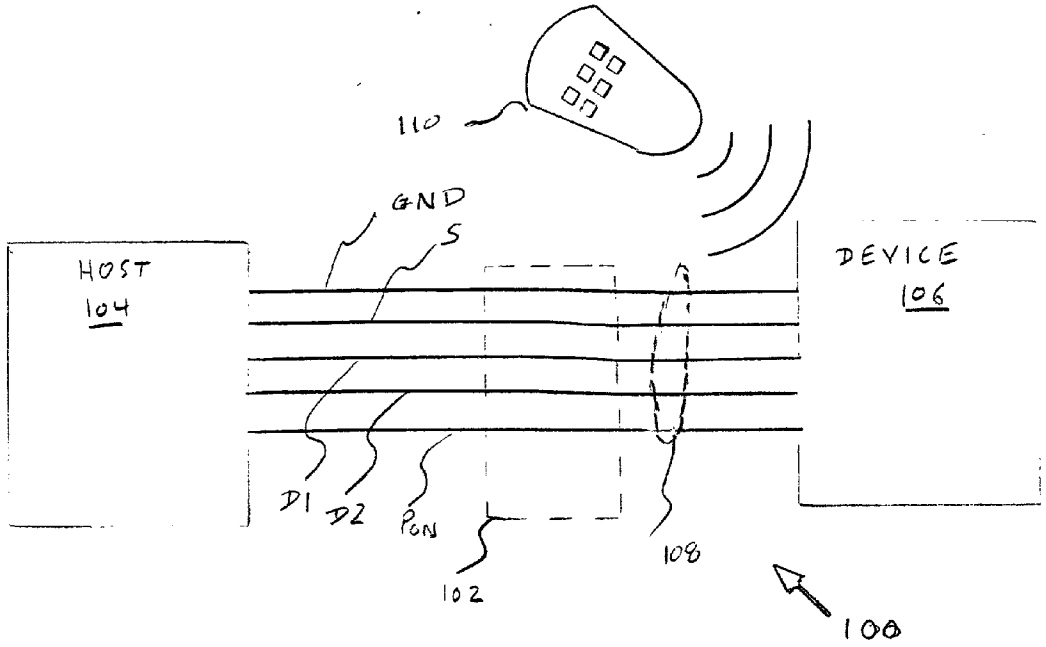


FIG. 1

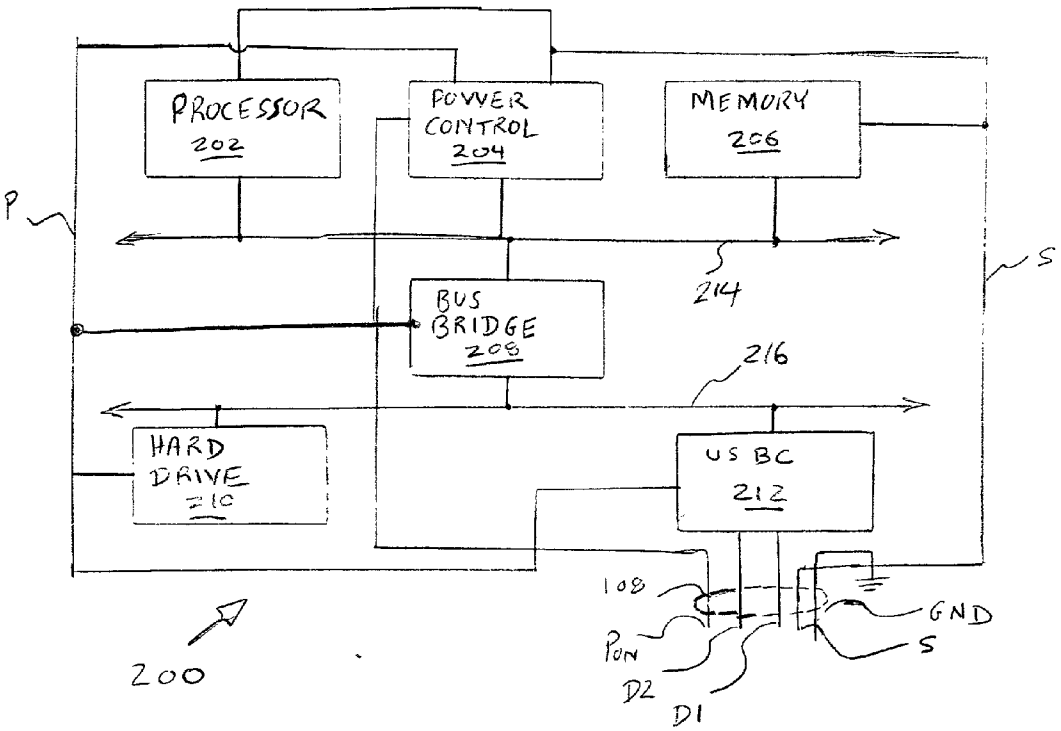


FIG. 2

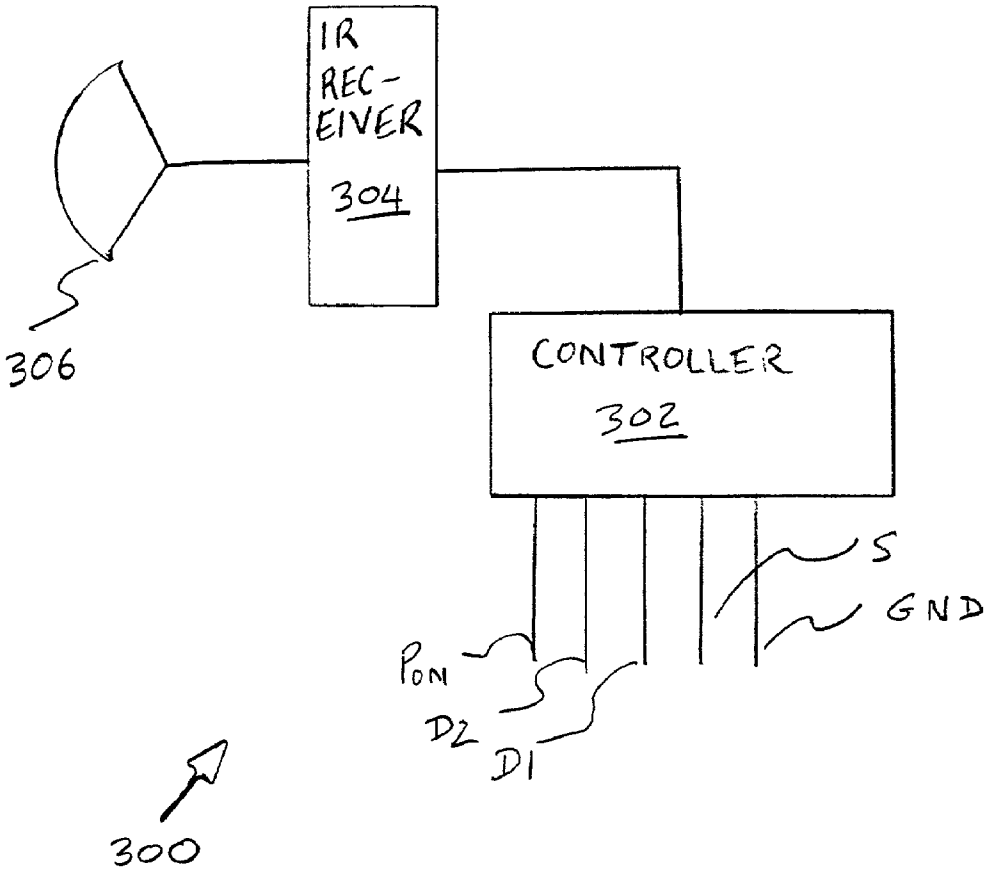


FIG. 3

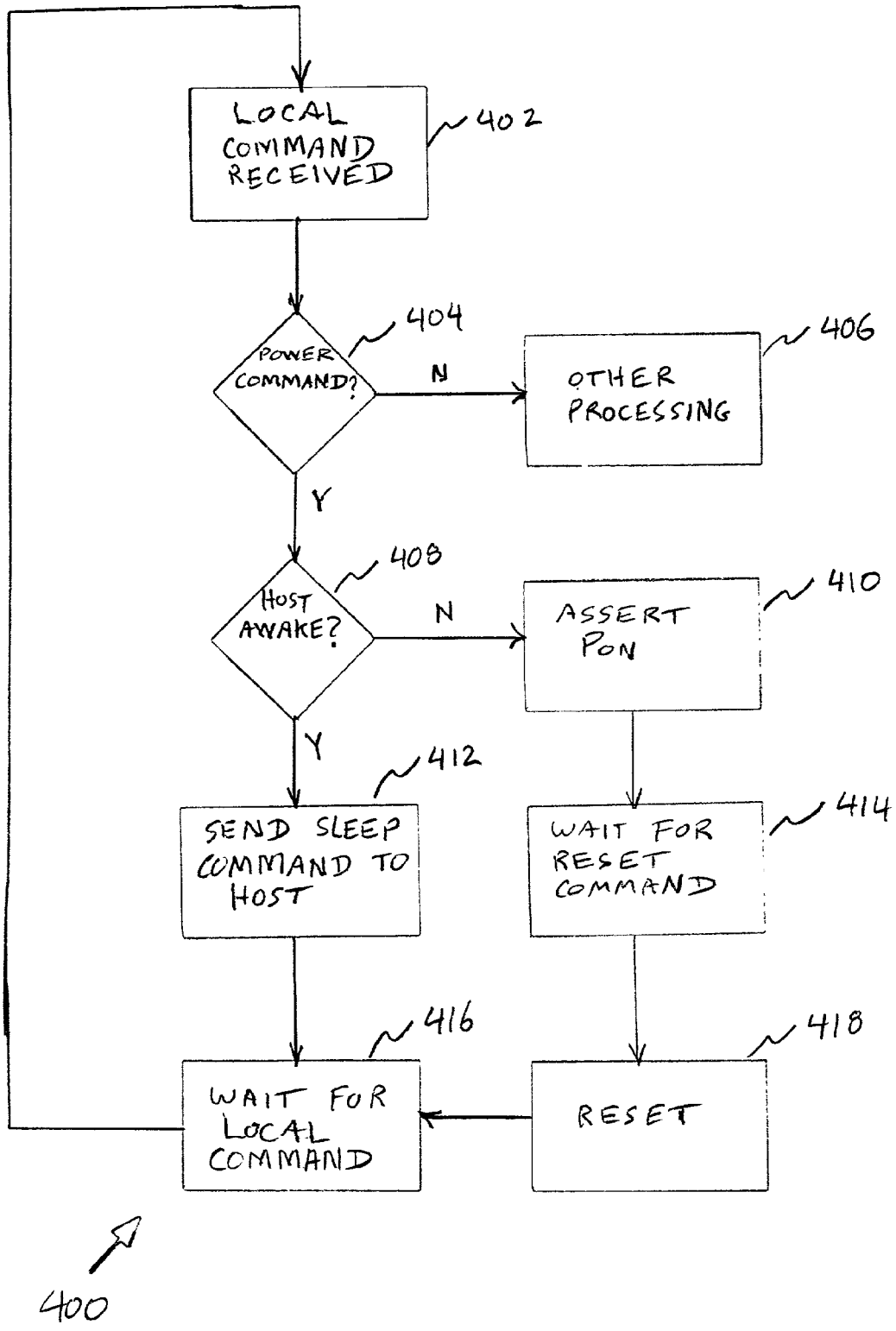


FIG. 4

METHOD AND APPARATUS TO CONTROL COMPUTER SYSTEM POWER

BACKGROUND

[0001] 1. Field

[0002] The invention relates to controlling the power state of an electronic device, and, more particularly, to controlling the power state of a computer system from a device on a bus.

[0003] 2. Background Information

[0004] As used herein, a computer system is any device comprising a processor to execute instructions and a memory to store the instructions. Computer systems often interface with other devices, called peripheral devices, by way of a bus. As described herein, a bus is one or more conductors for sending and receiving signals between electronic circuits, along with protocols associated with sending and receiving the signals. The bus may be internal or external to the physical casing comprising the circuits and other components of the computer system. An example of an internal bus is the Peripheral Component Interconnect (PCI) bus, as described for example in the PCI Local Bus Specification, Product Version, Revision 2.1, published June 11995. An example of an external peripheral bus is the Universal Serial Bus (USB), as described for example in the Universal Serial Bus Specification, Revision 1.0, published January 1996.

[0005] In some environments the host device may enter a reduced power state in which the host consumes less power than in a fully-powered state. In this low power state, power consumption by certain components of the computer system may be curtailed in order to reduce overall power consumption. For example, a mass storage device such as a hard drive within the computer system may have power curtailed in the reduced power state, in order to reduce overall system power consumption. When the host enters a low power state, it may also attempt to place devices on internal and external buses into a reduced power state as well. For devices on an external bus, this may involve the host sending the devices a command or request to enter the reduced power state. This command or request may be sent over the external bus. Some implementations may even enable a device on an internal or external bus to send a command or request to the host, in order to place the host in a reduced power consumption state. For example, USB supports such a feature.

[0006] The host may have two sources of power for components; a primary power source and a standby power source. Essential components may derive power from the standby power source. Non-essential components, e.g. components to whom power may be discontinued to place the host in a reduced power state, may derive power from the primary power source. Placing the host in a reduced power consumption state may thus involve cutting off the primary power source. The standby power source may remain available while the host is in the reduced power state. Restoring the primary power source may cause the host to enter the fully power state again.

[0007] The host may transition from the reduced power consumption state to a fully-powered state (or some power state between the reduced consumption state and the fully-powered state) when an operation is carried out which employs a component to which power has been cut off. For example, power to the hard drive component may be cut off in the reduced consumption state. Power may be restored to the hard drive when the host performs an operation which employs the hard drive, such as reading or writing data to a hard disk. Such restoration of power may be referred to as "waking up" the host. Throughout this document, the term "wake up" may be used interchangeably with the term "transition" to signify the transitioning of the host from a reduced power state to another state in which the host consumes more power than in the reduced power state.

[0008] A bus device may be in a reduced power consumption state when it receives a command which it cannot process in the reduced power state. To process the command (or subsequent commands which are expected to follow), the device may "wake up" itself and the host to which it is coupled via the bus. For example, a bus device operating in a reduced power consumption state may receive a "power on" command from a remote control unit (much like a typical television remote control). The power on command may result from a person pressing a power toggle button on the remote control. The device may receive the power on command and transition to a fully-powered state. To process subsequent commands which are expected to follow (for example, channel change commands if the device is a media player), the device may attempt to communicate with the host. However, if the host is operating in a reduced power state it may not be possible for the device to communicate with the host. Such communication may not be possible because, upon entering the reduced power consumption state, the host may have disabled transfer of signals via the bus. The host may need to be woken up before signals may be exchanged between the device and the host over the bus, but the bus cannot be used to wake up the host because it is disabled. There therefore exists a continuing need for a mechanism whereby a bus device may wake up a host from a reduced power consumption state.

SUMMARY

[0009] A system includes a power supply adapted to supply power to a device on a peripheral bus at least when the computer system is in a reduced power state. The system also includes a power control circuit adapted to receive a power control signal from the device at least when the computer system is in the reduced power state. The power control circuit transitions the computer system from the reduced power state as a result of receiving the power control signal.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The subject matter regarded as the invention is particularly pointed out and distinctly claimed in the concluding portion of the specification. The invention, however, may be further understood by reference to the following detailed description read with reference to the accompanying drawings.

[0011] **FIG. 1** shows a block diagram illustrating one embodiment of a system in accordance with the present invention.

[0012] **FIG. 2** shows a block diagram of an embodiment of a host computer system in accordance with the present invention.

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