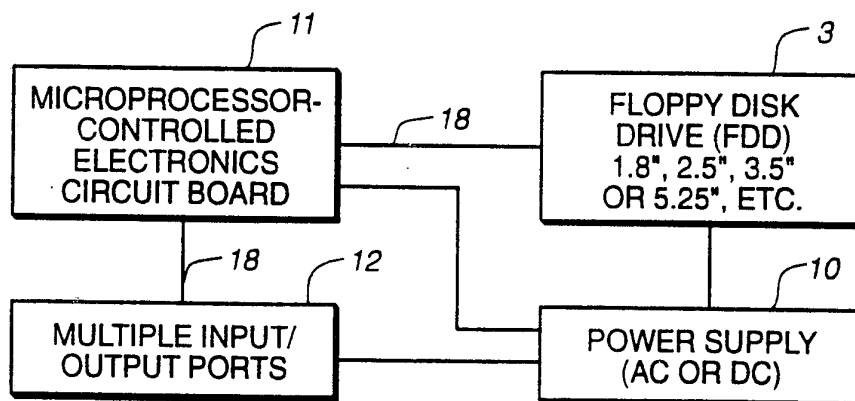




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁵ : G06F 13/00	A1	(11) International Publication Number: WO 93/09501 (43) International Publication Date: 13 May 1993 (13.05.93)
(21) International Application Number: PCT/US92/09088 (22) International Filing Date: 30 October 1992 (30.10.92) (30) Priority data: 786,483 1 November 1991 (01.11.91) US (71)(72) Applicant and Inventor: YEH, Keming, W. [US/US]; 43765 Abeloe Terrace, Fremont, CA 94539 (US). (74) Agents: KWOK, Edward, C. et al.; Skjerven, Morrill, MacPherson, Franklin & Friel, 25 Metro Drive, Suite 700, San Jose, CA 95110 (US). (81) Designated States: AU, CA, JP, KR, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, SE).		Published <i>With international search report.</i> <i>With amended claims and statement.</i>

(54) Title: PORTABLE DEVICE HAVING DATA STORAGE CAPABILITY FOR TRANSFERRING DATA BETWEEN A PORTABLE COMPUTER AND A DESKTOP COMPUTER

**(57) Abstract**

A portable information storage and transfer device for use with IC memory card-based portable computers performs many data transfer operations. The floppy disk drive (3) in the information storage and transfer device allows large amount of data and software programs to be made available to the IC memory card-based computer on floppy disks. The contents of such floppy disk can then be transferred for use in the portable computer on a blank IC memory card or the portable computer's system memory. Information entered into and stored in the system memory or an IC memory card of the portable computer can also be transferred through the information storage and transfer device to floppy disks, to a printer, to various peripheral devices or to a host computer. A built-in modem is also provided. Many types of software programs required to enable these functions of information storage, transfer, printout and communication are stored locally rather than on IC memory cards.

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PORTABLE DEVICE HAVING DATA STORAGE CAPABILITY
FOR TRANSFERRING DATA BETWEEN A PORTABLE
COMPUTER AND A DESKTOP COMPUTER

5 BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to the field of portable and hand-held computers and particularly to an information storage and transfer device for use with integrated
10 circuit memory card-based hand-held and portable computers.

Description of the Related Art

Many portable computers, especially hand-held or "palm-top" computers, use integrated circuit memory cards
15 ("IC memory cards") as the primary media of information storage. These IC memory cards are typically each the size of a customary credit card. IC memory cards are used in portable computers in place of hard disk drives and floppy disk drives (HDDs, FDDs) in order to achieve the
20 significant advantages of the size, weight, and battery lifetime attributes of the portable computer and to increase portability of the storage media. However, because of the limited memory density attainable in each IC memory card, and the high cost of IC memory chips,
25 using IC memory cards in hand-held computers imposes limitations not encountered in less portable computers, which typically use more power-consuming and heavier hard and floppy disk drives as their primary storage media. Also, in order to avoid the sizes and weights of the
30 necessary power supply unit and the interface adaptor, hand-held computers are typically not equipped with the standardized interfaces (e.g. RS232C) found on larger desktop and laptop computers. This is because standardized interfaces are larger than can be

conveniently provided on such hand-held computers and require voltages and power output levels impractical for such hand-held computers, if the requirements of size, weight and long battery lifetime are to be met.

5 Using IC memory cards as the primary media of storage in these portable computers also creates a problem in software distribution. Since these portable computers find wide applications in the consumer, industrial and vertical markets, an economical way for distributing
10 application software is key to the wide acceptability of these portable computers. Currently, because of the high cost and density limitations, it is neither easy nor economical to sell, distribute or upgrade application software using IC memory cards. An alternative to reduce
15 card cost, rather than using read/write IC memory card, software and data may be distributed using Read-Only Memory (ROM) cards. However, ROM cards require long lead times to produce and require substantial volume to be economical. Since there is seldom guarantee that a given
20 software will sell "well" in volume, a software manufacturer assumes significant inventory risk when adopting a ROM card distribution strategy.

Because portable computers are often issued by corporations to field personnel to provide "at their
25 fingertips" easy access to a large amount of essential information, e.g. product and customer information, there is a need to efficiently distribute and update such information. Currently, such update or distribution to a portable computer user is performed by issuing a new IC
30 memory card with the information already loaded, or by downloading the data or software using a modem. A special modem attachment to a hand-held computer capable of communicating with a facsimile machine, or accessing E-mail or local area networks requires the use of customized
35 software provided on an IC memory card. Such modem attachment is expensive relative to the cost of the hand-held computer, so that many applications of the hand-held

computer requiring the use of a modem are rendered uneconomical. As can be readily appreciated from the above, the use of IC memory cards for distribution and update purposes is limited both by the cost and the relatively modest capacity of the IC memory card. Since data transfer using a modem or an IC memory card limits the amount of data that can be transferred at a time, the problem of data distribution is by no means solved by the use of modems or the use of IC memory cards. Further, because prospective users of these portable computers are found in a variety of services, e.g. insurance or property sales, service calls, courier service, field engineering, surveyors, medical calls, accident or property assessors, etc., the use of IC memory cards as the primary storage media in these portable computers is indeed severely limiting the wide spread acceptability in these industries.

Another disadvantage often found in hand-held computers using the IC memory card as the primary storage medium results from the portable computer's inability to provide a variety of system services related to the use of a computer, e.g. connecting to a hard copy device, or transferring important data to a backup facility to prevent loss of data. This is because, as explained above, standardized interfaces to peripheral equipment are typically larger and require generating voltage levels impractical in a hand-held computer, due to their size, weight and power conservation requirements. Thus, each interface to a peripheral device is through a separate adapter which provides both the standard size connector and the necessary voltage level and signal representation conversions. At present, a number of these adapters are required to provide the various interfaces to common peripheral devices. Such adapters are bulky and cannot be simultaneously connected to the single small I/O connector on the hand-held computer. In addition, each adaptor is connected to the hand-held computers via a customized

cable and powered by the power supply of the hand-held computer. Even performing the most common applications, such as data backup and printing, require multiple adapters and each adaptor drains the precious battery power from the hand-held computer. To perform data backup, for example, a popular "PC-link cable" is used to connect a hand-held computer to the RS232C (serial) port of a desk top computer over a customized cable and a bulky attachment. The PC link cable provides only data transfer capability and requires both using the customized software and operating the desk top computer. To perform printing, a "printer-link cable" connects the hand-held computer to a printer for printing. Again, the connection to the printer requires another customized cable, a bulky adaptor and uses customized software. Of significance also, because the PC-link and printer-link cables plug into the same port on the hand-held computer, printing and data backup cannot at present be performed simultaneously. Further, since the printer-link and PC-link cables are expensive relative to the cost of the handheld computer, customized cables and adapters are very uneconomical ways to provide common applications in the hand-held computer.

Therefore, because of the limited functionalities necessitated by the size, weight and long battery lifetime requirements of such portable computers, users of these IC memory card-based portable computers are often required to perform through a desk-top computer, such tasks as data backup or printing after the necessary data is transferred to the desk-top computer. The importance of such functions as information backup or obtaining hard copies is self-evident, once one appreciates that the data most often stored in such computers are, for example, telephone numbers, addresses, memoranda, past appointment schedules, spreadsheets or databases etc. Information backups are particularly essential for record keeping and for recovering from an occasional system malfunction.

In addition, because the memory capacity of an IC

memory card-based portable computer is limited, it is often necessary to unload the software and data of one application program to create space for use by another application program. Currently, transfer from the portable computer to the desk top computer is cumbersome. For example, the user may be required to buy both a customized connection cable and a special communication software, and be required to perform a sophisticated set of tasks, such as connecting the cable to a RS232C port on the backplane of a desktop computer, setting up files and operating the communication software from the desktop computer. For many people, the apparent level of required skill to perform these tasks form a psychological barrier to their ability to use the portable computer effectively. Further, the cost of a desktop computer is often not justified for people who do not otherwise need a desk-top computer.

In the prior art, a number of computer system of various size, weight, shape, and power supply capabilities can be found. The computer systems described in U.S. Patent 4,330,839 to Miller et al, entitled "Programmable Calculator including Means for Automatically Processing Information Stored on a Magnetic Record Member", filed on Jun. 29, 1979, issued on May 18, 1982, and in U.S. Patent 4,117,542 to Klausner et al, entitled "Electronic Pocket Directory", filed on Jul. 7, 1977 and issued on Sep. 26, 1978 are examples of such computers. While each of these patents discloses a computer system comprising a keyboard, a display, electronic circuit boards and a system memory (in the case of Miller et al, a removable storage medium also), they address neither the problem of limited capacity of an IC memory card nor the attendant high cost of such removable storage medium. Neither do these patents disclose or propose a separate integrated peripheral device to address these deficiencies commonly found in a IC memory card-based portable computer.

U.S. Patent 4,591,974 to Dornbush et al, entitled

"Information Recording and Retrieval System", filed on Jan. 31, 1984 and issued on May 27, 1986, discloses a combination of a hand-held computer and a host computer for generating reports. In this system, the host computer
5 uses data taken in the field by the hand-held unit, which has a keyboard, a display, some memory and a microprocessor. In the system disclosed by Dornbush, essential operations, such as providing forms for data input, providing instructions, and providing codes of
10 authorized users etc., are directed by the host computer, which acts both as an information processing unit and a backup unit to the hand-held computer. Dornbush et al, however, fail to address the problem of transferring large amount of data and software of any type to an IC memory
15 card-based hand-held computers to be stored, reviewed and executed, especially where the hand-held unit has limited capacity in its fixed and removable storage media. Furthermore, Dornbush et al do not provide a solution to the problems in a portable computer of providing informa-
20 tion backup, communicating with other processors, transferring data between removable storage media and obtaining a hard copy of the data without using a host computer.

In the prior art, there are numerous intelligent
25 peripheral devices for such functions as information storage, printout, communication, and input/output (I/O). However, none of these devices integrate these functions into a single device in the manner achieved by the present invention to be described hereinafter.

30 SUMMARY OF THE INVENTION

In accordance with the present invention, a structure and a method are provided to achieve an information storage and transfer device for use with a portable or hand held computer. Such information storage and transfer
35 device includes a microprocessor-based control circuit, means for recording data on and reading data from a

removable medium, multiple input/output ports and a power supply unit. The data recording and reading means, the data ports and the control circuit are interconnected by a common bus controlled by the microprocessor.

5 The data recording and reading means can, for example, be a floppy disk drive accepting diskettes of one or more data densities and formats. The microprocessor-based control circuit includes (a) a microprocessor of 8-, 16-, or 32-bit or any suitable word size; (b) memory means
10 having read-only memory (ROM) components for "booting-up" the information storage and transfer device upon power up; (c) flash memory components for storing in a non-volatile but reprogrammable manner software and data necessary for
15 peripheral interfacing tasks, some of these tasks being customized to the portable computer to which the information storage and transfer device is connected; (d) dynamic random access memory (DRAM) components for
20 storing temporarily instructions and data during software execution; (e) I/O controller logic circuits for controlling various I/O functions at the data ports; and (f) a modem for communication with other modems and facsimile machines.

The data ports include one or more standardized
25 interfaces to a host computer or other peripheral devices. For example, a parallel port for connecting to a printer, a RS232C serial port for connecting to the telephone system or other communication network, a desktop computer, or a magnetic-card reader, and other ports customized for
30 connecting to palmtop computers, scanners, voice and other I/O devices.

The power supply unit allows the device to connect to either an AC source, disposable or rechargeable batteries, or a car battery. A fan for cooling can also be included,
35 if necessary.

The housing of the information storage and transfer device is contoured to include on a top surface a recessed

area for receiving securely a palmtop computer during device operation.

An advantage of the present invention provides both a method and a convenient and cost-effective means for transferring large amount of information of any type to an IC memory card-based portable computer.

Another advantage of the present invention provides both a method and an efficient device for allowing, without using a separate desk-top computer, the IC memory card-based portable computer to perform such functions as information backup, duplication, communication, printing and data input from other devices.

Another advantage of the present invention provides both a method and an apparatus, including built-in software, to access regular communication networks, such as the public telephone switch system. A built-in modem in one embodiment of the present invention provides access to facsimile machines, and allows data transmitted or received over the built-in modem to be backed up on floppy disks.

Another advantage of the present invention provides both a method and a convenient device for increasing the cost-effectiveness of an IC memory card-based portable computer by allowing the use of ordinary floppy disks, modems, printers without relying on the blank IC memory cards, customized peripheral devices, or a multiplicity of bulky adapters.

Another advantage of the present invention provides a stand-alone information storage and transfer device having its own power supply, a microprocessor-based control circuit, multiple I/O ports, and one or more floppy disk drives.

Another advantage of the present invention provides a simple and low-cost means for transferring information between palmtop computer and desktop computer using ordinary floppy disks, without having to permanently tie up a RS232C port of the desktop computer by a pc-link

cable as in the prior art. The present invention will be better understood upon consideration of the following detailed description and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

5 Figure 1 is an outside view of the information storage and transfer device according to the present invention;

Figure 2 is a block diagram of an embodiment of the present invention including the major modules;

10 Figure 3 is a block diagram of a control circuit for the information storage and transfer device in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figure 1 shows a housing 1 of an information storage and transfer device 100 in accordance with the present invention. This information storage and transfer device 100 has formed a recessed base area 2 at a top-central portion of the housing 1. The recessed base area 2 is contoured for securely accommodating a palmtop computer 20 (not shown). As shown in Figure 1, on one side of the housing 1 is an opening 3 for receiving into the floppy disk drive installed in the housing 1 a floppy disk or diskette. Also shown on a major sidewall of the housing 1 are input/output ports 4-8 for connection to host 25 computers or peripheral devices using standardized communication protocols and connection cables. For example, parallel port 4 can be used to connect a printer; serial port 5, which may be a RS232C port, can be used to connect a communication network device, such as the 30 telephone system; RS232C port 6 can be used to connect a host computer; port 7 can be used to connect a magnetic card reader; and I/O port 8 can be used to connect other I/O devices such as a hand-held or a desktop scanner, a wireless communication device such as a fax phone or a 35 pager, a solid-state recorder, a voice input and output

device, a mouse, a keyboard, a monitor, or a hard disk drive. The number and types of devices that can be connected to information storage and transfer device 100 are virtually limitless.

5 A third side of the housing 1 provides a port 9 (not shown) to connect a palmtop computer. In the prior art, for the reason described previously regarding connector size and voltage levels in standardized interfaces, a palmtop computer typically provides a customized cable for
10 data transfer between the palmtop and the desktop computers. This customized cable typically has a bulky attachment for connecting a customized port of the palmtop to a standardized port of a desktop computer. Signal conversion and amplification are achieved by the
15 electronics in the bulky attachment of the customized cables in the prior art. Prior to data transfer, the user must run customized software on both the palmtop and the desktop computers to properly set up both machines. In accordance with the present invention, a simple cable
20 connects port 9 to the customized port of the palmtop computer. Because the communication protocols used in the customized port on a palmtop computer vary from one manufacturer to another, the information storage and transfer device is provided software capable of
25 communicating with the specific palmtop it connects over port 9. As will be discussed in further detail, such software is provided in the non-volatile memory, e.g. an electrically erasable programmable read-only memory (EEPROM) or a flash memory. Along with the customized
30 cable, the EEPROM is purchased with the information storage and transfer device.

A fourth side of the housing 1 provides for a power cord 10 which connects the internal power supply or battery compartment to an outside power source, such as a
35 wall AC socket, or a car battery adapter.

Figure 2 illustrates the major functional blocks in the embodiment of the present invention shown in Figure 1.

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Recording module 3 comprises one or more floppy disk drives and the attendant controller or controllers. A floppy disk drive in recording module 3 can be any standardized format floppy disk drive, e.g. 1.8", 2.5", 3.5", 5.25", using the customary density diskettes of such floppy disk drives. Recording module 3 is controlled by a control circuit 11 over a bus 18, which can have a 8-, 16- or 32-bit word length. Control circuit 11 is a microprocessor-based control circuit, which is connected to the multiple input/output ports 12 by the bus 18. Multiple I/O ports 12 comprise various types of I/O ports for interfacing information storage and transfer device 100 with a host computer or other peripheral devices. Such peripheral devices include but are not limited to magnetic card readers, scanners and printers. Finally, power supply 10 includes automatically switchable AC or DC electrical connection for using a wall AC socket, disposable or re-chargeable batteries, or a car battery to power recording module 3, control circuit 11 and the input/output ports 12.

Figure 3 shows the major functional blocks of the control circuit 11 of the present invention. CPU 14 can be a microprocessor of any word length, e.g. an 8-, 16-, or 32-bit microprocessor, which is connected by bus 18 of an appropriate bus width to ROM 15, flash memory 16 and dynamic random access memory (DRAM) 17 units. ROM unit 15 provides the permanently stored software programs and data, such as the software required to "boot up" the information storage and transfer device 100 upon power up. Flash memory unit 16 provides programmable storage for infrequently changed software programs and data, such as the programs necessary to interface with a customized port of a specific portable computer. DRAM unit 17 provides temporary storage area for software instructions and data being executed by the CPU 14. I/O controller unit 13 controls modem 19 and the various I/O ports 4-9 and is, in turn, controlled by CPU 14 over bus 18.

Modem 19 is a built-in modem provided with attendant software to allow (i) access to the telephone system, (ii) access to facsimile machines for sending and receiving facsimile transmission, (iii) access to other communication networks, such as E-mail, and (iv) other modems. The built-in software allows the user to transfer data between the floppy disk drive 3 and the network or host machine accessed by the modem 19. Because built-in modem 19 is powered by the power supply of the information storage and transfer device 100 and shares the connection to the palmtop computer with the other functional units of information storage and transfer device 100, the built-in modem 19 can be provided at a much lower cost than the special modem attachment used currently by such palmtop computers.

After power up, information storage and transfer device 100 executes an initialization sequence to set up the communication protocols necessary for data transfer over the multiple I/O ports 4-9. The initialization sequence includes loading from flash memory 16 into random access memory 17 device driver software necessary to control multiple I/O ports 4-9. CPU 14 constantly polls each of the various I/O ports 4-9 for a connection to an external device. For example, if connection to a palmtop computer is detected, the CPU 14 receives in accordance with a predefined protocol instructions from the palmtop computer. Such instructions include, for example, file transfer commands to and from the floppy disk drive of module 3. In most palmtop computers, the user interface provides commands which the user can use to effectuate data transfer to and from another device, such as a desktop computer, over the single I/O port. Indeed, to use the aforementioned pc-link or printer-link cable in the prior art, after an application program is run on the desktop computer to set up the desktop computer, data transfer is effectuated by issuing a command on the palmtop computer.

In the present embodiment, where existing protocol supports a remote device to take control of the palmtop computer's input and display devices, the software in information storage and transfer device 100 can be invoked
5 to take control of the input and display devices to provide input and output capability to CPU 14. Thus, no additional steps need to be performed in the palmtop computer since the palmtop computer already has built-in facility to support data transfer into and out of the
10 palmtop computer. Information storage and transfer device 100 uses the predefined protocols of the palmtop computer, so that a connection to information storage and transfer device 100 is not different from a connection to a desktop computer over a pc-link cable.

15 Upon verifying on the palmtop computer that a connection with the information storage and transfer device 100 is established, the user can then proceed to issue commands using the palmtop computer's input facility, e.g. the keyboard to the information storage and
20 transfer device 100. Such commands include fetching a file from a floppy disk, writing a file onto a floppy disk, connecting the palmtop computer to an external computer through modem 19 or the network connection at port 5, and through desk-top computer port 6 to print a
25 file on the printer connected to parallel port 4, or to control the magnetic card reader connected to I/O port 7. Many other instructions are of course possible. Since it is within one of ordinary skill in the art, upon consideration of the above description and drawings, to
30 provide the software to be run on information storage and transfer device 100 to carry out the above-discussed functions, the detailed description of such program is omitted.

It will be appreciated from the above that the
35 present invention allows transferring large amount of information, e.g. a software or data distribution, to a palmtop computer using either one or more traditional

floppy disks or over the built-in modem. Instead of using a separate IC memory card to store each of the programs the user routinely use, the user needs only one read/write IC memory card on which the user selectively loads the
5 desired program from a floppy disk through the portable information storage and transfer device 100. Since the cost of a floppy disk is much less than the cost of an IC memory card, many application programs which would otherwise not be made available to the palmtop user
10 because of the aforementioned cost and limited capacity reasons, can be made available through the information storage and transfer device by means of an inexpensive floppy disk. The same mechanism can also be used by corporations to distribute information to their field
15 personnel. Thus, the advantage of the present invention in providing a convenient and cost-effective means for transferring large amount of information of any type to an IC memory card-based portable computer is achieved.

Transferring large amount of information can also be
20 achieved over built-in modem 19. Because the information transferred can be obtained from or received into the relatively large storage space of floppy disks, the amount of data transfer attainable using the information storage and transfer device 100 is of a magnitude not currently
25 achievable by a palmtop computer using only IC memory cards and its internal main memory. Further, built-in modem 19 allows access to facsimile machines and communication media for such applications as E-mail and access to host computers at much reduced costs.

30 Further, since the palmtop user can use information storage and transfer device 100 of the present invention to interface over the standardized input/output ports, such as ports 4-8, with other computers and peripheral devices, the present invention allows, without the use of
35 a separate desk top computer or customized peripherals the IC memory card-based portable computer to perform such functions as information backup, duplication,

communication, printing and data input from other devices. The present invention also eliminates a multiplicity of customized cable and bulky adapters. Further, a number of common applications such as data backup and printing can
5 be performed simultaneously over the I/O ports 4-8. Thus, the palmtop computer, together with the portable information storage and transfer device 100, provides capability equivalent to what is typically expected of a desk-top computer, without sacrificing the important
10 portability attributes of the palmtop machine.

To illustrate the power of information and storage device 100, an example is provided below taken from an application in the field of medicine. A medical doctor can have all her patients' medical and insurance records
15 transferred from a desktop computer and stored on a few floppy disks which she keeps in her car. Before making her rounds at a hospital, she needs only transfer the necessary information extracted from the floppy disk on to the IC memory card of her palmtop computer using the
20 portable information storage and transfer device 100, which she also keeps in the car. Alternatively, the medical and insurance records can be obtained by connecting the palmtop computer to an information storage and transfer device located at a nurses' station where
25 such medical and insurance records are scanned through a magnetic card reader into either the memory or a floppy disk of the information storage and transfer device without using a desktop computer. During her visit at the hospital, she enjoys the portability of her palmtop
30 computer for such functions as taking notes about her patients, checking suitability of treatment using an IC memory card published by a physician's reference book source, and noting the treatment prescribed. Data input for these functions are adequately provided by the
35 keyboard of the palmtop computer. At the end of the day, she can down load the information compiled during her rounds onto a floppy disk, again using information storage

and transfer device 100. The information about the visits and the prescribed treatments can be directly sent by the built-in modem to the computers of the insurance companies for billing purposes. The floppy disks are then given to her clerk for updating medical records, for accounting and other purposes maintained in the desktop or mainframe computer of her office.

Since the I/O ports, such as ports 4-8 of the information storage and transfer device 100, are standardized ports like those typically found on desk top computers, the present invention increases the cost-effectiveness of the IC memory card-based portable computers by providing access to ordinary floppy disks, modems, and printers without relying on the blank IC cards, and customized models of these peripheral devices, as is customary in the prior art.

The above detailed description illustrates the specific embodiments of the present invention and is not intended to be limiting. Numerous variations and modifications can be made without departing from the scope of the present invention. For example, it is within the scope of the present invention to use as CPU 14 any available CISC (Complex Instruction Set Computer) or RISC (Reduced Instruction Set Computer) microprocessors. The choice between RISC and CISC processor in the present invention is, determined only by cost, performance and software-tool considerations. As another example, it is also within the scope of the present invention to use, in addition to or in lieu of the floppy disk drive in the recording module 3, an IC memory card reader, or a hard disk drive, as primary or additional storage media. In yet another example, it is also within the scope of the present invention to provide additional built-in capability in the information storage and transfer device, such as a communication adaptor or an interface to allow the information storage and transfer device to be part of

a local area network, or to provide access to a satellite link. The present invention is defined by the following Claims.

CLAIMS

What is claimed is:

1. An information storage and transfer device, for use with a portable computer, comprising:
 - 5 a housing;
means inside said housing for reading data from and storing data onto a removable storage medium;
 - a customized connector mounted on said housing for connecting to said portable computer;
 - 10 a plurality of standardized connectors mounted on said housing for interfacing with peripheral devices and host computers; and
means inside said housing for controlling said information storage and transfer device to effectuate data transfer between (a) said portable computer, via
15 said customized connector and (b) alternatively (i) said removable storage medium, and (ii) one of said peripheral devices and host computers, via a corresponding one of said plurality of standardized
20 connectors.
2. A device as in Claim 1, wherein said means for reading data from and storing data onto a removable storage medium comprises a floppy disk drive.
3. A device as in Claim 1, wherein said means for
25 controlling comprises a microprocessor.
4. A device as in Claim 1, wherein said housing has a recessed area contoured for securely accommodating said portable computer, said portable computer when so accommodated is connected to the said information storage
30 and transfer device through said connector means.
5. A device as in claim 1, wherein said portable computer comprises a removable integrated circuit memory-based storage medium for data storage and wherein said

means for reading data from and storing data onto a removable storage medium includes a removable magnetic storage medium, such that said means for reading data from, and storing data onto a removable storage medium
5 enables data transfer between said removable integrated circuit memory-based storage medium and said removable magnetic storage medium.

6. A device as in claim 3, wherein said means for controlling further comprises memory circuits for storing
10 programs enabling said microprocessor to communicate with said portable computer, removable storage medium, and said peripheral devices and host computers through said customized connector, said means for reading data from and storing data onto a removable storage medium, and said
15 plurality of standardized connectors respectively.

7. A device as in claim 6, wherein said memory circuits comprises read-only memory, programmable non-volatile memory, and read/write access memory.

8. A device as in claim 1 further comprising a
20 modem.

9. A method for providing an information storage and transfer device, for use with a portable computer, comprising the steps of:

- providing a housing;
- 25 providing means inside said housing for reading data from and storing data onto a removable storage medium;
- providing a customized connector mounted on said housing for connecting to said portable computer;
- 30 providing a plurality of standardized connectors mounted on said housing for interfacing with peripheral devices and host computers; and

controlling said information storage and transfer device to effectuate data transfer between (a) said portable computer, via said customized connector and (b) alternatively (i) said removable storage medium, and (ii) one of said peripheral devices and host computers, via a corresponding one of said plurality of standardized connectors.

5 10. A method as in Claim 9, wherein said step of providing a storage means comprises the step of providing 10 a floppy disk drive.

11. A method as in Claim 9, wherein said step of controlling comprises the step of programming a microprocessor.

12. A method as in Claim 9, wherein said step of 15 providing a housing includes providing a recessed area contoured for securely accommodating said portable computer, said portable computer when so accommodated is connected to the said information storage and transfer device through said connector means.

20 13. A method as in claim 9, wherein said portable computer comprises a removable integrated circuit memory-based storage medium for data storage and wherein said means for reading data from and storing data onto a removable storage medium includes a removable magnetic 25 storage medium, such that said step of providing means for reading data from and storing data onto a removable storage medium enables data transfer between said removable integrated circuit memory-based storage medium and said removable magnetic storage medium.

30 14. A method as in claim 11, wherein said controlling step further comprises the step of providing memory circuits for storing programs enabling said

microprocessor to communicate with said portable computer, removable storage medium, and said peripheral devices and host computers through said customized connector, said means for reading data from and storing data onto a
5 removable storage medium, and said plurality of standardized connectors respectively.

15. A method as in claim 14, wherein said step of providing memory circuits comprises the steps of providing (i) read-only memory, (ii) programmable non-volatile
10 memory, and (iii) read/write access memory.

16. A method as in claim 9 further comprising the step of providing a modem.

17. An integrated peripheral device for a portable
15 computer, said portable computer having a customized port for communicating with a host computer, said integrated peripheral device comprising:

a connector for connecting to said customized port of said portable computer, said connector being
20 configured by software of said integrated peripheral device to emulate a connection of said portable computer to said host computer;

a programmable device for storing said software in a non-volatile manner;

25 means for providing storage having a capacity larger than the storage capacity of said portable computer; and

means, coupled to said connector, said programmable device and said means for providing
30 storage, for controlling said integrated peripheral device, said controlling means controlling data transfer between said means for providing storage and said portable computer via a connection at said connector, in accordance with said software stored in
35 said programmable device.

18. An integrated peripheral device as in claim 17, further comprising a modem.

19. An integrated peripheral device as in Claim 18, further comprising a port for input and output operations using a standardized communication protocol, wherein said programmable device stores software for use by said means for controlling data transfer operations among said portable computer, said modem, said means for providing storage and said standardized port.

20. An integrated peripheral device as in Claim 17, wherein said means for storage is a floppy drive.

21. An integrated peripheral device as in Claim 18, wherein said port comprises a parallel port.

22. An integrated peripheral device as in Claim 18, wherein said port comprises a serial port.

23. A method for providing a peripheral device for a portable computer, said portable computer having a customized port for communicating with a host computer, said method comprising the steps of:

providing a connector for connecting to said customized port of said portable computer, said connector being configured by software of said integrated peripheral device to emulate a connection of said portable computer to said host computer;

providing a programmable device for storing said software in a non-volatile manner;

providing storage having a capacity larger than the storage capacity of said portable computer; and

controlling said integrated peripheral device, said controlling step controlling data transfer between said provided storage and said portable computer via a connection at said connector, in

accordance with said software stored in said programmable device.

24. A method as in claim 23, further comprising the step of providing a modem.

5 25. A method for providing an integrated peripheral device as in Claim 24, further comprising the step of providing a port for input and output operations using a standardized communication protocol, wherein said step of providing a programmable device includes the step of
10 storing software for use by said controlling step to effectuate data transfer among said portable computer, said modem, said provided storage and said standardized port.

26. A method for providing an integrated peripheral
15 device as in Claim 23, wherein said step of providing storage includes the step of providing storage using a floppy disk drive.

27. A method for providing an integrated peripheral device as in Claim 25, wherein said step of providing a
20 port comprises the step of providing a parallel port.

28. An integrated peripheral device as in Claim 25, wherein said step of providing a port comprises the step of providing a serial port.

WO 93/09501

AMENDED CLAIMS

[received by the International Bureau on 4 March 1993 (04.03.1993);
original claims 1,2,4-6,9,10,12-14,17,19,23 and 25-28 amended;
new claims 29-46 added; remaining claims unchanged (12 pages)]

1. An information storage and transfer device, for
effectuating data exchange between a palmtop computer and
5 one or more host computers, said palmtop computer having a
customized port, said one or more host computers each
having a standardized port and running a standardized
operating system, said customized port using signal levels
different from signal levels in said standardized port,
10 said device comprising:

a housing;

means inside said housing for transferring data
bidirectionally between said information storage and
transfer device and a removable storage medium, said
15 removable storage medium storing data in a data
format compatible with said standardized operating
system of said host computers;

a customized connector mounted on said housing
adapted for connecting to said palmtop computer;

20 a plurality of standardized ports mounted on
said housing for interfacing with peripheral devices
and said host computers; and

means inside said housing coupled to said
customized connector, said means for transferring
25 data, and each of said plurality of standardized
ports for controlling said information storage and
transfer device, wherein said means for controlling
effectuates bidirectional data transfer between (a)
said palmtop computer, via said customized connector,
30 and (b) alternatively (i) said removable storage
medium, and (ii) one of said peripheral devices and
said host computers, via a corresponding one of said
plurality of standardized ports.

2. A device as in Claim 1, wherein said means for
35 transferring data comprises a floppy disk drive.

3. A device as in Claim 1, wherein said means for controlling comprises a microprocessor.

4. A device as in Claim 1, wherein said housing has a recessed area contoured for securely accommodating said
5 palmtop computer, wherein said palmtop computer, when so accommodated, is connected to said information storage and transfer device through said customized connector.

5. A device as in Claim 1, wherein said palmtop
computer comprises a removable integrated circuit memory-
10 based storage medium for data storage and wherein said means for transferring data includes a removable magnetic storage medium, such that said means for transferring data enables bidirectional data transfer between said removable
integrated circuit memory-based storage medium and said
15 removable magnetic storage medium.

6. A device as in Claim 3, wherein said means for controlling further comprises memory circuits for storing programs which enable said microprocessor to communicate with (i) said palmtop computer, via said customized
20 connector, (ii) said removable storage medium, via said means for transferring, and (iii) said peripheral devices and host computers, via said plurality of standardized ports.

7. A device as in Claim 6, wherein said memory
25 circuits comprise read-only memory, programmable non-volatile memory, and read/write access memory.

8. A device as in Claim 1, further comprising a modem.

9. A method for providing an information storage

and transfer device, for effectuating data exchange between a palmtop computer and one or more host computers, said host computers each having a standardized port and running a standardized operating system, said customized
5 port using signal levels different from signal levels in said standardized port, said method comprising the steps of:

providing a housing;
providing means inside said housing for
10 transferring data bidirectionally between said information storage and transfer device and a removable storage medium, said removable storage medium storing data in a data format compatible with said operating system of said host computers;
15 providing a customized connector mounted on said housing for connecting to said palmtop computer;
providing a plurality of standardized ports mounted on said housing for interfacing with peripheral devices and said host computers; and
20 controlling said information storage and transfer device to effectuate bidirectional data transfer between (a) said palmtop computer, via said customized connector and (b) alternatively (i) said removable storage medium, and (ii) one of said
25 peripheral devices and host computers, via a corresponding one of said plurality of standardized ports .

10. A method as in Claim 9, wherein said step of providing means for transferring data comprises the step
30 of providing a floppy disk drive.

11. A method as in Claim 9, wherein said step of controlling comprises the step of programming a microprocessor.

12. A method as in Claim 9, wherein said step of providing a housing includes providing a recessed area contoured for securely accommodating said palmtop computer, wherein said palmtop computer, when so
5 accommodated, is connected to said information storage and transfer device through said customized connector .

13. A method as in Claim 9, wherein said palmtop computer comprises a removable integrated circuit memory-based storage medium for data storage and wherein said
10 means for transferring data includes a removable magnetic storage medium, such that said step of providing means for transferring data enables bidirectional data transfer between said removable integrated circuit memory-based storage medium and said removable magnetic storage medium.

15 14. A method as in Claim 11, wherein said controlling step further comprises the step of providing memory circuits for storing programs which enable said microprocessor to communicate with (i) said palmtop
computer, via said customized connector, (ii) said
20 removable storage medium, via said means for transferring data and (iii) said peripheral devices and host computers, via said plurality of standardized ports.

15. A method as in Claim 14, wherein said step of providing memory circuits comprises the steps of providing
25 (i) read-only memory, (ii) programmable non-volatile memory, and (iii) read/write access memory.

16. A method as in Claim 9, further comprising the step of providing a modem.

17. An integrated peripheral device for a palmtop
30 computer, said palmtop computer having a customized port for communicating with a host computer, said host computer

having a standardized port and running a standardized operating system, said customized port using signal levels different from signal levels in said standardized port, said integrated peripheral device comprising:

5 a connector for connecting to said customized port of said palmtop computer, said connector being configured by software of said integrated peripheral device;

10 a programmable device for storing said software in a non-volatile manner;

means for providing storage for said integrated peripheral device, said means for providing storage using a data format compatible with said standardized operating system of said host computer; and

15 means, coupled to said connector, said programmable device and said means for providing storage, for controlling data transfer between said means for providing storage and said palmtop computer via a connection at said connector, in accordance
20 with said software stored in said programmable device.

18. An integrated peripheral device as in Claim 17, further comprising a modem.

19. An integrated peripheral device as in Claim 18,
25 further comprising a standardized port for input and output operations using a standardized data communication protocol, wherein said programmable device stores software for use by said means for controlling data transfer operations among said palmtop computer, said modem, said
30 means for providing storage and said standardized port.

20. An integrated peripheral device as in Claim 17, wherein said means for storage is a floppy drive.

21. An integrated peripheral device as in Claim 18, wherein said port comprises a parallel port.

22. An integrated peripheral device as in Claim 18, wherein said port comprises a serial port.

5 23. A method for providing a peripheral device for a palmtop computer, said palmtop computer having a customized port for communicating with a host computer, said host computer running a standardized operating system and having a standardized port, said customized port using
10 signal levels different from said standardized port, said method comprising the steps of:

providing a connector for connecting to said customized port of said palmtop computer, said connector being configured by software of said
15 integrated peripheral device;

providing a programmable device for storing said software in a non-volatile manner;

providing storage for said integrated peripheral device using a data format compatible with said
20 standardized operating system of said host computer;
and

controlling data transfer between said provided storage and said palmtop computer via a connection at said connector, in accordance with said software
25 stored in said programmable device.

24. A method as in Claim 23, further comprising the step of providing a modem.

25. A method for providing an integrated peripheral device as in Claim 24, further comprising the step of
30 providing a standardized port for input and output operations using a standardized data communication protocol, wherein said step of providing a programmable

device includes the step of storing software for use by said controlling step to effectuate data transfer among said palmtop computer, said modem, said provided storage and said
5 standardized port.

26. A method for providing an integrated peripheral device as in Claim 23, wherein said step of providing storage includes the step of providing storage using a floppy disk drive.

10 27. A method for providing an integrated peripheral device as in Claim 25, wherein said step of providing a standardized port comprises the step of providing a parallel port.

28. An integrated peripheral device as in Claim 25,
15 wherein said step of providing a standardized port comprises the step of providing a serial port.

29. An information storage and transfer device,
comprising:

20 a housing;
a first IC memory card device inside said housing for reading data from and storing data onto an IC memory card;
a connector mounted on said housing for interfacing with a portable computer;
25 a plurality of connecting means mounted on said housing for interfacing with peripheral devices and host computers; and
means inside said housing for controlling said information storage and transfer device to effectuate
30 data transfer between said portable computer and alternatively (i) said IC memory card, and (ii) one of said peripheral devices and host computers.

30. A device as in Claim 29, wherein said means for controlling comprises a microprocessor.

31. A device as in Claim 29, wherein said housing has a recessed area for securely accommodating said
5 portable computer, said portable computer when so accommodated is connected to the said information storage and transfer device through said connector.

32. A device as in claim 30, wherein said means for controlling further comprises memory circuits for storing
10 programs enabling said microprocessor to communicate with said portable computer, IC memory card device, and said peripheral devices and host computers through said means for communicating with said portable computer, said IC memory card device, and said plurality of connector means
15 respectively.

33. A device as in claim 29 further comprising a modem.

34. A device as in Claim 29, further comprising a floppy disk drive interface for connection to an external
20 floppy disk drive.

35. A device as in Claim 29, wherein said IC memory card device reads and writes customized IC memory cards, said device further comprising a second IC memory card device which reads and write standard format IC memory
25 cards, said first and second IC memory card devices being provided for data transfers between customized and standard IC memory cards.

36. An information storage and transfer device, comprising:

30 a housing;

storage means inside said housing for reading data from and storing data onto a removable storage medium;

5 means mounted on said housing for connecting to a data port of a portable computer;

a plurality of connecting means mounted on said housing for interfacing with peripheral devices and host computers;

10 power supply means receiving power from an external supply for providing power to said portable computer when said portable computer is connected to said means for connecting; and

15 means inside said housing for controlling said information storage and transfer device to effectuate data transfer between said portable computer and alternatively (i) said removable storage medium, and (ii) one of said peripheral devices and host computers.

20 37. A device as in Claim 36, wherein said portable computer is powered by a rechargeable battery and said power supply means recharges said rechargeable battery when said portable computer is connected to said means for connecting.

25 38. A method for providing an information storage and transfer device, comprising the steps of:

providing a housing;

providing an IC memory card device inside said housing for reading data from and storing data onto an IC memory card;

30 providing a connector mounted on said housing for interfacing with a portable computer;

providing a plurality of connecting means mounted on said housing for interfacing with peripheral devices and host computers; and

5 providing means inside said housing for controlling said information storage and transfer device to effectuate data transfer between said portable computer and alternatively (i) said IC memory card, and (ii) one of said peripheral devices and host computers.

10 39. A method as in Claim 38, wherein said step of providing means for controlling comprises the step of providing a microprocessor.

40. A method in Claim 38, wherein said step of providing a housing provides a recessed area for securely
15 accommodating said portable computer, said portable computer when so accommodated is connected to the said information storage and transfer device through said connector.

41. A method as in claim 39, wherein said step of
20 providing means for controlling further comprises the step of providing memory circuits for storing programs enabling said microprocessor to communicate with said portable computer, IC memory card device, and said peripheral devices and host computers through said means for

communicating with said portable computer, said IC memory card device, and said plurality of connector means respectively.

42. A method as in claim 38 further comprising the 5 step of providing a modem.

43. A method as in Claim 38, further comprising the step of providing a floppy disk drive interface for connection to an external floppy disk drive.

44. A method in Claim 38, wherein said said IC 10 memory card device reads and writes customized IC memory cards, said device further comprising a second IC memory card device which reads and write standard format IC memory cards, said first and second IC memory card devices being provided for data transfers between customized and 15 standard IC memory cards.

45. A method for providing an information storage and transfer device, comprising the steps of:

providing a housing;

20 providing storage means inside said housing for reading data from and storing data onto a removable storage medium;

providing means mounted on said housing for connecting to a data port of a portable computer;

providing a plurality of connecting means mounted on said housing for interfacing with peripheral devices and host computers;

5 providing power supply means receiving power from an external supply for providing power to said portable computer when said portable computer is connected to said means for connecting; and

10 providing means inside said housing for controlling said information storage and transfer device to effectuate data transfer between said portable computer and alternatively (i) said removable storage medium, and (ii) one of said peripheral devices and host computers.

46. A method as in Claim 45, wherein said portable
15 computer is powered by a rechargeable battery and said power supply means recharges said rechargeable battery when said portable computer is connected to said means for connecting.

STATEMENT UNDER ARTICLE 19

As amended, Claims 1-28 submitted herewith in the "Letter under Rule 46.5" clearly distinguish Applicant's invention over the references cited in the International Search Report. Newly presented Claims 29-46 are also believed patentable over the references recited in the International Search Report. These new claims and amendments find support throughout Applicant's Specification and drawings. No effect upon the Specification and the drawings is seen in these amendments.

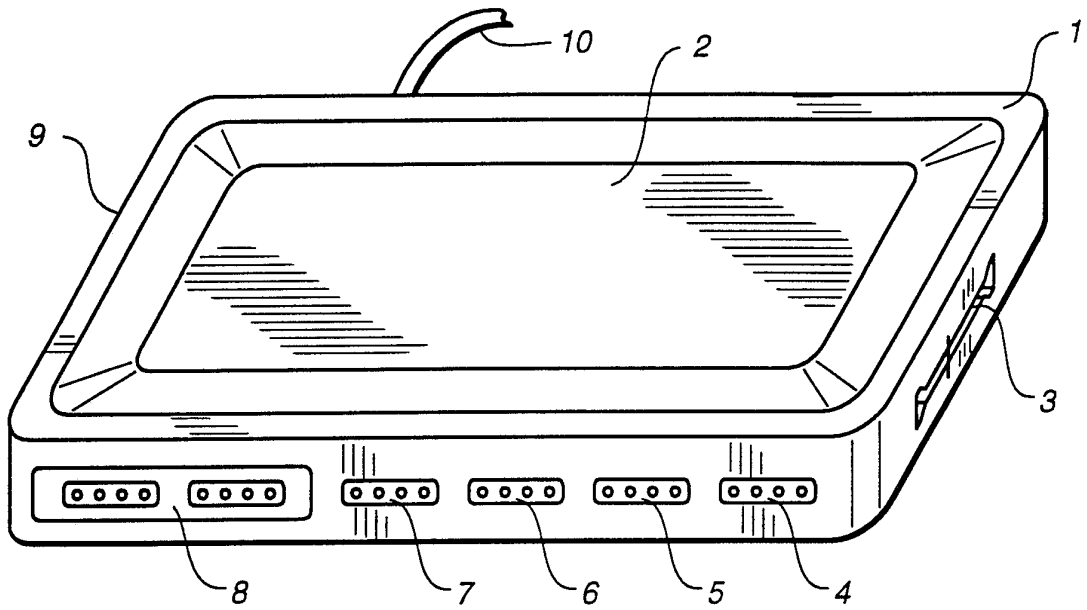


FIG. 1

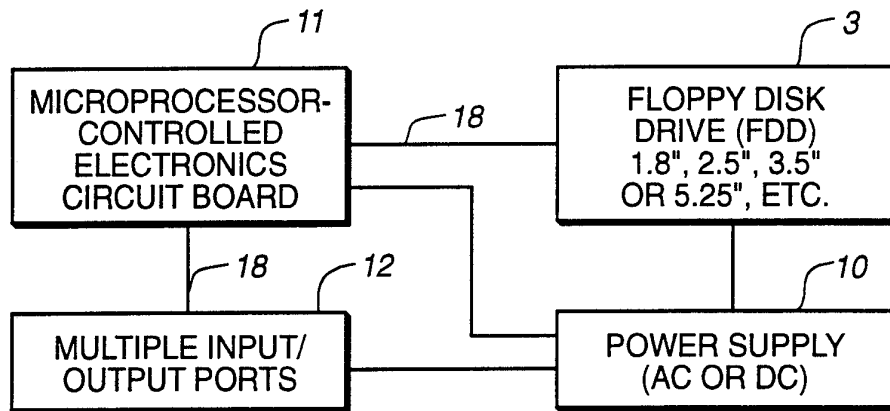


FIG. 2

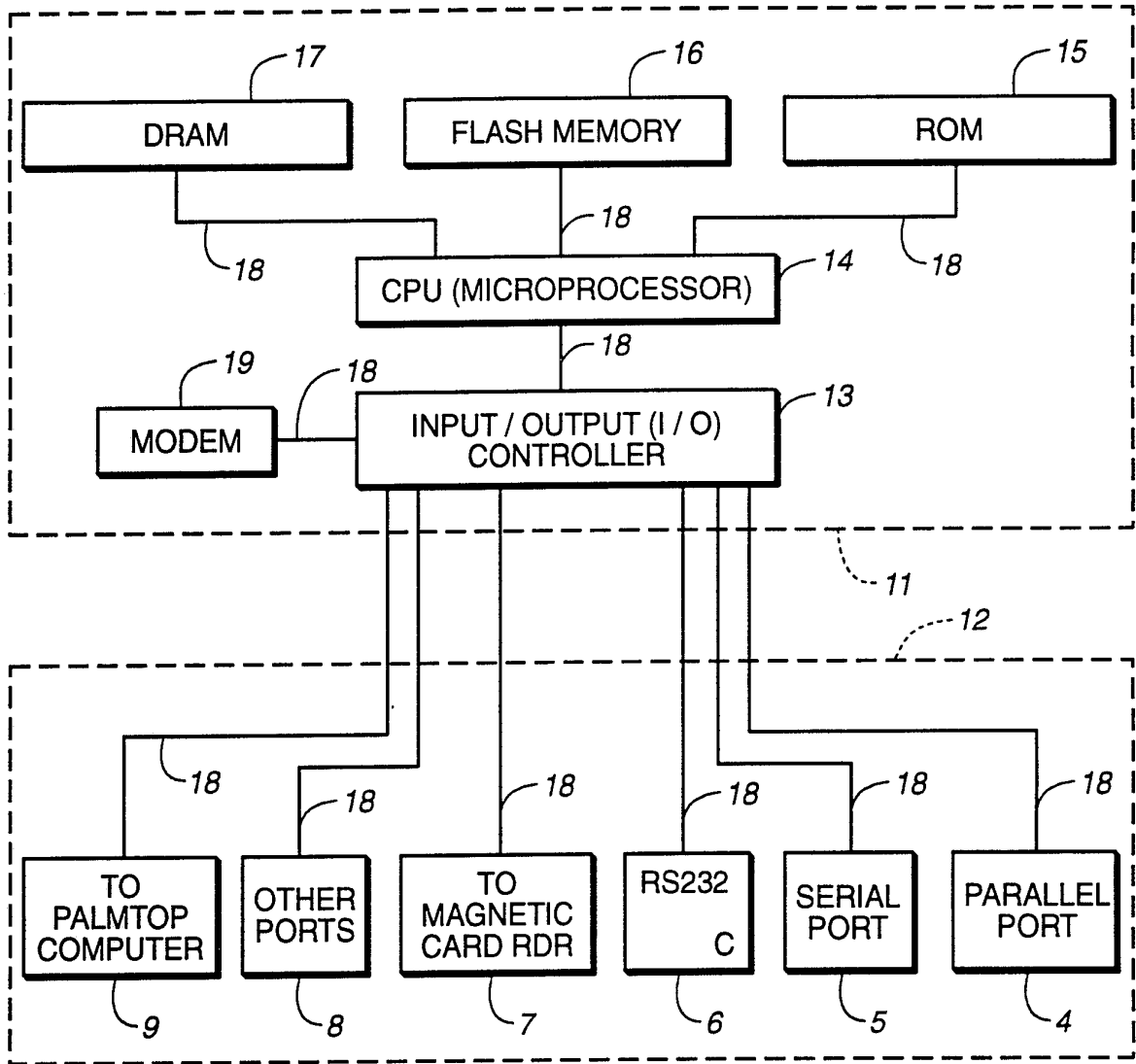


FIG. 3

INTERNATIONAL SEARCH REPORT

PCT/US92/09088

A. CLASSIFICATION OF SUBJECT MATTER
 IPC(5) :G06F 13/00
 US CL :395/275
 According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
 Minimum documentation searched (classification system followed by classification symbols)
 U.S. : 395/275

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US,A, 4,819,151 (May) 04 April 1989 See Fig. 1; Fig. 11.	1-28
Y	US,A, 4,982,324 (McConaughy et al.) 01 January 1991 See Fig. 2.	1-28

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be part of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 29 DECEMBER 1992	Date of mailing of the international search report 19 JAN 1993
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