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13 UNITED STATES DISTRICT COURT
14 SOUTHERN DISTRICT OF CALIFORNIA

16 RICHARD J. DITZIK,
an individual
17 *Plaintiff,*

18 v.

19 PANASONIC CORPORATION OF
NORTH AMERICA,
20 a Delaware corporation,

21 *Defendant.*

Case No.

'09 CV 1661 JAH NLS

COMPLAINT FOR DECLARATORY
JUDGMENT AND DEMAND FOR JURY
TRIAL

FILED

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CLERK US DISTRICT COURT
SOUTHERN DISTRICT OF CALIFORNIA

BY YNY DEPUTY

1 **I. NATURE OF THE ACTION**

2
3 1. This is an action in law and equity for declaratory judgment of ownership
4 and to quiet title to seven United States patents rightfully belonging to the plaintiff Richard Ditzik
5 ("Ditzik").

6 2. The seven patents at issue are U.S. Patent Nos. 5,983,073, 6,167,376,
7 6,421,235, 6,415,256, 6,970,678, 7,103,380 and 7,509,142 (collectively "the Ditzik Patents,"
8 attached as Exhibits A-G).

9
10 **II. THE PARTIES**

11
12 3. Plaintiff, Richard Ditzik, is an individual, having a residence located at 307
13 Surrey Drive, Bonita, California 91902.

14 4. Upon information and belief, defendant Panasonic Corporation of North
15 America ("Panasonic North America") is a Delaware corporation having its principal place of
16 business at 1 Panasonic Way, Secaucus, NJ 07094.

17
18 **III. JURISDICTION AND VENUE**

19
20 5. Ditzik brings this action under Title 35 of the United States Code, and under
21 28 U.S.C. § 2201, to obtain a declaration of patent ownership with respect to the Ditzik Patents.

22 6. This Court has subject matter jurisdiction under 28 U.S.C. § 1332 as there is
23 diversity of citizenship between the parties and the amount in controversy exceeds \$75,000.

24 7. This Court also has subject matter jurisdiction under 28 U.S.C. §§ 1331 and
25 1338(a) because this action arises under the Patent Laws of the United States.

26 8. Venue in this judicial district is proper under 28 U.S.C. § 1391.
27
28

1 **IV. BACKGROUND FACTS**

2
3 9. On May 1, 1996, Ditzik became an employee of Panasonic AVC Network
4 Systems (then known as Matsushita Television Company), a wholly owned subsidiary of
5 Panasonic (collectively be referred to as "Panasonic").

6 10. Prior to joining Panasonic, Ditzik conceived of the inventions disclosed and
7 claimed in the Ditzik Patents.

8 11. Ditzik was an employee of Panasonic from May 1, 1996 to April 17, 2006,
9 working exclusively on television technology.

10 12. Ditzik filed several applications for patents on wireless and notebook
11 computer technology which eventually issued as the Ditzik Patents. Ditzik filed and prosecuted
12 these patents, but on his own time, and not during work hours at Panasonic, and without the use of
13 Panasonic information or tools.

14 13. While Ditzik believes that others are infringing Ditzik Patents and wants to
15 enforce those Ditzik Patents against those infringers, Ditzik is concerned that Panasonic may claim
16 an ownership interest in the Ditzik Patents by virtue of the fact that Ditzik was employed by
17 Panasonic when the Ditzik Patents were filed, prosecuted, and/or issued.

18 14. All patent owners need to be named in an infringement lawsuit for proper
19 standing. Thus, an adverse ownership claim made by or on behalf of Panasonic would adversely
20 affect a lawsuit by Ditzik for infringement of the Ditzik Patents.

21 15. Each owner of a patent has the right to license its rights in the patent to a
22 third party. Thus, an adverse ownership claim made by or on behalf of Panasonic could also
23 adversely affect a lawsuit by Ditzik for infringement of the Ditzik Patents.

24 16. Accordingly, counsel for Ditzik contacted counsel for Panasonic in order to
25 clear up any potential ownership issues.

26 17. In a telephone conference between Ditzik's counsel and counsel for
27 Panasonic, held in early March 2009, Panasonic represented that at that time it would not contest
28 Ditzik's ownership of the Ditzik Patents.

1 18. In an e-mail dated March 19, 2009, counsel for Ditzik informed counsel for
2 Panasonic that such a representation would not be adequate because, when Ditzik seeks to enforce
3 the Ditzik Patents against an infringing party, that infringing party could assert that Panasonic has
4 a right in the patents and that may affect Ditzik's standing to sue for infringement. (Exhibit H)

5 19. In an e-mail dated April 7, 2009, counsel for Panasonic indicated that as a
6 matter of policy that it was unable to either acknowledge Ditzik's exclusive ownership of the
7 Ditzik Patents or assign any right and title that it may have in the Ditzik Patents to Ditzik.
8 (Exhibit I)

9 20. On June 2 2009, counsel for Ditzik sent a letter to Panasonic listing the
10 Ditzik Patents and seeking an agreement that the Panasonic would not claim any right, title or
11 interest in any of the Ditzik Patents due to Ditzik's employment with Panasonic AVC. (Exhibit J)

12 21. On June 22, 2009, in a telephone conference, counsel for Panasonic, Bob
13 Marin, told counsel for Ditzik, John Halan, that Panasonic is claiming an ownership interest in the
14 Ditzik Patents.

15 22. On June 23, 2009, counsel for Panasonic, Bob Marin, wrote a letter to
16 Ditzik's counsel, stating in pertinent part as follows: "Panasonic reserves its right to contest Mr.
17 Ditzik's ownership of, and make a claim of ownership with respect to, any patents that may be
18 subject to the Patent Rights and Confidentiality Agreement executed by Mr. Ditzik on May 1,
19 1996, including but not limited to any of the patents you listed in your June 2, 2009 letter."
20 (Exhibit K).

**V. COUNT I: DECLARATORY JUDGMENT
OF PATENT OWNERSHIP AND QUIET TITLE**

23. Ditzik incorporates by reference the allegations of paragraphs 1-22.

24. Panasonic claims an ownership interest in the Ditzik Patents.

25. Ditzik desires to enforce Ditzik Patents against alleged infringers.

26. Ditzik's enforcement of Ditzik Patents would be interfered with if a defendant raises the defense of lack of standing claiming that Panasonic has an ownership interest in the patents.

27. Ditzik's enforcement of Ditzik Patents would be interfered with if Panasonic licenses its alleged ownership interest in the Ditzik Patents to a third party accused of infringement by Ditzik, whether or not Panasonic is later found to be entitled to do so.

28. An actual and justiciable controversy over the ownership and title of the Ditzik Patents currently exists between Ditzik and Panasonic.

29. Ditzik will suffer hardship if judicial consideration is withheld.

30. Ditzik requests a judicial determination of its rights and a declaration that it is the true and proper owner of all legal and equitable right, title and interest in the Ditzik Patents.

1 **VI. DEMAND FOR RELIEF**

2
3 WHEREFORE, plaintiff Ditzik requests entry of a judgment against Defendant,
4 granting relief as follows.

5 A. A declaration that Ditzik, at all times has been the legal and equitable owner
6 of all right, title and interest in the Ditzik Patents and the subject matter thereof;

7 B. A declaration that Ditzik, continues to be the legal and equitable owner of
8 all right, title and interest in the Ditzik Patents and the subject matter thereof;

9 C. An injunction that defendant shall not represent to others that it has any
10 ownership or title in the Ditzik Patents;

11 D. Reasonable attorneys fees and costs incurred in bringing the present action;
12 and

13 E. Granting such other, further and different relief as may be just and equitable
14 on the proofs.

VII. DEMAND FOR JURY TRIAL

Plaintiff Ditzik demands trial by jury for all issues so triable.

Dated: July 31, 2009

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By 

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RICHARD J. DITZIK



US005983073A

United States Patent [19]**Ditzik**[11] **Patent Number:** **5,983,073**[45] **Date of Patent:** **Nov. 9, 1999**

[54] **MODULAR NOTEBOOK AND PDA
COMPUTER SYSTEMS FOR PERSONAL
COMPUTING AND WIRELESS
COMMUNICATIONS**

5,659,890 8/1997 Hidaka 455/575
5,675,629 10/1997 Raffel et al. 455/561
5,701,515 12/1997 Gradelier 395/834

[76] **Inventor:** **Richard J. Ditzik, 3143 Carnegie Ct.,
San Diego, Calif. 92122**

[21] **Appl. No.:** **08/832,923**

[22] **Filed:** **Apr. 4, 1997**

[51] **Int. Cl.:** **H04B 7/15**

[52] **U.S. Cl.:** **455/11.1; 455/556; 455/557;
455/569**

[58] **Field of Search** **455/11.1, 556,
455/557, 575, 568, 572, 90, 569; 364/705.05**

[56] **References Cited****U.S. PATENT DOCUMENTS**

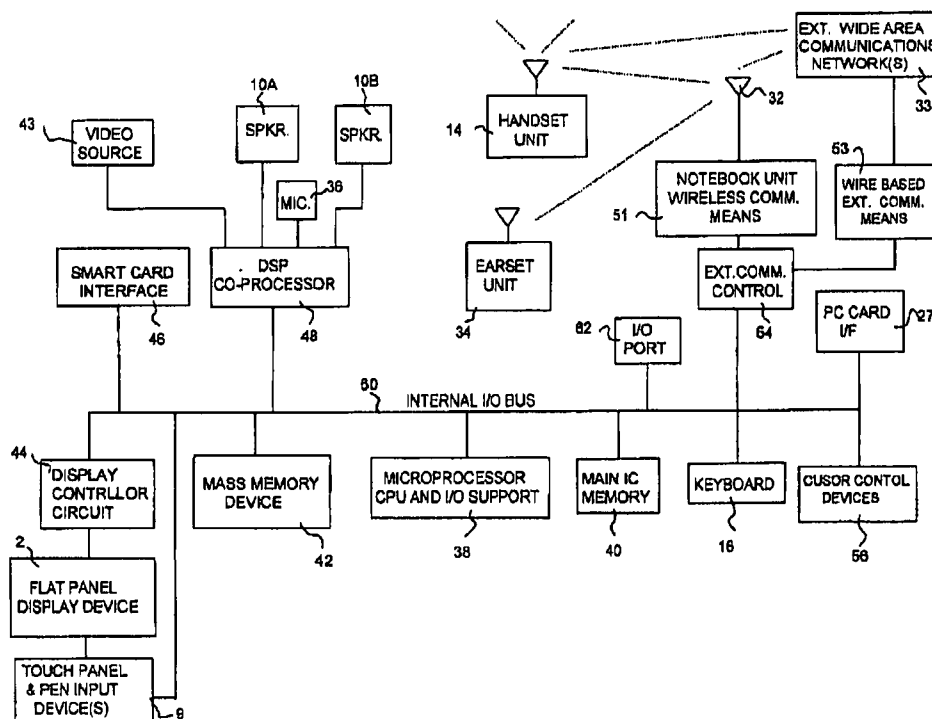
5,008,927	4/1991	Weiss et al.	379/364
5,127,041	6/1992	O'Sullivan	455/557
5,189,632	2/1993	Panjanen et al.	364/379
5,196,993	3/1993	Herron et al.	361/248
5,200,913	4/1993	Hawkins et al.	364/340
5,327,486	7/1994	Wolf et al.	379/379
5,440,449	8/1995	Scheer	361/686
5,459,458	10/1995	Richardson et al.	340/364
5,490,284	2/1996	Itoh et al.	455/11.1
5,570,389	10/1996	Rossi	455/557
5,592,491	1/1997	Dinkins	455/11.1
5,628,055	5/1997	Stein	455/90
5,634,080	5/1997	Kikinis et al.	455/575

Primary Examiner—Edward F. Urban

[57] **ABSTRACT**

A small light weight modular microcomputer based computer and communications systems, designed for both portability and desktop uses. The systems make use of a relative large flat panel display device assembly (2), an expandable hinge device (10), battery power source (9), keyboard assembly (16), and wireless communications devices (32, 51). The systems are capable of bi-directional realtime communications of voice, audio, text, graphics and video data. Both wire-based or wireless communications methods and devices are implemented. Wireless communications devices may include one or more telephone-like handsets (14) and/or earset (34). The wireless communication devices may include one or more antennae (32). Systems can be configured in a portable arrangement similar to conventional notebook computers, but can be quickly and easily disassembled and re-assembled for office desktop uses. Systems may consist of a base computer unit (100) comprising wireless communication devices may act as a relay station relaying voice and other data between the handset or earset and external wide area communications networks. The system may be capable of performing, personal digital assistant (PDA), cellular telephone, conventional notebook computer, desktop computer functions.

9 Claims, 9 Drawing Sheets



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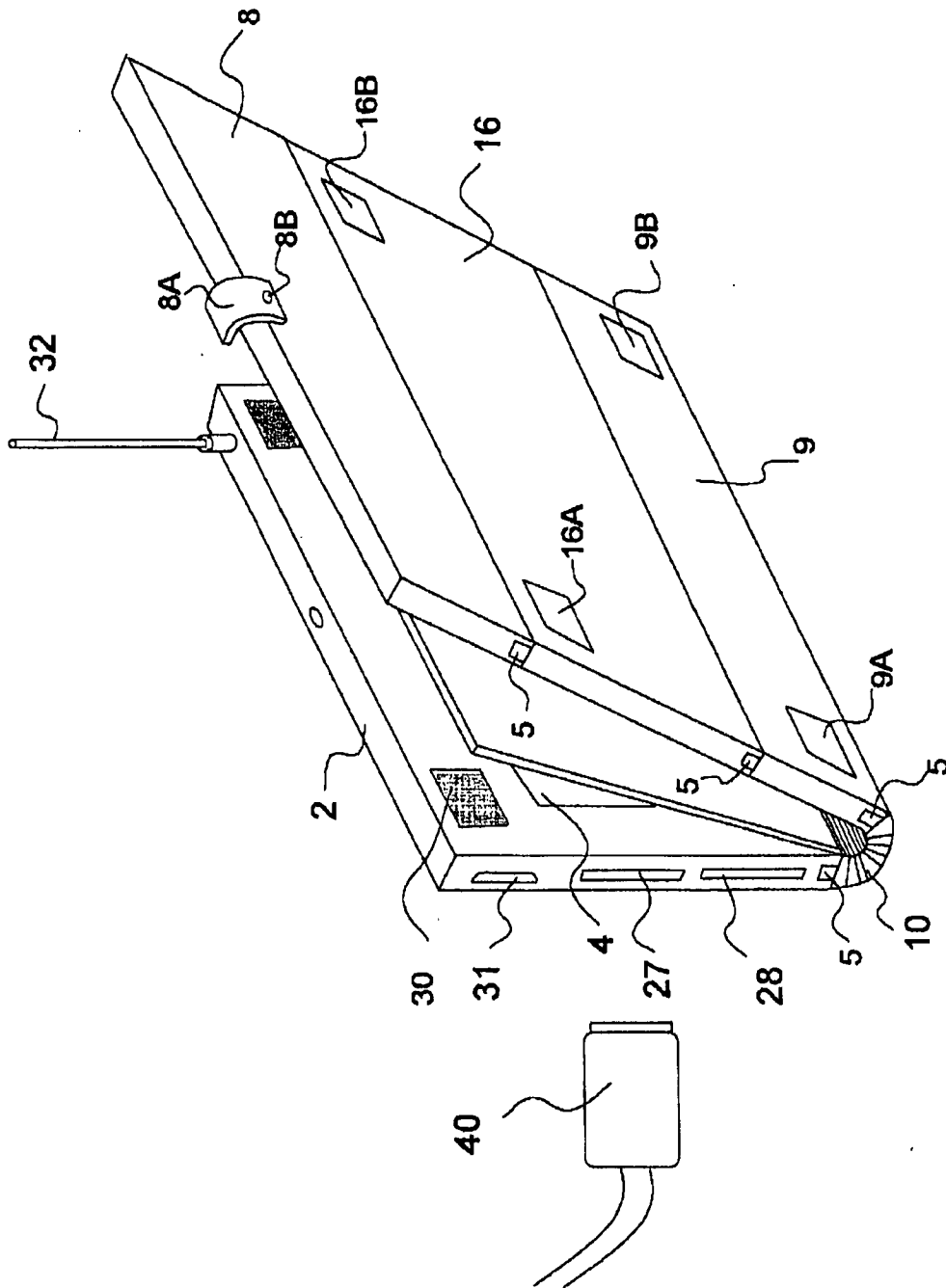


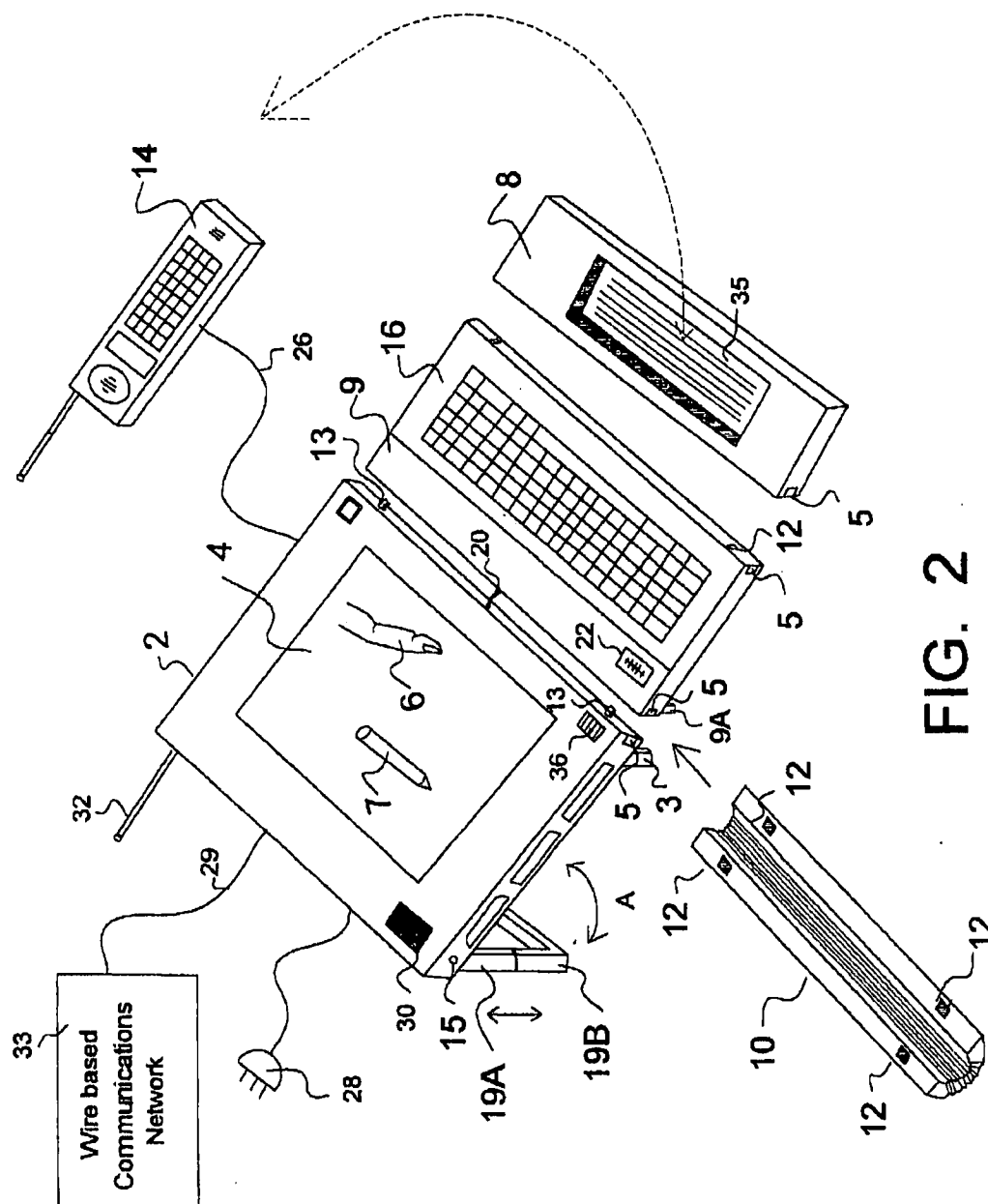
FIG. 1

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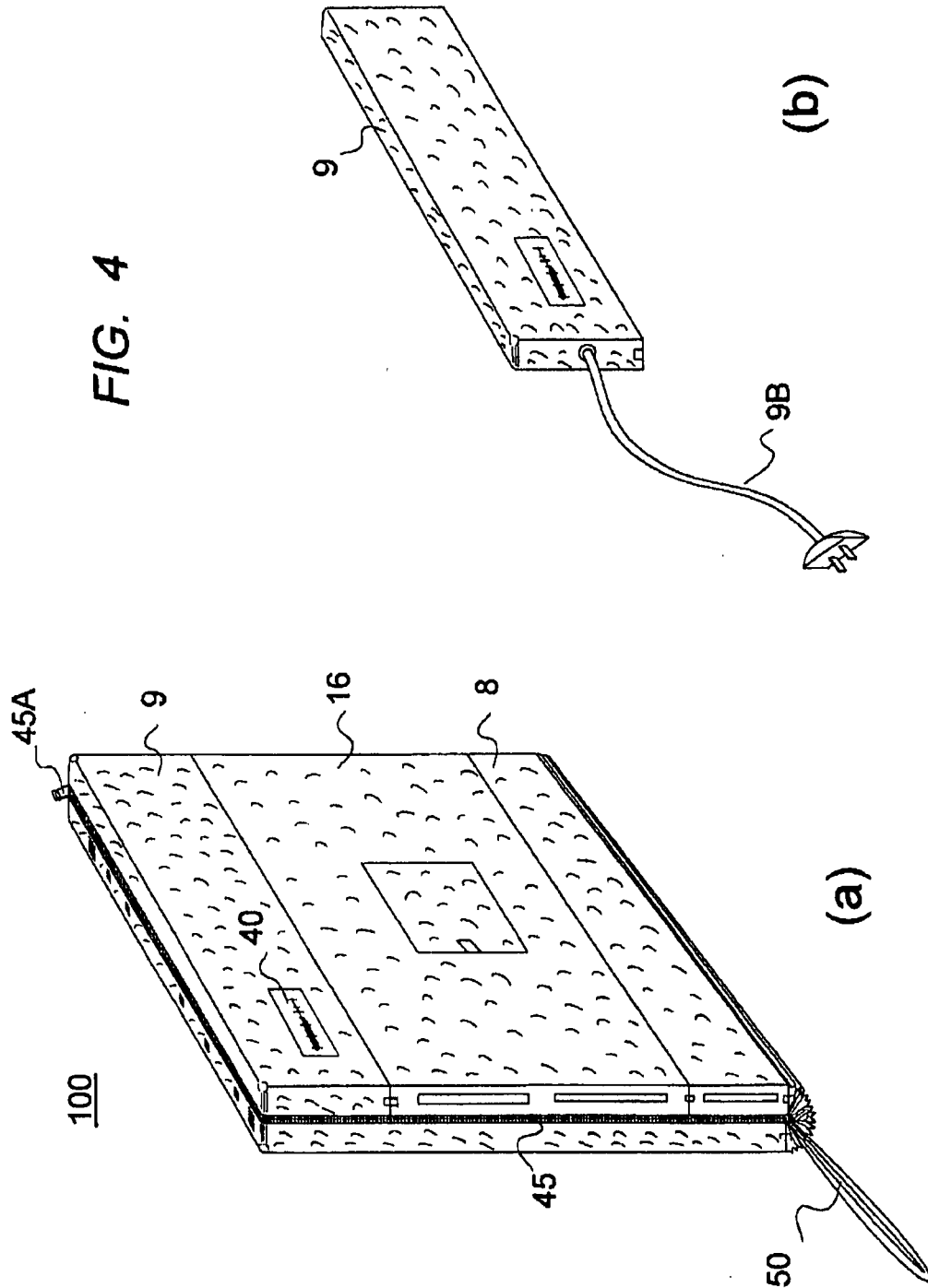
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FIG. 4



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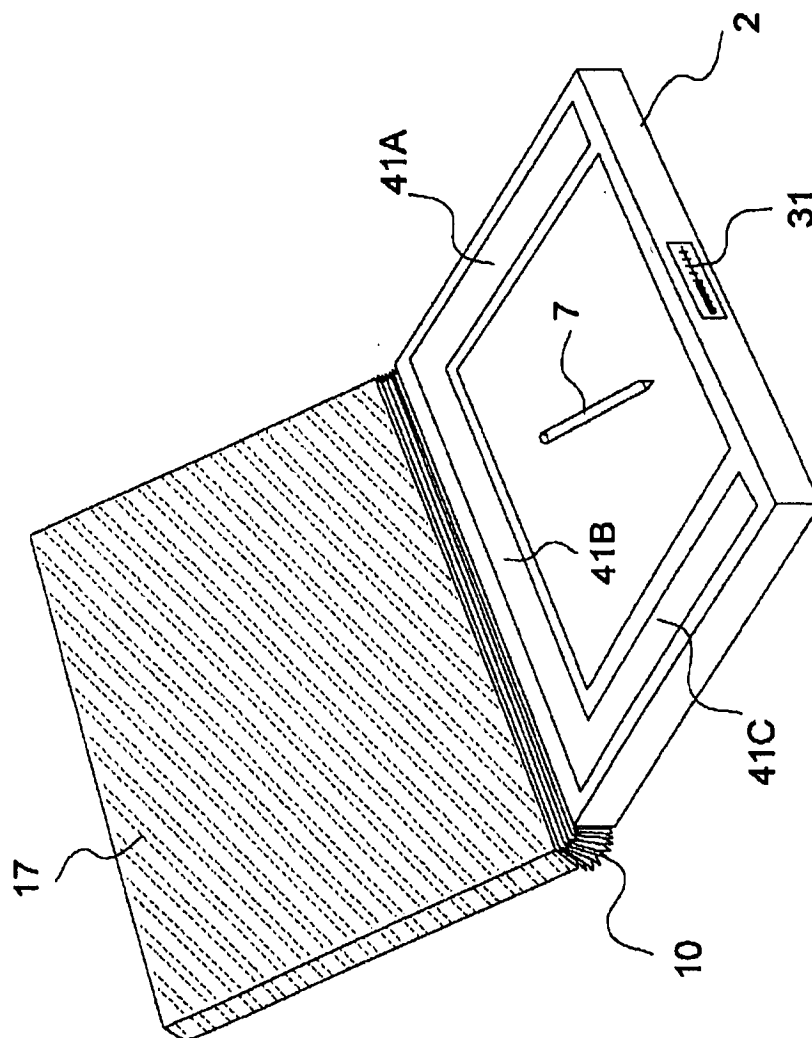


FIG. 5

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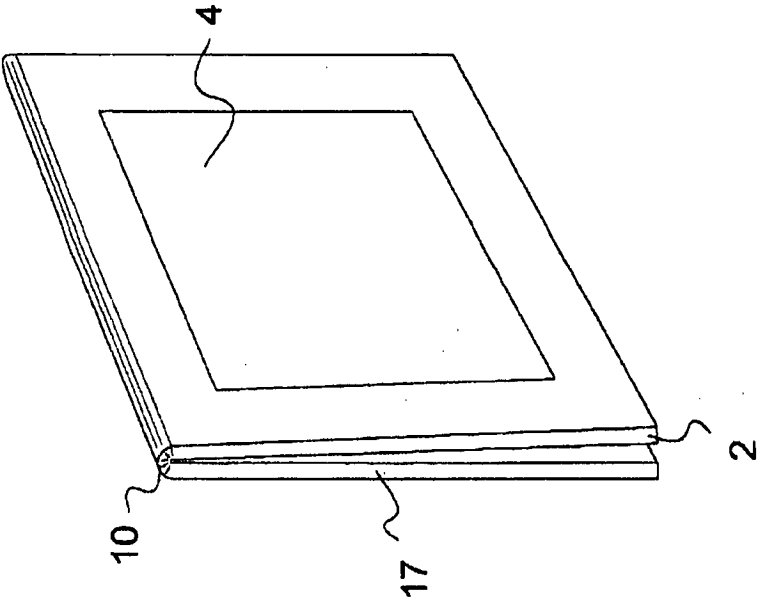


FIG. 6B

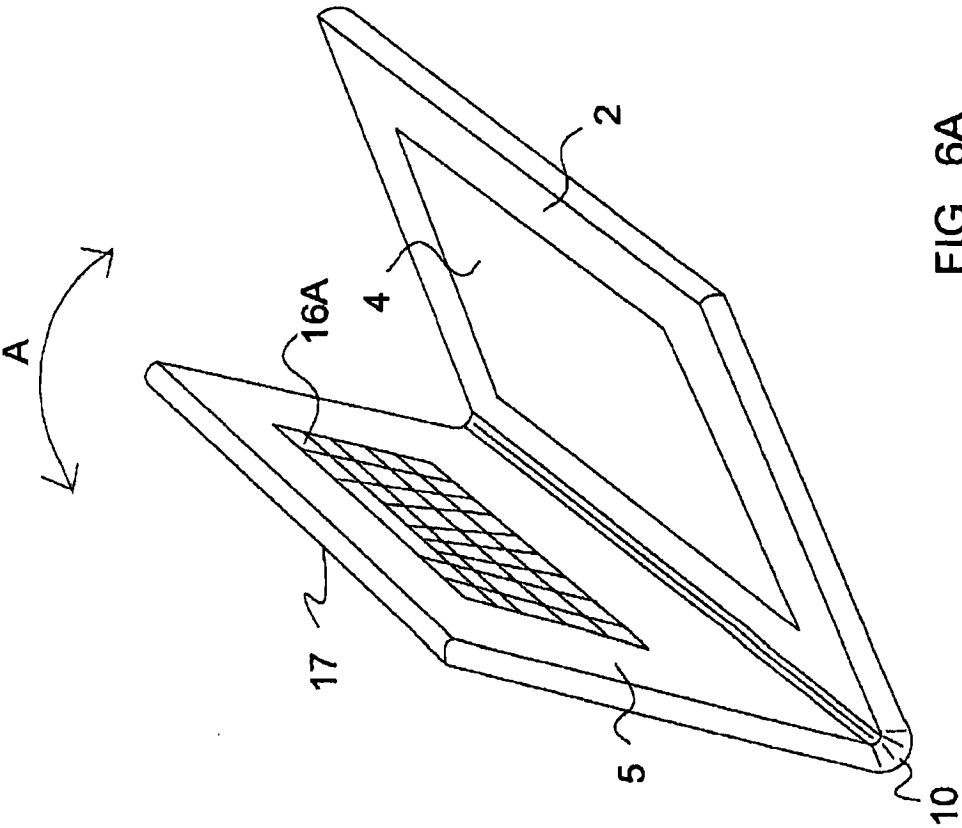


FIG. 6A

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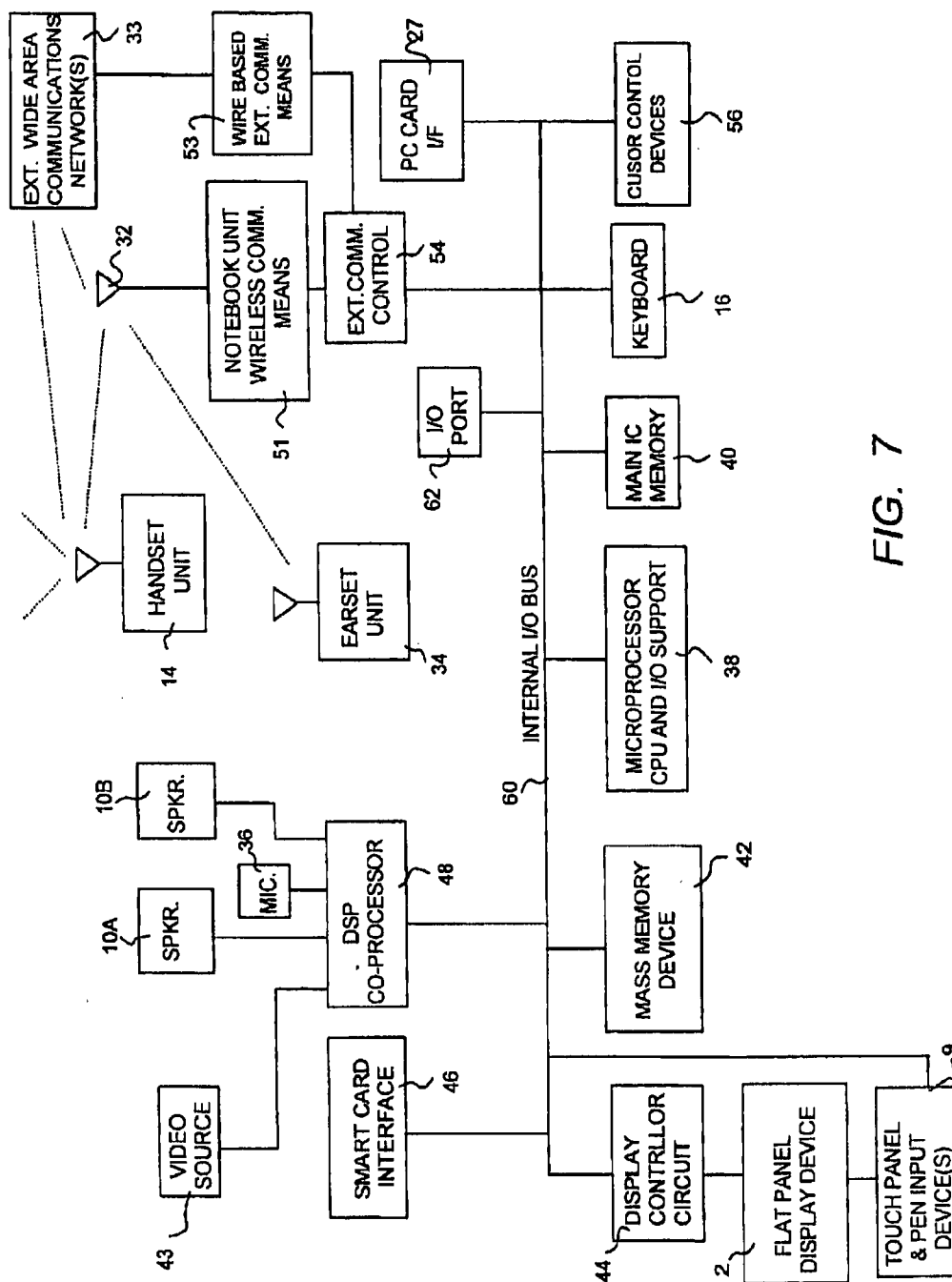


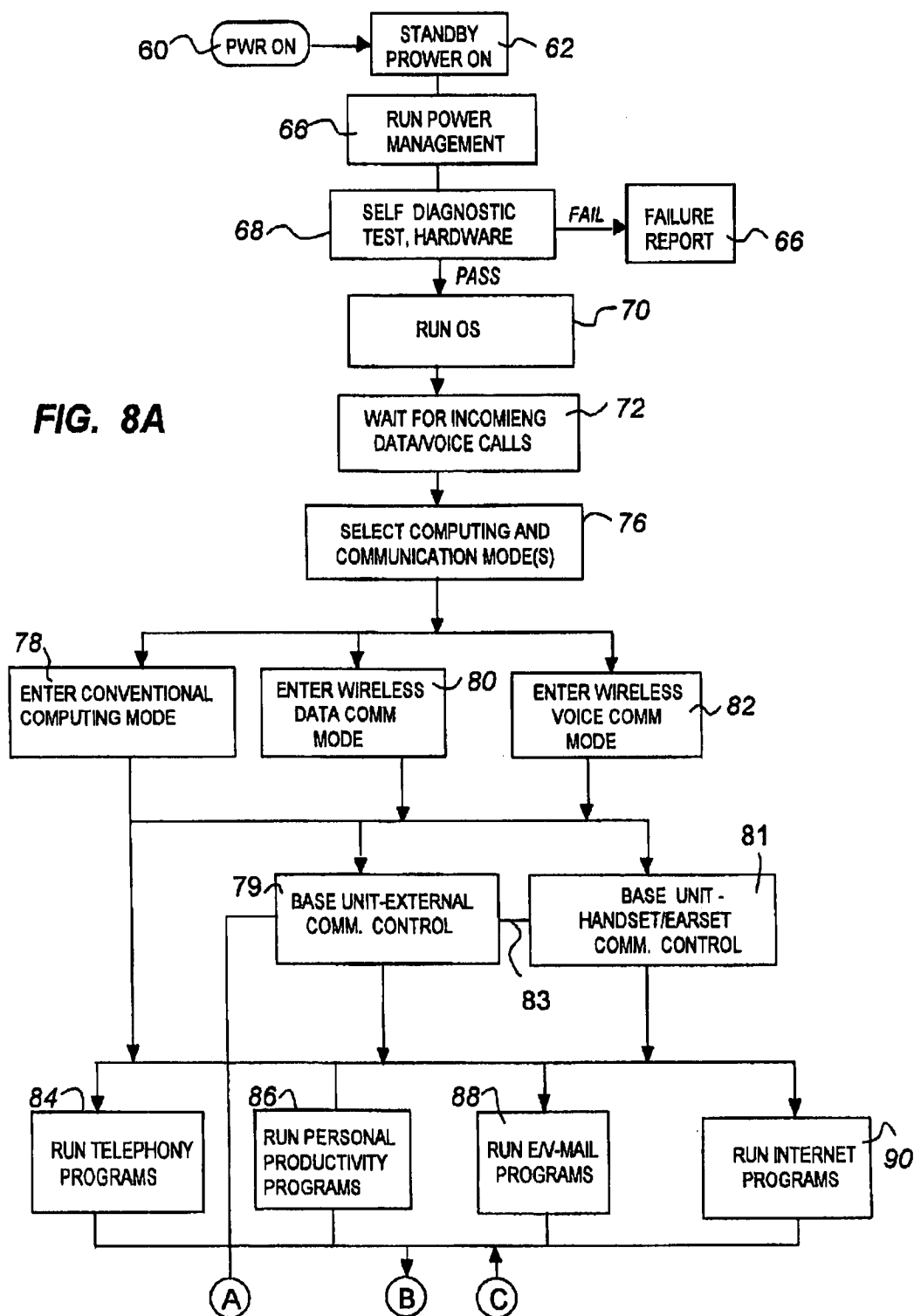
FIG. 7

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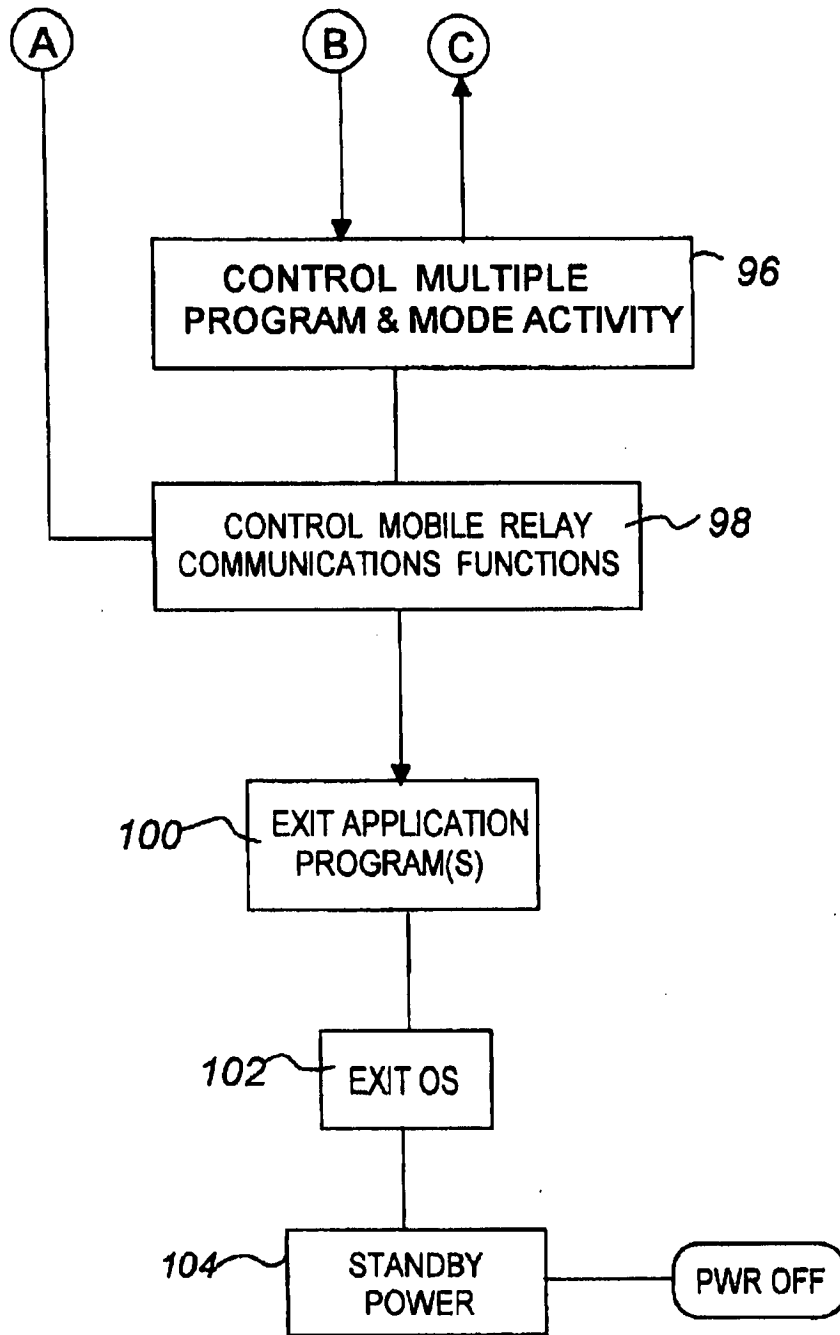


FIG. 8B

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**MODULAR NOTEBOOK AND PDA
COMPUTER SYSTEMS FOR PERSONAL
COMPUTING AND WIRELESS
COMMUNICATIONS**

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to portable personal computer systems with external communication means, which can be used by an individual in both desktop and mobile environments. The computer system involves a relatively large color flat panel display, conventional microcomputer system, and a plurality of human interface means. In particular, it relates to a computer unit, having a light weight thin notebook-like computer structure that is capable of performing personal digital assistants (PDA) like functions and wireless external communications of voice, text, graphic and image data.

2. Description of Prior Art

There are several shortcomings with prior art notebook computers, PDAs and wireless telephone units. Notebook computers have a relatively large flat panel display device, a full alphanumeric keyboard and battery power. PDAs are small handheld units with a small LCD display, small key pad and touch pen. PDAs are designed to be placed in one's pocket or purse for maximum portability. A problem arises when customers desire large high resolution color display for both portable and desktop applications. To use a computer system for both portable and desktop uses, the customer must purchase multiple systems. The cost of color flat panels are still too expensive for most customers to by two display monitors, one display for desktop and one for the portable applications. Many customers require functionality of a desktop computer, notebook computer and PDA, but it is much too expensive to purchase multiple CPUs, displays, and keyboards.

U.S. Pat. No. 5,189,632 of Paajanen et al disclosed a handheld computer unit with an antenna and wireless RF communication capability, small flat panel display and a keyboard, in a partial clam shell type structure. However, they do not teach expandable hinge means, base station for handset relay functions, or cover latching function. U.S. Pat. No. 5,327,486 of Wolff et al teach a conventional laptop computer with antenna and RF communications to a radio network and local exchange telephone network. However, they fail to teach expandable hinge means, edge hinge means, handset means or base station relay functions. U.S. Pat. No. 5,459,458 of Richardson et al teach a virtual pager and data terminal system. However, they do not teach notebook like computers, base unit station or personal/PDA computing. U.S. Pat. No. 5,008,927 of Weiss et al teach a computer and telephone system with a display screen on a conventional telephone structure keyboard unit. However they fail to teach notebook like structure, wireless communication or handset relay functions. U.S. Pat. No. 5,196,993 of Herron et al teach a laptop computer with a removable flat panel display with built-in support feet for desktop support. However, they fail to teach expandable hinge means, exterior communications functions, cover latching functions or computer display assembly. U.S. Pat. No. 5,200,913 of Hawkins et al teach a laptop computer with flat panel display and pen input means. However, they fail to teach expandable hinge means, edge mounted hinge or latching functions.

Wireless hand held computer devices, such as cellular and Personal Communication System (PCS) telephones, have limited display capabilities. Prior art wireless computer units have display screens that are small (1.5-2.5" diameter), and

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they lack interactive capabilities to be successful for text, graphic and video applications. Some prior art notebook and laptop computers have integrated wireless communication means, but they are too large and bulky to be successful for in mobile uses. Prior art wireless devices do a poor job of providing voice, data and video communication functions. Typical wireless computer systems have display screens that are too small and have limited computing power. Prior art laptop and notebook computers are too heavy to carry for long periods. Inventions herein solve these problems by embodying a unique relatively thin notebook-like computer system that is capable of: being: (1) opened like a notebook, (2) quickly disassembled and re-assembled, (3) used for handset/earset communications relay operations and (4) used in a wide variety of computing, collaboration, communications and conferencing applications.

Inventions described herein are based on several Disclosure Documents submitted to the U.S. Patent and Trademark Office, including Document Nos. 353691, 363753, 368165, and 377365. Inventions herein solve several prior art shortcomings, resulting in new modular integrated computer systems. The inventions as described below can be quickly configured to desktop, notebook, wireless and/or PDA embodiments. Thus, the user will be able to purchase a single computer system and pay much less money than conventional systems.

SUMMARY OF THE INVENTION

An object of this invention is to provide a modular multiple function display-computer system, where one can use the same relatively high resolution color flat panel display in both a desktop and mobile environments.

Another object of this invention is to provide means to reduce the cost to the customer of owning several expensive computer systems, by combining in one system the capability of performing both office desktop and portable/mobile computing and communications applications. Thus the invention herein saves the user the expense of purchasing separate computer systems for desktop uses, notebook computer uses, PCS uses and PDA uses.

Still another object of this invention involves means to quickly configure a modular notebook or PDA-like computer system into a plurality of system configurations for personal computer and wide area communication operations.

Another object of this invention is to provide for a relatively thin and light weight computer unit to be carried under one's arm in a notebook-like fashion, yet have sufficient computing power to execute a wide range of conventional computer and communications applications.

Still another object of this invention is to provide for bi-directional communication of voice, audio, text, graphics, image and/or video data to wide area communications networks where one or more users may communicate with other users with appropriate apparatus. The communication may realtime or store forward type communications.

Another object of this invention involves hardware and program software to control cellular or PCS communications, combined with a light weight mobile notebook or PDA like unit. The unit or system would act as a computing platform and base communications relay station. The system or unit may then relay voice and data to/from a handset unit or earset unit, where the base unit relays the this voice and data information to/from a wide area communication network.

Still another object of this invention involves means for quick disconnection or disassembly and subsequent connection.

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tion or assembly of key component of the system, such as battery power unit, communication adapters (modems) and/or wireless telephone units.

A still further object of this invention is to use the same display-computer system assembly, comprising of relatively large high resolution color flat display panel and a powerful CPU with large memory, etc., and combining them in a modular fashion with a thin keyboard, battery power source, modem, and wireless communications means.

Another objective of this invention is to provide means for integrated telephony functions on a portable computing platform, with powerful microprocessors running Windows operating systems for a wide range of computing and communication functions.

A still further objective of this invention is to provide for full Internet access on a wireless mobile platform, where the user can access the world wide web and execute most of the available Internet browser functions and plug-ins. The computer system would be capable of performing most of the Internet data access, download, upload and conferencing functions.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a perspective view of a portable computer with a notebook clamshell-like structure.

FIG. 2 shows a perspective view of a modular portable computer system in desktop configuration.

FIG. 3(a) shows a notebook like portable computer in an open state.

FIG. 3(b) shows the notebook like computer in a closed state.

FIG. 3(c) shows a handset telephone unit and earset unit.

FIG. 4(a) shows a notebook or portable computer with a protective covering material.

FIG. 4(b) shows an electrical power source unit.

FIG. 5 shows a PDA like unit with a roughly transparent cover half.

FIG. 6(a) shows a notebook or PDA in a partial open state.

FIG. 6(b) shows the notebook or PDA in a reversed open state.

FIG. 7 shows block diagram of the computer system and associated elements.

FIG. 8 shows a flow diagram of the computer system programs and operations.

DETAILED DESCRIPTION

FIG. 1 shows a computer system, to be operated by a person or user, where the unit has a conventional notebook clamshell-like structure. The computer system as used herein can also be referred to as a portable computer system, computer-display unit or base unit, and shall also include the terms: personal computer, notebook computer, sub-notebook computer or Personal Digital Assistant (PDA). The computer system as disclosed herein typically comprises of a flat panel display assembly 2, which includes a display panel and screen 4 and other components described below. An expandable hinge means 10 connects the flat panel display assembly and cover assembly (8, 9 and 16). Expandable hinge means 10 may be embodied many ways including using flexible material that is corrugated, having its grooves running parallel to the edge of the notebook structure. Cover assembly may consist of two or more sections, such as a first cover section 8, second cover section 9, and a keyboard section 16. One or more of the cover sections may be quickly

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disassembled from each other by the user. To avoid accidental disassembly, means may be embodied where the user must simultaneously press two push buttons 5, for example one on each side of the structure, in order to disconnect the sections. The portable portable computer system may also have an inside protective sheet member 4A attached to the inside the fold of the computer system. FIG. 1 shows a partially open notebook-like structure, but it may be closed all the way shut and secured, by a securing strap means 8A. This strap means may be secured to the other side of the display assembly 2 by Velcro like strips, for temporary securing and un-securing, with one's fingers. One purpose of this foldable embodiment is to provide the computer user with a handy portable notebook computer that: (1) when closed, one can easily carry, cradled in one hand under one's arm, and (2) easily opened for access to the computer indicators and controls.

The flat panel display assembly 2 may be a monochrome or color liquid crystal displays (LCD), such as those manufactured by Sharp Electronics, NEC Electronics, Toshiba Corporation or others. The display panels screen sizes may be 10 to 14 inches or more in diameter. The display pixel arrays may be 640 by 480 (VGA), 800 by 600 (SVGA), or 1024 by 768 (XGA). Color depth should be six bits, and the response time should be 45 to 50 milliseconds ($t_{on} + t_{off}$). Brightness of the screen should 70 Cd/m² and contrast ratio be at least 100:1, where 250:1 is preferred.

LCD panels from Sharp Electronics may be used in the embodiments. Applicable LCD Models include LQ11DS01, LQ12DS01, LQ12DX01 and LQ12X12. These panels have screen sizes of either 11.3 or 12.1 inches measure along their diagonal. Each panel is capable of a color depth of 6 bits/sub-pixel, a response time of 80 ms, brightness of 70-150 cd/m² and a contrast ratio of 100:1. LCD panels from NEC may also be used, such as NL10276BC24-04, NL8060BC31-02, NL8060BC31-01, and NL8060BC29-01. These panels are capable of 6 bit color depth, 50 ms response time, 70 cd/m² brightness and 150:1 contrast. Toshiba panels that may embodied include: LTM11C016, LTM12C236, or LTM12C25S, which are capable of 50 ms response, 70 cd/m² brightness and 100:1 contrast. Manufactures references and manuals for each are hereby incorporated by reference.

Several I/O slots and/or connectors may be embodied at one or more edges of the flat panel display assembly 2. FIG. 1 shows access slots to a floppy disk 28, external communication means 27, printer connector 31. Other external connection means may be embodied. Several connector means may be embodied, including auxiliary video connector, COM ports, and/or mouse/game ports. PCMCIA PC card 40 may be included for adding fax/modem, network interface (wire or wireless) external communications and/or added memory. An integrated built-in transmitter receiver and a retractable antenna 32 may be embodied, for example to the flat panel display assembly 2. The antenna and associated RF transceiver may be used for wireless communications to/from an external communication network. Many of the well-known notebook computer or personal computer I/O devices may be embodied.

An important feature of this embodiment is the dimensions of the computer-display unit. It may be made conveniently larger than a 8.5x11 inch sheet of paper, so that one can place one or more sheets of paper (or other relatively thin flat objects) inside the closed clamshell like notebook structure in a folding or latching fashion. The user can safely carry papers from location to location without folding or wrinkling them. Thus the unit can act as a carrying device as

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well as a notebook computer. The outside surfaces and edges of notebook computer may be covered with leather, vinyl of other type of soft material, for easy of hand carrying and surface protection. Other parts may be embodied including foldable short legs 9A and 9B, keyboard resting pads 16A and 16B, built-in audio speaker(s) 30.

FIG. 2 shows the portable computer with several parts detached or disassembled. This embodiment may be used in desktop computer system environments. The flat panel display assembly 2 may be placed at an inclined angle, with foldable leg support means 19A and 19B, the leg support means may fold relatively flush to the backside of the assembly 2 (motion range A) when not in use, via a simple hinge 15. Vertical portions 19A and 19B may slide in and out, in a telescoping type arrangement, to allow wide range inclination angles. A pair of short legs 3 may be placed near the front of assembly 2 that may also fold relatively flush with the back of the assembly. Means may be included to place the screen at a vertical orientation. A pen or stylus input means may be associated with the display screen 4. The pen or stylus means may include finger input (touch panel) means, where one can write or point to area on the display screen. The expandable hinge means 10 may be removed from the assembly 2 and from the cover section 9 by a quick disconnect or disassembly means 5. Alternatively, the hinge means may be fixed to parts 2 and 9. The hinge means may be made of a relatively flexible material, such as leather and vinyl. It may be corrugated as shown in the figure so it can bend easily and expand, as required. The hinge may have a number of attachment slots 12 for the quick disattachment or disconnection from hook mechanisms 13. FIG. 2 shows the flexible hinge means 10 removed from the other assemblies.

Cover section 9 may contain a battery power unit containing one or more batteries and power circuit elements. The battery power unit may be embodied with several types of batteries, including Lithium-ion or NiCd batteries. The power unit may be a self contained battery package, having an easy to read charge indicator 22 that indicates the state of the battery's electrical charge. Because all batteries have a limited useful charge life, the package may be easily and quickly disconnected from the keyboard section 16 and replaced with another battery package. Spare battery packages and other spare parts could be carried in a separate traveling case (not shown). The keyboard section 16 may have a full size QWERTY keyboard with movable tactile keys. An electrical cable 20 may connect the keyboard to the computer-display assembly 2. Although short cable is shown, it may be a long cable or a flexible cable, so that the keyboard may be moved about if desired. Alternatively, a wireless electromagnetic link may be embodied such as infrared (IR) or RF links, which would replace electrical cables 20 and 26. The cover section 8 may contain a wireless handset 14, such as a cellular telephone transceiver. The handset may have retractable antenna, small speaker, keypad, built-in microphone and a battery source. This handset 14 may be capable of analog or digital cellular operation, including AMPS, TDMA, CDMA, PCS, CDPD, or equivalent types for communicating with wide area wireless communication networks. The wireless unit 14 can be easily removed from a cutout or recess area 34 in the cover section 8. The recess area is made slightly larger than the outside dimensions of the handset 14, so it can fit inside the recess with a relatively snug fit. It is important the handset be easily and quickly removed and replaced in the base unit. Alternatively, cover section 8 consist of the handset itself, so that a separate cover section with recess would not be required.

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The portable computer system's flexible hinge and the cover sections should be made relatively thin so that when the two halves are folded (rotated) closed, it will not be too thick or heavy to carry with one hand. As shown in FIG. 1, legs 3, 5, 19A and 19B may be folded roughly flush with outside surfaces of the unit. The number cover sections are not limited to three. The cellular handset is shown in FIG. 2 may be connected to the computer system by an optional electrical cable 26. A RF transceiver in the wireless telephone would serve as the transceiver for the computer as well. This embodiment might be desirable to reduce the overall cost of the system. However, a wireless RF transceiver and modem may be located in the flat display panel assembly 2 for voice or data communications. An antenna may be embodied on the display assembly 2, with a retractable antenna 32. The display assembly may include the computer system located within the assembly housing. The advantage of this later embodiment is that the telephone 14 and computer system could be operated independently.

The portable computer system may also have means for connection to a non-battery power source, as shown in FIG. 2, via a standard power line cord and plug 28. The system may also have means for connection to an external wire based wide area communications network 33, via cable 29. The wire based wide area network may include one or more telephone networks, cable TV networks and/or computer LAN/WANs. Telephone networks may include POTS, ISDN, ATM or other equivalent types. Several computer interface connection means may be embodied, for example interface slots/connectors as shown (27, 31, and 38). These interfaces might include R/S 232, USB, IEEE 1394, PCMCIA, or other computer I/O (serial or parallel) connections. Useful connections may include a bus extender connection, so that the notebook computer can be interfaced to another more powerful computer. For portability reasons, it is desirable that the modem or digital terminal adapter be built into the computer system unit. Some means for software loading should be included such as a floppy disk or smart card. Internal mass memory of the computer system could include ROM, flash memory, or other memory means. Means for accepting PCMCIA cards, ROM cards or other types of memory card may be implemented. Preferably, the system may be embodied with a very small light weight and low power mini hard disk. One or more IR communications interfaces may also be implemented.

Other capabilities such as FAX send/receive, speech recognition, voice processing voice mail, telephony, and E-mail functions may be implemented in the computer system. A built-in microphone 36 and speaker 30 may be embodied to support speech input/output and multimedia functions. Preferably the display should be capable of full color with a wide viewing angle. If the display is back lit, the user should be allowed to switch the backlight "on", "off" and to a multiplicity of levels in between. The operating system of the notebook/PDA should be a GUI type such as Windows™ 3.1/95, Windows CE™, MagicCap or another suitable GUI based computer operating system. The system should can be designed to support wide range of communication connectivity and software compatibility.

FIGS. 3A and 3B show another embodiment of invention having a base unit or notebook computer system 100, a handset unit 14 and a earset 34. This embodiment shows a relatively thin flat display panel assembly 2 having a display screen 4. The system may also include a pen and/or finger input means 7. The base unit has an expandable hinge means 10 physically connecting the display assembly to the other half of the base computer unit. The other half can be

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comprised of several sub-assemblies including a battery power source section 9, keyboard assembly 16 and an electronics housing section 8. The keyboard assembly contains a keyboard unit 16A, which may contain a full-size QWERTY keyboard unit. The housing section 8 may include a wireless modem or communications adapter means. The expandable hinge means 10 should have an easy access locking and unlocking means 10A, which can temporarily lock the rotation of the two halves at the user's desired angle. Electronic housing section 8 may be attached edge wise to the keyboard assembly 16 by a quick attach and release connection means. As shown in the figures, several assemblies can be disassembled by pressing one or more finger access tabs 5. Likewise, a battery source section 9 may be edgewise connected to the opposite edge of the keyboard, via similar quick attach and release connection mechanism having finger push tabs 5. The tabs may be located on each side of the assemblies for quick and easy, but safe, user disassembly. The connection means may include means for secure physical attachment and connection of electrical wires, located inside the subassemblies. Although the sections may be ridge, the attachment mechanisms may be somewhat flexible, elastic or pliable, so that the combination of assemblies can bend slightly.

Battery power source unit 9 may consist of one or more batteries with voltage regulation, AC/DC operation, power management circuits and charging circuitry. In a preferred embodiment the unit should be capable of accepting electrical charge from an AC line. A important feature embodiment of the invention is means for quickly interchanging an electrical power depleted battery power unit 9 with a freshly charged battery unit. This may be accomplished by a combination of finger push tabs 5, latches and hook means for quick disconnection and re-attachment. In one intended scenario a user may carry several spare battery packages in a separate briefcase. When the attached battery package is depleted, the user can quickly changed out the battery sections. The user can then plug the depleted battery package into an AC line for a built-in charging operation.

It is preferable that each of the major assemblies and sub-assemblies be made relatively thin for easy carrying. The expandable hinge means should be made somewhat flexible, elastic or pliable so that the user may place relatively thin flat objects inside the folded space of the notebook like unit. These thin objects may include sheets of paper, cards, brochures, or similar relatively thin flat items. Linkages between the sections may be made somewhat yielding, pliable, elastic and/or stretchable. Although the display device may be ridged, the other half of the notebook may be embodied with thin flexible enclosures and other structural components. Also, the flat panel display device and assembly 2, 4 may be made flexible. Thin and flexible keyboards are known to those in the art. The other parts may be adapted to have thin and slightly flexible mechanical features. The two halves can be closed by hand and secured by a flap and snap means 43 or equivalent means. As discussed above, the expandable hinge means 10 may be made flexible and expandable by incorporating a multiplicity of small folds or other equivalent means. If the user places thin objects between the halves of the base unit, one or more sides could bulge out slightly, improving the physical object carrying capability of the notebook computer. This object carrying capability is an important feature for mobile users who may be carrying the notebook almost everywhere they go. The user may securely place and latch paper sheets, letters, memos, or other flat objects inside the notebook clam shell structure. A base unit hinge locking and unlocking

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means 10A may also be embodied, so that the user can quickly and easily temporarily lock the two halves of the unit to a rotationally fixed state (and later un-lock them).

FIG. 3(a) also shows several other elements including a small CCD video camera 46, built into the display assembly for video conferencing and other uses. One or more built-in audio microphones 36 may be embodied in the base unit. Preferably one microphone should be located on the edge of the notebook, as shown, so that the user may be in voice communications with other while the unit is closed. One or more audio speakers 30 may be built into the base unit. One or more compartments 47 and 48 may be embodied at convenient locations to store attachments for use with the mobile computer system. A telescoping antenna 32 may be embodied into the base unit as shown, or it may be built-in the unit and not exposed. Although the base unit 100 can be a self-contained unit, it may work with other optional attachments, such as a wireless cellular-like handset 14 or earset 34. The handset 14 may operate roughly equivalent to conventional cellular telephone handsets with a built in power source, providing voice and/or data communications to wide area communications networks. The earset 34 has a small low power RF transceiver, audio microphone, audio speaker and small battery source, which is capable of fitting into the user's ear. The wireless earset unit may be used for hands free applications. The user may then walk around while communicating with the handset or earset. If one is using the earset he/she may also use a pen input means 7 or keyboard 16 while in audio communications. For semi-private voice communications, some users may prefer using the handset 14, with hand set speaker 14A, handset key pad 14B and handset microphone pickup 14C. If one is using the handset or earset, the base computer unit 100 may be placed some distance away from the user, typically in the same room or nearby room. The base computer unit may be designed for a higher transmitting power level. The base unit may be designed to allow the user to switch between a high or low level transmitting and receiving power levels. The earset 34 or handset 14 can be designed for a much lower RF transmit and receiver electrical power levels, because the base computer unit 100 can be place a relatively short distance away (typically from a few feet to about fifty feet). Thus, the base unit 100 may relay RF communications between the handset or earset and an external wide area communications network. The base unit could safely embody a more powerful RF transmitter resulting in a larger signal to noise ratio. This will result in improved wireless communication to and from wide area networks that may have antennas several miles away. A very important advantage of this invention is that the user has the option of having very low electrical power electromagnetic fields near his/her's head, thus improving the health and safety aspects for the user. Since less power is required for the handset 14, it can be thinner and smaller than a standard cellular handset. Thus the handset can be smaller and easier to place in the user's pocket. The earset can be made very small so that the users can leave it in his/her's ear for long periods of time and have one's hands free for other uses.

FIG. 3(b) shows the base unit computer-display unit 100 in a closed configuration, in which one may carry it under one's arm. Since the unit is typically battery powered and contains electronics for a wireless voice and PCS like operations, one could use it for voice/data communications while carrying it about (i.e., in transport). The user may speak towards one or more microphones 36 located along the top edge. The user will be able to hear the other person(s) talking, through audio speakers 30 located conveniently on

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the base unit. A small telephone keypad could be located behind a protective door 41, for convenient dialing of a telephone number. The door may be a simple sliding door device or mechanism. The antenna 32 may be a sliding telescoping type. A simple display indicator 22 may show the electrical charge state of the battery source. A plurality of switches and indicators 46 may be located along one edge of the base unit for easy viewing and access. Such switches and indicators may include: an On-Off switch, Mode Switch (for voice, data, and video modes, etc.), high/low power transmit switch, ring/alarm mode and/or speaker/mic mode (for earset, handset, etc.). For securing the two halves of the base unit, a flap 43 made of a simple expanding material, which may include a snap means at one end and may be secured with a pin and/or pivot means. The flap would then snap to secure the flat panel display assembly 2 and cover assembly (9, 16, 8). In FIG. 3(a), the flap 43 is shown rotated in the opposite orientation for clarity only. Other securing means may be embodied that are known to those in the art.

FIG. 4(a) shows the portable computer system or computer-display unit 100 covered with a thin soft protective material or film, such as leather or vinyl. This material will protect the unit when it is bumped and/or banged into hard objects while in the use in field or office environments. The protective material may have a texture or roughen surface (as indicated in the figure), which would also provide for a relatively high mechanical friction; so it will be easier to carry under one's arm. Holes or cutouts may be embodied in the protective cover for viewing and/or using the various indicators, switches and keypads. A zipper securing means 45 may be embodied with the notebook, as shown in FIG. 4(a). The zipper means may be attached to the leather or vinyl covers so that the unit can be zipped closed to secure and protect objects placed inside the notebook. A pull tab 45A of the zipper means is shown in the figure. This embodiment could be especially applicable in rugged or harsh environments. A strap 50 may be attached to the unit so that the user may temporarily store it on a hook for example. FIG. 4(b) shows an embodiment of the battery power source section 9. As in previous embodiments, it may be detached from the notebook computer-display unit. A spring loaded pull out power cord 9B may be embodied, so that the user can conveniently pull out the power cord to electrically charge the package. The power cord and plug may be easily retracted inside a cutout space on the side of the subassembly. Several adjunct attachments and/or accessories may be carried in small compartments in the notebook unit. In addition, accessories and attachments may be carried in a separate briefcase or like carrying case (not shown in the figures). Such accessories may include a line power supply and cord, extra battery power source section 9, spare earsets 34, spare handsets 14, external hard drive, external CD ROM drive, external mouse, spare styluses and/or spare video camera/lenses 46.

An important advantage of this notebook computer unit invention is that it can be operational when it is in the closed configuration. Thus, while carrying the unit in one's hand or under one's arm, the user can perform voice, data and/or video communications. The notebook unit can be used in an open configuration on a desktop, airline tray or wide variety of other computing environments. The unit can be configured for wire based or wireless communication operations. The unit can be used for general purpose computing, network computing, pen input computing, PCS/Cellular, data/video conferencing, on-line network computing and data collaboration applications. The notebook unit can be used as a personal organizer or personal information manager, such

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as a computer equivalent of the Franklin Planner™ or equivalent planners. A multiplicity of personal computing applications may be embodied on its computer. The unit may be capable of wire or wireless communications, linking it to multiple handsets and earsets. The notebook computer unit may have a plurality of electrical connectors along the edges or other convenient locations for connection to a plurality of external devices, including but not limited to: modems, network interface cards, hard disks, floppy disks, and bus extender enclosures.

Preferably the notebook assemblies should be made relatively thin and light weight that would be an advantage in mobile use. For example, the flat panel display assembly 2 should have a thickness of roughly 0.75 inch or less. The cover assembly may be comprised of the battery power source section 9, keyboard assembly 16, and external communications section 8 should have a thickness roughly 0.75 inch or less; so that the folded total thickness of the unit could be 1.5 inches or less. However, an overall thickness of one inch (i.e. 0.5 inch for each half), or less, may be preferred. A keyboard unit located in keyboard section 16 that may be Model KPNR available from Alps Electric Co. Ltd. This keyboard unit has a thickness of 10 mm, a 3 mm key travel, a 1 mm over travel and a minimum key pitch of 18 mm. Alps Electric also has introduced a 7.5 mm height keyboard assembly a full size keyboard, capable of high speed typing without operator tiring.

FIG. 5 shows another alternate computer notebook embodiment, consisting of a somewhat smaller size flat panel assembly 2, display screen 4, pen/stylus means 7 and a roughly transparent display panel cover 17. The flat display panel could be an LCD, FED, or other type of flat panel display. The panel cover 17 could be made of a hard rigid material or a durable soft polymer material that is roughly transparent to a range of electromagnetic radiation frequencies. This cover may be made optically transparent to let the ambient room light to impinge onto a plurality of photoelectric light sensors 41A, 41B and 41C, which may be placed onto the display panel assembly 2. The photovoltaic or photoelectric light sensors may convert ambient room light to electrical voltages. These sensors may provide power energy to power the unit. The sensors may also help change the unit's battery source. Thus, with the roughly transparent cover 4 closed over the display panel assembly, some light rays will be transmitted through the cover. Photons from the ambient light are converted to an electric voltage, via the sensors and energy conversion circuitry that is applied to the computer unit's power source. Even if the computer unit is turned off and cover closed, the sensor could still be charging its batteries. The roughly transparent cover 17 may be made flexible layers of polyester, polycarbonate or other suitable materials. An advantage of this embodiment is an improvement in maintaining power to the notebook unit for longer periods compared to prior art battery powered units. Information on the display screen may be viewable even with the cover 17 is closed over the flat panel display assembly 2. Viewing of the display screen with the cover closed is an improvement over the opaque covers of conventional notebook computer and PDAs.

FIG. 6(a) shows another embodiment of a thin light weight notebook computer or PDA unit. The cover panel 17 contain a keyboard 16A, which may be a membrane type keyboard. The flat panel display assembly 2, with its display screen 4, is attached to the cover panel 17 by an expandable hinge means 10. The hinge means, which may be elastic or pliable, should be capable of being rotated over angles A. The hinge means should be capable of rotating through

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roughly 360 degrees, so that the two halves may be folded back onto each other as shown in FIG. 6B. In the configuration of FIG. 6B, the notebook unit can be held in one's arm, and the display screen can be written onto by a stylus or pen. The unit could also be placed onto the table or desk for convenient viewing. The cover keyboard assembly 17 can be closed to hold loose sheets of paper, brochures, etc. If this latter case, the size of the panel halves should be slightly larger than 8.5" by 11" to facilitate one carrying loose sheets. Expandable hinge means 10 is designed to expand to accommodate a relatively thick stack of documents. Hinges may be made of pressed pliable corrugated plastic sheets can accommodate 0.5 inch or more gaps.

Various battery power sources 9 may be used in the above embodiments, including smart-battery technology having rechargeable batteries. They may be made capable of monitoring themselves for electrical charge level. Batteries that are suitable for this smart battery technology include nickel-metal hydride (NiMH) and lithium-ion (Li-ion) types. NiMH batteries are more sensitive to overcharge than NiCd batteries. Care must be taken to avoid overcharging that causes heating, which is damaging to the NiMH cycle life and capacity. Li-ion batteries require tight battery management for safety purposes. NiMH batteries are available from Sanyo energy USA. Several power management and smart-battery devices are available. Duracell has a smart rechargeable battery with intelligent power management circuits for charge level gauge means, as disclosed above. The gauge may constantly show the state of the total battery charge. Advantages of an intelligent battery management system include customer notification of charge state, longer mobile operation times, longer battery lifetimes, and faster charge times. The rechargeable battery and power management circuit may collect and communicate the present and predicted battery data to the host notebook computer under software control.

Wireless communications adapters or modems disclosed in the above embodiments may consist of analog or digital transmitter and receivers, having control circuitry for cellular AMPS, PCS, CDPD, and RF links to wide area communication networks. The communication means disclosed herein may make use of long distance or short distance communications techniques, methods and equipment. Communication techniques may include several types of digital multiplexing and command access schemes such as TDMA, CDMA, GSM, or a combination thereof.

FIG. 7 shows a block diagram of the system elements and associated circuitry, hardware, firmware and software. A microprocessor 38 controls most of the system elements. A computer system I/O bus 60 is shown interfacing several system elements. Many types of microprocessors may be embodied, including 16, 32 or 64 bit processors. The microprocessor may a complex instruction set computer (CISC) or a reduced instruction computer (RISC) computer types, or a combination of the two. CISC microprocessors that may be embodied, including the Pentium P5 manufactured by the Intel Corporation, the 68000 series microprocessors made by Motorola Corporation. Many types of RISC processors may be embodied, including the ARM series, the UltraSpac by Sun Micro Systems, the SH Series by Hitachi, PowerPC by Motorola and IBM and the MIPS R4000 series by several sources. The above manufactures references and manuals are hereby incorporated by reference. Since electrical power dissipation is very important in portable systems, RISC microprocessor may have an advantage with smaller transistor counts, low voltages and fully static designs. RISC processors are available at an operating voltage of only 2.0

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volts. RISC processors using 0.5 micron CMOS processes have resulted in die sizes for core functions of roughly 4 mm². RISC processors can deliver 300-400 Mips/W. Microprocessor 38 may support several types of I/O buses (typically 32 bit wide), such as VL or PCI type buses. Microprocessor and I/O busses are well known to those skilled in the

A Microsoft Corporation's Windows® operating system software may be embodied in the computer system. For these systems, the microprocessor CPU should be at 32 or 64 bit processors, capable of clock speeds in the 100 MHz or more. The microcomputer system may also consist of one or more I/O port means 62. A PC Card interface 27 may be embodied for bus expansion, extended memory or other added circuitry having access to the main bus 60. A mass memory device 42 may be embodied in the system, which typically is a magnetic disk memory hard drive. Many devices may be connected to the computer system, including a smart card interface 46 and keyboard 16. A touch panel and pen input means 7 may be embodied in the system, which may be separate or integrated. Examples of such touch pen devices are available from Elo Touch Systems Inc. in Oak Ridge, Tenn., MicroTouch Systems Inc. in Methuen, Mass., and Carroll Touch Corp. in Round Rock, Tex. Pen and touch panel combinations means are available from Scriptel Corp. in Columbus, Ohio for the tablet, and Symbiotic Logic in Colorado Springs for an IC controller. Other pen and touch devices are available from Phillips Semiconductor, Sunnyvale Calif. Other more traditional cursor control devices 56 may be embodied, such as a mouse, trackball, touch pad, or force transducer. Preferably, most of these components should be sufficiently small as to fit into relatively thin display assembly 2.

The flat display panel device 2 is be interfaced to the system bus 60 through display controller circuitry 44. Preferably, the display controller should be capable of VGA or SVGA display formats. Integrated into the display controller may be a BitBlt engine (to accelerate graphics), RAMDAC memory, clock synthesizer and display frame buffer. A digital signal processing (DSP) co-processor 48 may be embodied. The DSP may accept data from many sources including a microphone 36 and video data source 43. The DSP or microprocessor may output signals to one or more audio speakers, as shown as 10A and 10B. Video data may be in either analog or digital form. Microphone 36, and speaker(s) may be embodied in the handset or earset of the previous figures. Video data may be pre-processed by a the DSP. Video sources may include output from video cameras, VCR, broadcast TV, satellite TV or cable TV.

External communication means 54 may be connected to the bus, which may be capable of fast two way data transfers. The communications means 54 should be capable of controlling communications to and from a plurality of wire and wireless communication systems. These include wire based telephone means 53 and wireless communication means 51. The system may include an antenna means 32 for transmitting and receiving electromagnetic radiated signals. External communication means may be connected to one or more information or communication service providers. These service providers may include telephone services (RBOCs, LEC), on-line computer networks, Internet service providers, cable MSOs and/or long distance telephone firms. They also may include cable TV companies, satellite TV service, and LAN/WAN communication network providers. The external I/O port means 62 may be connected to a Universal Series Bus (USB) and/or an IEEE 1394 (Firewire®) type I/O bus.

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FIG. 8 presents a typical flow diagram of computer programs executing in the system of the embodiments disclosed herein. After a power-on action 60, the system may enter a standby power on mode 62. A power management program 66 may then be executed followed by a self diagnostic routine 68 that tests the major hardware and firmware elements of the system. If the test fails, a failure report 66 may be generated and either displayed or stored. If the test passes, the operating system (OS) 70 may be loaded and executed. With the OS loaded successfully, the system waits for incoming data and/or voice calls 72. The system may automatically enter a default system mode, or the user can select one or more computer or communication modes 76. The user has the option of selecting several operating modes, which may include a conventional computing mode 78, a wireless data communications mode 80, and a wireless voice communications mode 82. A conventional computing mode includes typical PC computing or PDA computing. While in any of the above modes, base unit to external communications operations 79 may be controlled, which includes data/voice wire and wireless options. Control code 81 may control the bi-directional handset or earset to base unit communications operations. These operations may execute roughly simultaneously or on a time shared bases, as indicated by connection 83. Under program control, either the wireless handset or the earset may communicate data first between the base unit, then the base unit may relay the data to/from the external communications network. The above communications may involve two way or bi-directional communications, including many types of data (including text, voice, graphics, video and/or images).

Many types of computer application programs may be executed by the computer system. For example, one or more telephony programs 84, office/personal productivity programs 86, electronic mail or voice mail 88, and Internet/Web browsing programs 90 may be used. Other PDA, PC or workstation programs may also be executed. One or more programs (algorithms or routines) 96 may be used to control this multiple program or system modes; this may include program coordination, scheduling and execution. Programs to control the mobile communications relay functions 98 may be embodied. Users may have the option to exit the application programs 100. Typically, after the applications have been closed, the user may exit the operating system 102. After the system exits the OS, the system may still may be in a standby power mode 104, in which the system can answer and process incoming calls, plus service other requests for other processing tasks. Users may have the option of turning off (or removing) all power to the unit 106.

It should be further understood that, although a preferred embodiment of the invention has been illustrated and described herein. Changes and modifications can be made in the described arrangements without departing from the scope of the appended claims. Other embodiments, additions, and improvements will be obvious to those with an ordinary skill in the relevant art.

I claim:

1. A portable wireless communication system including a microcomputer system to be operated by a user for voice and data communications to and from external wide area communications networks and for data processing, the wireless communications systems comprising of:

a) a notebook computer adapted to function as a base unit for digital wireless communications, comprised of a microprocessor, transceiver and flat panel display, wherein the electrical power of the notebook computer is sufficient to communicate with external wide area communications networks;

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b) a handset for digital wireless communications having a structure, shape, and function set substantially different than said notebook computer, wherein said handset is adapted to communicate with the notebook computer, via electromagnetic radiation means, and wherein electrical power of the handset unit is substantially less than the power the notebook computer notebook computer; and

c) said notebook computer performing a communications in a bi-directional manner, relaying digital data between the handset and the wide area network, wherein the lower power handset is normally placed next to the user's ear during voice communications, but the user has the option to place the higher power notebook computer several feet away from the user such as in the same or nearby room.

2. A portable wireless communication system of claim 1, in which the means for handset communications is replaced by means for earset communications for lighter weight and hand free operations by the user.

3. A portable wireless communication systems of claim 1, in which the user has the option to switch the electrical power level of the handset means to either high power levels for communication directly with the wide area communications network, or switch to lower power levels for communications to the notebook computer.

4. A method for notebook computing and wireless communicating of voice and data to and from external wide area wireless communications networks, the method comprising the steps of:

a) transmitting digital data to at least one external wide area wireless communications network from a notebook computer, via electromagnetic radiation means, wherein the electrical power of said notebook computer is sufficient to communicate with wide area wireless communications networks;

b) receiving digital data from a wide area wireless communications network to said notebook computer, via electromagnetic radiation means, wherein the electrical power is sufficient to communicate with wide area wireless communications networks;

c) transmitting digital data to a handset unit from said notebook computer via electromagnetic radiation means, wherein the structure and functions set of said handset are different than said notebook computer, and the power of the handset unit is substantially less than the power of said notebook computer;

d) receiving digital data from the handset unit to said notebook computer via electromagnetic radiation means, wherein power of the handset unit is substantially less than the power of said notebook computer; and

e) said notebook computer performs bi-directional relay communication functions between the handset unit and wide area wireless communications networks, and performs conventional data processing via a microprocessor system, wherein data is displayed on a large display screen of said notebook.

5. A method for portable computing and wireless communicating of claim 4, in which the user has the option to execute a plurality of application programs on the microcomputer means, typically including telephony programs, personal productivity programs, e-mail programs, voice mail programs, Internet programs and other conventional PC programs.

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6. A method for portable computing and wireless communicating of claim 5, in which execution of the application programs, voice communications operations and data communications operations are performed on time shared basis, so that the user has the option to perform a plurality of communication and computing tasks, roughly simultaneously.

7. A notebook computer having wireless communication functions for use by an individual for voice and digital data communications, the notebook computer comprising:

- a. a first half panel structure having a flat panel display device and control electronics;
- b. a second half panel structure physically connected to the first half panel structure via a hinge means;
- c. a microprocessor electrically interfaced to the flat panel display device;
- d. a wireless digital data and voice communication means electrically interfaced to the microprocessor, wherein

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the communication means comprises one or more microphones, audio speakers, and antenna means; and

- e. said first and second panel structures can be closed together in a clam shell manner, wherein the notebook computer is operational providing voice communication functions even while the two halves are in a closed position.

8. A notebook computer as recited in claim 7, further comprising a full size keyboard located in the second half panel structure and electrically interfaced to the microprocessor.

9. A notebook computer as recited in claim 7, further comprising an attached battery module adapted to quick connection and dis-connection to one of the half panel structures, such that the battery module can be easily and quickly swapped with another battery module.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO : 5,983,073
DATED : Nov. 9, 1999
INVENTOR(S) : Richard J. Ditzik

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

At the end of element (e), of Claim 7, add the text -- and wherein said one or more microphones are placed on one or more edges of the first or second half panel structures, such that the individual has the option to enter into voice communications while carrying the notebook under his/her arm. --

Signed and Sealed this

Tenth Day of April, 2001

Nicholas P. Godici

Attest:

NICHOLAS P. GODICI

Attesting Officer

Acting Director of the United States Patent and Trademark Office



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United States Patent [19][11] **Patent Number:** 6,167,376**Ditzik**[45] **Date of Patent:** Dec. 26, 2000[54] **COMPUTER SYSTEM WITH INTEGRATED TELEPHONY, HANDWRITING AND SPEECH RECOGNITION FUNCTIONS**[76] **Inventor:** Richard Joseph Ditzik, 307 Surrey Dr., Bonita, Calif. 91902[21] **Appl. No.:** 09/217,339[22] **Filed:** Dec. 21, 1998[51] **Int. Cl.⁷** G10L 21/06; G10L 15/24; G10L 15/26; G06F 3/16[52] **U.S. Cl.** 704/235; 704/270; 704/231; 704/251; 704/275; D14/158; D14/154; D14/100; D14/341; D14/342[58] **Field of Search** 704/9, 207, 278, 704/260, 235, 275[56] **References Cited****U.S. PATENT DOCUMENTS**

5,257,314 10/1993 Kimura .
 5,287,415 2/1994 Chefalns et al. .
 5,313,531 5/1994 Jackson .
 5,361,310 11/1994 Ishigaki .
 5,388,183 2/1995 Lynch .
 5,434,777 7/1995 Luciw 704/9
 5,454,046 9/1995 Carman .
 5,459,798 10/1995 Bailey et al. .
 5,477,511 12/1995 Englehardt 704/235
 5,500,920 3/1996 Kupiec .
 5,502,774 3/1996 Bellegarda 704/235
 5,546,538 8/1996 Cobbley et al. .
 5,546,565 8/1996 Suzuki .
 5,602,963 2/1997 Bissonnette et al. 704/275
 5,875,448 3/1999 Boys et al. 704/278
 5,884,249 3/1999 Namba et al. 704/9

OTHER PUBLICATIONS

Atal, Bishnu S.: "Automatic Recognition of Speakers from their Voices", Proceedings of the IEEE, vol. 64, No. 4; Apr. 1976; pp. 460-475.

"Speech Understanding Systems"; Semiannual Technical Summary Report to the Advance Research Project Agency; Massachusetts Institute of Technology; Lincoln Laboratory, Lexington MA; Jul. 23, 1974.

White, G.H.; and Neely, R.B.: "Speech Recognition Experiments with Linear Prediction, Bandpass Filtering, and Dynamic Programming"; IEEE Transactions Acoustic, Speech, Signals Proceedings; vol. ASSP-24 No. 2; Apr. 1979, p. 183-188.

Lee, R.; "Speech Recognition", *Information Display*; Society for Information Display; Apr. 1990; pp. 12-14.

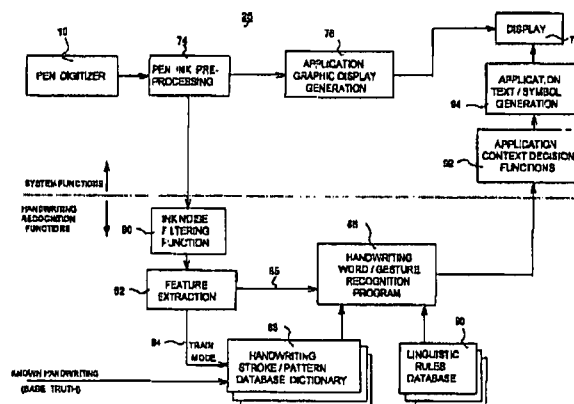
Quinnell, R.A.; "Speech Recognition, No Longer a Dream but Still a Challenge"; *Electronic Design News (EDN)*; Jan. 19, 1995; pp. 41-46.

Comerford, R.; Makhoul, R. & Schwartz, R.: "The Voice of the Computer"; *IEEE Spectrum*; Dec. 1997; pp. 39-47.

Markowitz, J.; "Talking to Machines"; *Byte Magazine*; Dec. 1995; pp. 97-104.

Primary Examiner—Tālvāldis I. Šmits**Assistant Examiner**—Daniel A Nolan[57] **ABSTRACT**

A computer system with speech recognition systems and handwriting recognition systems are disclosed that work closely together to improve the total recognition accuracy of each system alone. Handwriting recognition system may include a pen/stylus input device and associated program functions. These systems or programs may be combined with computer and telephone functions to provide integrated applications having voice output programs, Internet access, e-mail/v-mail, and personal information manager functions. The computer system can recognize speaker-dependent and speaker-independent speech, converting this information to computer recognizable text, which may be displayed onto a display device in realtime or delayed. Speech recognition errors may be corrected via a pen input device, and the pen information may be recognized, converted to text and graphics. This data may then be displayed immediately or displayed later at a user specified time. Recognized handwritten pen information may be integrated into speech recognized text and stored in a data storage system.

13 Claims, 4 Drawing Sheets

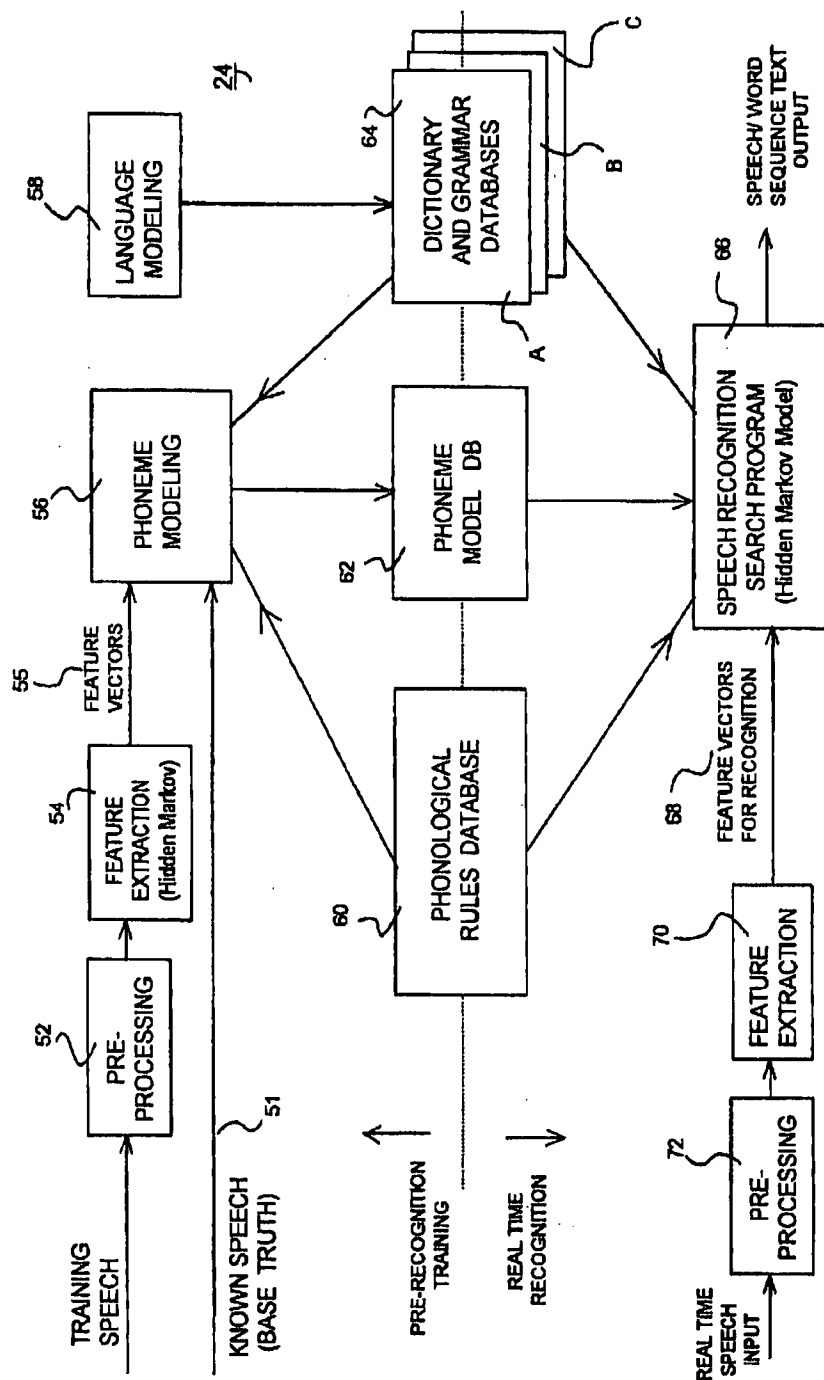


FIG. 1

PRIOR ART

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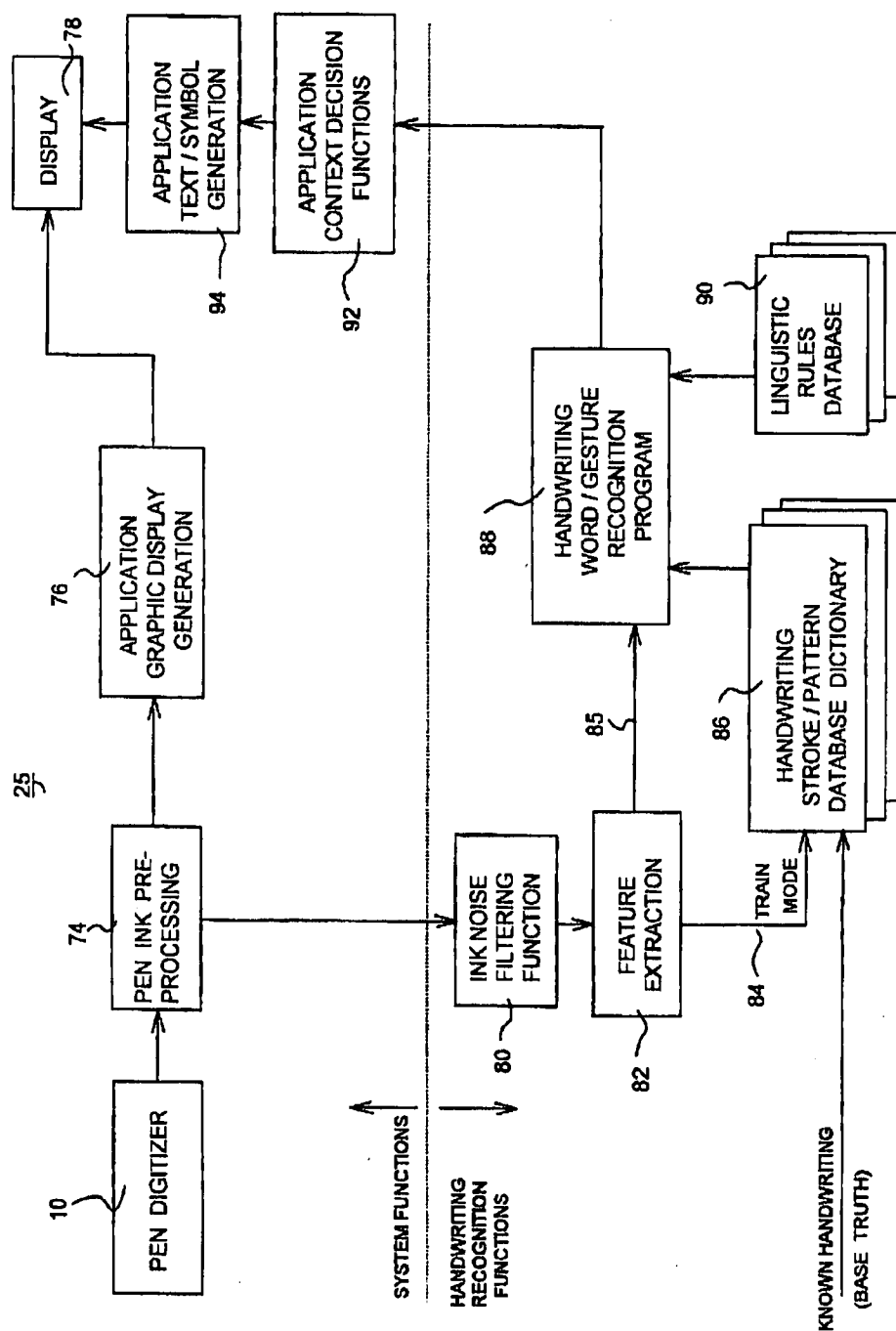


FIG. 2

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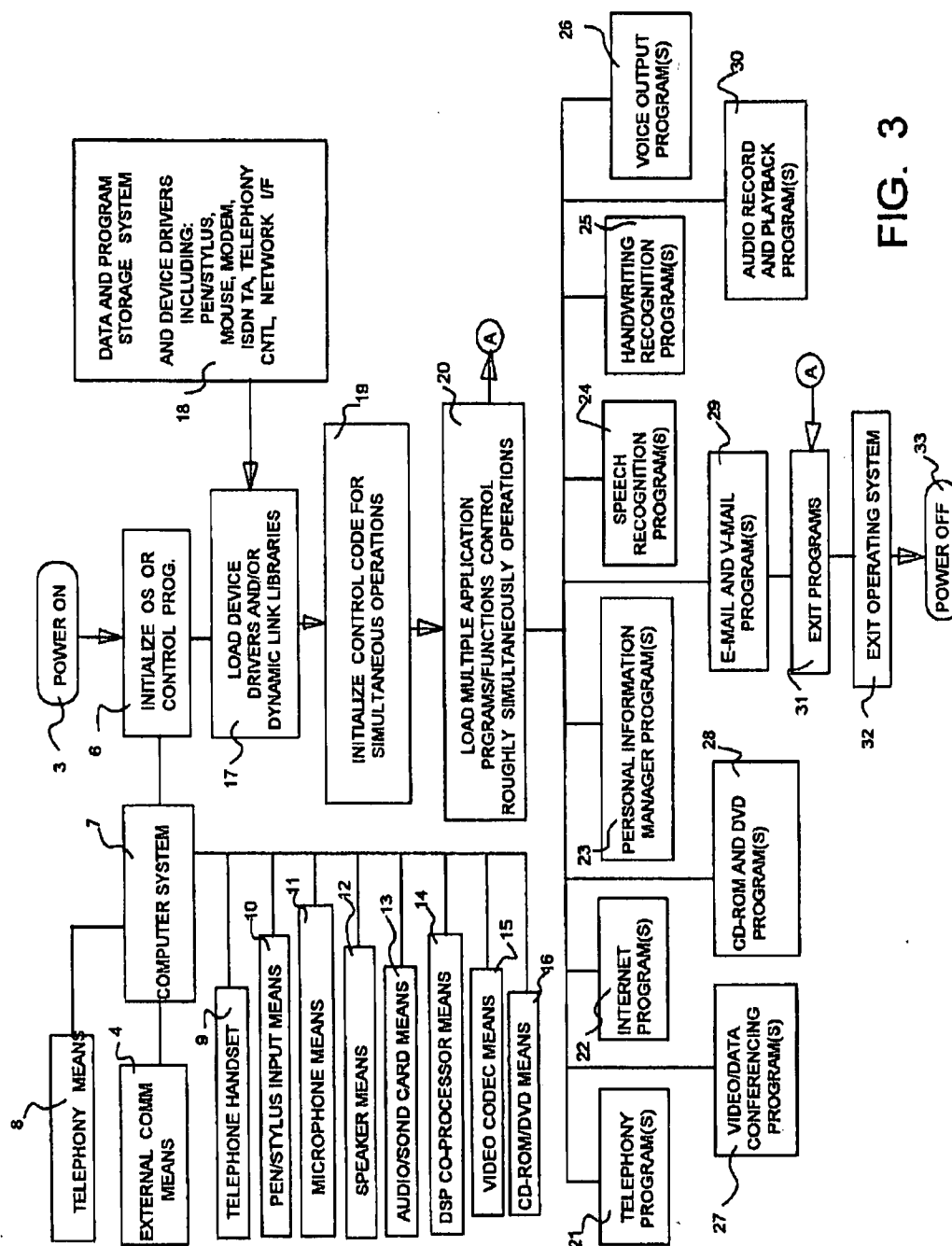


FIG. 3

TELEPHONE CONFERENCE - PARTIES: 2				SPEECH RECOGNITION: ON		
FILE	EDIT	TOOLS	SETUP	WINDOWS	PREFERENCES	HELP
SETUP		CALLER: JOHN SMITH, (619) XXX-XXXX		DATE: 02/01/96		TIME OF CALL: 08:04
SPEECH RECOGNITION		ANSWERED BY: RICHARD DITZIK, (619) 546-XXXX		ELAPSE TIME OF CALL: XX:XX		
R DITZIK: HELLO?						
J SMITH: THIS IS JOHN SMITH FROM ACE TECHNOLOGIES. HOW ARE YOU DOING TODAY.						
R DITZIK: OH PRETTY GOOD FOR A MONDAY MORNING.						
J SMITH: I FOUND THE INFORMATION YOU REQUESTED LAST WEEK ON OUR COMPUTER LAN SYSTEM PRODUCT.						
R DITZIK: OK GREAT WHAT DID YOU FINE OUT.						
J SMITH: WILL FIRST THE SERVER IS AN INTEL PENTIUM 100 MEGA HURTS CPU, THE LOCAL LAN IS AN ETHER NETWORK RUNNING A TQIP PROTO- STACK. THE CABLING IS STANDARD SPEED IS 10 MEGABITS PER SECOND AND THE REMOTE NODE TERMINAL IS A 486 68 HURTS PC. THE SERVER IS CONNECTED TO A MODEM BANK OF FIVE 28 MEGABITS PER SECOND U.S. ROBOTICS V.32BIS MODEMS.						
R DITZIK: HOW MUCH DOES THE MODEM BANK COST.						

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FILE

EDIT

TOOLS

SETUP

WINDOWS

PREFERENCES

HELP

SPEECH RECOGNITION

PRGRM: ENGLISH - C1C

PRE-TRAINED CALLER

TEMPLATE: SOUTHERN

U.S. MALE.

LOCAL SPEAKER PRE-

TRAINED TEMPLATE:

R. DITZIK - WITH GOLD.

PHONE LINE: ANALOG

ANSWER OTHER CALLS?

(YES) NO

DIGITALLY RECORD ALL

SPEECH? (YES) NO

DIGITALLY COMPRESS

SPEECH? (YES) NO

AUTO SAVE SPEECH

TEXT? (YES) NO

AUTO SAVE RAW DIGI-

TIZED SPEECH? (YES) NO

39

40

PC

PC

PC

PC

SERVER

POTS

M

M

M

M

M

TERM

FIG. 4

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COMPUTER SYSTEM WITH INTEGRATED TELEPHONY, HANDWRITING AND SPEECH RECOGNITION FUNCTIONS

BACKGROUND OF INVENTION

1. Field of Invention

This invention relates to a computer system that integrates together, computer handwriting recognition and speech recognition systems, where key elements are under human control. The computer system further relates to means where individuals use the system to capture and record verbal information, which may be made up of consistent or inconsistent messages. The system may convert this information into text and/or graphic data formats. The resulting data may be useful in computer telephony applications or for further computer processing and/or data storage.

2. Description of the Prior Art

Prior art computer based handwriting recognition suffers from problems of imperfect recognition accuracy. Typically, user hand printing can be recognized with a 95-98% accuracy, if the user pre-trains the recognition software program with samples of his/her hand printed alphabet and numbers. Prior art products having handwriting input means such as the Apple Newton that has not obtained success in the market place. Human speech recognition programs must also be pre-trained with a limited number of speech samples, to obtain recognition accuracy of 95-98%. Continuous speech is more difficult to recognize than discrete speech, and, as such, suffers lower recognition accuracy. Speaker independent recognition is more difficult than speaker dependent pre-trained recognition programs. Speaker independent recognition software programs can be pre-trained for common speaker categories, such as English, male, female, southern accent, mid-western, New York, Jersey, Texan, or some combinations thereof. Recognition accuracy and performance of handwriting and speech input have many shortcomings and problems that have prevented them from being a successful computer application in the market place.

Prior art systems also include message recognition systems that use both speech recognition and handwriting recognition to transform a consistent message to a recognizable message. However, in this prior art the original message gathered by each of the recognition systems must be identical. This prior art system is restrictive, limiting it to transcribing functions only. The invention herein over comes that shortcoming by disclosing key elements and functions of a system having several recognition modes and several computing applications, wherein the source message need not be identical or consistent.

The inventions herein consist of combinations of key elements and modifications to existing elements to make new powerful communications systems, with unique computing applications. The invention herein uses the strengths of both the handwriting and speech recognition, along with telephony and other computing applications to make an improved recognition and computing environment. The invention may use the computing power of microprocessors, including multitasking or multiprocessing operating systems to control the operation of the system. The invention may also include digital signal processors (DSP) for fast calculations. The invention herein teaches a computing system running several programs or tasks, running at roughly simultaneous (e.g., realtime or near realtime). The user input modes of handwriting (via a pen/stylus input means) and speech recognition (via an audio capture means) work

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together for new improved computer input result. The two input modes complement each other well and can be combined with other computer means as disclosed below.

SUMMARY OF INVENTION

An important objective of this new invention is to provide a quick as easy system to capture, record and modify speech recognized text on the fly during (i.e., in near realtime). This objective may be accomplished by combination of computer telephony, pen input and speech input, each running roughly at the same time under control of computer system.

Another important objective is to provide an information system coupled closely with a computer telephony system, where speech information from one or more telephony systems (wire based or wireless) is recognized, annotated, and converted into text and graphics.

A still another objective is to improve computer based verbal information recognition by combining the individual strengths of handwriting recognition with those of speech recognition, resulting in an easy to use system with an overall increase recognition result.

Another objective is to provide a computer data conferencing system with information capture and transcription of conferencing data, converting it into text and/or graphics information, and possibly recording the data for future use.

Another objective is provide a computer desktop environment having a human in the loop. The system may be comprised of several near realtime processing steps, where the human may be in control of: 1) the system setup, 2) viewing the initial speech recognition results, 3) making decisions on correcting speech recognition errors, and 4) adding additional information not found in the initial speech message.

Still another objective is to provide a system where the user can make certain decisions on the best parameters in setting up the speech and handwriting recognition programs. Such human in the loop decisions may include selecting languages, dictionaries, grammar rules, phonological rules, dialect options, speech accent options, and special user data. These human in the loop selections will greatly improve the overall speech recognition accuracy and usability of the system.

Yet still another objective is provide a system where handwriting and sketched object recognition accuracy is greatly improved by user selection of certain handwriting recognition parameters—either before recognition processing or during the processing. Such selection or selections may include handwriting, stroke or pattern dictionaries (databases). Also, the system may include selection of a general or special linguistic rules databases.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram a computer speech recognition system.

FIG. 2 is a block diagram a computer handwriting recognition system.

FIG. 3 is block diagram of system controls, application programs, and important system components.

FIG. 4 is representation of a typical display screen for one or more system applications.

DETAILED DESCRIPTION

Several types of speech recognition means, known to those skilled in the art, may be embodied in the invention

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herein. Speech recognition programs and systems are available in the marketplace. For example, IBM® offers a product called Via Voice™; another product available is Naturally Speaking™, from Dragon Systems Inc. of Newton Mass. Both of these speech recognition systems are designed for IBM compatible PC running Windows 95™ or NT operating systems, typically running on Intel Corporation Pentium™ microprocessor computer systems. FIG. 1 shows a typical block diagram of a prior art speech recognition system 24. The system may be comprised of a training path and a near realtime speech recognition path. The computer system may be adapted to detect a person's spoken speech patterns (audio data) via a microphone (not shown in the figures) and other electronic components. Such a speech recognition system may be designed for speaker dependent or speaker independent operation. In the following, the training path of the system is described first, followed by the speech recognition path.

Speech recognition training may be performed to improve the recognition accuracy of the system. Speech patterns from one or more persons may be captured and sent to a pre-processing function 52, where the audio waveforms are sampled into a digital data stream at a sampling period of roughly 10–20 ms, for example. From element 52 the data is input to a feature extraction function 54, which may be based on the Hidden Markov Model (HMM), well known to those skilled in the art. The output of the feature extraction function 54 is a digital stream having a plurality of feature vectors 55, which may be input to a phoneme modeling function 56. The variability and uncertainty of speech processing is reduced by extracting from the speech waveforms one or more features, which are typically processed using phoneme modeling algorithms and hidden Markov model algorithms. Normal human speech has a large number of possible branches (directions) that can be chosen in a string of words. HMM may be used to statistically predict the best choice of words in the recognition process. Typically each phoneme is divided into three audible states: an introduction stage, middle stage and an exiting stage. Thus, a three-state HMM is usually included in a speech recognition system. Although absolute accuracy is not possible, the recognition program usually calculates the most likely sequence of states. For speaker independent systems, a base or ground truth of voice data consisting of known words or speech patterns may be input directly to the phonetic modeling function 56, perhaps during factory setup. As shown in FIG. 1, this input 51 is typically only necessary for speaker independent systems.

From the phoneme modeling function 56, data may be sent to a phoneme modeling database 62. This data is one of a plurality of databases that comprise the speech recognition database. Included in the database set may be a word dictionary and a grammar rules database 64. The grammar dictionary may contain the rules of allowable word sequences. The word dictionary may include several general or specialized vocabularies. Similarly, the grammar rules database may be specialized for several identified speech recognition applications. This specialization is shown in FIG. 1 and represented by databases A, B, and C. A language modeling program 58 may input data to the word and grammar dictionary 64 that may in turn provide data to the phoneme modeling program 56. Another database consisting of a phonological rules database 60 may also provide data to the phoneme modeling program.

A person using the system typically will speak into a noise canceling type microphone that sends the resulting speech waveforms to pre-processing function 72 for digital sam-

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pling. Alternately the user may speak into a standard microphone such as a local or remote telephone. This data then is sent to a feature extraction function 70, which is similar to element 54. The resulting feature vectors for recognition 68 are sent to the speech recognition search program 66. Also, providing data to the search program may be the phonological rules database 60, the phoneme models database 62, and the word and grammar dictionary databases 64. The recognition search program 66 may be based on the Hidden Markov Model, which finds feature vectors representing a sequence of words from many possible combinations that are most likely. These calculations may be assisted by the application of vocabularies and rules data stored in the recognition databases. The output of the search program 66 maybe computer text of the speech input captured. In general, the speech recognition program predicts the most likely word sequence spoken.

One of the most difficult forms of speech to recognize is spontaneous telephone conversations, where error rates of up 50% are common with today's speech recognition systems. Increasing the size of the system's vocabulary (dictionary) does not always improve the recognition accuracy. This is due to the uncertainty of speech, i.e., the number of possible branches or directions that a person can speak when stringing a series of words together. The above is why a speech recognition alone, even with relatively high accuracy, has had difficulty in becoming a useful data input device for computers.

In general, computer handwriting recognition typically involve a pen or stylus input device, an electronic mean of digitizing the pen strokes, and a program to recognize the pen stroke data. Handwriting recognition system via a pen input means may transform hand written letters, numbers, punctuation, and symbols into recognizable computer generated text. This text or graphics may then be suitable for additional processing or data storage. Hand writing recognition may be comprised of either the discrete or cursive hand writing type program(s). Hand written information typically is comprised of stroke contours, intersections, and shape features, which may differentiate one handwritten word or mark from another. In this respect, handwriting recognition problem is similar to speech recognition, where in each case certain features of the raw data is exacted. This data is then compared to one of more databases, which may be comprised of language dictionaries (lexicons) and writing rules. Handwriting recognition may be accomplished in realtime or near realtime, and the data may be processed in chronological order as it was written.

FIG. 2 shows a block diagram of a handwriting recognition system that may be known to those skilled in the art. Handwriting recognition includes computer recognition of handwritten cursive writing of handwriting, hand writing symbols/marks in any written language (formal or informal). As used herein, handwriting also includes recognition of hand written sketches and/or certain selected drawing shapes (circles, triangles, rectangles, etc.). A pen or stylus digitizer means 10 may repeatedly sample the user's pen strokes and digitize the x and y positions at rates roughly between 5–40 ms. The pen digitizer may be an opaque tablet separated from the display or a digitizing means place over the screen of the display device 78. The digital stream can be thought to represent "electronic pen ink" or "pen ink" for short. The digital stream from the digitizer may be sent to a pen ink pre-processing function 74, where the digital data may be filtered, smoothed, and/or scaled. Two outputs may be embodied in element 74 leading to rough two generalized processing paths. One output may lead to an application

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graphic display generation means 76. A second output may lead to an electron ink noise filtering function 80.

In the first path, the application graphic display generation means 76 accepts the digital stream representing electronic ink and generates codes necessary to graphically display an equivalent representation of the users hand written strokes. Codes may be sent to the display 78, which may be a display device, display monitor or display system. This processing may be accomplished in realtime; so the user can see the electronic ink paths of his/her writing and/or drawings on the display screen very quickly after each stroke. The application graphic display generation means 76 may be included in the operating system of the computer system and/or in the hardware of the computer system or display 76.

In the second path the pen electronic ink pre-processing function 74 sends data to an electronic ink noise filtering function 80, where further filtering of digitizer ink noise may be filtered out. One reason for this filtering function is that handwriting recognition accuracy is effected by digitizer noise to a greater degree than it effects recognition of handwriting by humans. Data from this filtering function may sent to a feature extraction function 82, where certain key features of the handwriting data is removed from the data, and may be placed in feature vectors. As in speech recognition, these feature vectors may optimized for HMM algorithms. Depending on the operating mode of the recognition system, the data from the feature extraction function 82 may be used either for user training 84 or for near realtime recognition 85. If the system is in the training mode, data 84 is input to a handwriting stroke and/or pattern database 86. This database may be comprised of one or more dictionaries with a plurality of hand writing/sketch patterns for one or more languages and/or special symbol applications. The database may also accept handwriting data from a known source with known writing samples, which represent a set of base truth data. As in speech recognition programs, base truth data is especially helpful for user independent recognition systems.

If the system is in the realtime recognition mode, data 85 may be sent directly to a handwriting word and/or pen gesture recognition program 88. This program also accepts data from the handwriting stroke and/or pattern database 86 and one or more linguistic rules database 90. The recognition program 86, which may be based on HMM techniques, which determines the best match or matches, by comparing the feature vectors to databases 86 and 90. This recognition program may be programmed to recognize handwritten pen gestures, which includes such marks as a coma, colon, semi-colon, arrow (right, left up, down), and other special symbols with predetermined meanings. Sample gesture patterns could be stored in the stroke/pattern database 86. The linguistic rules database may be comprised of multiple rules databases, for example different rules for different written languages and/or regional subsets. Data containing the best match or matches and other related data may be sent to an application context decision functions element 92. This element may contain information on the context of computer application running roughly simultaneously with the recognition programs. Context information can be a great help in narrowing the best matches of the recognition program, thus improving the overall recognition accuracy. Data from element 92 may then be sent to an application text and/or symbol generator function 94. This element may be embodied in the operation system and/or hardware of the computer system. Data from this generator function may be sent to the display device for display within the application running on the computer. Application context decision function(s) may be also included in the recognition system.

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FIG. 3 shows a block diagram of key computer system elements of the invention herein. The computer system and programs may be comprised of multi-media type elements, which may be adapted for computer telephony, data/video conferencing as well as general purpose computing and remote communication functions. The computer system 7 may consist of typical personal computer (PC) components, including microprocessor, interface chip sets, main memory, mass disk memory, I/O bus, display monitor, keyboard and mouse devices. At power on 3 an operating system is typically loaded, which may be a windows based graphic user interface type operating system, such as Microsoft Windows® 95/NT/CE operating systems. Interfaced to the computer system may be several devices and/or software programs, including telephony means 8, external communication means 4 for remote data transmit and receive functions to other systems, for two-way data interchange, such as connection to the Internet. Telephony means may include one or more hardware components and software, providing for telephone and fax functions.

The system may include a pen/stylus input means 10, which captures a handwriting or graphic symbols from a person. Element 10 may be comprised on an opaque graphic tablet or transparent device, placed over a display screen. In addition to the above, the system may be comprised of a telephone handset device 9, microphone means 11, audio speaker(s) 12, audio /sound card means 13, DSP co-processor and electronic card means 14, video codex means 15, and CD-ROM/DVD playback/record means 16. These elements may be embodied separately or in combination as required for the specific configurations desired.

The operating system 6 may load all the necessary device drivers and/or dynamic link libraries (DLL) 17, automatically or via a command. Some of the device drivers may include pen/stylus, mouse, analog modem, ISDN terminal adapter, telephony controller and network interface card drivers. The system may initialize, load and control a plurality of roughly simultaneous programs, tasks, threads and/or operations, including additional control code or OS extensions 19, and application programs 20. Program code may be loaded to control tasks that are designed to run roughly simultaneously or at different times. Some of the software programs that may be loaded for computing or communications are telephony 21, Internet browser/applets 22, personal information manager (PIM) 23, speech input 24, pen/stylus applications 25, and voice output programs 26. Voice output programs may consist of text to speech programs or digital speech playback of recorded speech (compressed or uncompressed). Other programs may include video and data conferencing programs 27 (via telephone or Internet), CD-ROM and/or DVD control programs 28, E-mail/V-mail and fax programs 29 and/or audio record and playback programs 30. The user can choose programs to load and execute, depending on the user's desires. When the user is finished with his/her computing or recognition tasks, the user may issue an exit command 31. The user can then exit the operating system 32 and turn off the power 33 to the computer system.

The speech input recognition program/functions 24 and associated hardware may include several functions including speech capture (via microphone or telephone line), digitize data, process data, store raw speech data, and storage of recognized text. The pen/stylus input handwriting recognition program/functions 25 and associated hardware may include the following functions: handwriting capture, drawing capture, inking (displaying pen tracks). The system may store pen data, process data, perform pen gesture

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recognition and/or compression of the pen data. The Telephony program/task 21 and associated hardware may perform the following typical application functions: call answering, outgoing message play, call forwarding, incoming message recording, screen pop ups, manual dial out, auto dial out, and/or Voice mail control (record, route, store), among others. The PIM program/tasks 23 may include the following typical functions: calendar, address book, things to do, date-time stamp, and data base store/control functions. Voice output program/task functions may include audio speaker control (free standing and handset), voice data playback, text to speech control, playback speed/pitch control. In addition typical CD-ROM multimedia and new DVD record and playback control and processing may be included in the system. The computer system CPU may be powerful enough for multiple programs, tasks and/or threads to run at near realtime, such that the user may think that programs are running simultaneously.

FIG. 4 shows a representation of the computer system's display screen, with a new unique computer telephony application program. In this disclosure, telephony includes telephone-like connections to communication networks such as telephone, Internet, and cable networks. This system makes use of pen/stylus input means and speech input means, with both handwriting and speech recognition functions enabled (turned on) at the same time. The screen shows the name of the caller (via a caller ID function), the name of the answering party, date and time. The audio signal for the speech may sent to a speaker so that the user can listen the speech information; the user may then make one or more decisions on the system setup options desire, as shown in menus 39. Speech data from both the caller and local user may captured, digitized, processed, recognized and displayed on the screen at near realtime. Since speech recognition is not perfect, recognition errors and omissions may be displayed along with the correctly recognized text. Recognition of the caller speech over the phone lines may be slightly worse than the local user's speech. As these recognition errors are observed by the viewer, he/she may use the pen or stylus to correct these speech recognition errors or omissions by direct hand writing on a writing pad or on the screen. The speech recognition errors on the screen are represented in the figure by corrections 38, 38A, 38B, 38C, 38D, and 38E. The user may quickly and efficiently make editing marks (inking) with the pen, as shown. The pen marks and handwriting may be recognized immediately, but could be displayed after a delay interval selected by the user. The user, viewing the text of the two-way conversations, can make editing marks without losing concentration on what is being said during the telephone call or audio input. In an alternative embodiment, the user may have the option to delay the display of recognized handwriting data until the user provides a command action, perhaps by click an icon or menu item. The software application may also include code to provide means to quickly add one or more graphic frames 34. The user can draw and write in the frame, to record graphical representations 40 of what is being said by either party. Graphic frames can be scaled and sized via the graphic handles 36. Long conversations yielding much text can be accommodated by automatically scrolling off text from the screen. However, such data may remain stored in memory such in a data storage system 18. Manual scroll bars may be provided. Text can be made to wrap around the graphics frame 34 as in typical word processor or draw programs.

The operating system may support multiple independently controlled cursors to make the graphical user interface easier and faster to use. The setup of the program may

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have several options, as shown on the left side of FIG. 4. Many other typical computer application features may be included, as are well known to those skilled in the art. Although many tasks can be processed with little observable delay, other calculations and tasks may be compute intensive. There may be some delay in the display of speech and handwriting recognition text results, even with the help of DSP co-processors. However, the delays in the 500 ms range—may be small enough not to cause a human factors problem with respect to the user. Other delays may exist in pen inking, shape recognition or gesture recognition. When two or more of these systems are connected via an external communication system, there may be inherent communication delays. However, depending on the type and speed of the external communication means, response times should be made small as not be objectionable. The system may feature a delay option for the handwriting recognition, so that the user can view his or her pen input electronic ink for the screen or multiple screens, before the recognition data is displayed. A portion of the screen or screens may be displayed instead of the entire recognized data. The system may have telephone connection (POTS, ISDN, ASDL, HSDL, ATM, etc.), cable TV interface, Internet connection, and/or wireless communication. Interlaces to the network may be analog or digital or a combination. The inventions herein are compatible with video and data conferencing means. Many clever and useful combinations of PC and telephony applications can be embodied to provide new collaboration, groupware conferencing and remote communication uses.

One purpose of this new invention is to provide a user friendly means to capture, recognize and record speech from one or more individuals. Also, the system provides functions to convert recognized speech data to computer text at near realtime or delayed. One such application could be during telephone conferencing use where written text of the call is to be obtained. This may be accomplished by this unique combination of pen input and speech input running on a microprocessor computer system. The user may not choose to recognize and manipulate all telephone conversations. When an important or critical call is answered and/or complex information is being verbally communicated to the user, this invention will enable one to activate the system to capture and record 100% of the information communicated. The system may then record it in a computer readable text and/or graphics format. The embodiments presented herein are but a few possible embodiments of the invention herein, other embodiments, extensions and improvements are obvious to those with an ordinary skill in the art.

I claim:

1. A method of performing handwriting and speech recognition functions, the method implemented in a programmed computer comprising a processor, a data storage system, at least one user input device, and at least one display device, the method comprising the steps of:

- a. providing at least one control program to control the said computer;
- b. receiving speech input spoken by a user, converting the said input into computer recognizable data under control of the said computer's control program;
- c. recognizing the said speech data by identifying the best match to known words or phrases of a spoken language;
- d. receiving handwriting data from a user via a pen or stylus input device under control of the said computer control program;
- e. recognizing the said handwriting data from said user pen input and converting it into text, graphics or both;

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- f. displaying said recognized speech text with any recognition errors, and displaying said converted recognized handwriting data, at roughly the same time as said speech text; and
- g. altering by adding, changing or deleting said displayed text via said pen or stylus input device.
- 2. A method as recited in claim 1, in which the handwriting data from the said pen input device is not recognized and is displayed as electronic ink on said display, tracking the pen tip's path.
- 3. A method as recited in claim 1, in which the user has the option to display said recognized handwriting data within a time delay interval, wherein the maximum delay range interval is measured beginning immediately after recognition process is completed to the time of a command given by the user.
- 4. A method as recited in claim 1, further comprising steps to provide computer telephony functions, wherein voice and data information is communicated to and from telephone like communication networks, and wherein incoming speech information from a remote telephone is accepted, recognized and displayed in similar manner as the local speech input.
- 5. A method as recited in claim 4, in which the displaying speech text and handwriting data step presents at least one screen showing speech recognition setup menus, handwriting recognition setup menus, and telephony program setup menus.
- 6. A computer program, residing on a computer-readable medium, comprising instructions for causing a computer system to:
 - a. provide for bi-direction information flow to and from an operating system running on the said computer system;
 - b. receive speech input spoken by a user converting said input into computer recognizable data under control of the said operating system;
 - c. recognize the said speech data by identifying the best match to known words or phrases of a spoken language;
 - d. receive handwriting data from a user via a pen or stylus device under control of the said operating system;
 - e. recognize the said handwriting data from the, said user pen input and convert it into text, graphics or both;
 - f. display the said recognized speech text with any recognition errors, and displaying the said converted rec-

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- ognized handwriting data, at roughly the same time as the said speech text; and
- g. alter by adding, changing or deleting said displayed text via said pen or stylus input device.
- 7. A computer program as recited in claim 6, in which the handwriting data from said pen input device is displayed as electronic ink on said display, wherein the displayed electronic ink roughly tracks the pen tip's path during handwriting, and wherein the delay is measured almost immediately after the recognition process is completed and ending at the time of a command.
- 8. A computer program as recited in claim 6, in which the user has the option to display said recognized handwriting data at a settable a time delay, wherein the delay interval is measured beginning almost immediately after recognition process and is completed after a set delay time.
- 9. A computer program as recited in claim 6, in which the user has the option to display said recognized handwriting data at a time delay, wherein the delay is measured beginning almost immediately after recognition process is completed and extending to the time at which a command given by the user.
- 10. A computer program as recited in claim 6, further comprising instructions for causing a computer system to provide computer telephony functions, wherein voice and data information is communicated to and from telephone like communication networks, and wherein incoming speech information from a remote telephone is received, recognized and displayed in similar manner as the local speech input.
- 11. A computer program as recited in claim 10, in which the telephone like communication networks include the Internet network or similar wide area computer networks.
- 12. A computer program as recited in claim 6, further comprising instructions for causing a computer system to display at least one screen showing setup menus with speech recognition, handwriting recognition, and optionally telephony program information.
- 13. A computer program as recited in claim 6, further comprising instructions for causing a computer system to have at least one integrated voice output program for audio output of recorded or realtime speech information.

* * * * *



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(12) **United States Patent**
Ditzik

(10) **Patent No.:** **US 6,421,235 B2**
(45) **Date of Patent:** **Jul. 16, 2002**

(54) **PORTABLE ELECTRONIC UNITS
INCLUDING NOTEBOOK COMPUTERS,
PDAS AND BATTERY OPERATED UNITS**

5,515,303 A * 5/1996 Cargin, Jr. et al. 364/708.1
5,568,358 A * 10/1996 Nelson et al. 361/681
5,835,344 A * 11/1998 Alexander 361/683

(76) **Inventor:** **Richard J. Ditzik, 307 Surrey Dr.,
Bonita, CA (US) 91902**

* cited by examiner

(*) **Notice:** Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

Primary Examiner—Darren Schuberg
Assistant Examiner—Yean-Hsi Chang

(57) **ABSTRACT**

A small light weight modular microcomputer based computer and communications systems, designed for both portability and desktop uses. The systems make use of a relative large flat panel display device assembly (2), an expandable hinge device (10), battery power source (9), keyboard assembly (16), and wireless communications devices (32, 51). Systems can be configured in a portable arrangement similar to conventional notebook computers, but can be quickly and easily disassembled and re-assembled for office desktop uses. Systems may consist of a base computer unit (100) comprising communication devices may act as a relay station relaying voice and other data between the handset or earset and external wide area communications networks. The system may be capable of performing, personal digital assistant (PDA), cellular telephone, conventional notebook computer, desktop computer functions.

(21) **Appl. No.:** **09/818,747**

(22) **Filed:** **Mar. 27, 2001**

Related U.S. Application Data

(62) Division of application No. 08/832,923, filed on Apr. 4, 1997, now Pat. No. 5,983,073.

(51) **Int. Cl.**⁷ **G06F 1/16**

(52) **U.S. Cl.** **361/683; 361/679; 361/681;
361/686; 320/114**

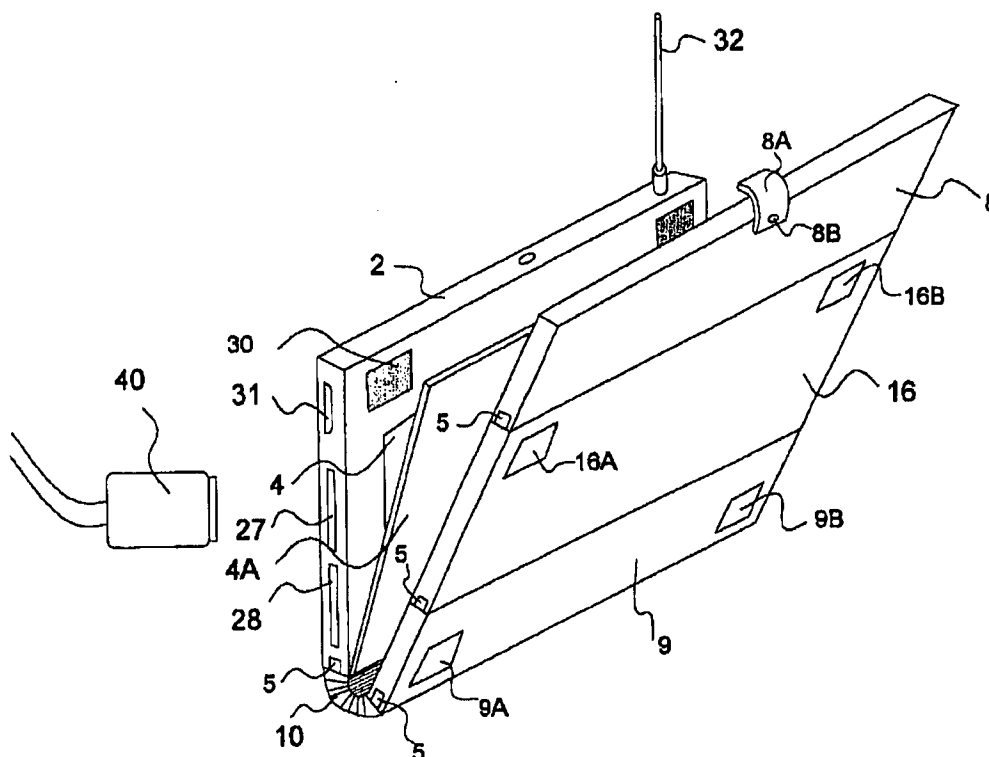
(58) **Field of Search** **361/679, 680,
361/681, 683-686; 320/114, 115, 136**

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,017,725 A * 4/1977 Roen 235/152

15 Claims, 9 Drawing Sheets



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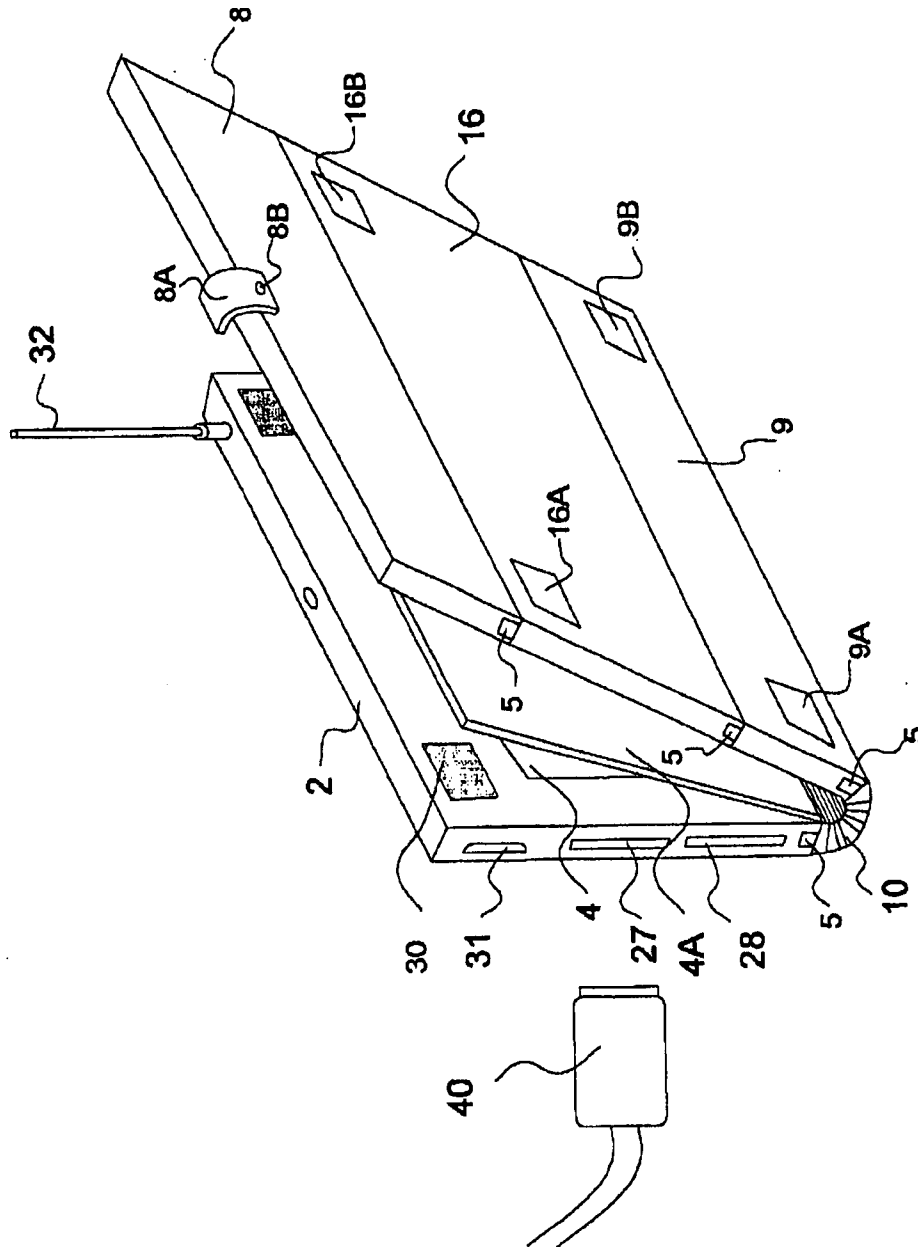


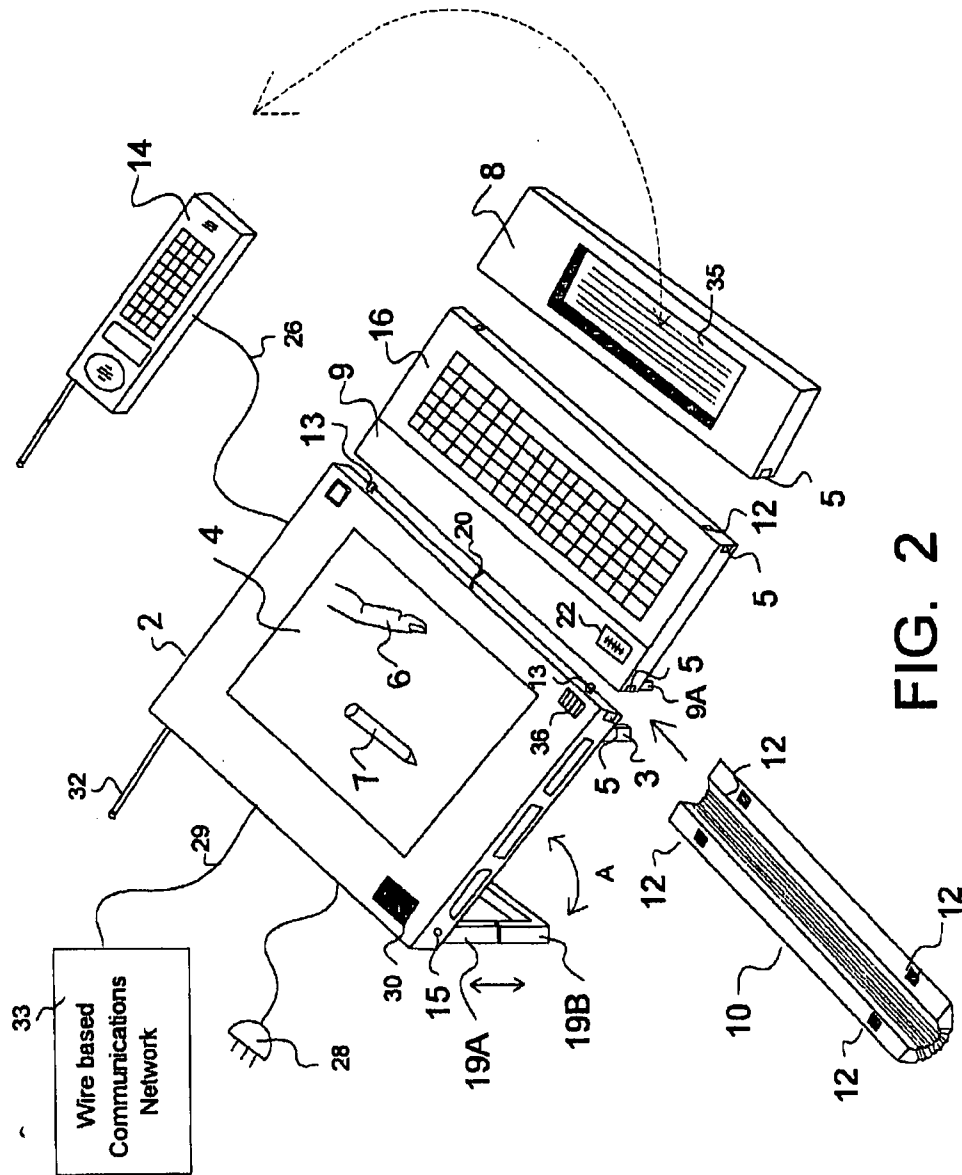
FIG. 1

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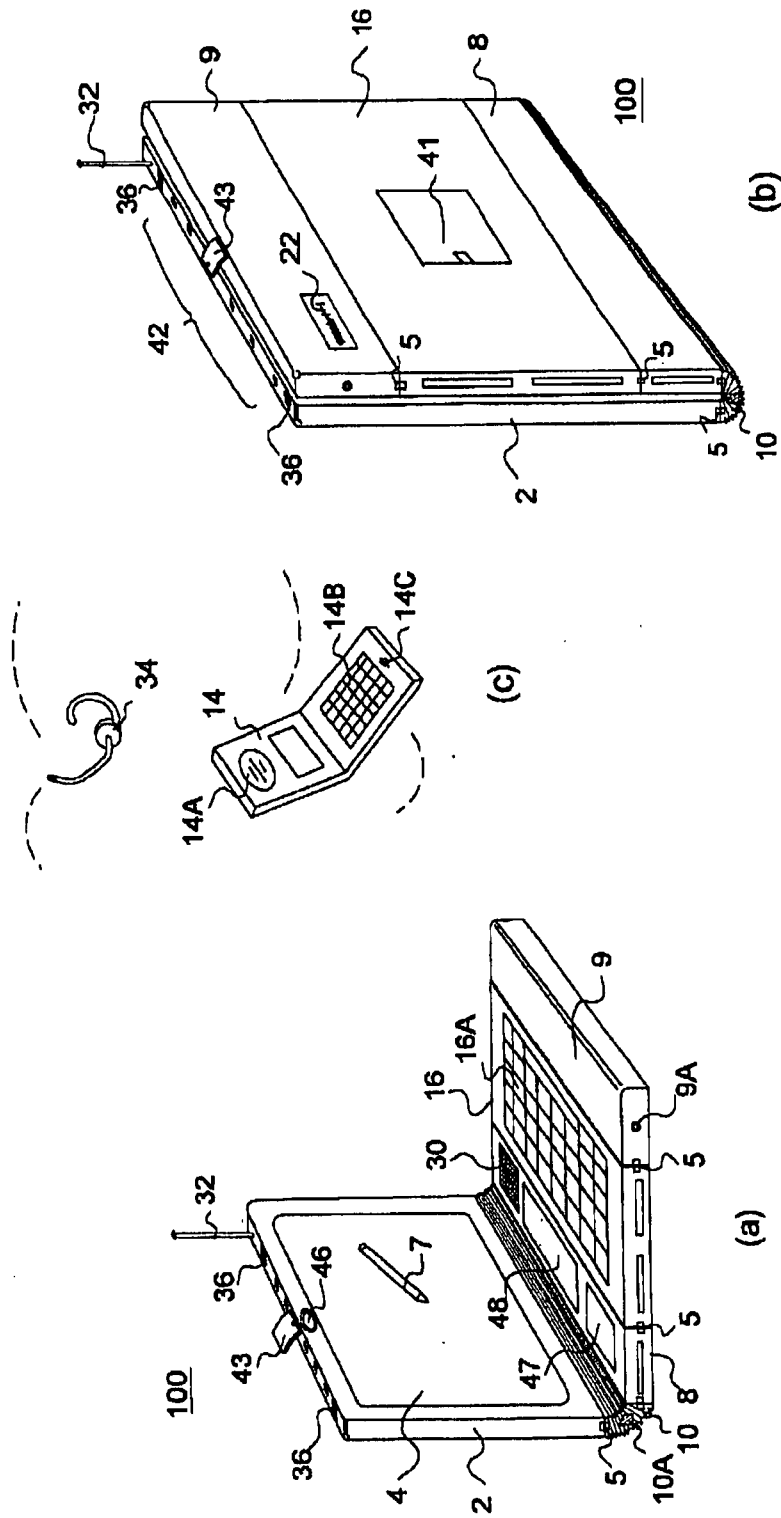


Fig. 3

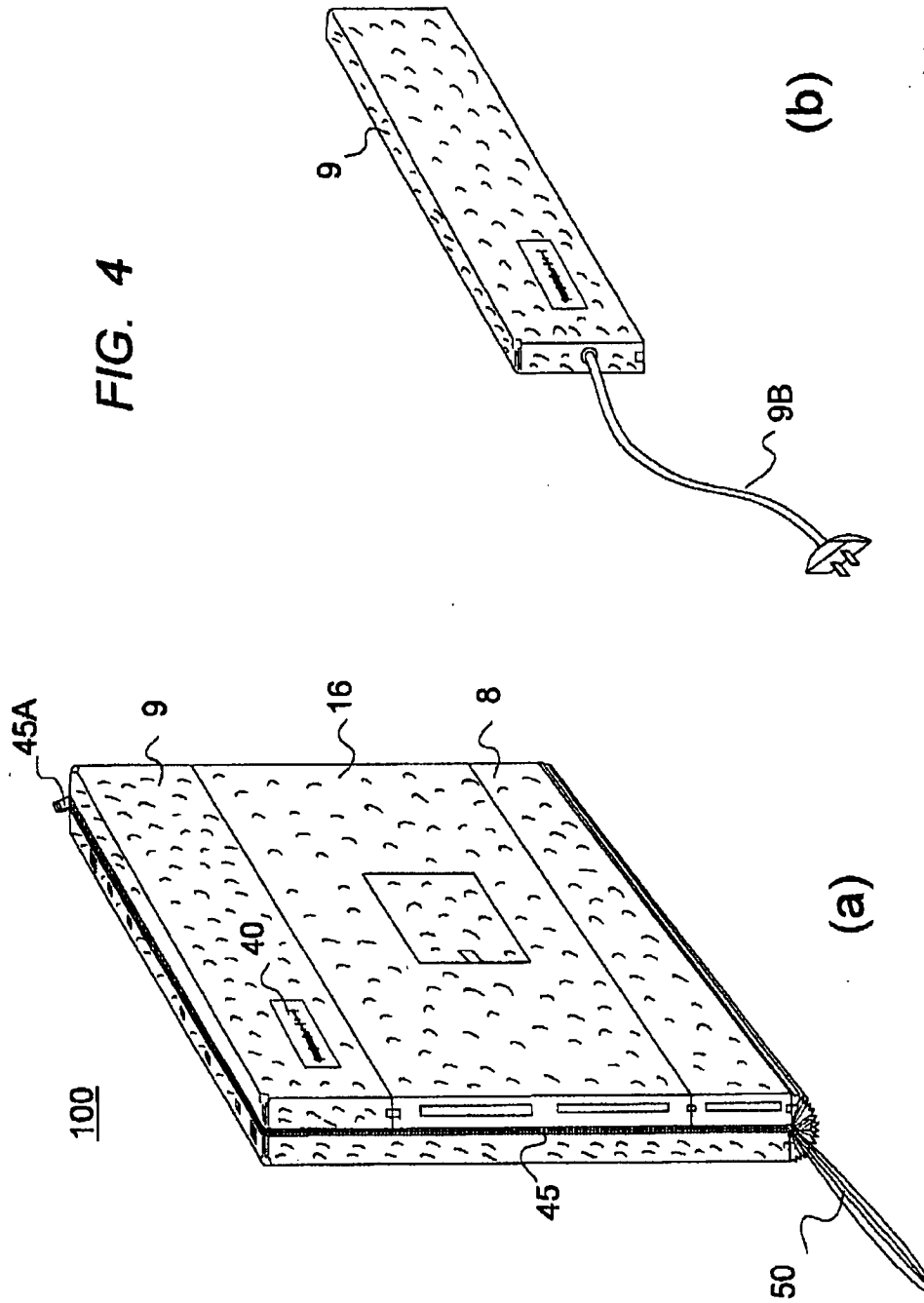
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FIG. 4



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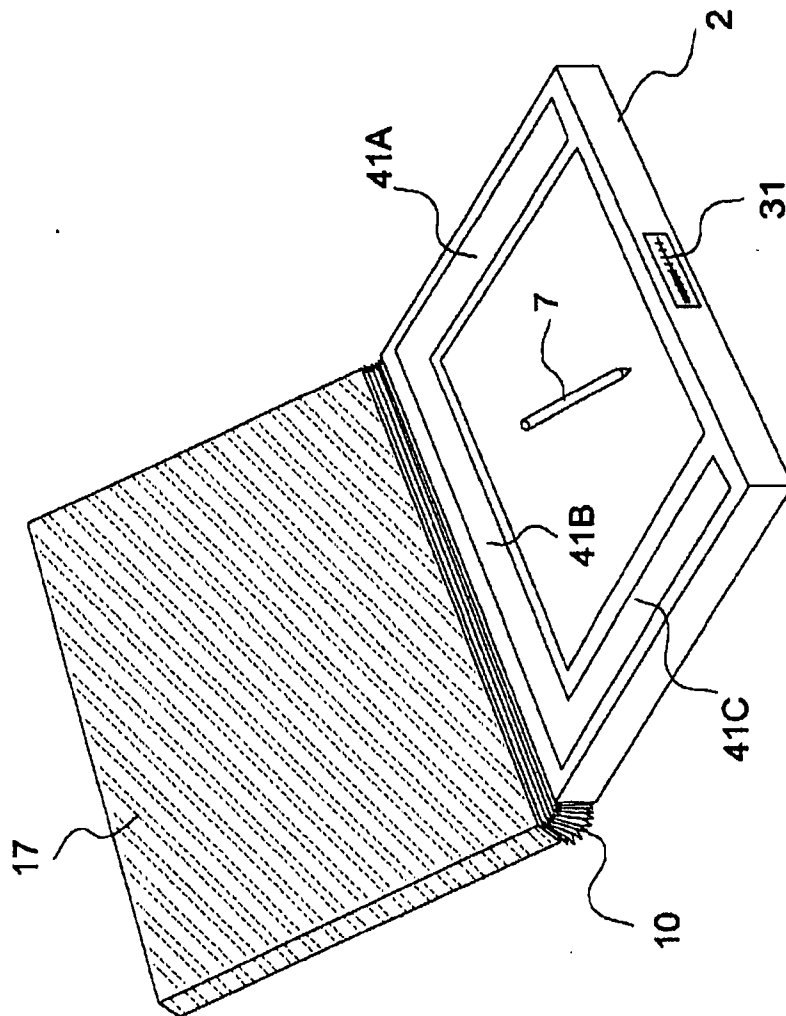


FIG. 5

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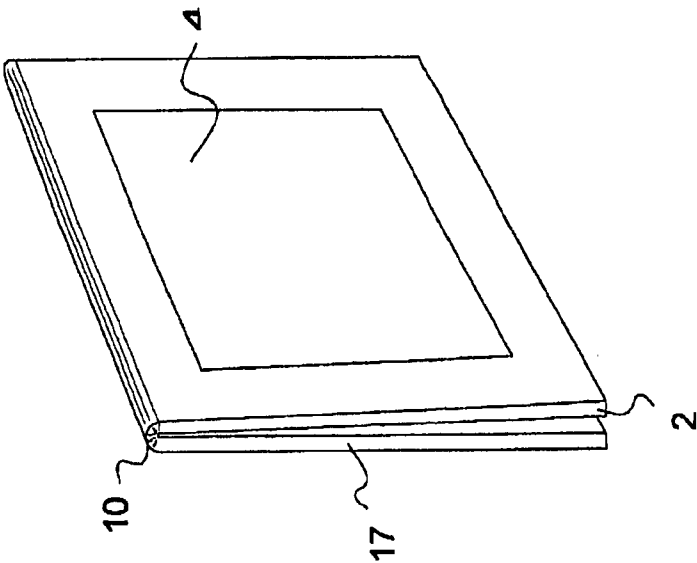


FIG. 6B

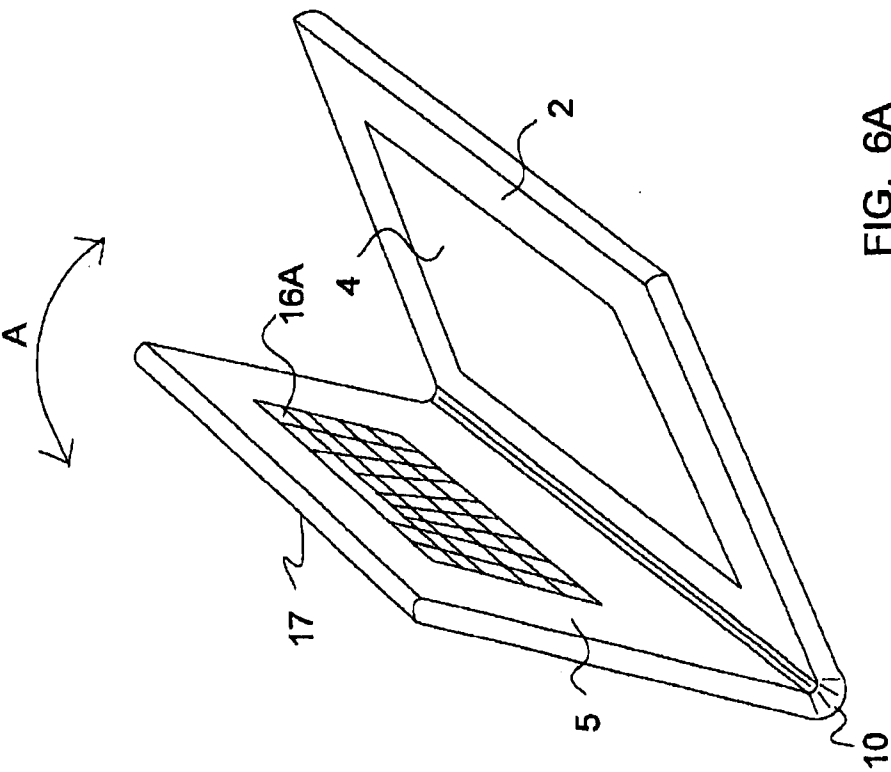


FIG. 6A

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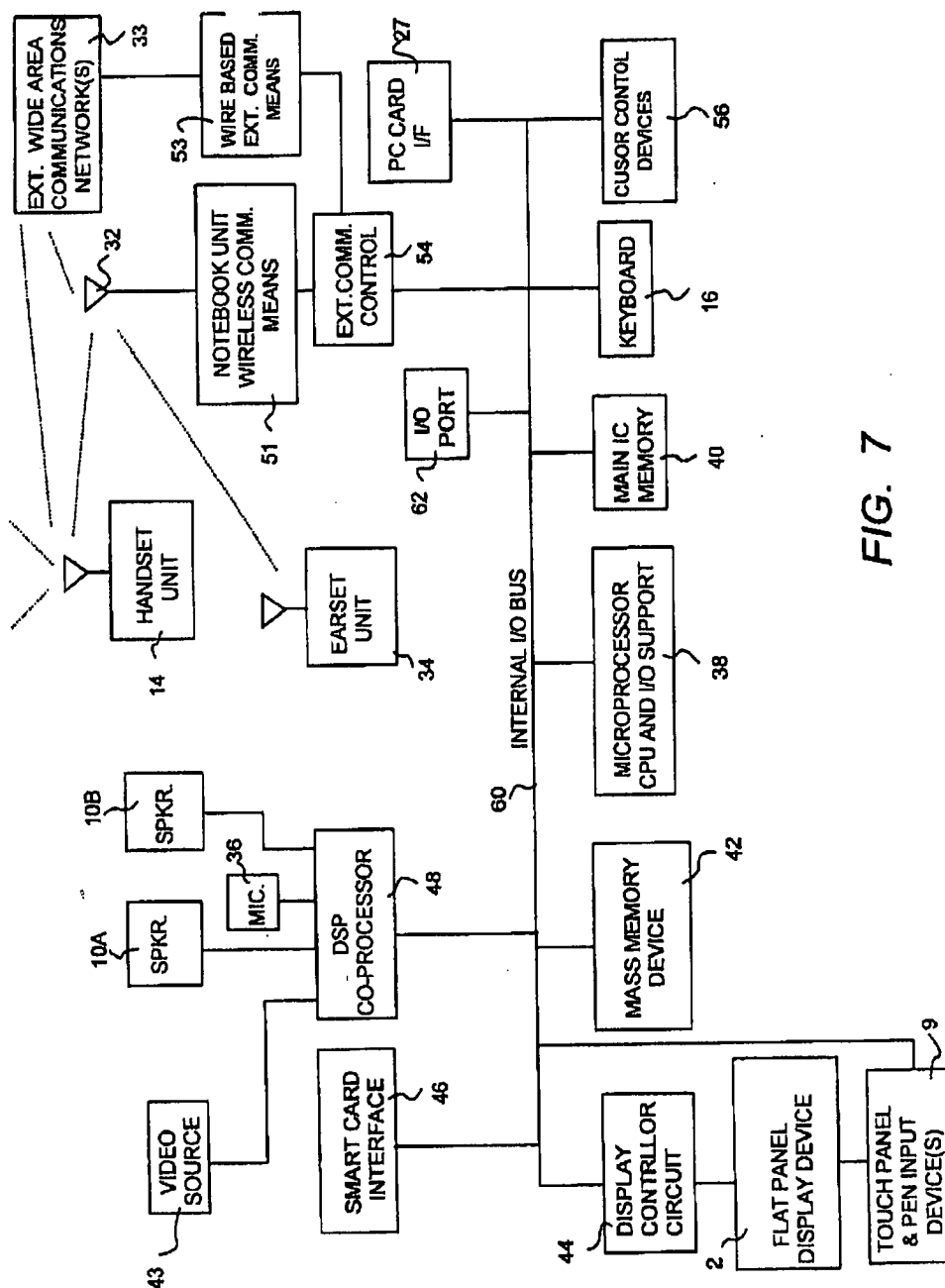


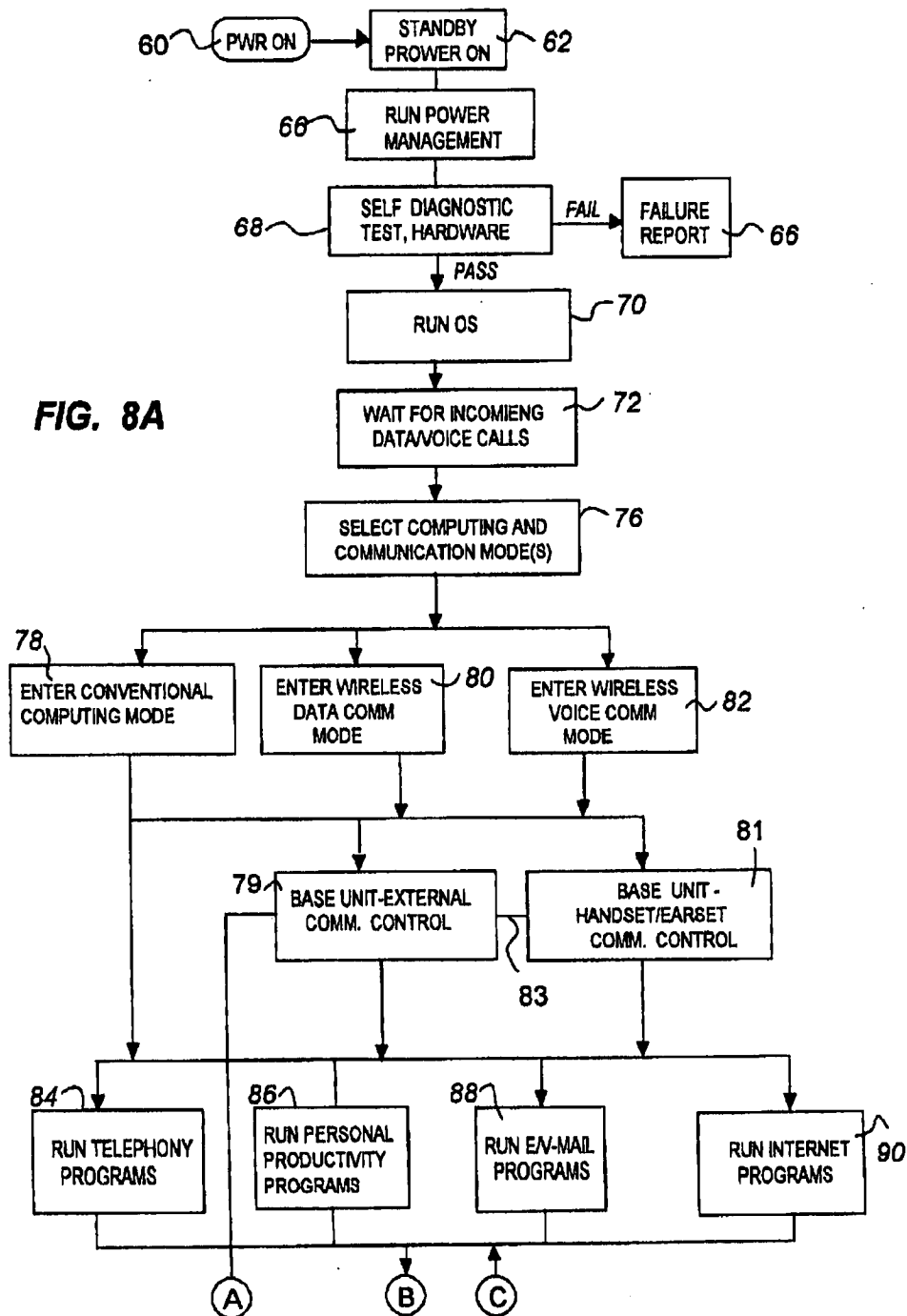
FIG. 7

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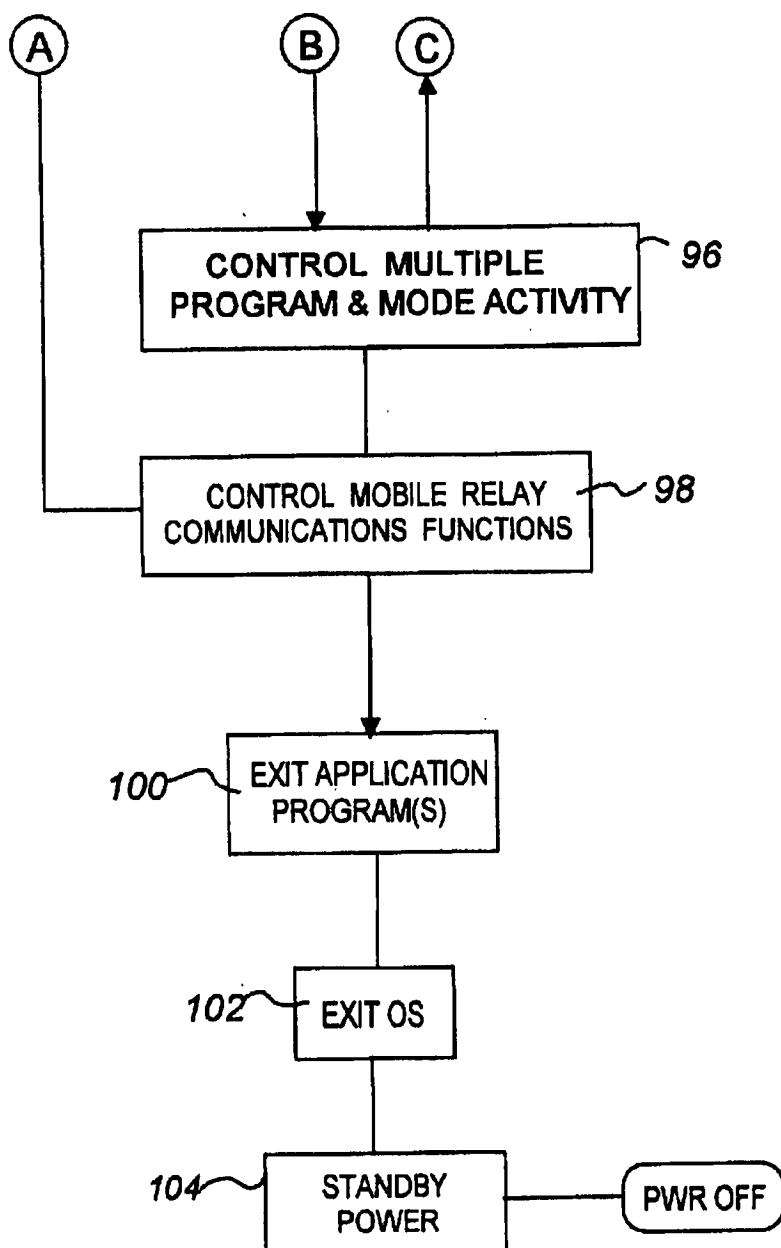


FIG. 8B

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PORTABLE ELECTRONIC UNITS INCLUDING NOTEBOOK COMPUTERS, PDAS AND BATTERY OPERATED UNITS

This is a continuation divisional application whose entire disclosure is Ser. No. 08/832,923, filed Apr. 4, 1997 now U.S. Pat. No. 5,983,073, which is hereby incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to portable personal computer systems with external communication means, which can be used by an individual in both desktop and mobile environments. The computer system involves a relatively large color flat panel display, conventional microcomputer system, and a plurality of human interface means. In particular, it relates to a computer unit, having a light weight thin notebook-like computer structure that is capable of performing personal digital assistants (PDA) like functions and wireless external communications of voice, text, graphic and image data.

2. Description of Prior Art

There are several shortcomings with prior art notebook computers, PDAs and wireless telephone units. Notebook computers have a relatively large flat panel display device, a full alphanumeric keyboard and battery power. PDAs are small handheld units with a small LCD display, small key pad and touch pen. PDAs are designed to be placed in one's pocket or purse for maximum portability. A problem arises when customers desire large high resolution color display for both portable and desktop applications. To use a computer system for both portable and desktop uses, the customer must purchase multiple systems. The cost of color flat panels are still too expensive for most customers to by two display monitors, one display for desktop and one for the portable applications. Many customers require functionality of a desktop computer, notebook computer and PDA, but it is much too expensive to purchase multiple CPUs, displays, and keyboards.

U.S. Pat. No. 5,189,632 of Paajanen et al disclosed a hand held computer unit with an antenna and wireless RF communication capability, small flat panel display and a keyboard, in a partial clam shell type structure. However, they do not teach expandable hinge means, base station for handset relay functions, or cover latching function. U.S. Pat. No. 5,327,486 of Wolff et al teach a conventional laptop computer with antenna and RF communications to a radio network and local exchange telephone network. However, they fail to teach expandable hinge means, edge hinge means, handset means or base station relay functions. U.S. Pat. No. 5,459,458 of Richardson et al teach a virtual pager and data terminal system. However, they do not teach notebook like computers, base unit station or personal/PDA computing. U.S. Pat. No. 5,008,927 of Weiss et al teach a computer and telephone system with a display screen on a conventional telephone structure keyboard unit. However they fail to teach notebook like structure, wireless communication or handset relay functions. U.S. Pat. No. 5,196,993 of Herron et al teach a laptop computer with a removable flat panel display with built-in support feet for desktop support. However, they fail to teach expandable hinge means, exterior communications functions, cover latching functions or computer display assembly. U.S. Pat. No. 5,200,913 of Hawkins et al teach a laptop computer with flat panel display and pen input means. However, they fail to teach expandable hinge means, edge mounted hinge or latching functions.

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Wireless hand held computer devices, such as cellular and Personal Communication System (PCS) telephones, have limited display capabilities. Prior art wireless computer units have display screens that are small (1.5-2.5" diameter), and they lack interactive capabilities to be successful for text, graphic and video applications. Some prior art notebook and laptop computers have integrated wireless communication means, but they are too large and bulky to be successful for in mobile uses. Prior art wireless devices do a poor job of providing voice, data and video communication functions. Typical wireless computer systems have display screens that are too small and have limited computing power. Prior art laptop and notebook computers are too heavy to carry for long periods. Inventions herein solve these problems by embodying a unique relatively thin notebook-like computer system that is capable of: being: (1) opened like a notebook, (2) quickly disassembled and re-assembled, (3) used for handset/earset communications relay operations and (4) used in a wide variety of computing, collaboration, communications and conferencing applications.

Inventions described herein are based on several Disclosure Documents submitted to the U.S. Pat. No. and Trademark Office, including Document Nos. 353691, 363753, 368165, and 377365. Inventions herein solve several prior art shortcomings, resulting in new modular integrated computer systems. The inventions as described below can be quickly configured to desktop, notebook, wireless and/or PDA embodiments. Thus, the user will be able to purchase a single computer system and pay much less money than conventional systems.

SUMMARY OF THE INVENTION

An object of this invention is to provide a modular multiple function display-computer system, where one can use the same relatively high resolution color flat panel display in both a desktop and mobile environments.

Another object of this invention is to provide means to reduce the cost to the customer of owning several expensive computer systems, by combining in one system the capability of performing both office desktop and portable/mobile computing and communications applications. Thus the invention herein saves the user the expense of purchasing separate computer systems for desktop uses, notebook computer uses, PCS uses and PDA uses.

Still another object of this invention involves means to quickly configure a modular notebook or PDA-like computer system into a plurality of system configurations for personal computer and wide area communication operations.

Another object of this invention is to provide for a relatively thin and light weight computer unit to be carried under one's arm in a notebook-like fashion, yet have sufficient computing power to execute a wide range of conventional computer and communications applications.

Still another object of this invention is to provide for bi-directional communication of voice, audio, text, graphics, image and/or video data to wide area communications networks where one or more users may communicate with other users with appropriate apparatus. The communication may realtime or store forward type communications.

Another object of this invention involves hardware and program software to control cellular or PCS communications, combined with a light weight mobile notebook or PDA like unit. The unit or system would act as a computing platform and base communications relay station. The system or unit may then relay voice and data to/from a

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handset unit or earset unit, where the base unit relays the this voice and data information to/from a wide area communication network.

Still another object of this invention involves means for quick disconnection or disassembly and subsequent connection or assembly of key components of the system, such as battery power unit, communication adapters (modems) and/or wireless telephone units.

A still further object of this invention is to use the same display-computer system assembly, comprising of relatively large high resolution color flat display panel and a powerful CPU with large memory, etc., and combining them in a modular fashion with a thin keyboard, battery power source, modem, and wireless communications means.

Another objective of this invention is to provide means for integrated telephony functions on a portable computing platform, with powerful microprocessors running Windows operating systems for a wide range of computing and communication functions.

A still further objective of this invention is to provide for full Internet access on a wireless mobile platform, where the user can access the world wide web and execute most of the available Internet browser functions and plug-ins. The computer system would be capable of performing most of the Internet data access, download, upload and conferencing functions

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a perspective view of a portable computer with a notebook clamshell-like structure.

FIG. 2 shows a perspective view of a modular portable computer system in desktop configuration.

FIG. 3(a) shows a notebook like portable computer in an open state.

FIG. 3(b) shows the notebook like computer in a closed state.

FIG. 3(c) shows a handset telephone unit and earset unit.

FIG. 4(a) shows a notebook or portable computer with a protective covering material.

FIG. 4(b) shows an electrical power source unit.

FIG. 5 shows a PDA like unit with a roughly transparent cover half.

FIG. 6(a) shows a notebook or PDA in a partial open state.

FIG. 6(b) shows the notebook or PDA in a reversed open state.

FIG. 7 shows block diagram of the computer system and associated elements.

FIGS. 8A and 8B show a flow diagram of the computer system programs and operations.

DETAILED DESCRIPTION

FIG. 1 shows a computer system, to be operated by a person or user, where the unit has a conventional notebook clamshell-like structure. The computer system as used herein can also be referred to as a portable computer system, computer-display unit or base unit, and shall also include the terms: personal computer, notebook computer, sub-notebook computer or Personal Digital Assistant (PDA). The computer system as disclosed herein typically comprises of a flat panel display assembly 2, which includes a display panel and screen 4 and other components described below. An expandable hinge means 10 connects the flat panel display assembly and cover assembly (8, 9 and 16). Expand-

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able hinge means 10 may be embodied many ways including using flexible material that is corrugated, having its grooves running parallel to the edge of the notebook structure. Cover assembly may consist of two or more sections, such as a first cover section 8, second cover section 9, and a keyboard section 16. One or more of the cover sections may be quickly disassembled from each other by the user. To avoid accidental disassembly, means may be embodied where the user must simultaneously press two push buttons 5, for example one on each side of the structure, in order to disconnect the sections. The portable computer system may also have an inside protective sheet member 4A attached to the inside the fold of the computer system. FIG. 1 shows a partially open notebook-like structure, but it may be closed all the way shut and secured, by a securing strap means 8A. This strap means may be secured to the other side of the display assembly 2 by Velcro like strips, for temporary securing and un-securing, with one's fingers. One purpose of this foldable embodiment is to provide the computer user with a handy portable notebook computer that: (1) when closed, one can easily carry, cradled in one hand under one's arm, and (2) easily opened for access to the computer indicators and controls.

The flat panel display assembly 2 may be a monochrome or color liquid crystal displays (LCD), such as those manufactured by Sharp Electronics, NEC Electronics, Toshiba Corporation or others. The display panels screen sizes may be 10 to 14 inches or more in diameter. The display pixel arrays may be 640 by 480 (VGA), 800 by 600 (SVGA), or 1024 by 768 (XGA). Color depth should be six bits, and the response time should be 45 to 50 milliseconds ($t_{on} + t_{off}$). Brightness of the screen should 70 Cd/m² and contrast ratio be at least 100:1, where 250:1 is preferred.

LCD panels from Sharp Electronics may be used in the embodiments. Applicable LCD Models include LQ11DS01, LQ12DS01, LQ12DX01 and LQ12X12. These panels have screen sizes of either 11.3 or 12.1 inches measure along their diagonal. Each panel is capable of a color depth of 6 bits/sub-pixel, a response time of 80 ms, brightness of 70-150 cd/m² and a contrast ratio of 100:1. LCD panels from NEC may also be used, such as NL10276BC24-04, NL8060BC31-02, NL8060BC31-01, and NL8060BC29-01. These panels are capable of 6 bit color depth, 50 ms response time, 70 cd/m² brightness and 150:1 contrast. Toshiba panels that may embodied include: LTM11C016, LTM12C236, or LTM12C25S, which are capable of 50 ms response, 70 cd/m² brightness and 100:1 contrast. Manufacturers' references and manuals for each are hereby incorporated by reference.

Several I/O slots and/or connectors may be embodied at one or more edges of the flat panel display assembly 2. FIG. 1 shows access slots to a floppy disk 28, external communication means 27, printer connector 31. Other external connection means may be embodied. Several connector means may be embodied, including auxiliary video connector, COM ports, and/or mouse/game ports. PCMCIA PC card 40 may be included for adding fax/modem, network interface (wire or wireless) external communications and/or added memory. An integrated built-in transmitter receiver and a retractable antenna 32 may be embodied, for example to the flat panel display assembly 2. The antenna and associated RF transceiver may be used for wireless communications to/from an external communication network. Many of the well-known notebook computer or personal computer I/O devices may be embodied.

An important feature of this embodiment is the dimensions of the computer-display unit. It may be made conve-

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niently larger than a 8.5x11 inch sheet of paper, so that one can place one or more sheets of paper (or other relatively thin flat objects) inside the closed clamshell like notebook structure in a folding or latching fashion. The user can safely carry papers from location to location without folding or wrinkling them. Thus the unit can act as a carrying device as well as a notebook computer. The outside surfaces and edges of notebook computer may be covered with leather, vinyl of other type of soft material, for easy of hand carrying and surface protection. Other parts may be embodied including foldable short legs 9A and 9B, keyboard resting pads 16A and 16B, built-in audio speaker(s) 30.

FIG. 2 shows the portable computer with several parts detached or disassembled. This embodiment may be used in desktop computer system environments. The flat panel display assembly 2 may be placed at an inclined angle, with foldable leg support means 19A and 19B. The leg support means may fold relatively flush to the backside of the assembly 2 (motion range A) when not in use, via a simple hinge 15. Vertical portions 19A and 19B may slide in and out, in a telescoping type arrangement, to allow wide range inclination angles. A pair of short legs 3 may be placed near the front of assembly 2 that may also fold relatively flush with the back of the assembly. Means may be included to place the screen at a vertical orientation. A pen or stylus input means may be associated with the display screen 4. The pen or stylus means may include finger input (touch panel) means, where one can write or point to area on the display screen. The expandable hinge means 10 may be removed from the assembly 2 and from the cover section 9 by a quick disconnect or disassembly means 5. Alternatively, the hinge means may be fixed to parts 2 and 9. The hinge means may be made of a relatively flexible material, such as leather and vinyl. It may be corrugated as shown in the figure so it can bend easily and expand, as 30 required. The hinge may have a number of attachment slots 12 for the quick dis-attachment or disconnection from book mechanisms 13. FIG. 2 shows the flexible hinge means 10 removed from the other assemblies.

Cover section 9 may contain a battery power unit containing one or more 35 batteries and power circuit elements. The battery power unit may be embodied with several types of batteries, including Lithium-ion or NiCd batteries. The power unit may be a self contained battery package, having an easy to read charge indicator 22 that indicates the state of the battery's electrical charge. Because all batteries have a limited useful charge life, the package may be easily and quickly disconnected from the keyboard section 16 and replaced with another battery package. Spare battery packages and other spare parts could be carried in a separate traveling case (not shown). The keyboard section 16 may have a full size QWERTY keyboard with movable tactile keys. An electrical cable 20 may connect the keyboard to the computer-display assembly 2. Although short cable is shown, it may be a long cable or a flexible cable, so that the keyboard may be moved about if desired. Alternatively, a wireless electromagnetic link may be embodied such as infrared (IR) or RF links, which would replace electrical cables 20 and 26. The cover section 8 may contain a wireless handset 14, such as a cellular telephone transceiver. The handset may have retractable antenna, small speaker, keypad, built-in microphone and a battery source. This handset 14 may be capable of analog or digital cellular operation, including AMPS, TDMA, CDMA, PCS, CDPD, or equivalent types for communicating with wide area wireless communication networks. The wireless unit 14 can be easily removed from a cutout or recess area 35 in the

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cover section 8. The recess area is made slightly larger than the outside dimensions of the handset 14, so it can fit inside the recess with a relatively snug fit. It is important the handset be easily and quickly removed and replaced in the base unit. Alternatively, cover section 8 consist[] of the handset itself, so that a separate cover section with recess would not be required.

The portable computer system's flexible hinge and the cover sections should be made relatively thin so that when the two halves are folded (rotated) closed, it will not be too thick or heavy to carry with one hand. As shown in FIG. 1, legs 3, 5, 19A and 19B may be folded roughly flush with outside surfaces of the unit. The number cover sections are not limited to three. The cellular handset is shown in FIG. 2 may be connected to the computer system by an optional electrical cable 26. A RF transceiver in the wireless telephone would serve as the transceiver for the computer as well. This embodiment might be desirable to reduce the overall cost of the system. However, a wireless RF transceiver and modem may be located in the flat display panel assembly 2 for voice or data communications. An antenna may be embodied on the display assembly 2, with a retractable antenna 32. The display assembly may include the computer system located within the assembly housing. The advantage of this later embodiment is that the telephone 14 and computer system could be operated independently.

The portable computer system may also have means for connection to a non-battery power source, as shown in FIG. 2, via a standard power line cord and plug 28. The system may also have means for connection to an external wire based wide area communications network 33, via cable 29. The wire based wide area network may include one or more telephone networks, cable TV networks and/or computer LAN/WANs. Telephone networks may include POTS, ISDN, ATM or other equivalent types. Several computer interface connection means may be embodied, for example interface slots/connectors as shown (27, 31, and 38). These interfaces might include R/S 232, USB, IEEE 1394, PCMCIA, or other computer I/O (serial or parallel) connections. Useful connections may include a bus extender connection, so that the notebook computer can be interfaced to another more powerful computer. For portability reasons, it is desirable that the modem or digital terminal adapter be built into the computer system unit. Some means for software loading should be included such as a floppy disk or smart card. Internal mass memory of the computer system could include ROM, flash memory, or other memory means. Means for accepting PCMCIA cards, ROM cards or other types of memory card may be implemented. Preferably, the system may be embodied with a very small light weight and low power mini hard disk. One or more IR communications interfaces may also be implemented.

Other capabilities such as FAX send/receive, speech recognition, voice processing voice mail, telephony, and E-mail functions may be implemented in the computer system. A built-in microphone 36 and speaker 30 may be embodied to support speech input/output and multimedia functions. Preferably the display should be capable of full color with a wide viewing angle. If the display is back lit, the user should be allowed to switch the backlight "on", "off" and to a multiplicity of levels in between. The operating system of the notebook/PDA should be a GUI type such as Windows™ 3.1/95, Windows CE™, MagicCap or another suitable GUI based computer operating system. The system should can be designed to support wide range of communication connectivity and software compatibility.

FIGS. 3A and 3B show another embodiment of the invention having a base unit or notebook computer system

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100, a handset unit 14 and a carset 34. This embodiment shows a relatively thin flat display panel assembly 2 having a display screen 4. The system may also include a pen and/or finger input means 7. The base unit has an expandable hinge means 10 physically connecting the display assembly to the other half of the base computer unit. The other half can be comprised of several sub-assemblies including a battery power source section 9, keyboard assembly 16 and an electronics housing section 8. The keyboard assembly contains a keyboard unit 16A, which may contain a full-size QWERTY keyboard unit. The housing section 8 may include a wireless modem or communications adapter means. The expandable hinge means 10 should have an easy access locking and unlocking means 10A, which can temporarily lock the rotation of the two halves at the user's desired angle. Electronic housing section 8 may be attached edge wise to the keyboard assembly 16 by a quick attach and release connection means. As shown in the figures, several assemblies can be disassembled by pressing one or more finger access tabs 5. Likewise, a battery source section 9 may be edgewise connected to the opposite edge of the keyboard, via similar quick attach and release connection mechanism having finger push tabs 5. The tabs may be located on each side of the assemblies for quick and easy, but safe, user disassembly. The connection means may include means for secure physical attachment and connection of electrical wires, located inside the subassemblies. Although the sections may be ridge, the attachment mechanisms may be may somewhat flexible, elastic or pliable, so that the combination of assemblies can bend slightly.

Battery power source unit 9 may consist of one or more batteries with voltage regulation, AC/DC operation, power management circuits and charging circuitry. In a preferred embodiment the unit should be capable of accepting electrical charge from an AC line. A important feature embodiment of the invention is means for quickly interchanging an electrical power depleted battery power unit 9 with a freshly charged battery unit. This may be accomplished by a combination of finger push tabs 5, latches and hook means for quick disconnection and re-attachment. In one intended scenario a user may carry several spare battery packages in a separate briefcase. When the attached battery package is depleted, the user can quickly changed out the battery sections. The user can then plug the depleted battery package into an AC line for a built-in charging operation.

It is preferable that each of the major assemblies and sub-assemblies be made relatively thin for easy carrying. The expandable hinge means should be made somewhat flexible, elastic or pliable so that the user may place relatively thin flat objects inside the folded space of the notebook-like unit. These thin objects may include sheets of paper, cards, brochures, or similar relatively thin flat items. Linkages between the sections may be made somewhat yielding, pliable, elastic and/or stretchable. Although the display device may be ridged, the other half of the notebook may be embodied with thin flexible enclosures and other structural components. Also, the flat panel display device and assembly 2, 4 may be made flexible. Thin and flexible keyboards are known to those in the art. The other parts may be adapted to have thin and slightly flexible mechanical features. The two halves can be closed by hand and secured by a flap and snap means 43 or equivalent means. As discussed above, the expandable hinge means 10 may be made flexible and expandable by incorporating a multiplicity of small folds or other equivalent means. If the user places thin objects between the halves of the base unit, one or more sides could bulge out slightly, improving the physi-

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cal object carrying capability of the notebook computer. This object carrying capability is an important feature for mobile users who may be carrying the notebook almost everywhere they go. The user may securely place and latch paper sheets, letters, memos, or other flat objects inside the notebook clam shell structure. A base unit hinge locking and unlocking means 10A may also be embodied, so that the user can quickly and easily temporarily lock the two halves of the unit to a rotationally fixed state (and later un-lock them).

FIG. 3(a) also shows several other elements including a small CCD video camera 46, built into the display assembly for video conferencing and other uses. One or more built-in audio microphones 36 may be embodied in the base unit. Preferably one microphone should be located on the edge of the notebook, as shown, so that the user may be in voice communications with other while the unit is closed. One or more audio speakers 30 may be built into the base unit. One or more compartments 47 and 48 may be embodied at convenient locations to store attachments for use with the mobile computer system. A telescoping antenna 32 may be embodied into the base unit as shown, or it may be built-in the unit and not exposed. Although the base unit 100 can be a self-contained unit, it may work with other optional attachments, such as a wireless cellular-like handset 14 or earset 34. The handset 14 may operate roughly equivalent to conventional cellular telephone handsets with a built in power source, providing voice and/or data communications to wide area communications networks. The earset 34 has a small low power RF transceiver, audio microphone, audio speaker and small battery source, which is capable of fitting into the user's ear. The wireless earset unit may be used for hands free applications. The user may then walk around while communicating with the handset or earset. If one is using the earset he/she may also use a pen input means 7 or keyboard 16 while in audio communications. For semi-private voice communications, some users may prefer using the handset 14, with hand set speaker 14A, handset key pad 14B and handset microphone pickup 14C.

If one is using the handset or earset, the base computer unit 100 may be placed some distance away from the user, typically in the same room or nearby room. The base computer unit may be designed for a higher transmitting power level. The base unit may be designed to allow the user to switch between a high or low level transmitting and receiving power levels. The earset 34 or handset 14 can be designed for a much lower RF transmit and receiver electrical power levels, because the base computer unit 100 can be place a relatively short distance away (typically from a few feet to about fifty feet). Thus, the base unit 100 may relay RF communications between the handset or earset and an external wide area communications network. The base unit could safely embody a more powerful RF transmitter resulting in a larger signal to noise ratio. This will result in improved wireless communication to and from wide area networks that may have antennas several miles away. A very important advantage of this invention is that the user has the option of having very low electrical power electromagnetic fields near his/her's head, thus improving the health and safety aspects for the user. Since less power is required for the handset 14, it can be thinner and smaller than a standard cellular handset. Thus the handset can be smaller and easier to place in the user's pocket. The earset can be made vary small so that the users can leave it in his/her's ear for long periods of time and have one's hands free for other uses.

FIG. 3(b) shows the base unit computer-display unit 100 in a closed configuration, in which one may carry it under one's arm. Since the unit is typically battery powered and

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contains electronics for a wireless voice and PCS like operations, one could use it for voice/data communications while carrying it about (i.e., in transport). The user may speak towards one or more microphones 36 located along the top edge. The user will be able to hear the other person(s) talking, through audio speakers 30 located conveniently on the base unit. A small telephone keypad could be located behind a protective door 41, for convenient dialing of a telephone number. The door may be a simple sliding door device or mechanism. The antenna 32 may be a sliding telescoping type. A simple display indicator 22 may show the electrical charge state of the battery source. A plurality of switches and indicators 46 may be located along one edge of the base unit for easy viewing and access. Such switches and indicators may include: an On-Off switch, Mode Switch (for voice, data, and video modes, etc.), high/low power transmit switch, ring/alarm mode and/or speaker/mic mode (for earset, handset, etc.). For securing the two halves of the base unit, a flap 43 made of a simple expanding material, which may include a snap means at one end and may be secured with a pin and/or pivot means. The flap would then snap to secure the flat panel display assembly 2 and cover assembly (9, 16, 8). In FIG. 3(a), the flap 43 is shown rotated in the opposite orientation for clarity only. Other securing means may be embodied that are known to those in the art.

FIG. 4(a) shows the portable computer system or computer-display unit 100 covered with a thin soft protective material or film, such as leather or vinyl. This material will protect the unit when it is bumped and/or banged into hard objects while in the use in field or office environments. The protective material may have a texture or roughen surface (as indicated in the figure), which would also provide for a relatively high mechanical friction; so it will be easier to carry under one's arm. Holes or cutouts may be embodied in the protective cover for viewing and/or using the various indicators, switches and keypads. A zipper securing means 45 may be embodied with the notebook, as shown in FIG. 4(a). The zipper means may be attached to the leather or vinyl covers so that the unit can be zipped closed to secure and protect objects placed inside the notebook. A pull tab 45A of the zipper means is shown in the figure. This embodiment would be especially applicable in rugged or harsh environments. A strap 50 may be attached to the unit so that the user may temporarily store it on a hook for example. FIG. 4(b) shows an embodiment of the battery power source section 9. As in previous embodiments, it may be detached from the notebook computer-display unit. A spring loaded pull out power cord 9B may be embodied, so that the user can conveniently pull out the power cord to electrically charge the package. The power cord and plug may be easily retracted inside a cutout space on the side of the subassembly. Several adjunct attachments and/or accessories may be carried in small compartments in the notebook unit. In addition, accessories and attachments may be carried in a separate briefcase or like carrying case (not shown in the figures). Such accessories may include a line power supply and cord, extra battery power source section 9, spare earsets 34, spare handsets 14, external hard drive, external CD ROM drive, external mouse, spare styluses and/or spare video camera/lenses 46.

An important advantage of this notebook computer unit invention is that it can be operational when it is in the closed configuration. Thus, while carrying the unit in one's hand or under one's arm, the user can perform voice, data and/or video communications. The notebook unit can be used in an open configuration on a desktop, airline tray or wide variety of other computing environments. The unit can be config-

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ured for wire based or wireless communication operations. The unit can be used for general purpose computing, network computing, pen input computing, PCS/Cellular, data/video conferencing, on-line network computing and data collaboration applications. The notebook unit can be used as a personal organizer or personal information manager, such as a computer equivalent of the Franklin Planner™ or equivalent planners. A multiplicity of personal computing applications may be embodied on its computer. The unit may be capable of wire or wireless communications, linking it to multiple handsets and earsets. The notebook computer unit may have a plurality of electrical connectors along the edges or other convenient locations for connection to a plurality of external devices, including but not limited to: modems, network interface cards, hard disks, floppy disks, and bus extender enclosures.

Preferably the notebook assemblies should be made relatively thin and light weight that would be an advantage in mobile use. For example, the flat panel display assembly 2 should have a thickness of roughly 0.75 inch or less. The cover assembly may be comprised of the battery power source section 9, keyboard assembly 16, and external communications section 8 should have a thickness roughly 0.75 inch or less; so that the folded total thickness of the unit could be 1.5 inches or less. However, an overall thickness of one inch (i.e. 0.5 inch for each half), or less, may be preferred. A keyboard unit located in keyboard section 16 that may be Model KFNR available from Alps Electric Co. Ltd. This keyboard unit has a thickness of 10 mm, a 3 mm key travel, a 1 mm over travel and a minimum key pitch of 18 mm. Alps Electric also has introduced a 7.5 mm height keyboard assembly a full size keyboard, capable of high speed typing without operator tiring.

FIG. 5 shows another alternate computer notebook embodiment, consisting of a somewhat smaller size flat panel assembly 2, display screen 4, pen/stylus means 7 and a roughly transparent display panel cover 17. The flat display panel could be an LCD, FED, or other type of flat panel display. The panel cover 17 could be made of a hard rigid material or a durable soft polymer material that is roughly transparent to a range of electromagnetic radiation frequencies. This cover may be made optically transparent to let the ambient room light to impinge onto a plurality of photoelectric light sensors 41A, 41B and 41C, which may be placed onto the display panel assembly 2. The photovoltaic or photoelectric light sensors may convert ambient room light to electrical voltages. These sensors may provide power energy to power the unit. The sensors may also help change the unit's battery source. Thus, with the roughly transparent cover 4 closed over the display panel assembly, some light rays will be transmitted through the cover. Photons from the ambient light are converted to an electric voltage, via the sensors and energy conversion circuitry that is applied to the computer unit's power source. Even if the computer unit is turned off and cover closed, the sensor could still be charging its batteries. The roughly transparent cover 17 may be made flexible layers of polyester, polycarbonate or other suitable materials. An advantage of this embodiment is an improvement in maintaining power to the notebook unit for longer periods compared to prior art battery powered units. Information on the display screen may be viewable even with the cover 17 is closed over the flat panel display assembly 2. Viewing of the display screen with the cover closed is an improvement over the opaque covers of conventional notebook computer and PDAs.

FIG. 6(a) shows another embodiment of a thin light weight notebook computer or PDA unit. The cover panel 17

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contain a keyboard 16A, which may be a membrane type keyboard. The flat panel display assembly 2, with its display screen 4, is attached to the cover panel 17 by an expandable hinge means 10. The hinge means, which may be elastic or pliable, should be capable of being rotated over angles A. The hinge means should be capable of rotating through roughly 360 degrees, so that the two halves may be folded back onto each other as shown in FIG. 6B. In the configuration of FIG. 6B, the notebook unit can be held in one's arm, and the display screen can be written onto by a stylus or pen. The unit could also be placed onto the table or desk for convenient viewing. The cover keyboard assembly 17 can be closed to a hold loose sheets of paper, brochures, etc. If this latter case, the size of the panel halves should be slightly larger than 8.5" by 11" to facilitate one carrying loose sheets. Expandable hinge means 10 is designed to expand to accommodate a relatively thick stack of documents. Hinges may be made of pressed pliable corrugated plastic sheets can accommodate 0.5 inch or more gaps.

Various battery power sources 9 may be used in the above embodiments, including smart-battery technology having rechargeable batteries. They may be made capable of monitoring themselves for electrical charge level. Batteries that are suitable for this smart battery technology include nickel-metal hydride (NiMH) and lithium-ion (Li-ion) types. NiMH batteries are more sensitive to overcharge than NiCd batteries. Care must be taken to avoid overcharging that causes heating, which is damaging to the NiMH cycle life and capacity. Li-ion batteries require tight battery management for safety purposes. NiMH batteries are available from Sanyo Energy USA. Several power management and smart-battery devices are available. Duracell has a smart rechargeable battery with intelligent power management circuits for charge level gauge means, as disclosed above. The gauge may constantly show the state of the total battery charge. Advantages of an intelligent battery management system include customer notification of charge state, longer mobile operation times, longer battery lifetimes, and faster charge times. The rechargeable battery and power management circuit may collect and communicate the present and predicted battery data to the host notebook computer under software control.

Wireless communications adapters or modems disclosed in the above embodiments may consist of analog or digital transmitter and receivers, having control circuitry for cellular AMPS, PCS, CDPD, and RF links to wide area communication networks. The communication means disclosed herein may make use of long distance or short distance communications techniques, methods and equipment. Communication techniques may include several types of digital multiplexing and command access schemes such as TDMA, CDMA, GSM, or a combination thereof.

FIG. 7 shows a block diagram of the system elements and associated circuitry, hardware, firmware and software. A microprocessor 38 controls most of the system elements. A computer system I/O bus 60 is shown interfacing several system elements. Many types of microprocessors may be embodied, including 16, 32 or 64 bit processors. The microprocessor may a complex instruction set computer (CISC) or a reduced instruction computer (RISC) computer types, or a combination of the two. CISC microprocessors that may be embodied, including the Pentium P5 manufactured by the Intel Corporation, the 68000 series microprocessors made by Motorola Corporation. Many types of RISC processors may be embodied, including the ARM series, the UltraSpac by Sun Micro Systems, the SH Series by Hitachi, PowerPC by Motorola and IBM and the MIPS R4000 series by several

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sources. The above manufactures' references and manuals are hereby incorporated by reference. Since electrical power dissipation is very important in portable systems, RISC microprocessor may have an advantage with smaller transistor counts, low voltages and fully static designs. RISC processors are available at an operating voltage of only 2.0 volts. RISC processors using 0.5 micron CMOS processes have resulted in die sizes for core functions of roughly 4 mm². RISC processors can deliver 300-400 Mips/W. Microprocessor 38 may support several types of I/O buses (typically 32 bit wide), such as VL or PCI type buses. Microprocessor and I/O busses are well known to those skilled in the art.

A Microsoft Corporation's Windows® operating system software may be embodied in the computer system. For these systems, the microprocessor CPU should be at 32 or 64 bit processors, capable of clock speeds in the 100 MHz or more. The microcomputer system may also consist of one or more I/O port means 62. A PC Card interface 27 may be embodied for bus expansion, extended memory or other added circuitry having access to the main bus 60. A mass memory device 42 may be embodied in the system, which typically is a magnetic disk memory hard drive. Many devices may be connected to the computer system, including a smart card interface 46 and keyboard 16. A touch panel and pen input means 7 may be embodied in the system, which may be separate or integrated. Examples of such touch pen devices are available from Elo Touch Systems Inc. in Oak Ridge, Tenn., MicroTouch Systems Inc. in Methuen, Mass., and Carroll Touch Corp. in Round Rock, Tex. Pen and touch panel combinations means are available from Scriptel Corp. in Columbus, Ohio for the tablet, and Symbiosis Logic in Colorado Springs for an IC controller. Other pen and touch devices are available from Phillips Semiconductor, Sunnyvale Calif. Other more traditional cursor control devices 56 may be embodied, such as a mouse, trackball, touch pad, or force transducer. Preferably, most of these components should be sufficiently small as to fit into relatively thin display assembly 2.

The flat display panel device 2 is be interfaced to the system bus 60 through display controller circuitry 44. Preferably, the display controller should be capable of VGA or SVGA display formats. Integrated into the display controller may be a BitBlt engine (to accelerate graphics), RAMDAC memory, clock synthesizer and display frame buffer. A digital signal processing (DSP) co-processor 48 may be embodied. The DSP may accept data from many sources including a microphone 36 and video data source 43. The DSP or microprocessor may output signals to one or more audio speakers, as shown as 10A and 10B. Video data may be in either analog or digital form. Microphone 36, and speaker(s) may be embodied in the handset or earset of the previous figures. Video data may be pre-processed by a the DSP. Video sources may include output from video cameras, VCR, broadcast TV, satellite TV or cable TV.

External communication means 54 may be connected to the bus, which may be capable of fast two way data transfers. The communications means 54 should be capable of controlling communications to and from a plurality of wire and wireless communication systems. These include wire based telephone means 53 and wireless communication means 51. The system may include an antenna means 32 for transmitting and receiving electromagnetic radiated signals. External communication means may be connected to one or more information or communication service providers. These service providers may include telephone services (RBOCs, LEC), on-line computer networks, Internet service

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providers, cable MSOs and/or long distance telephone firms. They also may include cable TV companies, satellite TV service, and LAN/WAN communication network providers. The external I/O port means 62 may be connected to a Universal Serial Bus (USB) and/or an IEEE 1394 (Firewire®) type I/O bus.

FIG. 8 presents a typical flow diagram of computer programs executing in the system of the embodiments disclosed herein. After a power-on action 60, the system may enter a standby power on mode 62. A power management program 66 may then be executed followed by a self diagnostic routine 68 that tests the major hardware and firmware elements of the system. If the test fails, a failure report 66 may be generated and either displayed or stored. If the test passes, the operating system (OS) 70 may be loaded and executed. With the OS loaded successfully, the system waits for incoming data and/or voice calls 72. The system may automatically enter a default system mode, or the user can select one or more computer or communication modes 76. The user has the option of selecting several operating modes, which may include a conventional computing mode 78, a wireless data communications mode 80, and a wireless voice communications mode 82. A conventional computing mode includes typical PC computing or PDA computing. While in any of the above modes, base unit to external communications operations 79 may be controlled, which includes data/voice wire and wireless options. Control code 81 may control the bidirectional handset or earset to base unit communications operations. These operations may execute roughly simultaneously or on a time shared bases, as indicated by connection 83. Under program control, either the wireless handset or the earset may communicate data first between the base unit, then the base unit may relay the data to/from the external communications network. The above communications may involve two way or bidirectional communications, including many types of data (including text, voice, graphics, video and/or images).

Many types of computer application programs may be executed by the computer system. For example, one or more telephony programs 84, office/personal productivity programs 86, electronic mail or voice mail 88, and Internet/Web browsing programs 90 may be used. Other PDA, PC or workstation programs may also be executed. One or more programs (algorithms or routines) 96 may be used to control this multiple program or system modes; this may include program coordination, scheduling and execution. Programs to control the mobile communications relay functions 98 may be embodied. Users may have the option to exit the application programs 100. Typically, after the applications have been closed, the user may exit the operating system 102. After the system exits the OS, the system may still may be in a standby power mode 104, in which the system can answer and process incoming calls, plus service other requests for other processing tasks. Users may have the option of turning off (or removing) all power to the unit 106.

It should be further understood that, although a preferred embodiment of the invention has been illustrated and described herein. Changes and modifications can be made in the described arrangements without departing from the scope of the appended claims. Other embodiments, additions, and improvements will be obvious to those with an ordinary skill in the relevant art.

I claim:

1. A portable computer unit having two leaf structures that can be opened and closed like a book, portable computer unit comprising:

a) a flat panel display assembly having a flat panel display device, control electronics and connection means which forms a first leaf structure;

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b) a microprocessor system electrically interfaced to said flat panel display assembly, having control circuitry, internal memory means and data storage means;

c) a battery power means electrically connected to said flat panel display microprocessor system and flat panel display device; and

d) a second leaf structure which is hinge connected to said flat panel display assembly at an edge of each leaf structure, wherein said second leaf structure has a recessed cutout having the approximate size a handset for optional placement of a handset or other objects, and deep enough for said object or multiple objects to fit, such that said portable computer unit can be closed.

2. A portable computer unit, as recited in claim 1, in which said second leaf structure, includes a keyboard and the said hinge connections means is to be easily disconnected from said first and second leaf structure without using tools.

3. A portable computer-display unit having a notebook-like arrangement having two leaf structures, in which a user has an option to open and close like a book, the portable computer display unit comprising:

a) a flat panel display assembly defining a first leaf structure, comprised of a display device, display screen, drive electronics, battery, and control electronics;

b) microcomputer system electrically interfaced to said flat panel display device, said microcomputer system having a microprocessor unit, data storage means, input/output means and control circuitry;

c) a roughly transparent cover panel of a second leaf structure, which is essentially flat in two dimensions and hinged to said first leaf structure at one edge of each leaf structure, wherein said user can open and close the two leaf structures like a notebook; and

d) said transparent cover panel being sufficiently transparent and being a least the size of said display screen so that said display screen information is viewable when said leaf structures.

4. A portable computer-display unit, as recited in claim 3, further comprising photo electric sensors fixed onto the upper surface of said flat panel display assembly to convert light to electrical energy to charge said battery.

5. A portable computer-display unit, as recited in claim 3, in which said transparent cover is adapted to be removed from said flat panel display assembly.

6. A notebook computer having a clam shell like structure having two leaf halves that a user can open and close like a book, the notebook computer comprising:

a) a display assembly having a flat panel device, display screen and control electronics;

b) a cover assembly pivotally attached at one edge of said display assembly via a hinge means, wherein the user have options to open and close said display assembly and cover assembly like a book;

c) a relatively thin sheet-like member interposed between said display assembly and said cover assembly is pivotally attached to said hinges means, wherein said thin sheet member serves in-part as a physical protection function; and

d) said thin sheet-like member is roughly the same length and width as said cover assembly or display assembly, wherein said sheet-like member can be pivotally moved back and forth like a page in a book.

7. A notebook computer as recited in claim 6, in which said relatively thin sheet-like member is roughly transparent.

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8. A battery operated portable electronics unit adapted for quick and easy battery means replacement so that a user can refresh said battery means, the portable electronics unit comprising:

- a) a power unit having a battery source, first electrical connection means, and first housing enclosure structure forming a part of the external enclosure structure of said portable electronics unit, said power unit having a top and bottom external surfaces;
- b) a unit assembly having support electronics, second electrical connections means and second housing enclosure structure, wherein said electronics unit is adapted to physical attachment and electrical connection to said power unit;
- c) said power unit and said support electronics are adapted to physical attachment onto an external surface of said second housing enclosure structure, and adapted to electrical connection to said unit assembly, wherein electrical mating is accomplished via electrical connector means, and wherein said physical attachment of said housing enclosures structure is accomplished via external surface connection and latching means; and
- d) said external surface connection and latching means is adapted to quick release and attach-functions. having-finger-or-hand-actuated-mechanical-release-and-latching-function.

9. A battery operated portable electronics unit as recited in claim 8, further comprising display indicator means located

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on said power unit indicating electrical battery charge remaining in said battery source.

10. A battery operated portable electronics unit as recited in claim 9, wherein said display indicator means is a low power liquid crystal indicator.

11. A battery operated portable electronics unit, as recited in claim 8, further comprising battery recharging means.

12. A battery operated portable electronics unit as recited in claim 8, further comprising a power cord and optional power cord retractor device connected to said power unit.

13. A battery operated portable electronics unit as recited in claim 8, in which said latching means is comprised of two push button tabs or buttons located on opposite sides of said power unit, wherein when a user pushes or pulls said tabs or buttons, and said latching means will release said power unit from said unit assembly.

14. A battery operated portable electronics unit as recited in claim 8, in which said power unit is attached to said unit assembly edgewise, wherein the top and bottom external surfaces said first housing enclosure of said power unit may optionally have other structural functions.

15. A battery operated portable electronics unit as recited in claim 8, in which said power unit is adapted to other electrical functions in addition to providing electrical power to said portable electronics unit.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,421,235 B2
DATED : July 16, 2002
INVENTOR(S) : Richard J. Ditzik

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It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 5,

Line 35, delete the number "30".

Line 41, delete the number "35".

Column 6,

Line 5, replace the word "consist" with the word -- consists -- and delete the brackets [].

Column 14,

Line 36, element (d), after the word "structures" add -- are closed --.

Column 15,

Line 25, element (d), delete the dash after the words "attach" and "having".

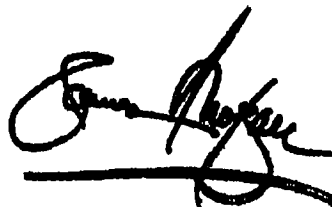
Line 25, element (d), replace the period with a coma.

Line 26, element (d), delete the dash after the words "finger", "or", "actuated", "mechanical", "release" and "and".

Line 27, element (d), delete the dash after the word "latching".

Signed and Sealed this

Seventeenth Day of December, 2002

A handwritten signature in black ink, appearing to read "James E. Rogan", written over a horizontal line.

JAMES E. ROGAN
Director of the United States Patent and Trademark Office

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US006415256B1

(12) **United States Patent**
Ditzik

(10) Patent No.: **US 6,415,256 B1**
(45) Date of Patent: **Jul. 2, 2002**

(54) **INTEGRATED HANDWRITING AND SPEED
RECOGNITION SYSTEMS**

6,178,403 B1 * 1/2001 Detlef 704/270

(76) Inventor: **Richard Joseph Ditzik**, 307 Surrey Dr.,
Bonita, CA (US) 91902

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/723,192**

(22) Filed: **Nov. 27, 2000**

Related U.S. Application Data

(63) Continuation of application No. 09/217,339, filed on Dec.
21, 1998, now Pat. No. 6,167,376.

(51) Int. Cl.⁷ **G10L 15/26; G10L 15/00;**
G10L 21/06; G09G 5/40; G06F 3/16

(52) U.S. Cl. **704/231; 704/235; 704/251;**
704/270; 704/275; 345/169; 708/100; 708/141;
708/131

(58) Field of Search **704/260, 270,**
704/231, 235, 251, 275; 345/169; 708/100,
141, 131

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,243,149 A * 9/1993 Comerford et al. 178/18.03
5,546,538 A * 8/1996 Cobbley et al. 709/203
5,699,089 A * 12/1997 Murray 345/823
5,712,957 A 1/1998 Walbel et al.
5,946,499 A * 8/1999 Saunders 710/73
5,956,681 A * 9/1999 Yamakita 704/260
6,151,576 A * 11/2000 Warnock et al. 704/260

OTHER PUBLICATIONS

Mobilegates ("Opening the Gates the Wireless World!",
Mobilegates, © 1999).*

Mann ("Wearable Computing as means for Personal
Empowerment," Keynote Address for The First Interna-
tional Conference on Wearable Computing, ICWC-98, May
12-13, Fairfax VA).*

* cited by examiner

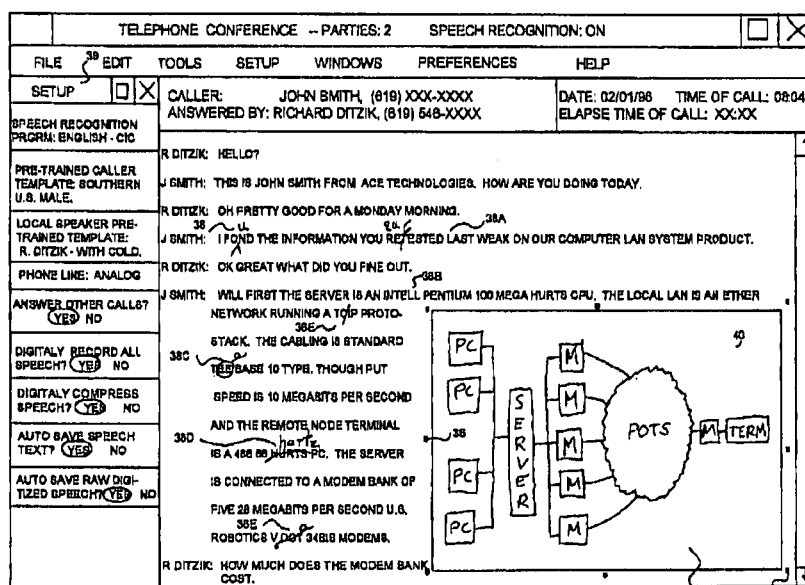
Primary Examiner—Richmond Dorvil

Assistant Examiner—Daniel A. Nolan

(57) **ABSTRACT**

A computer system with speech recognition system and
handwriting recognition system are disclosed that work
closely together to improve the total recognition accuracy of
each alone. The handwriting recognition system may
include a pen/stylus input device and associated program
functions. The system or programs may be combined with
computer telephony functions to provide integrated appli-
cations having voice output programs, Internet access,
e-mail/v-mail and personal information manager functions.
The computer system can recognize speaker-dependent and
speaker-independent speech, converting this information to
computer recognizable text, which may be displayed onto a
display device in near realtime. Speech recognition errors
may be corrected via a pen input device, and the pen
information may be recognized, converted to text and graph-
ics. This data may then be displayed at near realtime or
displayed later at a user specified time. Recognized hand-
written pen information may be integrated into the speech
recognized text and stored in a data storage system.

22 Claims, 4 Drawing Sheets

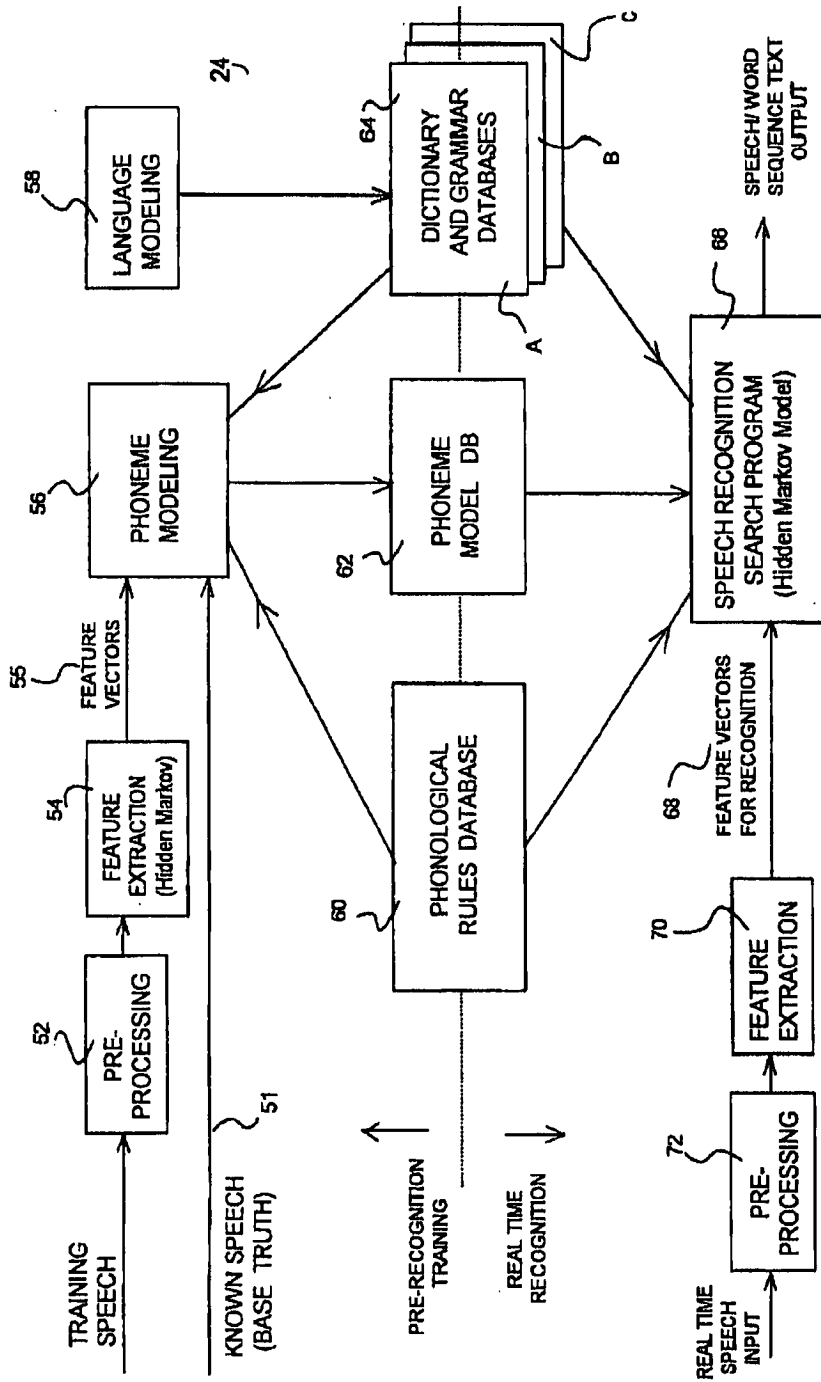


U.S. Patent

Jul. 2, 2002

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PRIOR ART

FIG. 1

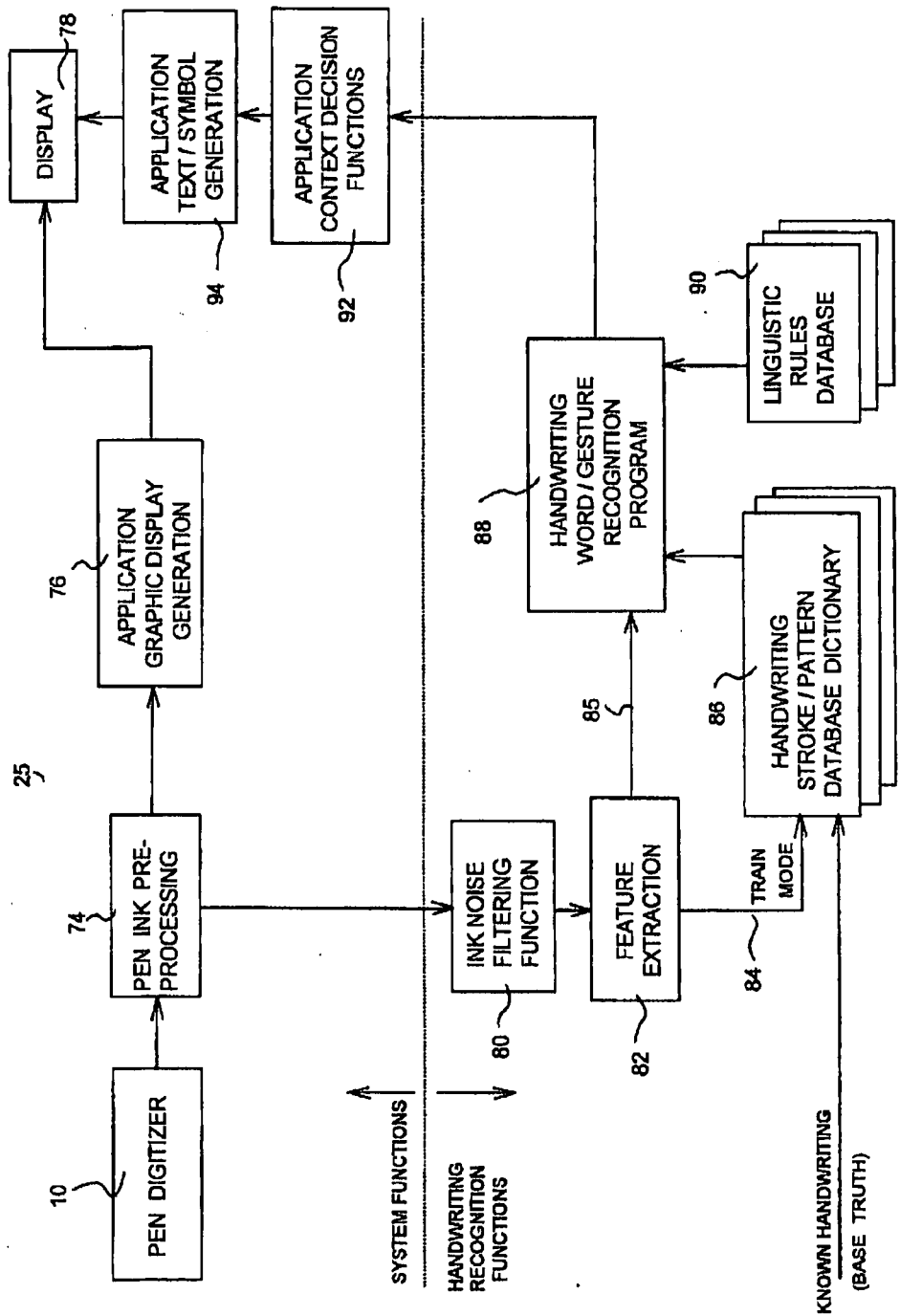


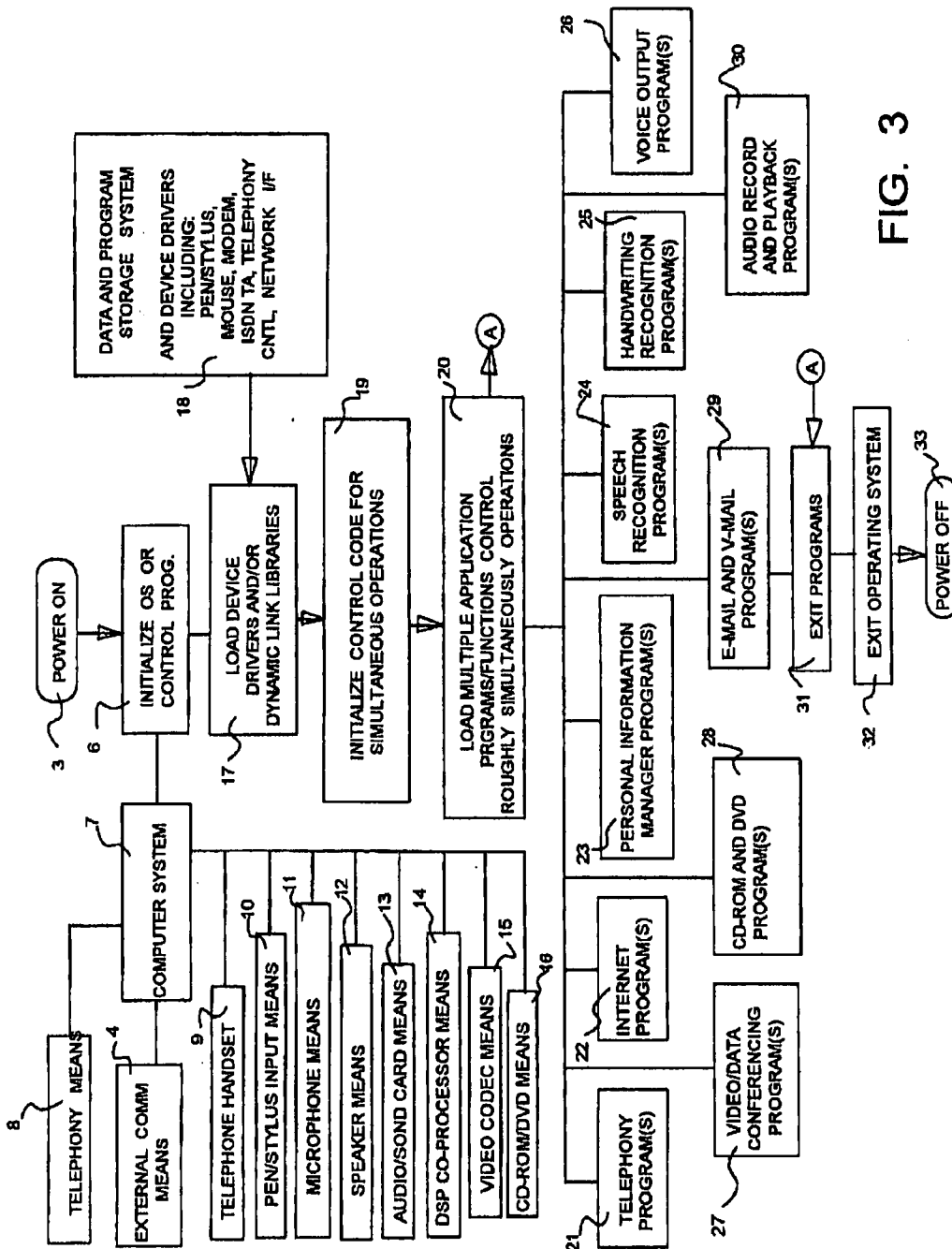
FIG. 2

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TELEPHONE CONFERENCE - PARTIES: 2		SPEECH RECOGNITION: ON	
FILE	EDIT	TOOLS	SETUP
		WINDOWS	PREFERENCES
		HELP	
CALLER: JOHN SMITH, (619) XXX-XXXX ANSWERED BY: RICHARD DITZIK, (619) 546-XXXX		DATE: 02/01/96 TIME OF CALL: 08:04 ELAPSE TIME OF CALL: XX:XX	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>R DITZIK: HELLO?</p> <p>J SMITH: THIS IS JOHN SMITH FROM ACE TECHNOLOGIES. HOW ARE YOU DOING TODAY.</p> <p>R DITZIK: OH PRETTY GOOD FOR A MONDAY MORNING.</p> <p>J SMITH: I FOUND THE INFORMATION YOU REQUESTED LAST WEEK ON OUR COMPUTER LAN SYSTEM PRODUCT.</p> <p>R DITZIK: OK GREAT WHAT DID YOU FINE OUT.</p> <p>J SMITH: WILL FIRST THE SERVER IS AN INTEL PENTIUM 100 MEGA HURTS CPU. THE LOCAL LAN IS AN ETHER NETWORK RUNNING A TCP PROTO- STACK. THE CABLING IS STANDARD SPEED IS 10 MEGABITS PER SECOND AND THE REMOTE NODE TERMINAL IS A 486 66 HURTS PC. THE SERVER IS CONNECTED TO A MODEM BANK OF FIVE 28 MEGABITS PER SECOND U.S. ROBOTICS V.120 34815 MODEMS.</p> <p>R DITZIK: HOW MUCH DOES THE MODEM BANK COST.</p> </div> <div style="width: 50%;"> </div> </div>			

FIG. 4

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**INTEGRATED HANDWRITING AND SPEED
RECOGNITION SYSTEMS**

This is a Continuation application of 09/217,339 filed Dec. 21, 1998, now U.S. Pat. No. 6,167,376. The entire disclosure of the prior application is hereby incorporated by reference.

BACKGROUND OF INVENTION**1. Field of Invention**

This invention relates to a computer system that integrates together, computer handwriting recognition and speech recognition systems, where key elements are under human control. The computer system further relates to means where individuals use the system to capture and record verbal information, which may be made up of consistent or inconsistent messages. The system may convert this information into text and/or graphic data formats. The resulting data may be useful in computer telephony applications or for further computer processing and/or data storage.

2. Description of the Prior Art

Prior art computer based handwriting recognition suffers from problems of imperfect recognition accuracy. Typically, user hand printing can be recognized with a 95-98% accuracy, if the user pre-trains the recognition software program with samples of his/her hand printed alphabet and numbers. Prior art products having handwriting input means such as the Apple Newton that has not obtained success in the market place. Human speech recognition programs must also be pre-trained with a limited number of speech samples, to obtain recognition accuracy of 95-98%. Continuous speech is more difficult to recognize than discrete speech, and, as such, suffers lower recognition accuracy. Speaker independent recognition is more difficult than speaker dependent pre-trained recognition programs. Speaker independent recognition software programs can be pre-trained for common speaker categories, such as English, male, female, southern accent, mid-western, New York, Jersey, Texan, or some combinations thereof. Recognition accuracy and performance of handwriting and speech input have many shortcomings and problems that have prevented them from being a successful computer application in the market place.

Prior art systems also include message recognition systems that use both speech-recognition and handwriting recognition to transform a consistent message to a recognizable message. However, in this prior art the original message gathered by each of the recognition systems must be identical. This prior art system is restrictive, limiting it to transcribing functions only. The invention herein overcomes that shortcoming by disclosing key elements and functions of a system having several recognition modes and several computing applications, wherein the source message need not be identical or consistent.

The inventions herein consist of combinations of key elements and modifications to existing elements to make new powerful communications systems, with unique computing applications. The invention herein uses the strengths of both the handwriting and speech recognition, along with telephony and other computing applications to make an improved recognition and computing environment. The invention may use the computing power of microprocessors, including multitasking or multiprocessing operating systems to control the operation of the system. The invention may also include digital signal processors (DSP) for fast calculations. The invention herein teaches a computing system

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running several programs or tasks, running at roughly simultaneous (e.g., real-time or near real-time). User input modes of handwriting (via a pen/stylus input means) and speech recognition (via an audio capture means) work together for new improved computer input results. The two input modes complement each other well and can be combined with other computer means as disclosed below.

SUMMARY OF INVENTION

10 An important objective of this new invention is to provide a quick and easy to use system to capture, record and modify speech-recognized text on the fly during (i.e., in near real-time). This objective may be accomplished by combination of computer telephony, pen input and speech input, each running roughly at the same time under control of computer system.

Another important objective is to provide an information system coupled closely with a computer telephony system, where speech information from one or more telephony systems (wire based or wireless) is recognized, annotated, and converted into text and graphics.

Still another objective is to improve computer based verbal information recognition by combining the individual strengths of handwriting recognition with those of speech recognition, resulting in an easy to use system with an overall increase recognition result.

Another objective is to provide a computer data conferencing system with information capture and transcription of conferencing data, converting it into text and/or graphics information, and possibly recording the data for future use.

Another objective is to provide a computer desktop environment having a human in the loop. The system may be comprised of several near real-time processing steps, where the human may be in control of: 1) the system setup, 2) viewing the initial speech recognition results, 3) making decisions on correcting speech recognition errors, and 4) adding additional information not found in the initial speech message.

Still another objective is to provide a system where the user can make certain decisions on the best parameters in setting up the speech and handwriting recognition programs. Such human in the loop decisions may include selecting languages, dictionaries, grammar rules, phonological rules, dialect options, speech accent options, and special user data. These human in the loop selections will greatly improve the overall speech recognition accuracy and usability of the system.

Yet still another objective is provide a system where handwriting and sketched object recognition accuracy is greatly improved by user selection of certain handwriting recognition parameters, either before recognition processing or during the processing. Such selection or selections may include handwriting, stroke or pattern dictionaries (databases). Also, the system may include selection of a general or special linguistic rules databases.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram a computer speech recognition system.

FIG. 2 is a block diagram a computer handwriting recognition system.

FIG. 3 is block diagram of system controls, application programs, and important system components.

FIG. 4 is representation of a typical display screen for one or more system applications.

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DETAILED DESCRIPTION

Several types of speech recognition means, known to those skilled in the art, may be embodied in the invention herein. Speech recognition programs and systems are available in the marketplace. For example, IBM® offers a product called Via Voice™; another product available is Naturally Speaking™, from Dragon Systems Inc. of Newton Mass. Both of these speech recognition systems are designed for IBM compatible PC running Windows 95™ or NT operating systems, typically running on Intel Corporation Pentium™ microprocessor computer systems. FIG. 1 shows a typical block diagram of a prior art speech recognition system 24. The system may be comprised of a training path and a near real-time speech recognition path. The computer system may be adapted to detect a person's spoken speech patterns (audio data) via a microphone (not shown in the figures) and other electronic components. Such a speech recognition system may be designed for speaker dependent or speaker independent operation. In the following, the training path of the system is described first, followed by the speech recognition path.

Speech recognition training may be performed to improve the recognition accuracy of the system. Speech patterns from one or more persons may be captured and sent to a pre-processing function 52, where the audio waveforms are sampled into a digital data stream at a sampling period of roughly 10–20 ms, for example. From element 52 the data is input to a feature extraction function 54, which may be based on the Hidden Markov Model (HMM), well known to those skilled in the art. The output of the feature extraction function 54 is a digital stream having a plurality of feature vectors 55, which may be input to a phoneme modeling function 56. The variability and uncertainty of speech processing is reduced by extracting from the speech waveforms one or more features, which are typically processed using phoneme modeling algorithms and hidden Markov model algorithms. Normal human speech has a large number of possible branches (directions) that can be chosen in a string of words. HMM may be used to statistically predict the best choice of words in the recognition process. Typically each phoneme is divided into three audible states: an introduction stage, middle stage and an exiting stage. Thus, a three-state HMM is usually included in a speech recognition system. Although absolute accuracy is not possible, the recognition program usually calculates the most likely sequence of states. For speaker independent systems, a base or ground truth of voice data consisting of known words or speech patterns may be input directly to the phonetic modeling function 56, perhaps during factory setup. As shown in FIG. 1, this input 51 is typically only necessary for speaker independent systems.

From the phoneme modeling function 56, data may be sent to a phoneme modeling database 62. This data is one of a plurality of databases that comprise the speech recognition database. Included in the database set may be a word dictionary and a grammar rules database 64. The grammar dictionary may contain the rules of allowable word sequences. The word dictionary may include several general or specialized vocabularies. Similarly, the grammar rules database may be specialized for several identified speech recognition applications. This specialization is shown in FIG. 1 and represented by databases A, B, and C. A language modeling program 58 may input data to the word and grammar dictionary 64 that may in turn provide data to phoneme modeling program 56. Another database consisting of a phonological rules database 60 may also provide data to the phoneme modeling program.

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A person using the system typically will speak into a noise canceling type microphone that sends the resulting speech waveforms to pre-processing function 72 for digital sampling. Alternately the user may speak into a standard microphone such as a local or remote telephone. This data then is sent to a feature extraction function 70, which is similar to element 54. The resulting feature vectors for recognition 68 are sent to the speech recognition search program 66. Also, providing data to the search program may be the phonological rules database 60, the phoneme models database 62, and the word and grammar dictionary databases 64. The recognition search program 66 may be based on the Hidden Markov Model, which finds feature vectors representing a sequence of words from many possible combinations that are most likely. These calculations may be assisted by the application of vocabularies and rules data stored in the recognition databases. The output of the search program 66 may be computer text of the speech input captured. In general, the speech recognition program predicts the most likely word sequence spoken.

One of the most difficult forms of speech to recognize is spontaneous telephone conversation, where error rates of up to 50% are common with today's speech recognition systems. Increasing the size of the system's vocabulary (dictionary) does not always improve the recognition accuracy. This is due to the uncertainty of speech, i.e., the number of possible branches or directions that a person can speak when stringing a series of words together. The above is why a speech recognition alone, even with relatively high accuracy, has difficulty in becoming a useful data input device for computers.

In general, computer handwriting recognition typically involves a pen or stylus input device, an electronic mean of digitizing the pen strokes, and a program to recognize the pen stroke data. Handwriting recognition system via a pen input means may transform hand written letters, numbers, punctuation, and symbols into recognizable computer generated text. This text or graphics may then be suitable for additional processing or data storage. Handwriting recognition may be comprised of either discrete or cursive handwriting type program(s). Hand written information typically is comprised of stroke contours, intersections, and shape features, which may differentiate one handwritten word or mark from another. In this respect, the handwriting recognition problem is similar to speech recognition, where in each case certain features of the raw data is extracted. This data is then compared to one of more databases, which may be comprised of language dictionaries (lexicons) and writing rules. Handwriting recognition may be accomplished in real-time or near real-time, and the data may be processed in chronological order as it was written.

FIG. 2 shows a block diagram of a handwriting recognition system that may be known to those skilled in the art. Handwriting recognition includes computer recognition of handwritten cursive writing of words, hand printing, handwriting symbols/marks in any written language (formal or informal). As used herein, handwriting also includes recognition of hand written sketches and/or certain selected drawing shapes (circles, triangles, rectangles, etc.). A pen or stylus digitizer means 10 may repeatedly sample the user's pen strokes and digitize the x and y positions at rates roughly between 5–40 ms. The pen digitizer may be an opaque tablet separated from the display or a digitizing means placed over the screen of the display device 78. The digital stream can be thought to represent "electronic pen ink" or "pen ink" for short. The digital stream from the digitizer may be sent to a pen ink pre-processing function 74, where the digital data

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may be filtered, smoothed, and/or scaled. Two outputs may be embodied in element 74 leading to roughly two generalized processing paths. One output may lead to an application graphic display generation means 76. A second output may lead to an electronic ink noise filtering function 80.

In the first path, the application graphic display generation means 76 accepts the digital stream representing electronic ink and generates codes necessary to graphically display an equivalent representation of the users hand written strokes. Codes may be sent to the display 78, which may be a display device, display monitor or display system. This processing may be accomplished in real-time; so the user can see electronic ink paths of his/her writing and/or drawings on the display screen very quickly after each stroke. The application graphic display generation means 76 may be included in the operating system of the computer system and/or in the hardware of the computer system or display 76.

In the second path the pen electronic ink pre-processing function 74 sends data to an electronic ink noise filtering function 80, where further filtering of digitizer ink noise may be filtered out. One reason for this filtering function is that handwriting recognition accuracy is effected by digitizer noise to a greater degree than it effects recognition of handwriting by humans. Data from this filtering function may be sent to a feature extraction function 82, where certain key features of the handwriting data is removed from the data, and may be placed in feature vectors. As in speech recognition, these feature vectors may be optimized for HMM algorithms. Depending on the operating mode of the recognition system, the data from the feature extraction function 82 may be used either for user training 84 or for near real-time recognition 85. If the system is in the training mode, data 84 is input to a handwriting stroke and/or pattern database 86. This database may be comprised of one or more dictionaries with a plurality of handwriting/sketch patterns for one or more languages and/or special symbol applications. The database may also accept handwriting data from a known source with known writing samples, which represent a set of base truth data. As in speech recognition programs, base truth data is especially helpful for user independent recognition systems.

If the system is in the real-time recognition mode, data 85 may be sent directly to a handwriting word and/or pen gesture recognition program 88. This program also accepts data from the handwriting stroke and/or pattern database 86 and one or more linguistic rules database 90. The recognition program 86, which may be based on HMM techniques, which determines the best match or matches, by comparing the feature vectors to databases 86 and 90. This recognition program may be programmed to recognize hand written pen gestures, which includes such marks as a comma, colon, semi-colon, arrow (right, left up, down), and other special symbols with predetermined meanings. Sample gesture patterns could be stored in the stroke/pattern database 86. The linguistic rules database may be comprised of multiple rules databases, for example different rules for different written languages and/or regional subsets. Data containing the best match or matches and other related data may be sent to an application context decision functions element 92. This element may contain information on the context of computer application running roughly simultaneously with the recognition programs. Context information can be a great help in narrowing the best matches of the recognition program, thus improving the overall recognition accuracy. Data from element 92 may then be sent to an application text and/or symbol generator function 94. This element may be embodied in the operation system and/or hardware of the computer

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system. Data from this generator function may be sent to the display device for display with the application running on the computer. Application context decision function(s) may be also included in the recognition system.

Thus, both speech recognition and handwriting recognition functions are shown in figures. As used herein, speech recognition of speech input resulting in computer readable text output is defined as speech transcription. Similarly, as used herein, handwriting recognition of pen handwriting input resulting in computer readable text output is defined as handwriting transcription. It is well known in the art that written or verbal transcription functions are useful in many types of business applications. For example, transcription of a persons speech or handwriting into computer readable text, such as ASCII code, so that the coded information can be displayed, stored onto recordable media, and/or stored into a database for later searching functions. These transcription functions may form a part of the inventions herein. Other functions, extensions, operations and uses, taught herein or generally known in the art may be added to these transcription operations.

FIG. 3 shows a block diagram of key computer system elements of the invention herein. The computer system and programs may be comprised of multi-media type elements, which may be adapted for computer telephony, data/video conferencing as well as general purpose computing and remote communication functions. The computer system 7 may consist of typical personal computer (PC) components, including microprocessor, interface chip sets, main memory, mass disk memory, I/O bus, display monitor, keyboard and mouse devices. At power on 3 an operating system is typically loaded, which may be a windows based graphic user interface type operating system, such as Microsoft Windows® 95/NT/CE operating systems. Interfaced to the computer system may be several devices and/or software programs, including telephony means 8, external communication means 4 for remote data transmit and receive functions to other systems, for two-way data interchange, such as connection to the Internet. Telephony means may include one or more hardware components and software, providing for telephone and fax functions.

The system may include a pen/stylus input means 10, which captures a handwriting or graphic symbols from a person. Element 10 may be comprised on an opaque graphic tablet or transparent device, placed over a display screen. In addition to the above, the system may be comprised of a telephone handset device 9, microphone means 11, audio speaker(s) 12, audio/sound card means 13, DSP co-processor and electronic card means 14, video codec means 15, and CD-ROM/DVD playback/record means 16. These elements may be embodied separately or in combination as required for the specific configurations desired.

The operating system 6 may load all the necessary device drivers and/or dynamic link libraries (DLL) 17, automatically or via a command. Some of the device drivers may include pen/stylus, mouse, analog modem, ISDN terminal adapter, telephony controller and network interface card drivers. The system may initialize, load and control a plurality of roughly simultaneous programs, tasks, threads and/or operations, including additional control code or OS extensions 19, and application programs 20. Program code may be loaded to control tasks that are designed to run roughly simultaneously or at different times. Some of the software programs that may be loaded for computing or communications are telephony 21, Internet browser/applets 22, personal information manager (PIM) 23, speech input 24, pen/stylus applications 25, and voice output programs

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26. Voice output programs may consist of text to speech programs or digital speech playback of recorded speech (compressed or uncompressed). Other programs may include video and data conferencing programs 27 (via telephone or Internet), CD-ROM and/or DVD control programs 28, E-mail, voice mail (v-mail), and fax programs 29 and/or audio record and playback programs 30. The user can choose programs to load and execute, depending on the user's desires. When the user is finished with his/her computing or recognition tasks, the user may issue an exit command 31. The user can then exit the operating system 32 and turn off the power 33 to the computer system.

The speech input recognition program/functions 24 and associated hardware may include several functions including speech capture (via microphone or telephone line), digitize data, process data, store raw speech data, and storage of recognized text. The pen/stylus input handwriting recognition program/functions 25 and associated hardware may include the following functions: handwriting capture, drawing capture, inking (displaying pen tracks). The system may store pen data, process data, perform pen gesture recognition and/or compression of the pen data. The Telephony program/task 21 and associated hardware may perform the following typical application functions: call answering, outgoing message play, call forwarding, incoming message recording, screen pop ups, manual dial out, auto dial out, and/or Voice mail control (record, route, store), among others. The PIM program/tasks 23 may include the following typical functions: calendar, address book, things to do, date-time stamp, and data base store/control functions. Voice output program/task functions may include audio speaker control (free standing and handset), voice data playback, text to speech control, playback speed/pitch control. In addition typical CD-ROM multimedia and new DVD record and playback control and processing may be included in the system. The computer system CPU may be powerful enough for multiple programs, tasks and/or threads to run at near real-time, such that the user may think that programs are running simultaneously.

FIG. 4 shows a representation of the computer system's display screen, with a new unique computer telephony application program. In this disclosure, telephony includes telephone-like connections to communication networks such as telephone, Internet, and cable networks. This system makes use of pen/stylus input means and speech input means, with both handwriting and speech recognition functions enabled (turned on) at the same time. The screen shows the name of the caller (via a caller ID function), the name of the answering party, date and time. The audio signal for the speech may sent to a speaker so that the user can listen the speech information; the user may then make one or more decisions on the system setup options desire, as shown in menus 39. Speech data from both the caller and local user may be captured, digitized, processed, recognized and displayed on the screen at near real-time. Since speech recognition is not perfect, recognition errors and omissions may be displayed along with the correctly recognized text. Recognition of the caller speech over the phone lines may be slightly worse than the local user's speech. As these recognition errors are observed by the viewer, he/she may use the pen or stylus to correct these speech recognition errors or omissions by direct handwriting on a writing pad or on the screen. The speech recognition errors on the screen are represented in the figure by corrections 38, 38A, 38B, 38C, 38D, and 38E. The user may quickly and efficiently make editing marks (inking) with the pen, as shown. The pen marks and handwriting may be recognized immediately, but

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could be displayed after a delay interval selected by the user. The user, viewing the text of the two-way conversations, can make editing marks without losing concentration on what is being said during the telephone call or audio input. In an alternative embodiment, the user may have the option to delay the display of recognized handwriting data until the user provides a command action, perhaps by click an icon or menu item. The software application may also include code to provide means to quickly add one or more graphic frames 34. The user can draw and write in the frame, to record graphical representations 40 of what is being said by either party. Graphic frames can be scaled and sized via the graphic handles 36. Long conversations yielding much text can be accommodated by automatically scrolling off text from the screen. However, such data may remain stored in memory such in a data storage system 18. Manual scroll bars may be provided. Text can be made to wrap around the graphics frame 34 as in typical word processor or draw programs.

The operating system may support multiple independently controlled cursors to make the graphical user interface easier and faster to use. The setup of the program may have several options, as shown on the left side of FIG. 4. Many other typical computer application features may be included, as are well known to those skilled in the art. Although many tasks can be processed with little observable delay, other calculations and tasks may be compute intensive. There may be some delay in the display of speech and handwriting recognition text results, even with the help of DSP co-processors. However, the delays in the 500 ms range may be small enough not to cause a human factors problem with respect to the user. Other delays may exist in pen inking, shape recognition or gesture recognition. When two or more of these systems are connected via an external communication system, there may be inherent communication delays. However, depending on the type and speed of the external communication means, response times should be made small and not objectionable. The system may feature a delay option for the handwriting recognition, so that the user can view his or her pen input electronic ink for the screen or multiple screens, before the recognition data is displayed. A portion of the screen or screens may be displayed instead of the entire recognized data. The system may have telephone connection (POTS, ISDN, ASDL, HSDL, ATM, etc.), cable TV interface, Internet connection, and/or wireless communication. Interlaces to the network may be analog or digital or a combination. The inventions herein are compatible with video and data conferencing means. Many clever and useful combinations of PC and telephony applications can be embodied to provide new collaboration, groupware conferencing and remote communication uses.

One purpose of this new invention is to provide a user friendly means to capture, recognize and record speech from one or more individuals. Also, the system provides functions to convert recognized speech data to computer text at near real-time or delayed. One such application could be during telephone conferencing use, where written text of the call is to be obtained. This may be accomplished by this unique combination of pen input and speech input running on a microprocessor computer system. The user may not choose to recognize and manipulate all telephone conversations. When an important or critical call is answered and/or complex information is being verbally communicated to the user, this invention will enable one to activate the system to capture and record 100% of the information communicated. The system may then record it in a computer readable text and/or graphics format. The embodiments presented herein

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are but a few possible embodiments of the invention herein, other embodiments, extensions and improvements are obvious to those with an ordinary skill in the art.

I claim:

1. A computer program, residing on one or more computer-readable mediums, comprising instructions for causing at least one computer system to:

- a) control data and information flow to and from said computer system and at least one user interface;
- b) receive speech input data spoken by a user via speech input means and convert said input data into computer recognizable data under control of said computer system;
- c) recognize said speech data by identifying best matches to known words or phrases of a spoken language and output recognized speech text or data;
- d) receive handwriting data from a user via a pen input means under control of said computer system, convert this data to electronic ink form of data and, at the option of the user, select recognition of said handwriting data;
- e) relate said recognized speech data with said recognized handwriting data, at the option of said user, so that enhanced understanding of said information is accomplished; and
- f) format for display said recognized speech data, said recognized handwriting data, or said converted electronic ink data.

2. A computer program as recited in claim 1, further comprising additional one or more cycles of speech and/or pen input with associated recognition processing which is accomplished to improve computer program recognition functions and user understanding of said information.

3. A computer program as recited in claim 1, in which said computer program is interfaced to the Internet via external communication means, wherein said computer program provides user interfaces for Internet applications.

4. A computer program as recited in claim 1, in which said computer program acts to control user interfaces for application programs, wherein typical editing functions can be accomplished via said additional pen inputs or additional speech inputs.

5. A computer program as recited in claim 1, in which said additional speech and pen input functions are coordinated, wherein said computer program provides telephony or Internet functions.

6. A computer program as recited in claim 1, in which said computer program resides in personal digital assistants or cellular phones devices, wherein said computer program controls user interface functions based on said pen input and speech input functions.

7. A computer program as recited in claim 6, in which said personal digital assistant or cellular phone includes handwriting transcription functions.

8. A computer program as recited in claim 6, in which said personal digital assistant or cellular phone includes audio recording functions, wherein audio information is recorded but not recognized into computer readable text.

9. A computer program as recited in claim 6, in which said personal digital assistant or cellular phone is connected to the Internet or telephony network via wireless communication means.

10. A computer program as recited in claim 6, in which said personal digital assistant or cellular phone includes speech transcription functions.

11. A computer program as recited in claim 1, in which said additional speech and pen input functions are coordinated to compliment each other's functions.

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12. A computer program as recited in claim 1, in which said altering functions can be accomplished, wherein understanding of said user interface can be assisted by session a setup function.

13. A computer program as recited in claim 1, in which said computer program controls two or more displayable cursors that are independently controlled by said computer program and user inputs.

14. A computer program, residing on one or more computer-readable mediums, comprising instructions for causing at least one computer system to:

- a) control certain program functions of computer system, including data input and data output of data;
- b) receive speech input spoken by a user and convert said speech input into computer recognizable data under control of said computer system;
- c) recognize said speech data by identifying best matches to known words or phrases of a spoken language, wherein said received speech and recognized speech forms speech input means;
- d) receive handwriting data from a user via a pen input device under control of said computer system and recognize said handwriting data by identifying best matches to known written words or symbols, wherein the meaning of said handwriting data is either consistent with or inconsistent with said speech input data; and
- e) combine recognition results of said handwriting and said speech recognition data, in a manner to provide output text or data with improved recognition accuracy.

15. A computer program as recited in claim 14, further causing the computer system to format said output text or data for display on a user interface.

16. A computer program as recited in claim 14, further causing the computer system to

- a) receive user input to select one or more portions of said output text or data; and
- b) process additional cycles of speech input functions or pen input functions for additional information recognition on said user selected portion of said output text or data.

17. A computer program as recited in claim 14, in which said pen input recognition and speech input recognition occurs at roughly realtime.

18. A computer program as recited in claim 14, in which said computer program is interfaced to the Internet via external communication means, wherein said computer program provides user interfaces and processing for Internet applications.

19. A computer program as recited in claim 14, in which said computer program is adapted to reside in personal digital assistants or cellular phones devices, wherein said computer program controls user interface functions using said pen input and speech input functions.

20. A method of controlling a user interface for viewing and control of a speech and pen data processing system, said method comprising the steps of:

- a) displaying text, characters images, and/or graphics on a display screen of a display device;
- b) running an operating system supporting a graphic user interface for example Windows™ on said display screen of said display device;
- c) accepting pen input data from a pen input system and showing said pen input data on said display screen;

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d) accepting speech input from a speech input means, recognizing the speech input and showing recognized speech text on said display screen; and

e) displaying, at the option of the user, system setup data of said speech and pen data processing system on said display screen. 5

21. A method of controlling a user interface as recited in claim 20, in which said pen input data is, at the option of the user, either recognized before said pen input data is shown on said display screen. 10

22. An computer operating system with a graphic user interface controlling a digital computer system, the operating system comprising the steps:

a) controlling multiple cursor operations in a single application program 15

b) accepting input data from first input device under control of said controlling multiple cursor operation step, and generating a first cursor;

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c) generating data for the display of said first cursor under control of said controlling multiple cursor operation step;

d) accepting input data from second input device and generating a second cursor, under control of said controlling multiple cursor operation step;

e) generating data for the display of said second cursor under control of said controlling multiple cursor operation step; and

f) said first and second cursors are both visible to the user and active in the graphical user interface screen simultaneously, for example during an input device operation, and adapted to being independently controlled by said first and second input devices simultaneously.

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,415,256 B1
DATED : July 2, 2002
INVENTOR(S) : Richard J. Ditzik

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page, Item [54] and Column 1, line 1,

Replace the word "SPEED" with the word -- SPEECH --

Title page,

Item [57], **ABSTRACT,**

Line 4, after the word "each", add the word -- system --

Line 6, replace the word "system" to the word -- systems --

Line 7, replace the word "intergrated" with the word -- integrated --

Line 9, after the word "e-mail", delete the slash, and add -- , voice mail -- and place parenthesis around the word "v-mail".

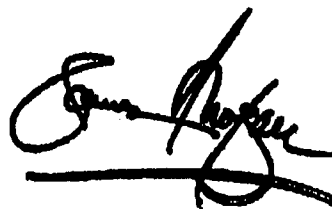
Line 18, replace the word "intergrated" with the word -- intergrated --

Column 11,

Line 9, add the words -- or unrecognized --

Signed and Sealed this

Tenth Day of December, 2002



JAMES E. ROGAN
Director of the United States Patent and Trademark Office



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(12) **United States Patent**
Ditzik

(10) Patent No.: **US 6,970,678 B1**
(45) Date of Patent: **Nov. 29, 2005**

(54) **WIRELESS LOCAL AREA
COMMUNICATION AND NETWORKING
SYSTEM**

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Bonita, CA (US) 91902**

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 133 days.

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8, 1999, which is a division of application No.
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5,983,073.

(51) Int. Cl.⁷ **H04B 7/15**

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455/569.1**

(58) Field of Search **455/11.1, 556,
455/557, 568, 575, 572, 90, 569, 15, 16,
455/3.05, 403, 422, 462, 463, 465, 550, 552.1,
455/566.1; 364/705.05**

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,008,927 A	4/1991	Weiss et al.
5,127,041 A	6/1992	O'Sullivan
5,189,632 A	2/1993	Paajanen et al.
5,196,993 A	3/1993	Herron et al.
5,200,913 A	4/1993	Hawkins et al.
5,276,680 A	1/1994	Messenger
5,327,485 A	7/1994	Wolff et al.
5,351,270 A	9/1994	Graham et al.
5,440,449 A	8/1995	Scheer
5,446,783 A	8/1995	May
5,459,458 A	10/1995	Richardson et al.
5,487,069 A	1/1996	O'Sullivan
5,490,284 A	2/1996	Itoh et al.

5,533,027 A	7/1996	Akerberg et al.
5,553,312 A	9/1996	Gathey et al.
5,570,389 A	10/1996	Rossi
5,592,491 A	1/1997	Dinkins
5,628,055 A	5/1997	Stein
5,634,080 A	5/1997	Kikinis et al.
5,659,890 A	8/1997	Hidaka
5,675,629 A	10/1997	Raffel et al.
5,699,367 A	12/1997	Haartsen 714/749
5,701,515 A	12/1997	Grader
5,796,727 A	8/1998	Harrison et al.
5,809,115 A	9/1998	Inkinen

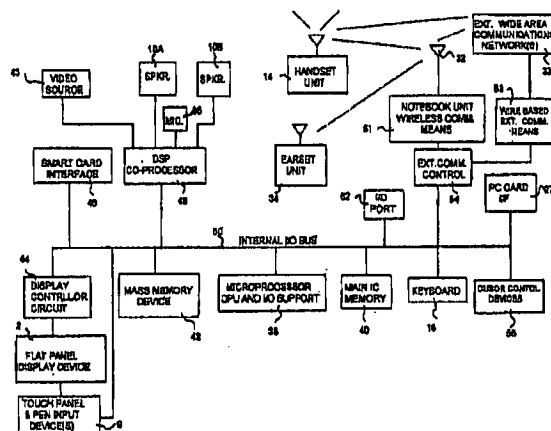
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Primary Examiner—Sonny Trinh
Assistant Examiner—Sam Bhattacharya

(57) **ABSTRACT**

A small light weight modular microcomputer based computer and communications systems, designed for both portability and desktop uses. The systems make use of a relative large flat panel display device assembly (2), an expandable hinge device (10), battery power source (9), keyboard assembly (16), and wireless communications devices (32, 51). The systems are capable of bi-directional realtime communications of voice, audio, text, graphics and video data. Both wire-based or wireless communications methods and devices are implemented. Wireless communications devices may include one or more telephone-like handsets (14) and/or carset (34). The wireless communication devices may include one or more antennae (32). Systems can be configured in a portable arrangement similar to conventional notebook computers, but can be quickly and easily disassembled and re-assembled for office desktop uses. Systems may consist of a base computer unit (100) comprising wireless communication devices may act as a relay station relaying voice and other data between the handset or carset and external wide area communications networks. The system may be capable of performing, personal digital assistant (PDA), cellular telephone, conventional notebook computer, desktop computer functions.

15 Claims, 9 Drawing Sheets



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U.S. PATENT DOCUMENTS

5,809,415 A *	9/1998	Rossmann	455/422.1	5,983,073 A	11/1999	Ditzik
5,884,190 A	3/1999	Lintula et al.		5,991,644 A	11/1999	Ogawa
5,896,369 A	4/1999	Warsta et al.		6,049,796 A	4/2000	Siitonen et al.
5,907,815 A	5/1999	Grimm et al.		6,112,103 A *	8/2000	Puthuff 455/557
5,920,826 A	7/1999	Meiso et al.		6,134,454 A	10/2000	Foladare et al.
5,930,719 A *	7/1999	Babitch et al.	455/462	6,289,213 B1 *	9/2001	Flint et al. 455/420
5,953,322 A *	9/1999	Kimball	370/328	6,459,897 B2 *	10/2002	Holmes et al. 455/426.1

* cited by examiner

U.S. Patent

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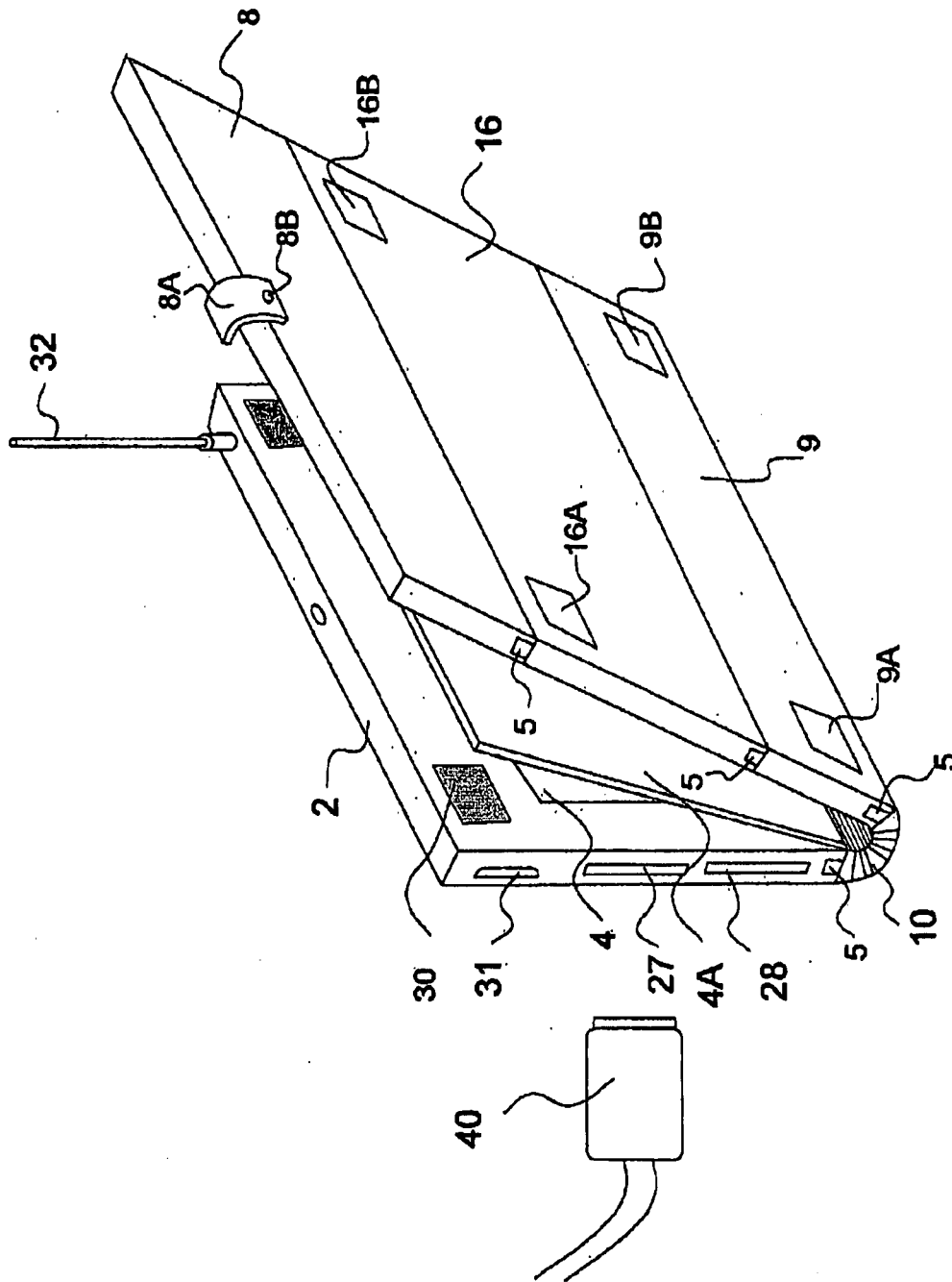
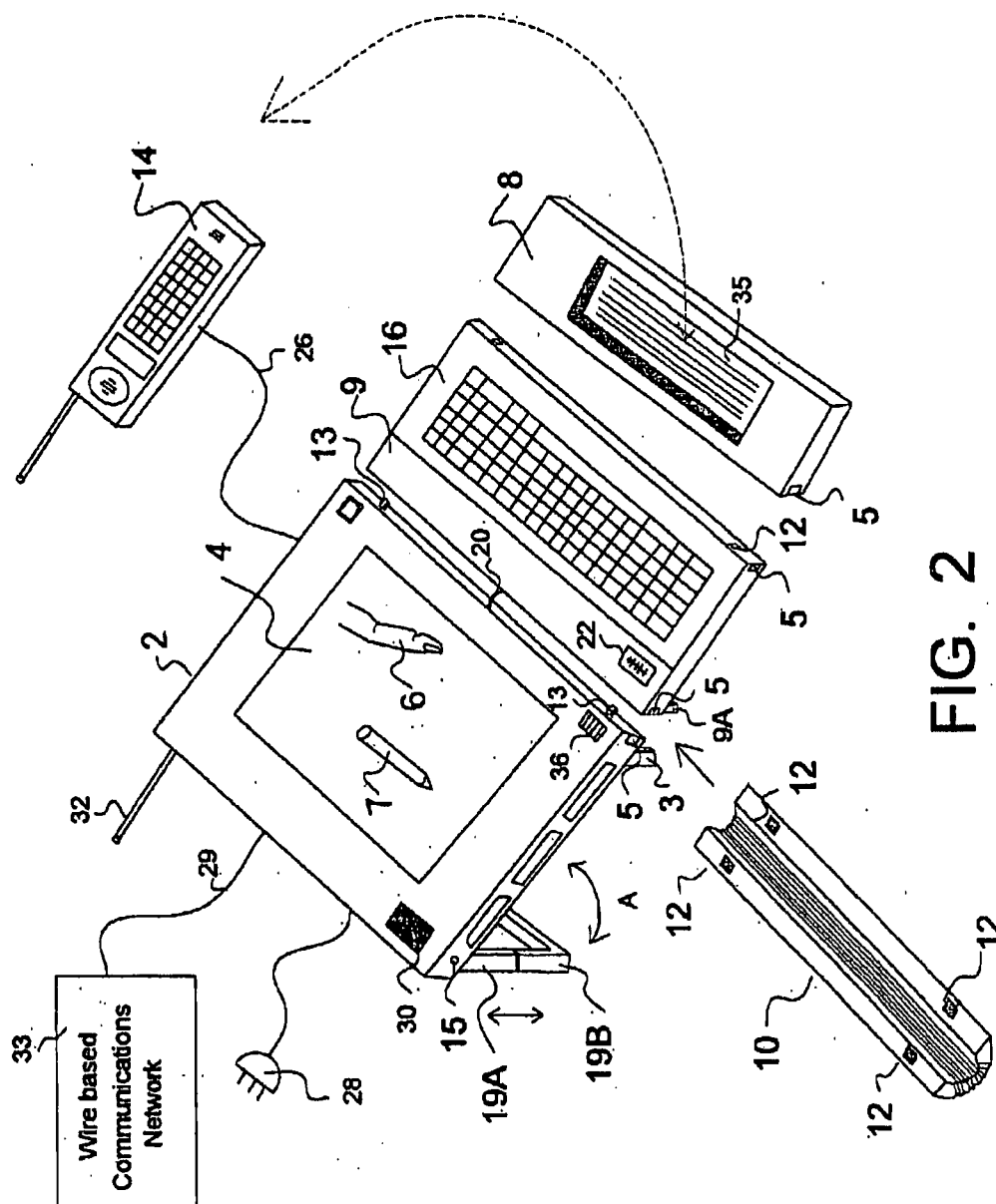


FIG. 1



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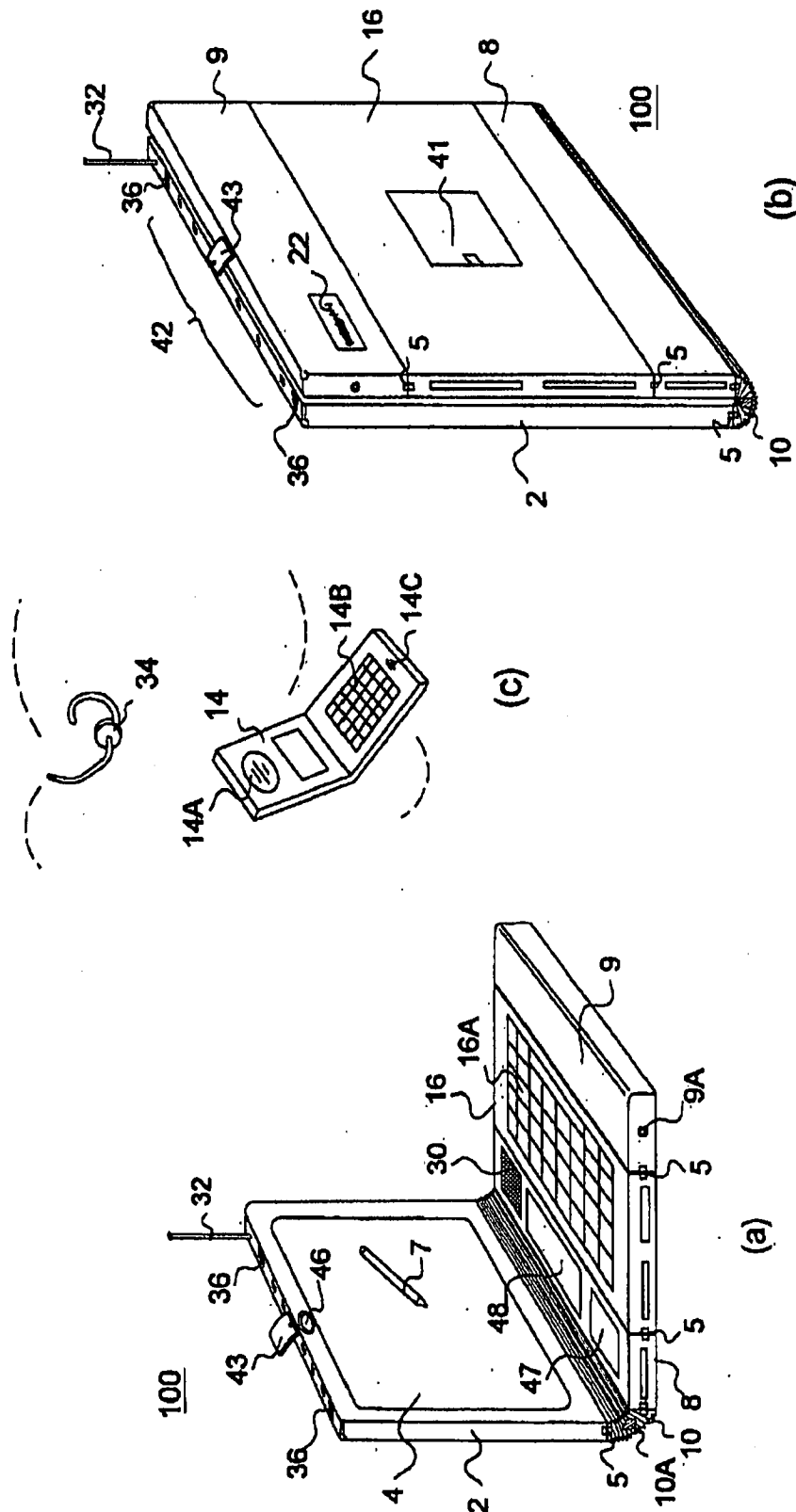


Fig. 3

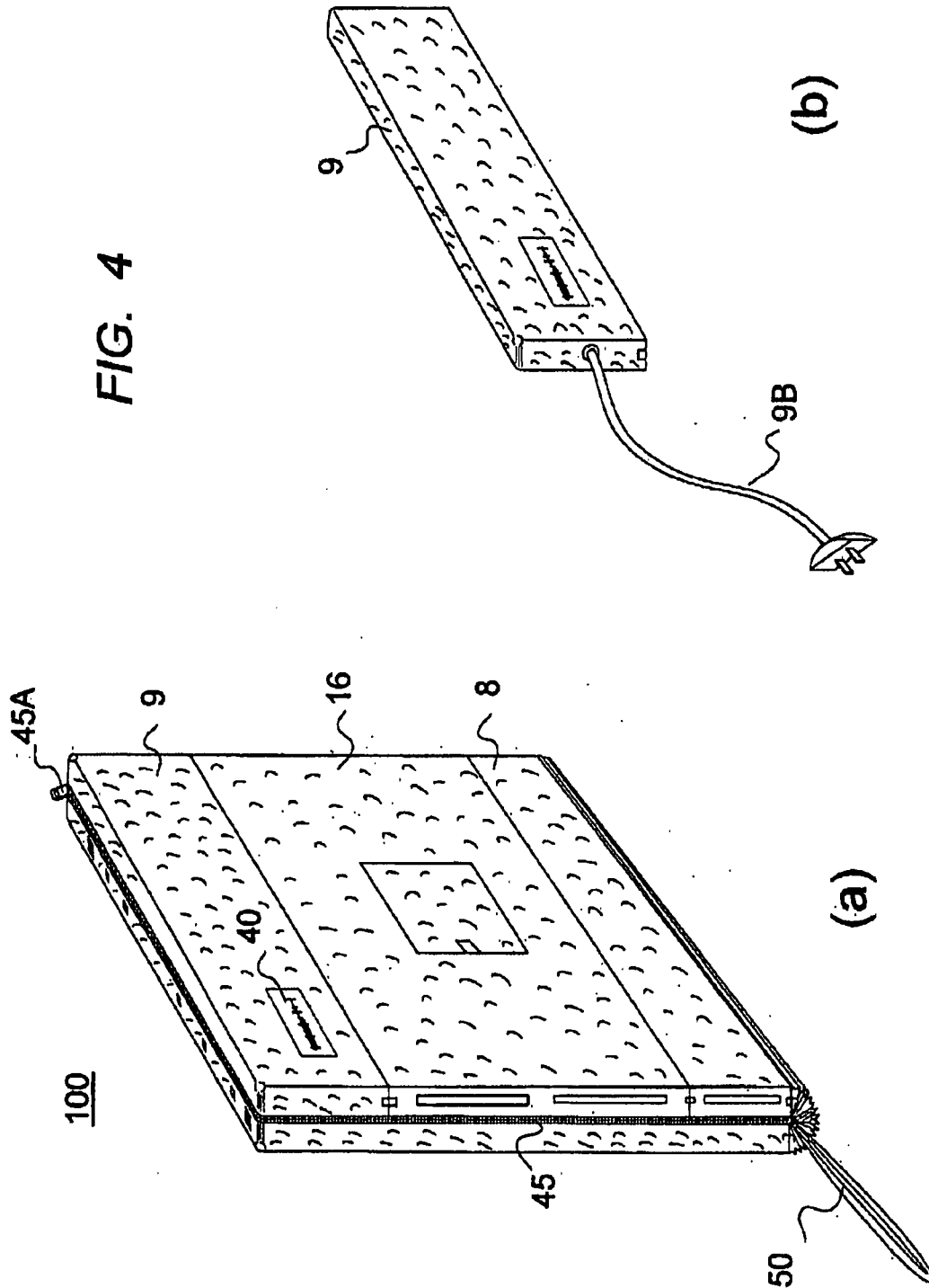
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FIG. 4



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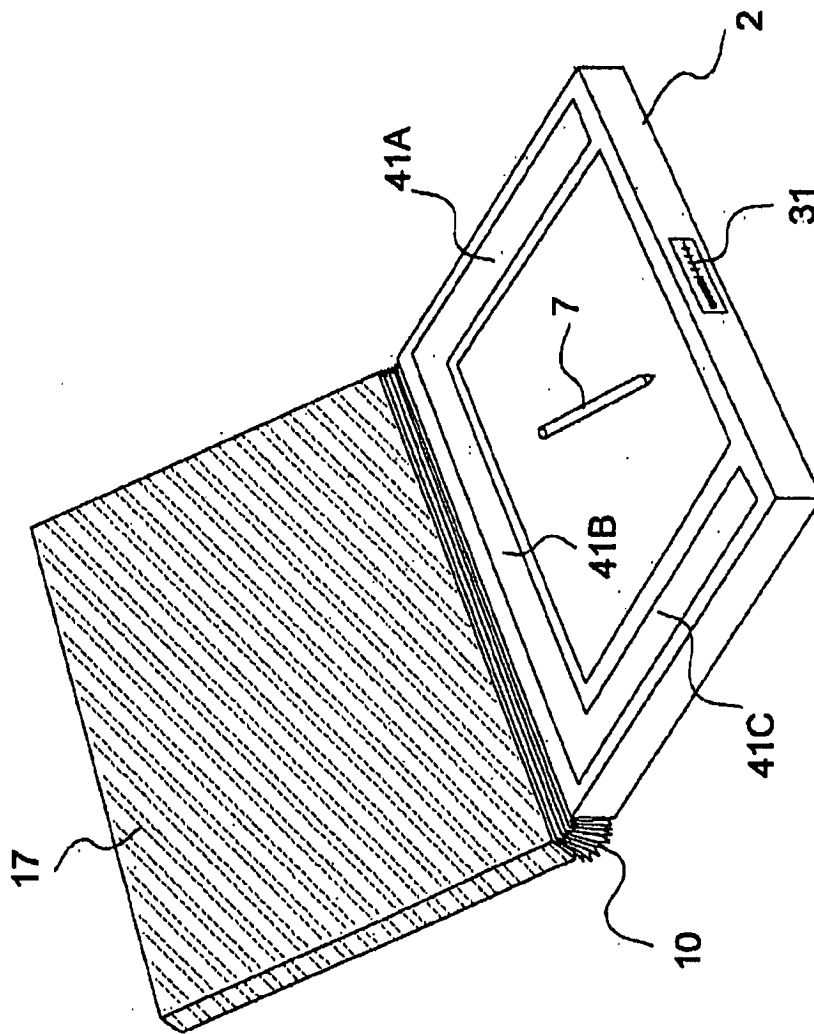


FIG. 5

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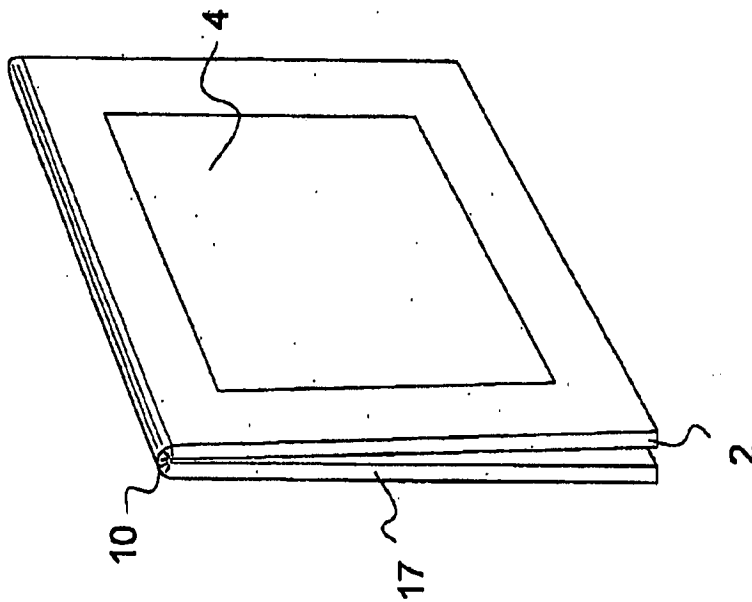


FIG. 6B

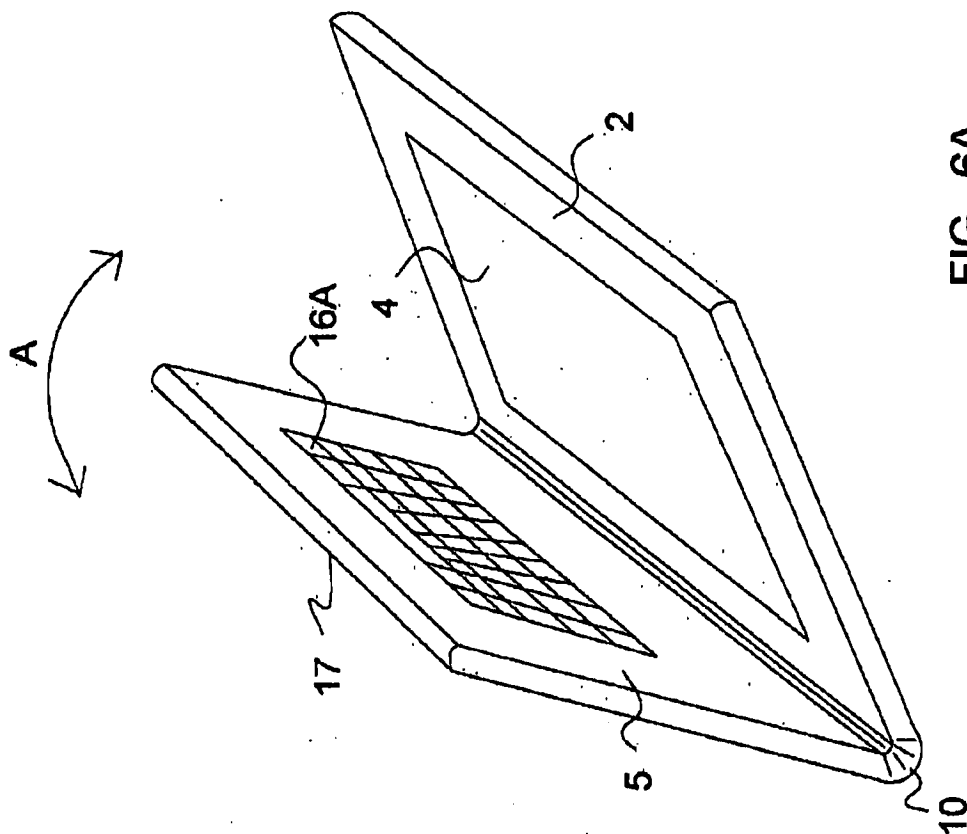


FIG. 6A

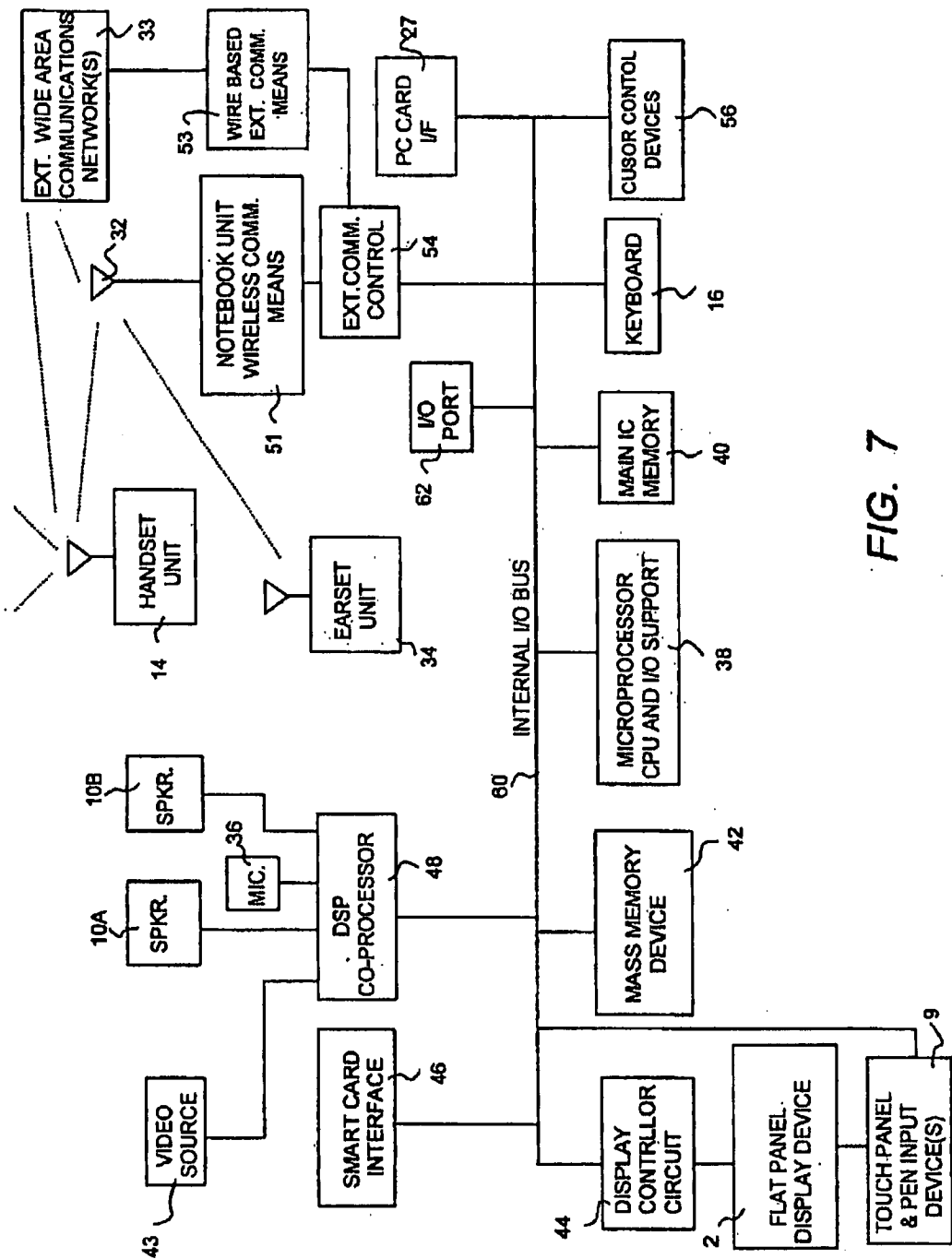


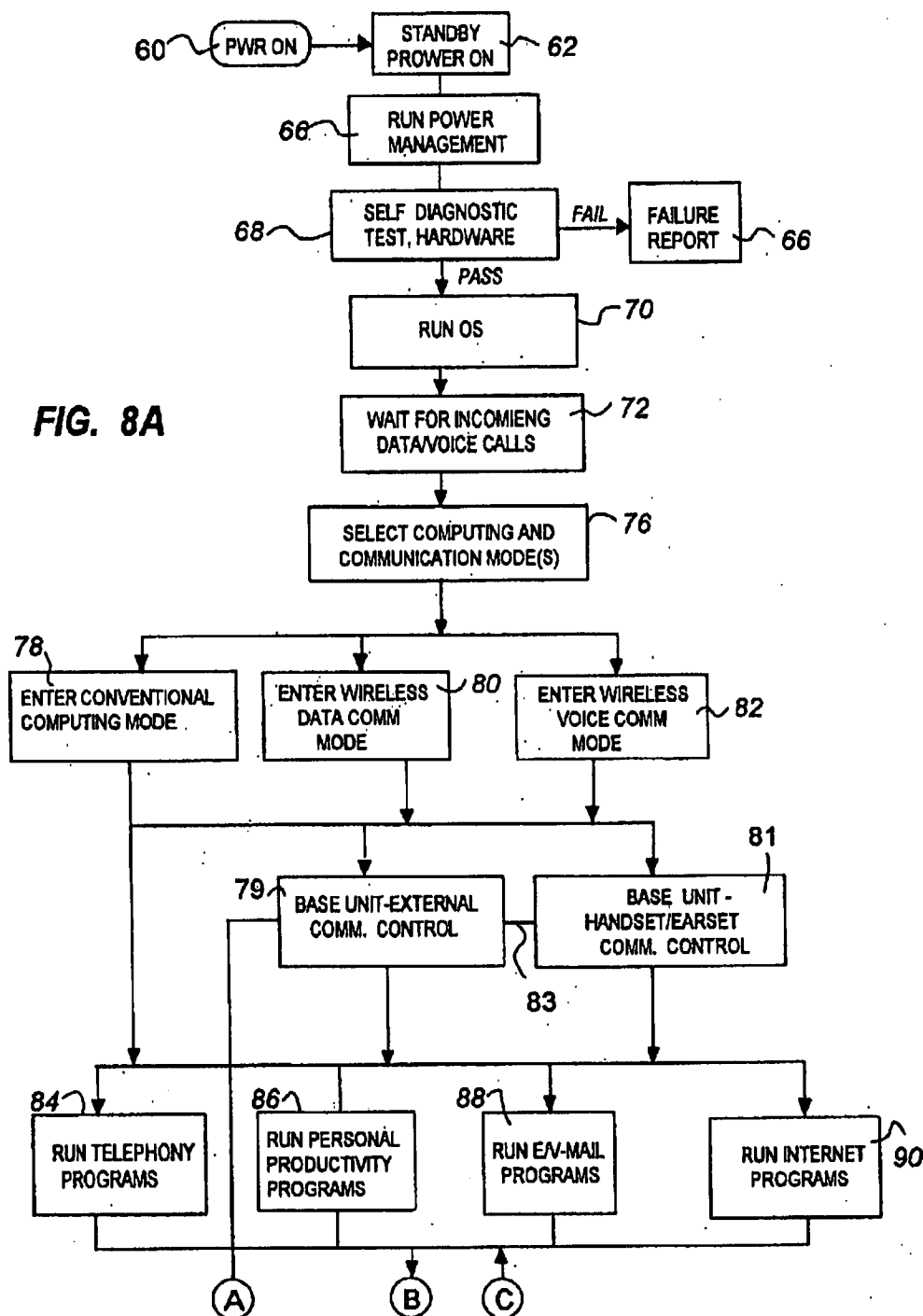
FIG. 7

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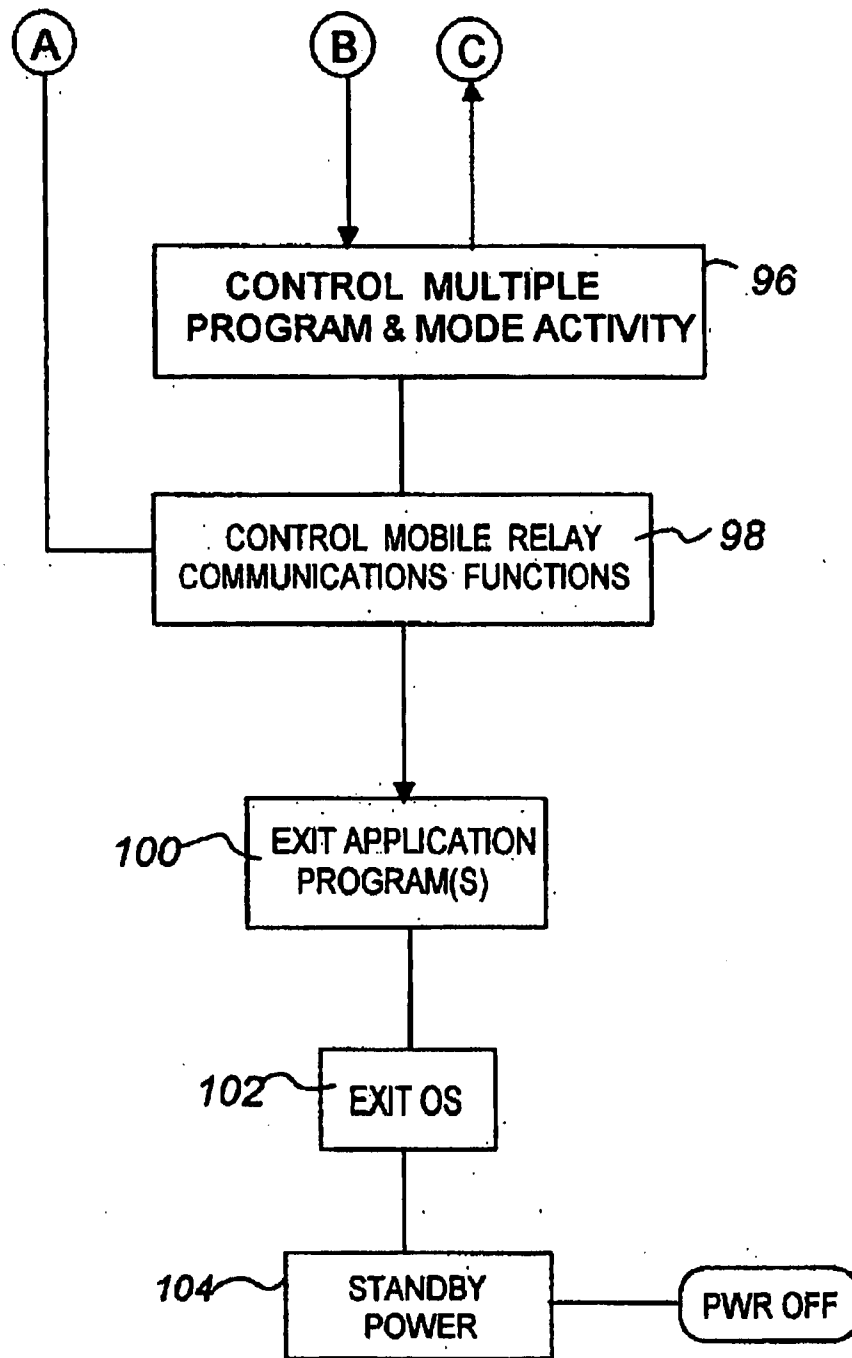


FIG. 8B

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WIRELESS LOCAL AREA COMMUNICATION AND NETWORKING SYSTEM

RELATED APPLICATION

The present application is a divisional application of U.S. patent application Ser. No. 09/391,966 filed Sep. 8, 1999, which is a divisional application of U.S. patent application Ser. No. 08/832,923, filed Apr. 4, 1997, which issued as U.S. Pat. No. 5,983,073. Each of the related applications is incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to portable personal computer systems with external communication means, which can be used by an individual in both desktop and mobile environments. The computer system involves a relatively large color flat panel display, conventional microcomputer system, and a plurality of human interface means. In particular, it relates to a computer unit, having a light weight thin notebook-like computer structure that is capable of performing personal digital assistants (PDA) like functions and wireless external communications of voice, text, graphic and image data.

2. Description of Prior Art

There are several shortcomings with prior art notebook computers, PDAs and wireless telephone units. Notebook computers have a relatively large flat panel display device, a full alphanumeric keyboard and battery power. PDAs are small handheld units with a small LCD display, small key pad and touch pen. PDAs are designed to be placed in one's pocket or purse for maximum portability. A problem arises when customers desire large high resolution color display for both portable and desktop applications. To use a computer system for both portable and desktop uses, the customer must purchase multiple systems. The cost of color flat panels are still too expensive for most customers to buy two display monitors, one display for desktop and one for the portable applications. Many customers require functionality of a desktop computer, notebook computer and PDA, but it is much too expensive to purchase multiple CPUs, displays, and keyboards.

U.S. Pat. No. 5,189,632 of Paajanen et al disclosed a handheld computer unit with an antenna and wireless RF communication capability, small flat panel display and a keyboard, in a partial clam shell type structure. However, they do not teach expandable hinge means, base station for handset relay functions, or cover latching function. U.S. Pat. No. 5,327,486 of Wolff et al teach a conventional laptop computer with antenna and RF communications to a radio network and local exchange telephone network. However, they fail to teach expandable hinge means, edge hinge means, handset means or base station relay functions. U.S. Pat. No. 5,459,458 of Richardson et al teach a virtual pager and data terminal system. However, they do not teach notebook like computers, base unit station or personal/PDA computing. U.S. Pat. No. 5,008,927 of Weiss et al teach a computer and telephone system with a display screen on a conventional telephone structure keyboard unit. However they fail to teach notebook like structure, wireless communication or handset relay functions. U.S. Pat. No. 5,196,993 of Herron et al teach a laptop computer with a removable flat panel display with built-in support feet for desktop support. However, they fail to teach expandable hinge means, exterior communications functions, cover latching functions or

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computer display assembly. U.S. Pat. No. 5,200,913 of Hawkins et al teach a laptop computer with flat panel display and pen input means. However, they fail to teach expandable hinge means, edge mounted hinge or latching functions.

Wireless hand held computer devices, such as cellular and Personal Communication System (PCS) telephones, have limited display capabilities. Prior art wireless computer units have display screens that are small (1.5-2.5" diameter), and they lack interactive capabilities to be successful for text, graphic and video applications. Some prior art notebook and laptop computers have integrated wireless communication means, but they are too large and bulky to be successful for in mobile uses. Prior art wireless devices do a poor job of providing voice, data and video communication functions. Typical wireless computer systems have display screens that are too small and have limited computing power. Prior art laptop and notebook computers are too heavy to carry for long periods. Inventions herein solve these problems by embodying a unique relatively thin notebook-like computer system that is capable of being: (1) opened like a notebook, (2) quickly disassembled and re-assembled, (3) used for handset/earset communications relay operations and (4) used in a wide variety of computing, collaboration, communications and conferencing applications.

Inventions described herein are based on several Disclosure Documents submitted to the U.S. Patent and Trademark Office, including Document No.s 353691, 363753, 368165, and 377,365. Inventions herein solve several prior art shortcomings, resulting in new modular integrated computer systems. The inventions as described below can be quickly configured to desktop, notebook, wireless and/or PDA embodiments. Thus, the user will be able to purchase a single computer system and pay much less money than conventional systems.

SUMMARY OF THE INVENTION

An object of this invention is to provide a modular multiple function display-computer system, where one can use the same relatively high resolution color flat panel display in both a desktop and mobile environments.

Another object of this invention is to provide means to reduce the cost to the customer of owning several expensive computer systems, by combining in one system the capability of performing both office desktop and portable/mobile computing and communications applications. Thus the invention herein saves the user the expense of purchasing separate computer systems for desktop uses, notebook computer uses, PCS uses and PDA uses.

Still another object of this invention involves means to quickly configure a modular notebook or PDA-like computer system into a plurality of system configurations for personal computer and wide area communication operations.

Another object of this invention is to provide for a relatively thin and light weight computer unit to be carried under one's arm in a notebook-like fashion, yet have sufficient computing power to execute a wide range of conventional computer and communications applications.

Still another object of this invention is to provide for bi-directional communication of voice, audio, text, graphics, image and/or video data to wide area communications networks where one or more users may communicate with other users with appropriate apparatus. The communication may realtime or store forward type communications.

Another object of this invention involves hardware and program software to control cellular or PCS communica-

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tions, combined with a light weight mobile notebook or PDA like unit. The unit or system would act as a computing platform and base communications relay station. The system or unit may then relay voice and data to/from a handset unit or earset unit, where the base unit relays the this voice and data information to/from a wide area communication network.

Still another object of this invention involves means for quick disconnection or disassembly and subsequent connection or assembly of key component of the system, such as battery power unit, communication adapters (modems) and/or wireless telephone units.

A still further object of this invention is to use the same display-computer system assembly, comprising of relatively large high resolution color flat display panel and a powerful CPU with large memory, etc., and combining them in a modular fashion with a thin keyboard, battery power source, modem, and wireless communications means.

Another objective of this invention is to provide means for integrated telephony functions on a portable computing platform, with powerful microprocessors running Windows operating systems for a wide range of computing and communication functions.

A still further objective of this invention is to provide for full Internet access on a wireless mobile platform, where the user can access the world wide web and execute most of the available Internet browser functions and plug-ins. The computer system would be capable of performing most of the Internet data access, download, upload and conferencing functions

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a perspective view of a portable computer with a notebook clamshell-like structure.

FIG. 2 shows a perspective view of a modular portable computer system in desktop configuration.

FIG. 3(a) shows a notebook like portable computer in an open state.

FIG. 3(b) shows the notebook like computer in a closed state.

FIG. 3(c) shows a handset telephone unit and earset unit.

FIG. 4(a) shows a notebook or portable computer with a protective covering material.

FIG. 4(b) shows an electrical power source unit.

FIG. 5 shows a PDA like unit with a roughly transparent cover half

FIG. 6(a) shows a notebook or PDA in a partial open state.

FIG. 6(b) shows the notebook or PDA in a reversed open state.

FIG. 7 shows block diagram of the computer system and associated elements.

FIGS. 8(a) and 8(b) shows a flow diagram of the computer system programs and operations.

DETAILED DESCRIPTION

FIG. 1 shows a computer system, to be operated by a person or user, where the unit has a conventional notebook clamshell-like structure. The computer system as used herein can also be referred to as a portable computer system, computer-display unit or base unit, and shall also include the terms: personal computer, notebook computer, sub-notebook computer or Personal Digital Assistant (PDA). The computer system as disclosed herein typically comprises of a flat panel display assembly 2, which includes a display panel and screen 4 and other components described below.

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An expandable hinge means 10 connects the flat panel display assembly and cover assembly (8, 9 and 16). Expandable hinge means 10 may be embodied many ways including using flexible material that is corrugated, having its grooves running parallel to the edge of the notebook structure. Cover assembly may consist of two or more sections, such as a first cover section 8, second cover section 9, and a keyboard section 16. One or more of the cover sections may be quickly disassembled from each other by the user. To avoid accidental disassembly, means may be embodied where the user must simultaneously press two push buttons 5, for example one on each side of the structure, in order to disconnect the sections. The portable computer system may also have an inside protective sheet member 4A attached to the inside the fold of the computer system. FIG. 1 shows a partially open notebook-like structure, but it may be closed all the way shut and secured, by a securing strap means 8A. This strap means may be secured to the other side of the display assembly 2 by Velcro like strips, for temporary securing and un-securing, with one's fingers. One purpose of this foldable embodiment is to provide the computer user with a handy portable notebook computer that: (1) when closed, one can easily carry, cradled in one hand under one's arm, and (2) easily opened for access to the computer indicators and controls.

The flat panel display assembly 2 may be a monochrome or color liquid crystal displays (LCD), such as those manufactured by Sharp Electronics, NEC Electronics, Toshiba Corporation or others. The display panels screen sizes may be 10 to 14 inches or more in diameter. The display pixel arrays may be 640 by 480 (VGA), 800 by 600 (SVGA), or 1024 by 768 (XGA). Color depth should be six bits, and the response time should be 45 to 50 milliseconds ($t_{on} + t_{off}$). Brightness of the screen should 70 Cd/m² and contrast ratio be at least 100:1, where 250:1 is preferred.

LCD panels from Sharp Electronics may be used in the embodiments. Applicable LCD Models include LQ11DS01, LQ12DS01, LQ12DX01 and LQ12X12. These panels have screen sizes of either 11.3 or 12.1 inches measure along their diagonal. Each panel is capable of a color depth of 6 bits/sub-pixel, a response time of 80 ms, brightness of 70-150 cd/m² and a contrast ratio of 100:1. LCD panels from NEC may also be used, such as NL10276BC24-04, NL8060BC31-02, NL8060BC31-01, and NL8060BC29-01. These panels are capable of 6 bit color depth, 50 ms response time, 70 cd/m² brightness and 150:1 contrast. Toshiba panels that may embodied include: LTM11C016, LTM12C236, or LTM12C25S, which are capable of 50 ms response, 70 cd/m² brightness and 100:1 contrast. Manufacturers' references and manuals for each are hereby incorporated by reference.

Several I/O slots and/or connectors may be embodied at one or more edges of the flat panel display assembly 2. FIG. 1 shows access slots to a floppy disk 28, external communication means 27, printer connector 31. Other external connection means may be embodied. Several connector means may be embodied, including auxiliary video connector, COM ports, and/or mouse/game ports. PCMCIA PC card 40 may be included for adding fax/modem, network interface (wire or wireless) external communications and/or added memory. An integrated built-in transmitter receiver and a retractable antenna 32 may be embodied, for example to the flat panel display assembly 2. The antenna and associated RF transceiver may be used for wireless communications to/from an external communication network. Many of the well-known notebook computer or personal computer I/O devices may be embodied.

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An important feature of this embodiment is the dimensions of the computer-display unit. It may be made conveniently larger than a 8.5x11 inch sheet of paper, so that one can place one or more sheets of paper (or other relatively thin flat objects) inside the closed clamshell like notebook structure in a folding or latching fashion. The user can safely carry papers from location to location without folding or wrinkling them. Thus the unit can act as a carrying device as well as a notebook computer. The outside surfaces and edges of notebook computer may be covered with leather, vinyl of other type of soft material, for easy of hand carrying and surface protection. Other parts may be embodied including foldable short legs 9A and 9B, keyboard resting pads 16A and 16B, built-in audio speaker(s) 30.

FIG. 2 shows the portable computer with several parts detached or disassembled. This embodiment may be used in desktop computer system environments. The flat panel display assembly 2 may be placed at an inclined angle, with foldable leg support means 19A and 19B. The leg support means may fold relatively flush to the backside of the assembly 2 (motion range A) when not in use, via a simple hinge 15. Vertical portions 19A and 19B may slide in and out, in a telescoping type arrangement, to allow wide range inclination angles. A pair of short legs 3 may be placed near the front of assembly 2 that may also fold relatively flush with the back of the assembly. Means may be included to place the screen at a vertical orientation. A pen or stylus input means may be associated with the display screen 4. The pen or stylus means may include finger input (touch panel) means, where one can write or point to area on the display screen. The expandable hinge means 10 may be removed from the assembly 2 and from the cover section 9 by a quick disconnect or disassembly means 5. Alternatively, the hinge means may be fixed to parts 2 and 9. The hinge means may be made of a relatively flexible material, such as leather and vinyl. It may be corrugated as shown in the figure so it can bend easily and expand, as required. The hinge may have a number of attachment slots 12 for the quick dis-attachment or disconnection from hook mechanisms 13. FIG. 2 shows the flexible hinge means 10 removed from the other assemblies.

Cover section 9 may contain a battery power unit containing one or more batteries and power circuit elements. The battery power unit may be embodied with several types of batteries, including Lithium-ion or NiCd batteries. The power unit may be a self contained battery package, having an easy to read charge indicator 22 that indicates the state of the battery's electrical charge. Because all batteries have a limited useful charge life, the package may be easily and quickly disconnected from the keyboard section 16 and replaced with another battery package. Spare battery packages and other spare parts could be carried in a separate traveling case (not shown). The keyboard section 16 may have a full size QWERTY keyboard with movable tactile keys. An electrical cable 20 may connect the keyboard to the computer-display assembly 2. Although short cable is shown, it may be a long cable or a flexible cable, so that the keyboard may be moved about if desired. Alternatively, a wireless electromagnetic link may be embodied such as infrared (IR) or RF links, which would replace electrical cables 20 and 26. The cover section 8 may contain a wireless handset 14, such as a cellular telephone transceiver. The handset may have retractable antenna, small speaker, keypad, built-in microphone and a battery source. This handset 14 may be capable of analog or digital cellular operation, including AMPS, TDMA, CDMA, PCS, CDPD, or equivalent types for communicating with wide area wireless com-

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munication networks. The wireless unit 14 can be easily removed from a cutout or recess area 35 in the cover section 8. The recess area is made slightly larger than the outside dimensions of the handset 14, so it can fit inside the recess with a relatively snug fit. It is important the handset be easily and quickly removed and replaced in the base unit. Alternatively, cover section 8 consist of the handset itself, so that a separate cover section with recess would not be required.

The portable computer system's flexible hinge and the cover sections should be made relatively thin so that when the two halves are folded (rotated) closed, it will not be too thick or heavy to carry with one hand. As shown in FIG. 1, legs 3, 5, 19A and 19B may be folded roughly flush with outside surfaces of the unit. The number cover sections are not limited to three. The cellular handset is shown in FIG. 2 may be connected to the computer system by an optional electrical cable 26. A RF transceiver in the wireless telephone would serve as the transceiver for the computer as well. This embodiment might be desirable to reduce the overall cost of the system. However, a wireless RF transceiver and modem may be located in the flat display panel assembly 2 for voice or data communications. An antenna may be embodied on the display assembly 2, with a retractable antenna 32. The display assembly may include the computer system located within the assembly housing. The advantage of this later embodiment is that the telephone 14 and computer system could be operated independently.

The portable computer system may also have means for connection to a non-battery power source, as shown in FIG. 2, via a standard power line cord and plug 28. The system may also have means for connection to an external wire based wide area communications network 33, via cable 29. The wire based wide area network may include one or more telephone networks, cable TV networks and/or computer LAN/WANs. Telephone networks may include POTS, ISDN, ATM or other equivalent types. Several computer interface connection means may be embodied, for example interface slots/connectors as shown (27, 31, and 38). These interfaces might include R/S 232, USB, IEEE 1394, PCMCIA, or other computer I/O (serial or parallel) connections. Useful connections may include a bus extender connection, so that the notebook computer can be interfaced to another more powerful computer. For portability reasons, it is desirable that the modem or digital terminal adapter be built into the computer system unit. Some means for software loading should be included such as a floppy disk or smart card. Internal mass memory of the computer system could include ROM, flash memory, or other memory means. Means for accepting PCMCIA cards, ROM cards or other types of memory card may be implemented. Preferably, the system may be embodied with a very small light weight and low power mini hard disk. One or more IR communications interfaces may also be implemented.

Other capabilities such as FAX send/receive, speech recognition, voice processing voice mail, telephony, and E-mail functions may be implemented in the computer system. A built-in microphone 36 and speaker 30 may be embodied to support speech input/output and multimedia functions. Preferably the display should be capable of full color with a wide viewing angle. If the display is back lit, the user should be allowed to switch the backlight "on", "off" and to a multiplicity of levels in between. The operating system of the notebook/PDA should be a GUI type such as Windows™ 3.1/95, Windows CE™, MagicCap or another suitable GUI based computer operating system. The system can be designed to support wide range of communication connectivity and software compatibility.

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FIGS. 3(a) and 3(b) show another embodiment of the invention having a base unit or notebook computer system 100, a handset unit 14 and a earset 34. This embodiment shows a relatively thin flat display panel assembly 2 having a display screen 4. The system may also include a pen and/or finger input means 7. The base unit has an expandable hinge means 10 physically connecting the display assembly to the other half of the base computer unit. The other half can be comprised of several sub-assemblies including a battery power source section 9, keyboard assembly 16 and an electronics housing section 8. The keyboard assembly contains a keyboard unit 16A, which may contain a full-size QWERTY keyboard unit. The housing section 8 may include a wireless modem or communications adapter means. The expandable hinge means 10 should have an easy access locking and unlocking means 10A, which can temporarily lock the rotation of the two halves at the user's desired angle. Electronic housing section 8 may be attached edge wise to the keyboard assembly 16 by a quick attach and release connection means. As shown in the figures, several assemblies can be disassembled by pressing one or more finger access tabs 5. Likewise, a battery source section 9 may be edgewise connected to the opposite edge of the keyboard, via similar quick attach and release connection mechanism having finger push tabs 5. The tabs may be located on each side of the assemblies for quick and easy, but safe, user disassembly. The connection means may include means for secure physical attachment and connection of electrical wires, located inside the subassemblies. Although the sections may be ridge, the attachment mechanisms may be somewhat flexible, elastic or pliable, so that the combination of assemblies can bend slightly.

Battery power source unit 9 may consist of one or more batteries with voltage regulation, AC/DC operation, power management circuits and charging circuitry. In a preferred embodiment the unit should be capable of accepting electrical charge from an AC line. A important feature embodiment of the invention is means for quickly interchanging an electrical power depleted battery power unit 9 with a freshly charged battery unit. This may be accomplished by a combination of finger push tabs 5, latches and hook means for quick disconnection and re-attachment. In one intended scenario a user may carry several spare battery packages in a separate briefcase. When the attached battery package is depleted, the user can quickly changed out the battery sections. The user can then plug the depleted battery package into an AC line for a built-in charging operation.

It is preferable that each of the major assemblies and sub-assemblies be made relatively thin for easy carrying. The expandable hinge means should be made somewhat flexible, elastic or pliable so that the user may place relatively thin flat objects inside the folded space of the notebook-like unit. These thin objects may include sheets of paper, cards, brochures, or similar relatively thin flat items. Linkages between the sections may be made somewhat yielding, pliable, elastic and/or stretchable. Although the display device may be ridged, the other half of the notebook may be embodied with thin flexible enclosures and other structural components. Also, the flat panel display device and assembly 2, 4 may be made flexible. Thin and flexible keyboards are known to those in the art. The other parts may be adapted to have thin and slightly flexible mechanical features. The two halves can be closed by hand and secured by a flap and snap means 43 or equivalent means. As discussed above, the expandable hinge means 10 may be made flexible and expandable by incorporating a multiplicity of small folds or other equivalent means. If the user

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places thin objects between the halves of the base unit, one or more sides could bulge out slightly, improving the physical object carrying capability of the notebook computer. This object carrying capability is an important feature for mobile users who may be carrying the notebook almost everywhere they go. The user may securely place and latch paper sheets, letters, memos, or other flat objects inside the notebook clam shell structure. A base unit hinge locking and unlocking means 10A may also be embodied, so that the user can quickly and easily temporarily lock the two halves of the unit to a rotationally fixed state (and later un-lock them).

FIG. 3(a) also shows several other elements including a small CCD video camera 46, built into the display assembly for video conferencing and other uses. One or more built-in audio microphones 36 may be embodied in the base unit. Preferably one microphone should be located on the edge of the notebook, as shown, so that the user may be in voice communications with other while the unit is closed. One or more audio speakers 30 may be built into the base unit. One or more compartments 47 and 48 may be embodied at convenient locations to store attachments for use with the mobile computer system. A telescoping antenna 32 may be embodied into the base unit as shown, or it may be built-in the unit and not exposed. Although the base unit 100 can be a self-contained unit, it may work with other optional attachments, such as a wireless cellular-like handset 14 or earset 34 as shown in FIG. 3(c). The handset 14 may operate roughly equivalent to conventional cellular telephone handsets with a built in power source, providing voice and/or data communications to wide area communications networks. The earset 34 has a small low power RF transceiver, audio microphone, audio speaker and small battery source, which is capable of fitting into the user's ear. The wireless earset unit may be used for hands free applications. The user may then walk around while communicating with the handset or earset. If one is using the earset he/she may also use a pen input means 7 or keyboard 16 while in audio communications. For semi-private voice communications, some users may prefer using the handset 14, with hand set speaker 14A, handset key pad 14B and handset microphone pickup 14C.

If one is using the handset or earset, the base computer unit 100 may be placed some distance away from the user, typically in the same room or nearby room. The base computer unit may be designed for a higher transmitting power level. The base unit may be designed to allow the user to switch between a high or low level transmitting and receiving power levels. The earset 34 or handset 14 can be designed for a much lower RF transmit and receiver electrical power levels, because the base computer unit 100 can be placed a relatively short distance away (typically from a few feet to about fifty feet). Thus, the base unit 100 may relay RF communications between the handset or earset and an external wide area communications network. The base unit could safely embody a more powerful RF transmitter resulting in a larger signal to noise ratio. This will result in improved wireless communication to and from wide area networks that may have antennas several miles away. A very important advantage of this invention is that the user has the option of having very low electrical power electromagnetic fields near his/her's head, thus improving the health and safety aspects for the user. Since less power is required for the handset 14, it can be thinner and smaller than a standard cellular handset. Thus the handset can be smaller and easier to place in the user's pocket. The earset can be made very small so that the users can leave it in his/her's ear for long periods of time and have one's hands free for other uses.

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FIG. 3(b) shows the base unit computer-display unit 100 in a closed configuration, in which one may carry it under one's arm. Since the unit is typically battery powered and contains electronics for a wireless voice and PCS like operations, one could use it for voice/data communications while carrying it about (i.e., in transport). The user may speak towards one or more microphones 36 located along the top edge. The user will be able to hear the other person(s) talking, through audio speakers 30 located conveniently on the base unit. A small telephone keypad could be located behind a protective door 41, for convenient dialing of a telephone number. The door may be a simple sliding door device or mechanism. The antenna 32 may be a sliding telescoping type. A simple display indicator 22 may show the electrical charge state of the battery source. A plurality of switches and indicators 46 may be located along one edge of the base unit for easy viewing and access. Such switches and indicators may include: an On-Off switch, Mode Switch (for voice, data, and video modes, etc.), high/low power transmit switch, ring/alarm mode and/or speaker/mic mode (for carset, handset, etc.). For securing the two halves of the base unit, a flap 43 made of a simple expanding material, which may include a snap means at one end and may be secured with a pin and/or pivot means. The flap would then snap to secure the flat panel display assembly 2 and cover assembly (9, 16, 8). In FIG. 3(a), the flap 43 is shown rotated in the opposite orientation for clarity only. Other securing means may be embodied that are known to those in the art.

FIG. 4(a) shows the portable computer system or computer-display unit 100 covered with a thin soft protective material or film, such as leather or vinyl. This material will protect the unit when it is bumped and/or banged into hard objects while in the use in field or office environments. The protective material may have a texture or roughen surface (as indicated in the figure), which would also provide for a relatively high mechanical friction; so it will be easier to carry under one's arm. Holes or cutouts may be embodied in the protective cover for viewing and/or using the various indicators, switches and keypads. A zipper securing means 45 may be embodied with the notebook, as shown in FIG. 4(a). The zipper means may be attached to the leather or vinyl covers so that the unit can be zipped closed to secure and protect objects placed inside the notebook. A pull tab 45A of the zipper means is shown in the figure. This embodiment would be especially applicable in rugged or harsh environments. A strap 50 may be attached to the unit so that the user may temporarily store it on a hook for example. FIG. 4(b) shows an embodiment of the battery power source section 9. As in previous embodiments, it may be detached from the notebook computer-display unit. A spring loaded pull out power cord 9B may be embodied, so that the user can conveniently pull out the power cord to electrically charge the package. The power cord and plug may be easily retracted inside a cutout space on the side of the subassembly. Several adjunct attachments and/or accessories may be carried in small compartments in the notebook unit. In addition, accessories and attachments may be carried in a separate briefcase or like carrying case (not shown in the figures). Such accessories may include a line power supply and cord, extra battery power source section 9, spare carsets 34, spare handsets 14, external hard drive, external CD ROM drive, external mouse, spare styluses and/or spare video camera/lenses 46.

An important advantage of this notebook computer unit invention is that it can be operational when it is in the closed configuration. Thus, while carrying the unit in one's hand or under one's arm, the user can perform voice, data and/or

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video communications. The notebook unit can be used in an open configuration on a desktop, airline tray or wide variety of other computing environments. The unit can be configured for wire based or wireless communication operations. The unit can be used for general purpose computing, network computing, pen input computing, PCS/Cellular, data/video conferencing, on-line network computing and data collaboration applications. The notebook unit can be used as a personal organizer or personal information manager, such as a computer equivalent of the Franklin Planner™ or equivalent planners. A multiplicity of personal computing applications may be embodied on its computer. The unit may be capable of wire or wireless communications, linking it to multiple handsets and earsets. The notebook computer unit may have a plurality of electrical connectors along the edges or other convenient locations for connection to a plurality of external devices, including but not limited to: modems, network interface cards, hard disks, floppy disks, and bus extender enclosures.

Preferably the notebook assemblies should be made relatively thin and light weight that would be an advantage in mobile use. For example, the flat panel display assembly 2 should have a thickness of roughly 0.75 inch or less. The cover assembly may be comprised of the battery power source section 9, keyboard assembly 16, and external communications section 8 should have a thickness roughly 0.75 inch or less; so that the folded total thickness of the unit could be 1.5 inches or less. However, an overall thickness of one inch (i.e. 0.5 inch for each half), or less, may be preferred. A keyboard unit located in keyboard section 16 that may be Model KFNR available from Alps Electric Co. Ltd. This keyboard unit has a thickness of 10 mm, a 3 mm key travel, a 1 mm over travel and a minimum key pitch of 18 mm. Alps Electric also has introduced a 7.5 mm height keyboard assembly a full size keyboard, capable of high speed typing without operator tiring.

FIG. 5 shows another alternate computer notebook embodiment, consisting of a somewhat smaller size flat panel assembly 2, display screen 4, pen/stylus means 7 and a roughly transparent display panel cover 17. The flat display panel could be an LCD, FED, or other type of flat panel display. The panel cover 17 could be made of a hard rigid material or a durable soft polymer material that is roughly transparent to a range of electromagnetic radiation frequencies. This cover may be made optically transparent to let the ambient room light to impinge onto a plurality of photoelectric light sensors 41A, 41B and 41C, which may be placed onto the display panel assembly 2. The photovoltaic or photoelectric light sensors may convert ambient room light to electrical voltages. These sensors may provide power energy to power the unit. The sensors may also help change the unit's battery source. Thus, with the roughly transparent cover 4 closed over the display panel assembly, some light rays will be transmitted through the cover. Photons from the ambient light are converted to an electric voltage, via the sensors and energy conversion circuitry that is applied to the computer unit's power source. Even if the computer unit is turned off and cover closed, the sensor could still be charging its batteries. The roughly transparent cover 17 may be made flexible layers of polyester, polycarbonate or other suitable materials. An advantage of this embodiment is an improvement in maintaining power to the notebook unit for longer periods compared to prior art battery powered units. Information on the display screen may be viewable even with the cover 17 is closed over the flat panel display assembly 2. Viewing of the display screen

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with the cover closed is an improvement over the opaque covers of conventional notebook computer and PDAs.

FIG. 6(a) shows another embodiment of a thin light weight notebook computer or PDA unit. The cover panel 17 contain a keyboard 16A, which may be a membrane type keyboard. The flat panel display assembly 2, with its display screen 4, is attached to the cover panel 17 by an expandable hinge means 10. The hinge means, which may be elastic or pliable, should be capable of being rotated over angles A. The hinge means should be capable of rotating through roughly 360 degrees, so that the two halves may be folded back onto each other as shown in FIG. 6B. In the configuration of FIG. 6B, the notebook unit can be held in one's arm, and the display screen can be written onto by a stylus or pen. The unit could also be placed onto the table or desk for convenient viewing. The cover keyboard assembly 17 can be closed to a hold loose sheets of paper, brochures, etc. If this latter case, the size of the panel halves should be slightly larger than 8.5" by 11" to facilitate one carrying loose sheets. Expandable hinge means 10 is designed to expand to accommodate a relatively thick stack of documents. Hinges may be made of pressed pliable corrugated plastic sheets can accommodate 0.5 inch or more gaps.

Various battery power sources 9 may be used in the above embodiments, including smart-battery technology having rechargeable batteries. They may be made capable of monitoring themselves for electrical charge level. Batteries that are suitable for this smart battery technology include nickel-metal hydride (NiMH) and lithium-ion (Li-ion) types. NiMH batteries are more sensitive to overcharge than NiCd batteries. Care must be taken to avoid overcharging that causes heating, which is damaging to the NiMH cycle life and capacity. Li-ion batteries require tight battery management for safety purposes. NiMH batteries are available from Sanyo Energy USA. Several power management and smart-battery devices are available. Duracell has a smart rechargeable battery with intelligent power management circuits for charge level gauge means, as disclosed above. The gauge may constantly show the state of the total battery charge. Advantages of an intelligent battery management system include customer notification of charge state, longer mobile operation times, longer battery lifetimes, and faster charge times. The rechargeable battery and power management circuit may collect and communicate the present and predicted battery data to the host notebook computer under software control.

Wireless communications adapters or modems disclosed in the above embodiments may consist of analog or digital transmitter and receivers, having control circuitry for cellular AMPS, PCS, CDPD, and RF links to wide area communication networks. The communication means disclosed herein may make use of long distance or short distance communications techniques, methods and equipment. Communication techniques may include several types of digital multiplexing and command access schemes such as TDMA, CDMA, GSM, or a combination thereof.

FIG. 7 shows a block diagram of the system elements and associated circuitry, hardware, firmware and software. A microprocessor 38 controls most of the system elements. A computer system I/O bus 60 is shown interfacing several system elements. Many types of microprocessors may be embodied, including 16, 32 or 64 bit processors. The microprocessor may be a complex instruction set computer (CISC) or a reduced instruction computer (RISC) computer types, or a combination of the two. CISC microprocessors that may be embodied, including the Pentium P5 manufactured by the Intel Corporation, the 68000 series microprocessors made

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by Motorola Corporation. Many types of RISC processors may be embodied, including the ARM series, the UltraSpac by Sun Micro Systems, the SH Series by Hitachi, PowerPC by Motorola and IBM and the MIPS R4000 series by several sources. The above manufactures' references and manuals are hereby incorporated by reference. Since electrical power dissipation is very important in portable systems, RISC microprocessor may have an advantage with smaller transistor counts, low voltages and fully static designs. RISC processors are available at an operating voltage of only 2.0 volts. RISC processors using 0.5 micron CMOS processes have resulted in die sizes for core functions of roughly 4 mm². RISC processors can deliver 300-400 Mips/W. Microprocessor 38 may support several types of I/O buses (typically 32 bit wide), such as VT, or PCI type buses. Microprocessor and I/O busses are well known to those skilled in the art.

A Microsoft Corporation's Windows® operating system software may be embodied in the computer system. For these systems, the microprocessor CPU should be at 32 or 64 bit processors, capable of clock speeds in the 100 MHz or more. The microcomputer system may also consist of one or more I/O port means 62. A PC Card interface 27 may be embodied for bus expansion, extended memory or other added circuitry having access to the main bus 60. A mass memory device 42 may be embodied in the system, which typically is a magnetic disk memory hard drive. Many devices may be connected to the computer system, including a smart card interface 46 and keyboard 16. A touch panel and pen input means 7 may be embodied in the system, which may be separate or integrated. Examples of such touch pen devices are available from Elo Touch Systems Inc. in Oak Ridge, TN, MicroTouch Systems Inc. in Methuen, MA, and Carroll Touch Corp. in Round Rock, Tex. Pen and touch panel combinations means are available from Scriptel Corp. in Columbus, Ohio for the tablet, and Symbiosis Logic in Colorado Springs for an IC controller. Other pen and touch devices are available from Phillips Semiconductor, Sunnyvale CA. Other more traditional cursor control devices 56 may be embodied, such as a mouse, trackball, touch pad, or force transducer. Preferably, most of these components should be sufficiently small as to fit into relatively thin display assembly 2.

The flat display panel device 2 is be interfaced to the system bus 60 through display controller circuitry 44. Preferably, the display controller should be capable of VGA or SVGA display formats. Integrated into the display controller may be a BitBlt engine (to accelerate graphics), RAMDAC memory, clock synthesizer and display frame buffer. A digital signal processing (DSP) co-processor 48 may be embodied. The DSP may accept data from many sources including a microphone 36 and video data source 43. The DSP or microprocessor may output signals to one or more audio speakers, as shown as 10A and 10B. Video data may be in either analog or digital form. Microphone 36, and speaker(s) may be embodied in the handset or earset of the previous figures. Video data may be pre-processed by a the DSP. Video sources may include output from video cameras, VCR, broadcast TV, satellite TV or cable TV.

External communication means 54 may be connected to the bus, which may be capable of fast two way data transfers. The communications means 54 should be capable of controlling communications to and from a plurality of wire and wireless communication systems. These include wire based telephone means 53 and wireless communication means 51. The system may include an antenna means 32 for transmitting and receiving electromagnetic radiated signals.

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External communication means may be connected to one or more information or communication service providers. These service providers may include telephone services (RBOCs, LEC), on-line computer networks, Internet service providers, cable MSOs and/or long distance telephone firms. They also may include cable TV companies, satellite TV service, and LAN/WAN communication network providers. The external I/O port means 62 may be connected to a Universal Series Bus (USB) and/or an IEEE 1394 (Firewire®) type I/O bus.

FIG. 8 presents a typical flow diagram of computer programs executing in the system of the embodiments disclosed herein. After a power-on action 60, the system may enter a standby power on mode 62. A power management program 66 may then be executed followed by a self diagnostic routine 68 that tests the major hardware and firmware elements of the system. If the test fails, a failure report 66 may be generated and either displayed or stored. If the test passes, the operating system (OS) 70 may be loaded and executed. With the OS loaded successfully, the system waits for incoming data and/or voice calls 72. The system may automatically enter a default system mode, or the user can select one or more computer or communication modes 76. The user has the option of selecting several operating modes, which may include a conventional computing mode 78, a wireless data communications mode 80, and a wireless voice communications mode 82. A conventional computing mode includes typical PC computing or PDA computing. While in any of the above modes, base unit to external communications operations 79 may be controlled, which includes data/voice wire and wireless options. Control code 81 may control the bi-directional handset or earset to base unit communications operations. These operations may execute roughly simultaneously or on a time shared bases, as indicated by connection 83. Under program control, either the wireless handset or the earset may communicate data first between the base unit, then the base unit may relay the data to/from the external communications network. The above communications may involve two way or bi-directional communications, including many types of data (including text, voice, graphics, video and/or images).

Many types of computer application programs may be executed by the computer system. For example, one or more telephony programs 84, office/personal productivity programs 86, electronic mail or voice mail 88, and Internet/Web browsing programs 90 may be used. Other PDA, PC or workstation programs may also be executed. One or more programs (algorithms or routines) 96 may be used to control this multiple program or system modes; this may include program coordination, scheduling and execution. Programs to control the mobile communications relay functions 98 may be embodied. Users may have the option to exit the application programs 100. Typically, after the applications have been closed, the user may exit the operating system 102. After the system exits the OS, the system may still may be in a standby power mode 104, in which the system can answer and process incoming calls, plus service other requests for other processing tasks. Users may have the option of turning off (or removing) all power to the unit 106.

It should be further understood that, although a preferred embodiment of the invention has been illustrated and described herein. Changes and modifications can be made in the described arrangements without departing from the scope of the appended claims. Other embodiments, additions, and improvements will be obvious to those with an ordinary skill in the relevant art.

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I claim:

1. A method for local area base unit communication comprising the following steps in any order:

- a) transmitting first data via wireless communication means to a local portable handset unit a relatively short distance away;
- b) receiving second data via wireless communication from the local portable handset unit a relatively short distance away;
- c) relaying the second data between the local portable handset unit and an external wide area data network by the local area base unit by selectively using wire based or wireless communication, wherein the transmission power level required to relay the second data from the local area base unit to the external wide area network is higher than the transmission power level required to transmit the second data from the local portable handset unit to the local base unit; d) wherein the local base unit comprises an electronic microprocessor and said first and second data includes data formatted for e-mail.

2. A method for local area base unit communication as recited in claim 1, in which the local area base unit operates substantially as a notebook computer.

3. A method for local area base unit communication as recited in claim 1, in which said portable handset unit functions substantially as a personal digital assistant (PDA).

4. A method for local area base unit communication as recited in claim 1, in which the local area base unit is adapted to communicate with an earset unit.

5. A method for local area base unit communication as recited in claim 1, in which the local area base unit is adapted to communicate among multiple handset units or earset units.

6. A method for local area base unit communication as recited in claim 1, in which the local area base unit is adapted to access the Internet, allowing a user of the local portable handset unit access to the Internet.

7. A method for local area base unit communication as recited in claim 1, in which said second data includes voice and/or audio data.

8. A method for local area base unit communication as recited in claim 1, wherein the transmit and receive power of the local area base unit wireless communication with said local portable handset unit is significantly less than required if the local portable handset unit were adapted to wirelessly communicate with the external wide area data network directly.

9. A method for local area base unit communication as recited in claim 1, wherein the local area base unit is powered by a battery.

10. A method for local area base unit communication as recited in claim 1, wherein the local area base unit is a network access point device.

11. A method for local area base unit communication as recited in claim 1, wherein the local area base unit is adapted to wirelessly communicating with multiple local portable handset units.

12. A method for base unit communication comprising the following steps in any order:

- a) transmitting first wireless digital data to a portable mobile unit a relatively short distance away so as to result in a local communication;
- b) receiving the second wireless digital data from the portable mobile unit a relatively short distance away so as to result in a local communication;

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- c) adapting said transmitting and receiving first and second wireless digital data to function as a device to device wireless communication function, and
- d) controlling said base unit via a microprocessor and associated functions to relay the second wireless data 5 from the portable mobile unit to a wide area wireless communication network, wherein said second wireless data includes data formatted for e-mail data communication and wherein the second wireless data is transmitted from the portable mobile unit to the base unit at 10 a relatively low electrical power level compared to the power level required to relay the data from the base unit to the wide area wireless communication network.
13. A method for base unit communication as recited in claim 12, wherein selectively either the base unit or the

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portable mobile unit is adapted to a wirelessly communicate with the wide area wireless communication network, wherein the wireless wide area communication network is the Internet.

14. A method for base unit communication as recited in claim 12, wherein the base unit is adapted to a wire or cable communication with the wide area wireless communication network, wherein the wireless wide area communication network is the Internet.

15. A method for base unit communication as recited in claim 12, further including a plurality of portable mobile units which are adapted to device to device communication.

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(12) **United States Patent**
Ditzik

(10) **Patent No.:** **US 7,103,380 B1**
(45) **Date of Patent:** **Sep. 5, 2006**

(54) **WIRELESS HANDSET COMMUNICATION SYSTEM**

(76) **Inventor:** Richard J. Ditzik, 307 Surrey Dr., Bonita, CA (US) 91902

(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 567 days.

(21) **Appl. No.:** 09/391,966

(22) **Filed:** Sep. 8, 1999

Related U.S. Application Data

(62) Division of application No. 08/832,933, filed on Apr. 4, 1997, now Pat. No. 5,983,073.

(51) **Int. Cl.**
H04B 7/15 (2006.01)

(52) **U.S. Cl.** 455/556.2; 455/11.1; 455/557;
455/569.1

(58) **Field of Classification Search** 455/566,
455/556, 550, 557, 11.1, 569, 403, 422, 462,
455/463, 465, 568, 15, 16, 41, 3.05
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,008,927 A 4/1991 Weiss et al.
5,189,632 A 2/1993 Panjanen et al.
5,196,993 A 3/1993 Herron et al.
5,200,913 A 4/1993 Hawkins et al.
5,276,680 A 1/1994 Messenger
5,327,486 A 7/1994 Wolff et al.
5,351,270 A * 9/1994 Graham et al. 455/11.1
5,440,449 A 8/1995 Scheer
5,446,783 A * 8/1995 May 455/557
5,487,069 A 1/1996 O'Sullivan
5,490,284 A 2/1996 Itoh et al.
5,533,027 A * 7/1996 Akerberg et al. 370/280
5,553,312 A * 9/1996 Gattey et al. 455/11.1
5,570,389 A 10/1996 Rossi

5,592,491 A 1/1997 Dinkins
5,628,055 A * 5/1997 Stein 455/90
5,634,080 A 5/1997 Kikinis et al.
5,659,890 A 8/1997 Hidaka
5,675,629 A 10/1997 Raffel et al.
5,699,367 A * 12/1997 Haartsen 714/749
5,701,515 A 12/1997 Grader
5,796,727 A * 8/1998 Harrison et al. 455/557
5,809,115 A * 9/1998 Inkinen 455/557
5,809,415 A * 9/1998 Rossmann 455/422.1
5,884,190 A * 3/1999 Lintula et al. 455/557
5,896,369 A * 4/1999 Warsta et al. 455/557
5,907,815 A * 5/1999 Grimm et al. 455/556
5,920,826 A * 7/1999 Metso et al. 455/556

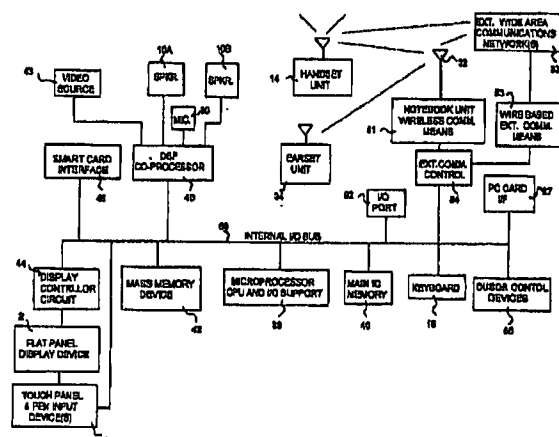
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Primary Examiner—Sonny Trinh
Assistant Examiner—Sam Bhattacharya

(57) **ABSTRACT**

A small light weight modular microcomputer based computer and communications systems, designed for both portability and desktop uses. The systems make use of a relative large flat panel display device assembly (2), an expandable hinge device (10), battery power source (9), keyboard assembly (16), and wireless communications devices (32, 51). The systems are capable of bi-directional realtime communications of voice, audio, text, graphics and video data. Both wire-based or wireless communications methods and devices are implemented. Wireless communications devices may include one or more telephone-like handsets (14) and/or earset (34). The wireless communication devices may include one or more antennae (32). Systems can be configured in a portable arrangement similar to conventional notebook computers, but can be quickly and easily disassembled and re-assembled for office desktop uses. Systems may consist of a base computer unit (100) comprising wireless communication devices may act as a relay station relaying voice and other data between the handset or earset and external wide area communications networks. The system may be capable of performing, personal digital assistant (PDA), cellular telephone, conventional notebook computer, desktop computer functions.

14 Claims, 8 Drawing Sheets



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U.S. PATENT DOCUMENTS

5,930,719 A	*	7/1999	Babitch et al.	455/557	6,049,796 A	*	4/2000	Siitonen et al.	707/3
5,953,322 A	*	9/1999	Kimball	370/328	6,112,103 A	*	8/2000	Puthuff	455/557
5,983,073 A	*	11/1999	Ditzik	455/556	6,134,454 A	*	10/2000	Foladare et al.	455/556
5,991,644 A	*	11/1999	Ogawa	455/566	6,289,213 B1	*	9/2001	Flint et al.	455/420

* cited by examiner

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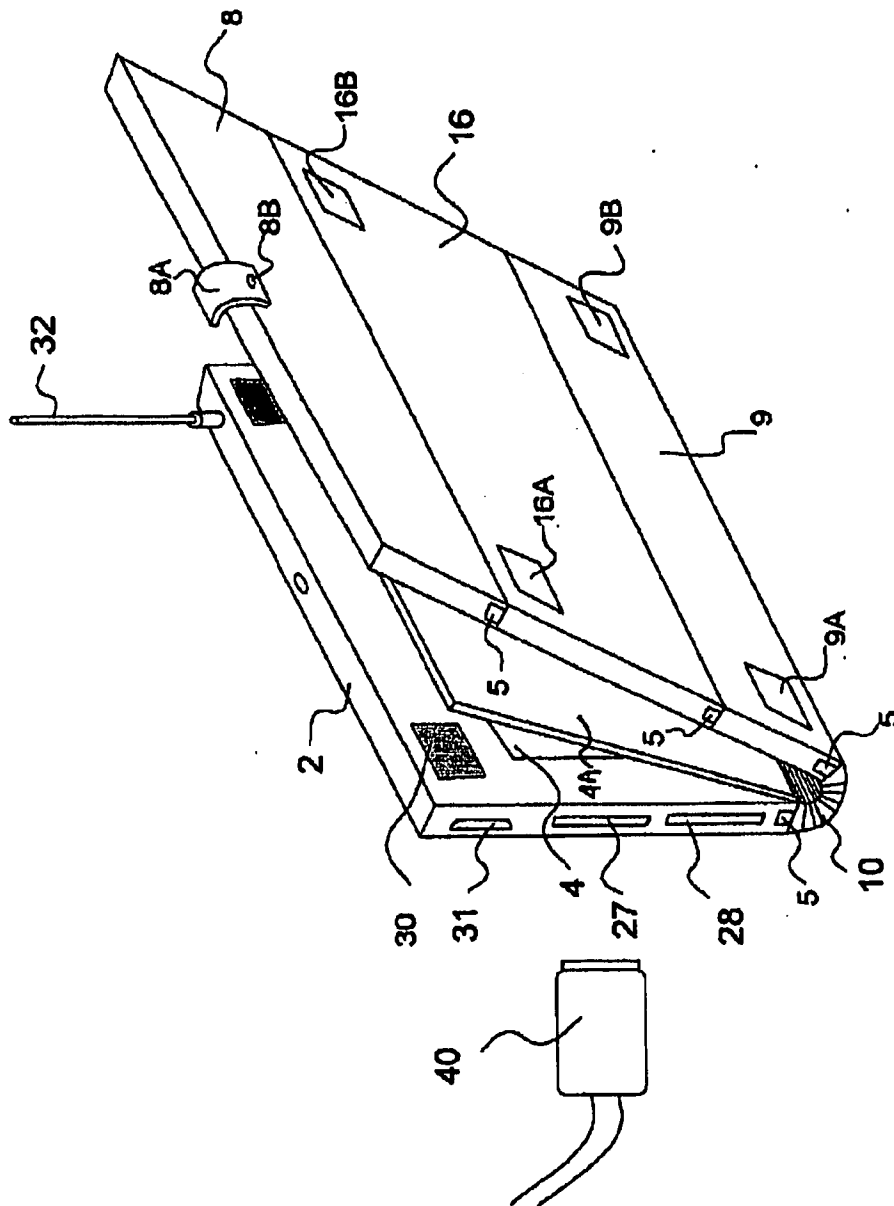


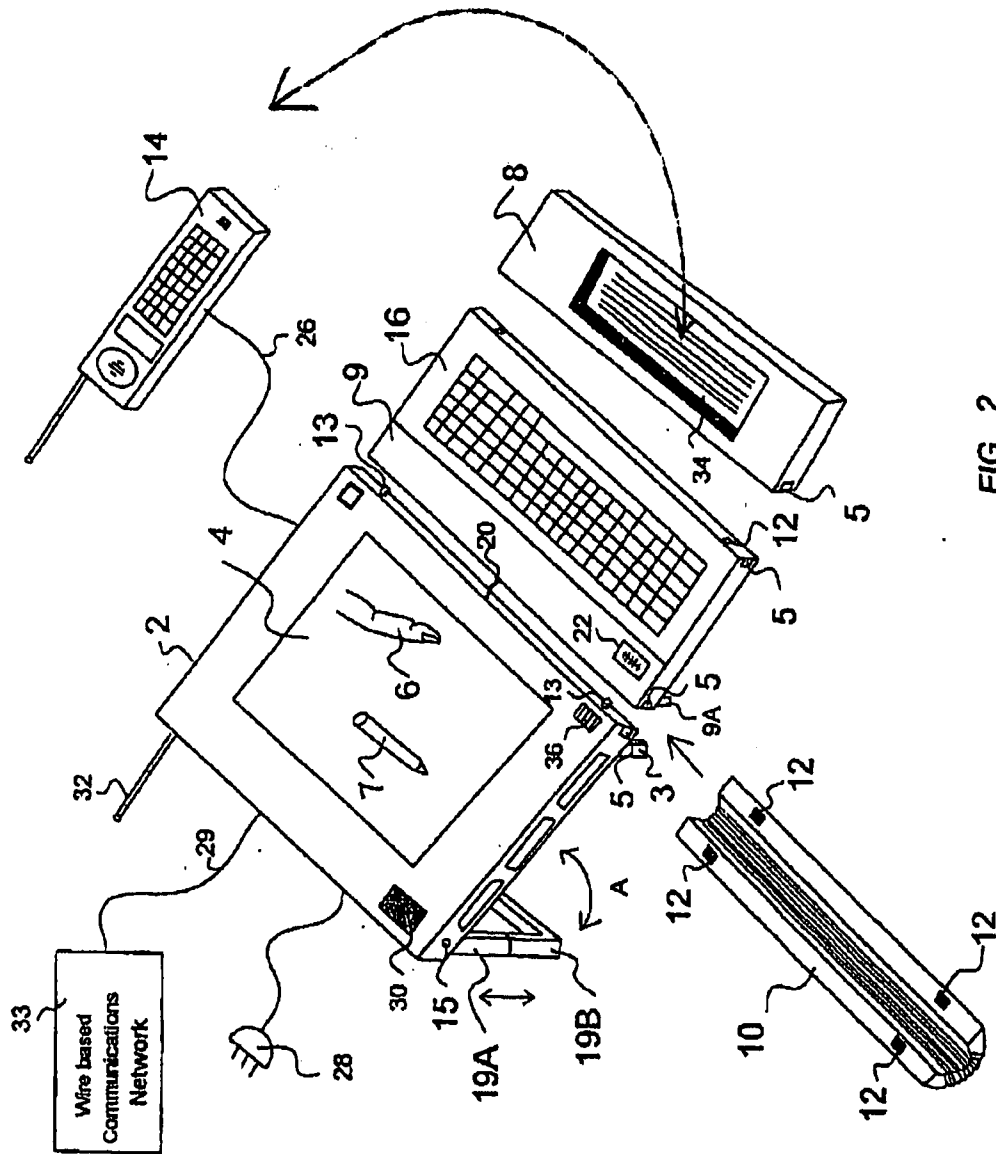
FIGURE 1

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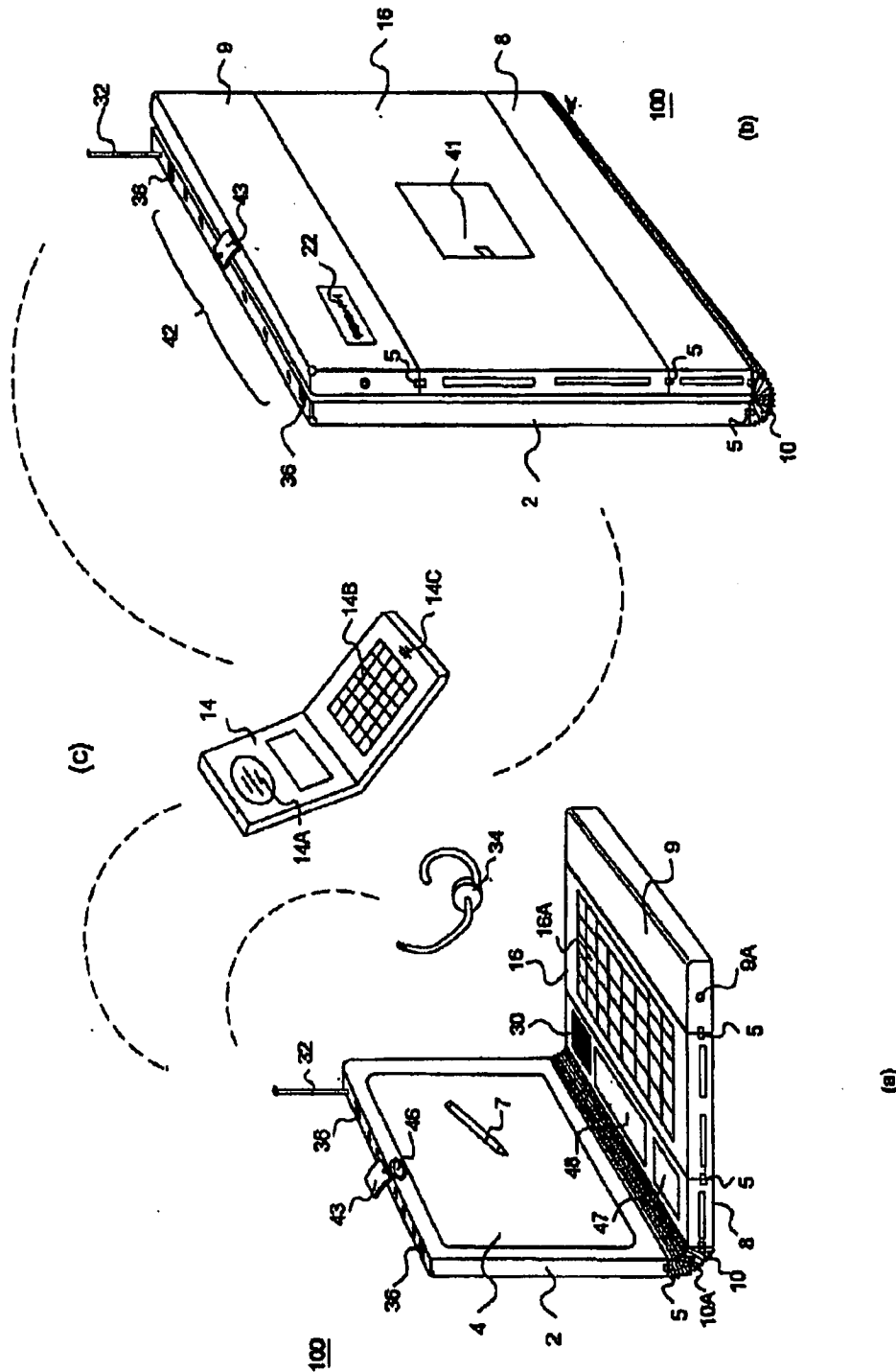


Figure 3

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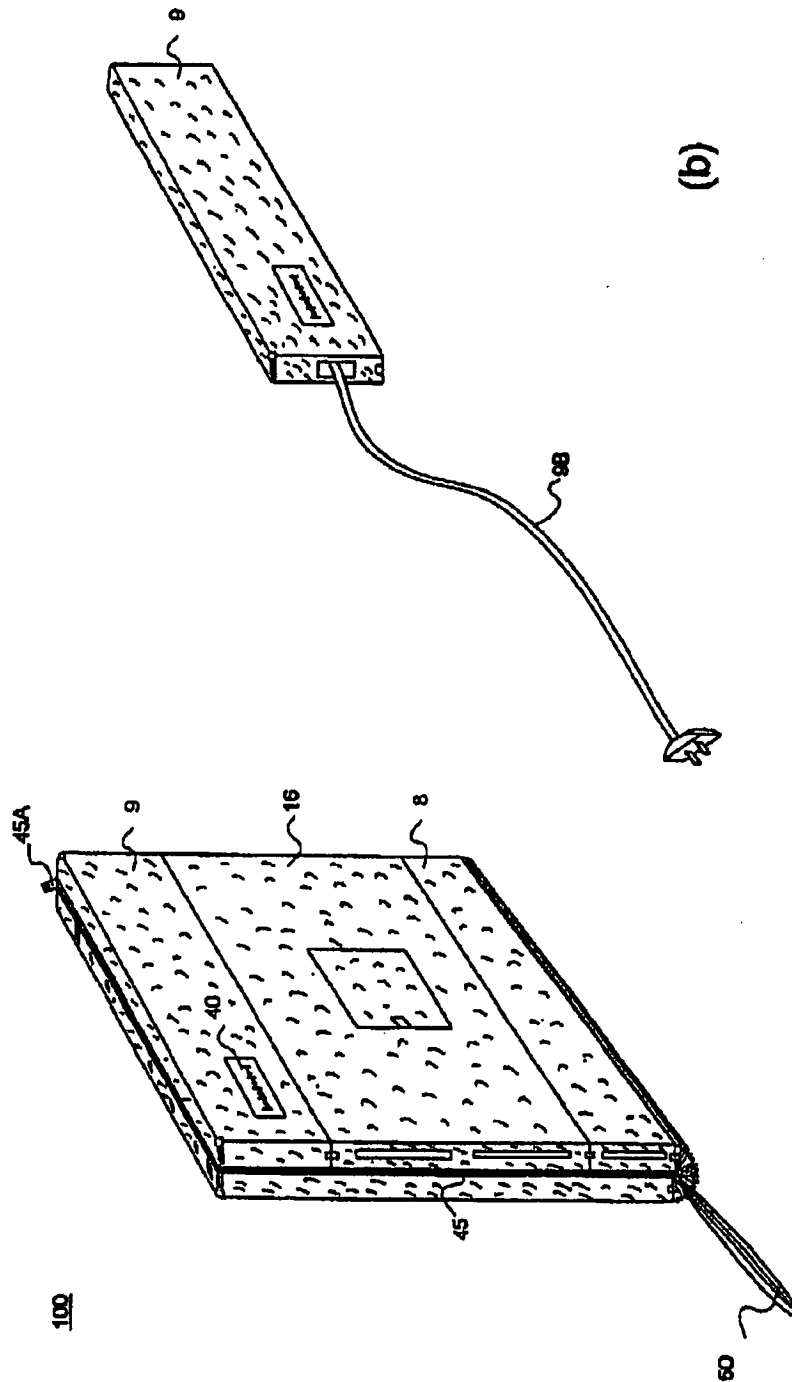


FIGURE 4

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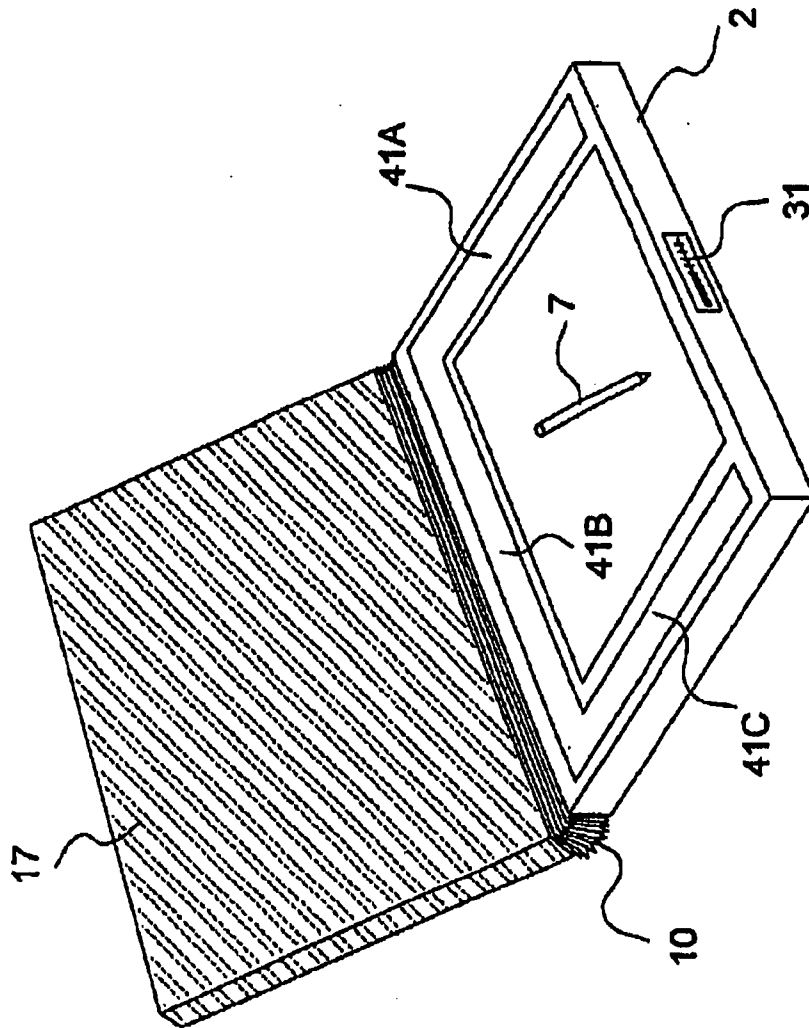


FIG. 5

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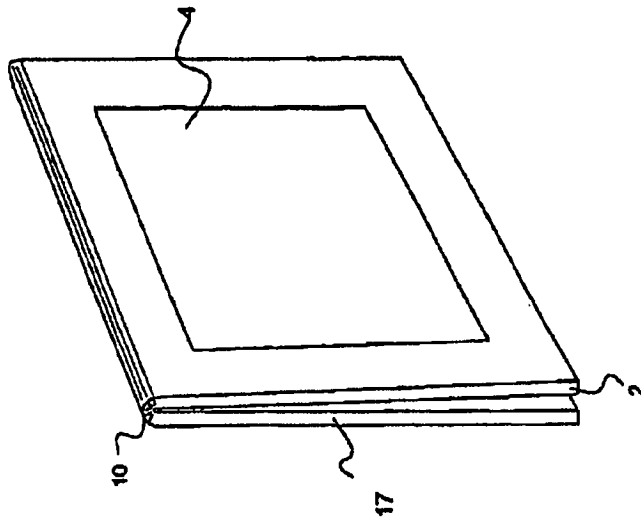


FIG. 6B

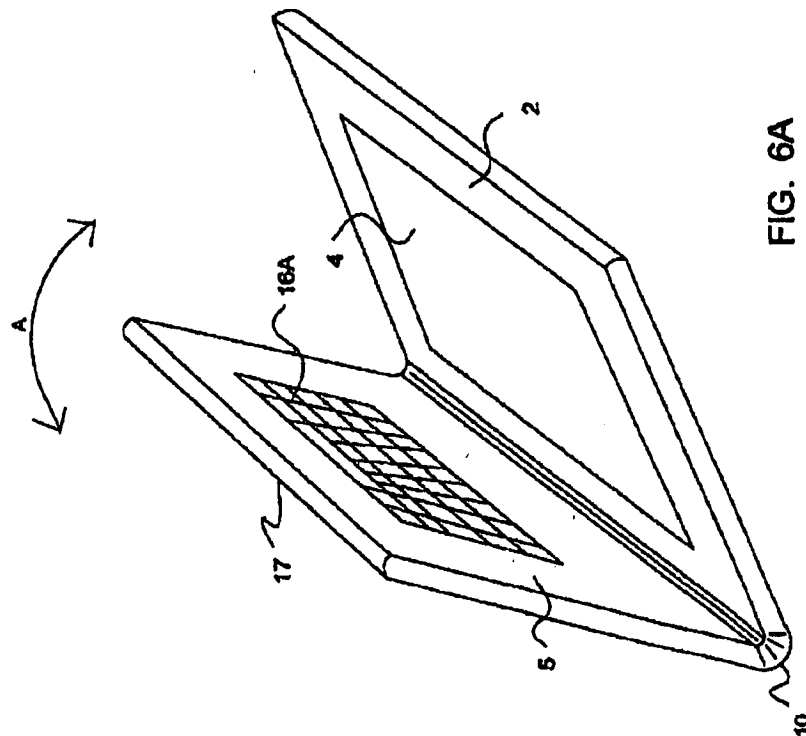


FIG. 6A

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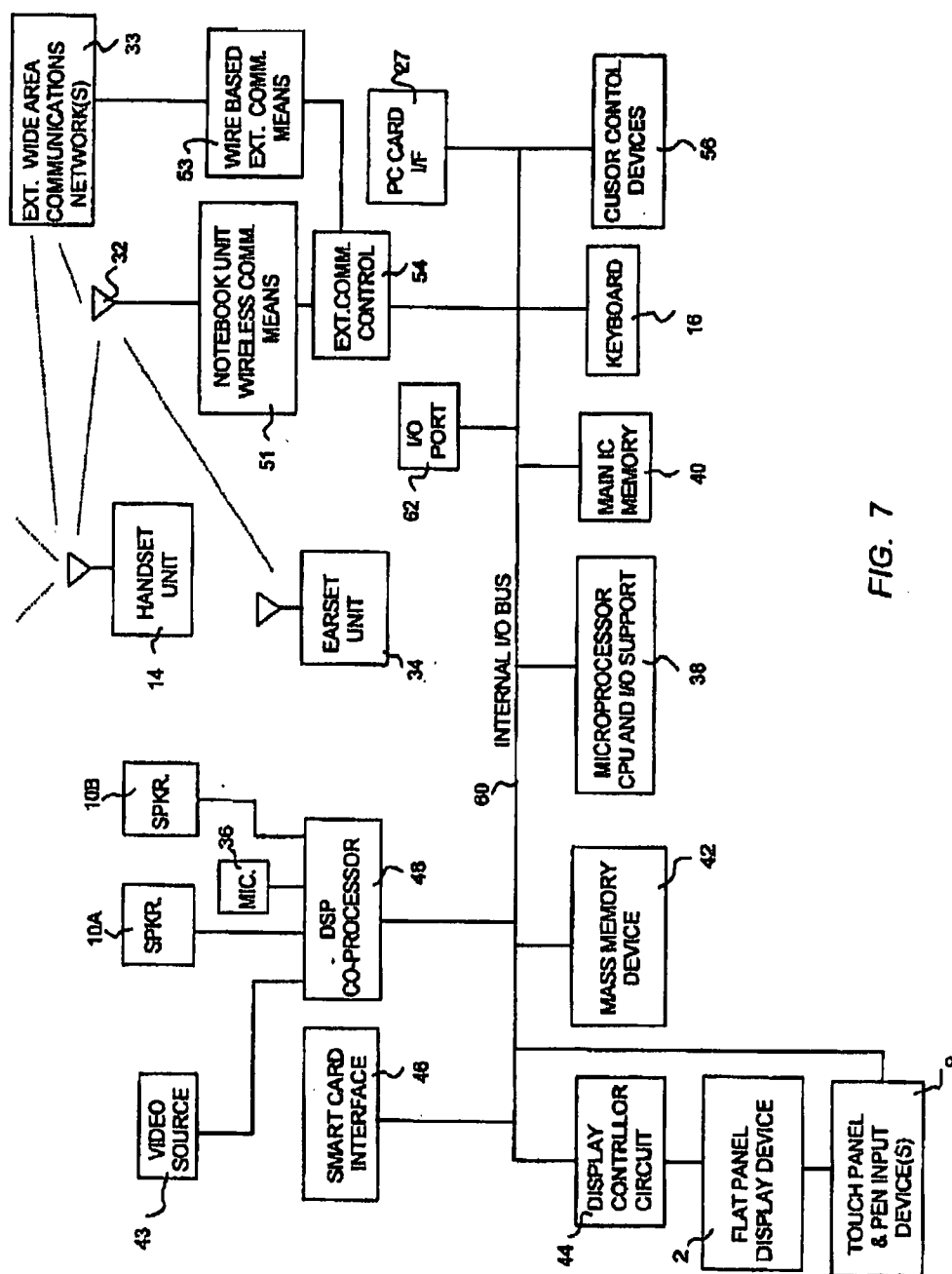


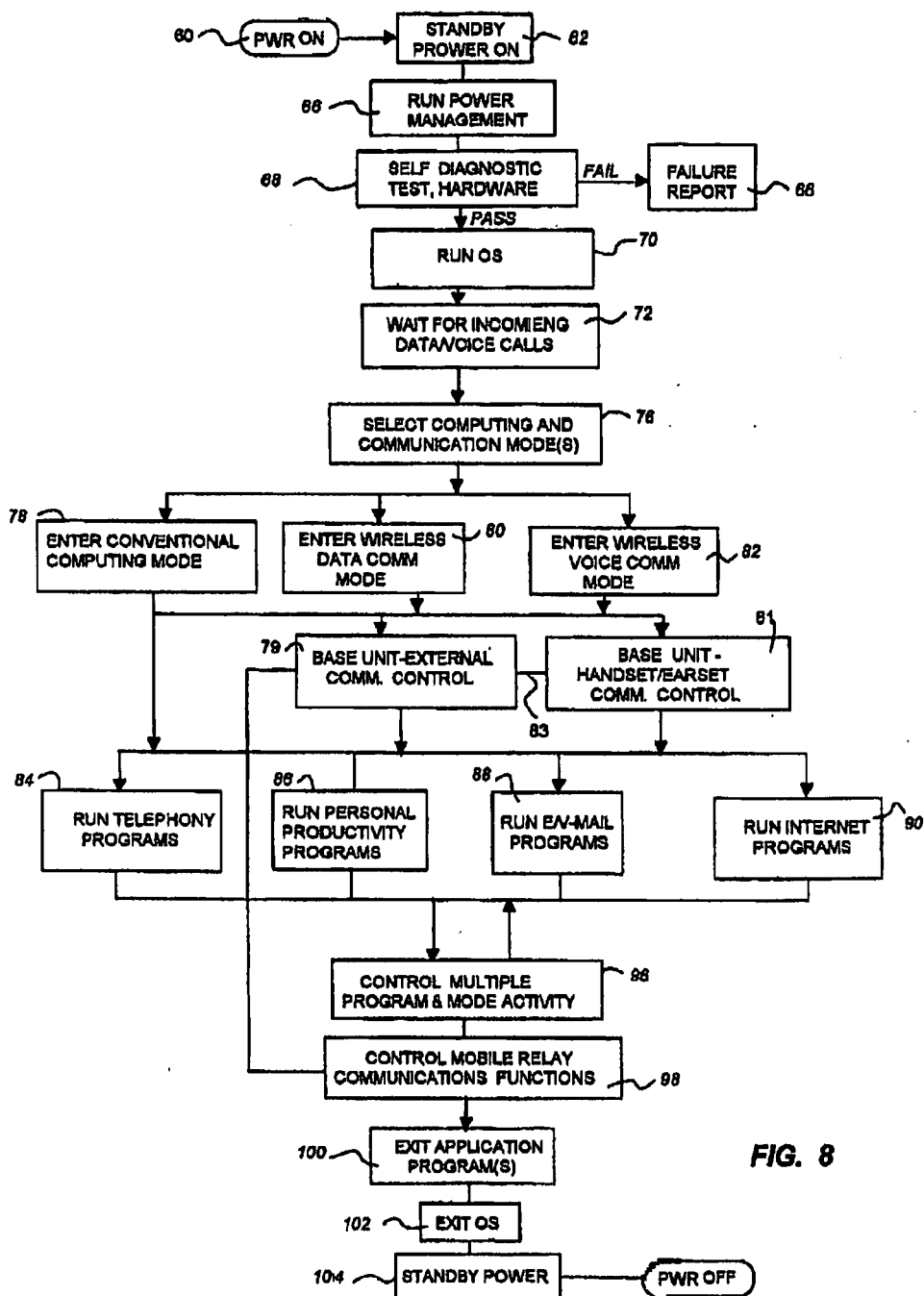
FIG. 7

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WIRELESS HANDSET COMMUNICATION SYSTEM

This application is a divisional of application No. 08/832, 933, filed Apr. 4, 1997, which issued as U.S. Pat. No. 5,983,073, whose entire application is hereby incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to portable personal computer systems with external communication means, which can be used by an individual in both desktop and mobile environments. The computer system involves a relatively large color flat panel display, conventional microcomputer system, and a plurality of human interface means. In particular, it relates to a computer unit, having light weight thin notebook-like computer structure that is capable of performing personal digital assistants (PDA) like functions and wireless external communications of voice, text, graphic and image data.

2. Description of Prior Art

There are several shortcomings with prior art notebook computers, PDAs and wireless telephone units. Notebook computers have a relatively large flat panel display device, a full alphanumeric keyboard and battery power. PDAs are small handheld units with a small LCD display, small key pad and touch pen. PDAs are designed to be placed in one's pocket or purse for maximum portability. A problem arises when customers desire large high resolution color display for both portable and desktop applications. To use a computer system for both portable and desktop uses, the customer must purchase multiple systems. The cost of color flat panels are still too expensive for most customers to by two display monitors, one display for desktop and one for the portable applications. Many customers require functionality of a desktop computer, notebook computer and PDA, but it is much too expensive to purchase multiple CPUs, displays, and keyboards.

U.S. Pat. No. 5,189,632 of Paaanen et al disclosed a handheld computer unit with an antenna and wireless RF communication capability, small flat panel display and a keyboard, in a partial clam shell type structure. However, they do not teach expandable hinge means, base station for handset relay functions, or cover latching function. U.S. Pat. No. 5,327,486 of Wolff et al teach a conventional laptop computer with antenna and RF communications to a radio network and local exchange telephone network. However, they fail to teach expandable hinge means, edge hinge means, handset means or base station relay functions. U.S. Pat. No. 5,459,458 of Richardson et al teach a virtual pager and data terminal system. However, they do not teach notebook like computers, base unit station or personal/PDA computing. U.S. Pat. No. 5,008,927 of Weiss et al teach a computer and telephone system with a display screen on a conventional telephone structure keyboard unit. However they fail to teach notebook like structure, wireless communication or handset relay functions. U.S. Pat. No. 5,196,993 of Herron et al teach a laptop computer with a removable flat panel display with built-in support feet for desktop support. However, they fail to teach expandable hinge means, exterior communications functions, cover latching functions or computer display assembly. U.S. Pat. No. 5,200,913 of Hawkins et al teach a laptop computer with flat panel display and pen input means. However, they fail to teach expandable hinge means, edge mounted hinge or latching functions.

Wireless hand held computer devices, such as cellular and Personal Communication System (PCS) telephones, have

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limited display capabilities. Prior art wireless computer units have display screens that are small (1.5-2.5" diameter), and they lack interactive capabilities to be successful for text, graphic and video applications. Some prior art notebook and laptop computers have integrated wireless communication means, but they are too large and bulky to be successful for in mobile uses. Prior art wireless devices do a poor job of providing voice, data and video communication functions. Typical wireless computer systems have display screens that are too small and have limited computing power. Prior art laptop and notebook computers are too heavy to carry for long periods. Inventions herein solve these problems by embodying a unique relatively thin notebook-like computer system that is capable of: being: (1) opened like a notebook, (2) quickly disassembled and re-assembled, (3) used for handset/earset communications relay operations and (4) used in a wide variety of computing, collaboration, communications and conferencing applications.

Inventions described herein are based on several Disclosure Documents submitted to the U.S. Patent and Trademark Office, including Document No.s 353691, 363753, 368165, and 377365. Inventions herein solve several prior art shortcomings, resulting in new modular integrated computer systems. The inventions as described below can be quickly configured to desktop, notebook, wireless and/or PDA embodiments. Thus, the user will be able to purchase a single computer system and pay much less money than conventional systems.

SUMMARY OF THE INVENTION

An object of this invention is to provide a modular multiple function display-computer system, where one can use the same relatively high resolution color flat panel display in both a desktop and mobile environments.

Another object of this invention is to provide means to reduce the cost to the customer of owning several expensive computer systems, by combining in one system the capability of performing both office desktop and portable/mobile computing and communications applications. Thus the invention herein saves the user the expense of purchasing separate computer systems for desktop uses, notebook computer uses, PCS uses and PDA uses.

Still another object of this invention involves means to quickly configure a modular notebook or PDA-like computer system into a plurality of system configurations for personal computer and wide area communication operations.

Another object of this invention is to provide for a relatively thin and light weight computer unit to be carried under one's arm in a notebook-like fashion, yet have sufficient computing power to execute a wide range of conventional computer and communications applications.

Still another object of this invention is to provide for bi-directional communication of voice, audio, text, graphics, image and/or video data to wide area communications networks where one or more users may communicate with other users with appropriate apparatus. The communication may realtime or store forward type communications.

Another object of this invention involves hardware and program software to control cellular or PCS communications, combined with a light weight mobile notebook or PDA like unit. The unit or system would act as a computing platform and base communications relay station. The system or unit may then relay voice and data to/from a handset unit or earset unit, where the base unit relays this voice and data information to/from a wide area communication network.

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Still another object of this invention involves means for quick disconnection or disassembly and subsequent connection or assembly of key component of the system, such as battery power unit, communication adapters (modems) and/or wireless telephone units.

A still further object of this invention is to use the same display-computer system assembly, comprising of relatively large high resolution color flat display panel and a powerful CPU with large memory, etc., and combining them in a modular fashion with a thin keyboard, battery power source, modem, and wireless communications means.

Another objective of this invention is to provide means for integrated telephony functions on a portable computing platform, with powerful microprocessors running Windows operating systems for a wide range of computing and communication functions.

A still further objective of this invention is to provide for full Internet access on a wireless mobile platform, where the user can access the world wide web and execute most of the available Internet browser functions and plug-ins. The computer system would be capable of performing most of the Internet data access, download, upload and conferencing functions.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a perspective view of a portable computer with a notebook clamshell-like structure.

FIG. 2 shows a perspective view of a modular portable computer system in desktop configuration.

FIG. 3(a) shows a notebook like portable computer in an open state.

FIG. 3(b) shows the notebook like computer in a closed state.

FIG. 3(c) shows a handset telephone unit and earset unit.

FIG. 4(a) shows a notebook or portable computer with a protective covering material.

FIG. 4(b) shows an electrical power source unit.

FIG. 5 shows a PDA like unit with a roughly transparent cover half.

FIG. 6(a) shows a notebook or PDA in a partial open state.

FIG. 6(b) shows the notebook or PDA in a reversed open state.

FIG. 7 shows block diagram of the computer system and associated elements.

FIGS. 8a and 8B shows a flow diagram of the computer system programs and operations.

DETAILED DESCRIPTION

FIG. 1 shows a computer system, to be operated by a person or user, where the unit has a conventional notebook clamshell-like structure. The computer system as used herein can also be referred to as a portable computer system, computer-display unit or base unit, and shall also include the terms: personal computer, notebook computer, sub-notebook computer or Personal Digital Assistant (PDA). The computer system as disclosed herein typically comprises of a flat panel display assembly 2, which includes a display panel and screen 4 and other components described below. An expandable hinge means 10 connects the flat panel display assembly and cover assembly (8, 9 and 16). Expandable hinge means 10 may be embodied many ways including using flexible material that is corrugated, having its grooves running parallel to the edge of the notebook structure. Cover assembly may consist of two or more sections, such as a first

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cover section 8, second cover section 9, and a keyboard section 16. One or more of the cover sections may be quickly disassembled from each other by the user. To avoid accidental disassembly, means may be embodied where the user must simultaneously press two push buttons 5, for example one on each side of the structure, in order to disconnect the sections. The portable portable computer system may also have an inside protective sheet member 4A attached to the inside the fold of the computer system. FIG. 1 shows a partially open notebook-like structure, but it may be closed all the way shut and secured, by a securing strap means BA. This strap means may be secured to the other side of the display assembly 2 by Velcro like strips, for temporary securing and un-securing, with one's fingers. One purpose of this foldable embodiment is to provide the computer user with a handy portable notebook computer that: (1) when closed, one can easily carry, cradled in one hand under one's arm, and (2) easily opened for access to the computer indicators and controls.

The flat panel display assembly 2 may be a monochrome or color liquid crystal displays (LCD), such as those manufactured by Sharp Electronics, NEC Electronics, Toshiba Corporation or others. The display panels screen sizes may be 10 to 14 inches or more in diameter. The display pixel arrays may be 640 by 480 (VGA), 800 by 600 (SVGA), or 1024 by 768 (XGA). Color depth should be six bits, and the response time should be 45 to 50 milliseconds ($t_{90}+t_{off}$). Brightness of the screen should 70 Cd/m² and contrast ratio be at least 100:1, where 250:1 is preferred.

LCD panels from Sharp Electronics may be used in the embodiments. Applicable LCD Models include LQ11DS01, LQ12DS01, LQ12DX01 and LQ12X12. These panels have screen sizes of either 11.3 or 12.1 inches measure along their diagonal. Each panel is capable of a color depth of 6 bits/sub-pixel, a response time of 80 ms, brightness of 70-150 cd/m² and a contrast ratio of 100:1. LCD panels from NEC may also be used, such as NL10276BC24-04, NL8060BC31-02, NL8060BC31-01, and NL8060BC29-01. These panels are capable of 6 bit color depth, 50 ms response time, 70 cd/m² brightness and 150:1 contrast. Toshiba panels that may embodied include: LTM11C016, LTM12C236, or LTM12C25S, which are capable of 50 ms response, 70 cd/m² brightness and 100:1 contrast. Manufacturers' references and manuals for each are hereby incorporated by reference.

Several I/O slots and/or connectors may be embodied at one or more edges of the flat panel display assembly 2. FIG. 1 shows access slots to a floppy disk 28, external communication means 27, printer connector 31. Other external connection means may be embodied. Several connector means may be embodied, including auxiliary video connector, COM ports, and/or mouse/game ports. PCMCIA PC card 40 may be included for adding fax/modem, network interface (wire or wireless) external communications and/or added memory. An integrated built-in transmitter receiver and a retractable antenna 32 may be embodied, for example to the flat panel display assembly 2. The antenna and associated RF transceiver may be used for wireless communications to/from an external communication network. Many of the well-known notebook computer or personal computer I/O devices may be embodied.

An important feature of this embodiment is the dimensions of the computer-display unit. It may be made conveniently larger than a 8.5×11 inch sheet of paper, so that one can place one or more sheets of paper (or other relatively thin flat objects) inside the closed clamshell like notebook structure in a folding or latching fashion. The user can safely

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carry papers from location to location without folding or wrinkling them. Thus the unit can act as a carrying device as well as a notebook computer. The outside surfaces and edges of notebook computer may be covered with leather, vinyl or other type of soft material, for easy of hand carrying and surface protection. Other parts may be embodied including foldable short legs 9A and 9B, keyboard resting pads 16A and 16B, built-in audio speaker(s) 30.

FIG. 2 shows the portable computer with several parts detached or disassembled. This embodiment may be used in desktop computer system environments. The flat panel display assembly 2 may be placed at an inclined angle, with foldable leg support means 19A and 19B. The leg support means may fold relatively flush to the backside of the assembly 2 (motion range A) when not in use, via a simple hinge 15. Vertical portions 19A and 19B may slide in and out, in a telescoping type arrangement, to allow wide range inclination angles. A pair of short legs 3 may be placed near the front of assembly 2 that may also fold relatively flush with the back of the assembly. Means may be included to place the screen at a vertical orientation. A pen or stylus input means may be associated with the display screen 4. The pen or stylus means may include finger input (touch panel) means, where one can write or point to area on the display screen. The expandable hinge means 10 may be removed from the assembly 2 and from the cover section 9 by a quick disconnect or disassembly means 5. Alternatively, the hinge means may be fixed to parts 2 and 9. The hinge means may be made of a relatively flexible material, such as leather and vinyl. It may be corrugated as shown in the figure so it can bend easily and expand as required. The hinge may have a number of attachment slots 12 for the quick dis-attachment or disconnection from hook mechanisms 13. FIG. 2 shows the flexible hinge means 10 removed from the other assemblies.

Cover section 9 may contain a battery power unit containing one or more batteries and power circuit elements. The battery power unit may be embodied with several types of batteries, including Lithium-ion or NiCd batteries. The power unit may be a self contained battery package, having an easy to read charge indicator 22 that indicates the state of the battery's electrical charge. Because all batteries have a limited useful charge life, the package may be easily and quickly disconnected from the keyboard section 16 and replaced with another battery package. Spare battery packages and other spare parts could be carried in a separate traveling case (not shown). The keyboard section 16 may have a full size QWERTY keyboard with movable tactile keys. An electrical cable 20 may connect the keyboard to the computer-display assembly 2. Although short cable is shown, it may be a long cable or a flexible cable, so that the keyboard may be moved about if desired. Alternatively, a wireless electromagnetic link may be embodied such as infrared (IR) or RF links, which would replace electrical cables 20 and 26. The cover section 8 may contain a wireless handset 14, such as a cellular telephone transceiver. The handset may have retractable antenna, small speaker, keypad, built-in microphone and a battery source. This handset 14 may be capable of analog or digital cellular operation, including AMPS, TDMA, CDMA, PCS, CDPD, or equivalent types for communicating with wide area wireless communication networks. The wireless unit 14 can be easily removed from a cutout or recess area 35 in the cover section 8. The recess area is made slightly larger than the outside dimensions of the handset 14, so it can fit inside the recess with a relatively snug fit. It is important the handset be easily and quickly removed and replaced in the

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base unit. Alternatively, cover section 8 consist of the handset itself, so that a separate cover section with recess would not be required.

The portable computer system's flexible hinge and the cover sections should be made relatively thin so that when the two halves are folded (rotated) closed, it will not be too thick or heavy to carry with one hand. As shown in FIG. 1, legs 3, 5, 19A and 19B may be folded roughly flush with outside surfaces of the unit. The number cover sections are not limited to three. The cellular handset is shown in FIG. 2 may be connected to the computer system by an optional electrical cable 26. A RF transceiver in the wireless telephone would serve as the transceiver for the computer as well. This embodiment might be desirable to reduce the overall cost of the system. However, a wireless RF transceiver and modem may be located in the flat display panel assembly 2 for voice or data communications. An antenna may be embodied on the display assembly 2, with a retractable antenna 32. The display assembly may include the computer system located within the assembly housing. The advantage of this later embodiment is that the telephone 14 and computer system could be operated independently.

The portable computer system may also have means for connection to a non-battery power source, as shown in FIG. 2, via a standard power line cord and plug 28. The system may also have means for connection to an external wire based wide area communications network 33, via cable 29. The wire based wide area network may include one or more telephone networks, cable TV networks and/or computer LAN/WANs. Telephone networks may include POTS, ISDN, ATM or other equivalent types. Several computer interface connection means may be embodied, for example interface slots/connectors as shown (27, 31, and 38). These interfaces might include R/S 232, USB, IEEE 1394, PCMCIA, or other computer I/O (serial or parallel) connections. Useful connections may include a bus extender connection, so that the notebook computer can be interfaced to another more powerful computer. For portability reasons, it is desirable that the modem or digital terminal adapter be built into the computer system unit. Some means for software loading should be included such as a floppy disk or smart card. Internal mass memory of the computer system could include ROM, flash memory, or other memory means. Means for accepting PCMCIA cards, ROM cards or other types of memory card may be implemented. Preferably, the system may be embodied with a very small light weight and low power mini hard disk. One or more IR communications interfaces may also be implemented.

Other capabilities such as FAX send/receive, speech recognition, voice processing voice mail, telephony, and E-mail functions may be implemented in the computer system. A built-in microphone 36 and speaker 30 may be embodied to support speech input/output and multimedia functions. Preferably the display should be capable of full color with a wide viewing angle. If the display is back lit, the user should be allowed to switch the backlight "on", "off" and to a multiplicity of levels in between. The operating system of the notebook/PDA should be a GUI type such as Windows™ 3.1/95, Windows CE™, MagicCap or another suitable GUI based computer operating system. The system can be designed to support wide range of communication connectivity and software compatibility.

FIGS. 3A and 3B show another embodiment of the invention having a base unit or notebook computer system 100, a handset unit 14 and a earset 34. This embodiment shows a relatively thin flat display panel assembly 2 having a display screen 4. The system may also include a pen and/or

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finger input means 7. The base unit has an expandable hinge means 10 physically connecting the display assembly to the other half of the base computer unit. The other half can be comprised of several sub-assemblies including a battery power source section 9, keyboard assembly 16 and an electronics housing section 8. The keyboard assembly contains a keyboard unit 16A, which may contain a full-size QWERTY keyboard unit. The housing section 8 may include a wireless modem or communications adapter means. The expandable hinge means 10 should have an easy access locking and unlocking means 10A, which can temporarily lock the rotation of the two halves at the user's desired angle. Electronic housing section 8 may be attached edge wise to the keyboard assembly 16 by a quick attach and release connection means. As shown in the figures, several assemblies can be disassembled by pressing one or more finger access tabs S. Likewise, a battery source section 9 may be edgewise connected to the opposite edge of the keyboard, via similar quick attach and release connection mechanism having finger push tabs 5. The tabs may be located on each side of the assemblies for quick and easy, but safe, user disassembly. The connection means may include means for secure physical attachment and connection of electrical wires, located inside the subassemblies. Although the sections may be ridge, the attachment mechanisms may be somewhat flexible, elastic or pliable, so that the combination of assemblies can bend slightly.

Battery power source unit 9 may consist of one or more batteries with voltage regulation, AC/DC operation, power management circuits and charging circuitry. In a preferred embodiment the unit should be capable of accepting electrical charge from an AC line. A important feature embodiment of the invention is means for quickly interchanging an electrical power depleted battery power unit 9 with a freshly charged battery unit. This may be accomplished by a combination of finger push tabs 5, latches and hook means for quick disconnection and re-attachment. In one intended scenario a user may carry several spare battery packages in a separate briefcase. When the attached battery package is depleted, the user can quickly change out the battery sections. The user can then plug the depleted battery package into an AC line for a built-in charging operation.

It is preferable that each of the major assemblies and sub-assemblies be made relatively thin for easy carrying. The expandable hinge means should be made somewhat flexible, elastic or pliable so that the user may place relatively thin flat objects inside the folded space of the notebook-like unit. These thin objects may include sheets of paper, cards, brochures, or similar relatively thin flat items. Linkages between the sections may be made somewhat yielding, pliable, elastic and/or stretchable. Although the display device may be ridged, the other half of the notebook may be embodied with thin flexible enclosures and other structural components. Also, the flat panel display device and assembly 2, 4 may be made flexible. Thin and flexible keyboards are known to those in the art. The other parts may be adapted to have thin and slightly flexible mechanical features. The two halves can be closed by hand and secured by a flap and snap means 43 or equivalent means. As discussed above, the expandable hinge means 10 may be made flexible and expandable by incorporating a multiplicity of small folds or other equivalent means. If the user places thin objects between the halves of the base unit, one or more sides could bulge out slightly, improving the physical object carrying capability of the notebook computer. This object carrying capability is an important feature for mobile users who may be carrying the notebook almost everywhere

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they go. The user may securely place and latch paper sheets, letters, memos, or other flat objects inside the notebook clam shell structure. A base unit hinge locking and unlocking means 10A may also be embodied, so that the user can quickly and easily temporarily lock the two halves of the unit to a rotationally fixed state (and later un-lock them).

FIG. 3(a) also shows several other elements including a small CCD video camera 46, built into the display assembly for video conferencing and other uses. One or more built-in audio microphones 36 may be embodied in the base unit. Preferably one microphone should be located on the edge of the notebook, as shown, so that the user may be in voice communications with other while the unit is closed. One or more audio speakers 30 may be built into the base unit. One or more compartments 47 and 48 may be embodied at convenient locations to store attachments for use with the mobile computer system. A telescoping antenna 32 may be embodied into the base unit as shown, or it may be built-in the unit and not exposed. Although the base unit 100 can be a self-contained unit, it may work with other optional attachments, such as a wireless cellular-like handset 14 or earset 34, as shown in FIG. 3(c). The handset 14 may operate roughly equivalent to conventional cellular telephone handsets with a built in power source, providing voice and/or data communications to wide area communications networks. The earset 34 has a small low power RF transceiver, audio microphone, audio speaker and small battery source, which is capable of fitting into the user's ear. The wireless earset unit may be used for hands free applications. The user may then walk around while communicating with the handset or earset. If one is using the earset he/she may also use a pen input means 7 or keyboard 16 while in audio communications. For semi-private voice communications, some users may prefer using the handset 14, with handset speaker 14A, handset key pad 14B and handset microphone pickup 14C.

If one is using the handset or earset, the base computer unit 100 may be placed some distance away from the user, typically in the same room or nearby room. The base computer unit may be designed for a higher transmitting power level. The base unit may be designed to allow the user to switch between a high or low level transmitting and receiving power levels. The earset 34 or handset 14 can be designed for a much lower RF transmit and receiver electrical power levels, because the base computer unit 100 can be placed a relatively short distance away (typically from a few feet to about fifty feet). Thus, the base unit 100 may relay RF communications between the handset or earset and an external wide area communications network. The base unit could safely embody a more powerful RF transmitter resulting in a larger signal to noise ratio. This will result in improved wireless communication to and from wide area networks that may have antennas several miles away. A very important advantage of this invention is that the user has the option of having very low electrical power electromagnetic fields near his/her's head, thus improving the health and safety aspects for the user. Since less power is required for the handset 14, it can be thinner and smaller than a standard cellular handset. Thus the handset can be smaller and easier to place in the user's pocket. The earset can be made very small so that the users can leave it in his/her's ear for long periods of time and have one's hands free for other uses.

FIG. 3(b) shows the base unit computer-display unit 100 in a closed configuration, in which one may carry it under one's arm. Since the unit is typically battery powered and contains electronics for a wireless voice and PCS like operations, one could use it for voice/data communications while carrying it about (i.e., in transport). The user may

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5 speak towards one or more microphones 36 located along the top edge. The user will be able to hear the other person(s) talking, through audio speakers 30 located conveniently on the base unit. A small telephone keypad could be located behind a protective door 41, for convenient dialing of a telephone number. The door may be a simple sliding door device or mechanism. The antenna 32 may be a sliding telescoping type. A simple display indicator 22 may show the electrical charge state of the battery source. A plurality of switches and indicators 46 may be located along one edge of the base unit for easy viewing and access. Such switches and indicators may include: an On-Off switch, Mode Switch (for voice, data, and video modes, etc.), high/low power transmit switch, ring/alarm mode and/or speaker/mic mode (for earset, handset, etc.). For securing the two halves of the base unit, a flap 43 made of a simple expanding material, which may include a snap means at one end and may be secured with a pin and/or pivot means. The flap would then snap to secure the flat panel display assembly 2 and cover assembly (9, 16, 8). In FIG. 3(a), the flap 43 is shown rotated in the opposite orientation for clarity only. Other securing means may be embodied that are known to those in the art.

FIG. 4(a) shows the portable computer system or computer-display unit 100 covered with a thin soft protective material or film, such as leather or vinyl. This material will protect the unit when it is bumped and/or banged into hard objects while in the use in field or office environments. The protective material may have a texture or roughen surface (as indicated in the figure), which would also provide for a relatively high mechanical friction; so it will be easier to carry under one's arm. Holes or cutouts may be embodied in the protective cover for viewing and/or using the various indicators, switches and keypads. A zipper securing means 45 may be embodied with the notebook, as shown in FIG. 4(a). The zipper means may be attached to the leather or vinyl covers so that the unit can be zipped closed to secure and protect objects placed inside the notebook. A pull tab 45A of the zipper means is shown in the figure. This embodiment would be especially applicable in rugged or harsh environments. A strap 50 may be attached to the unit so that the user may temporarily store it on a hook for example. FIG. 4(b) shows an embodiment of the battery power source section 9. As in previous embodiments, it may be detached from the notebook computer-display unit. A spring loaded pull out power cord 9B may be embodied, so that the user can conveniently pull out the power cord to electrically charge the package. The power cord and plug may be easily retracted inside a cutout space on the side of the subassembly. Several adjunct attachments and/or accessories may be carried in small compartments in the notebook unit. In addition, accessories and attachments may be carried in a separate briefcase or like carrying case (not shown in the figures). Such accessories may include line power, supply and cord, extra battery power source section 9, spare earsets 34, spare handsets 14, external hard drive, external CD ROM drive, external mouse, spare styluses and/or spare video camera/lenses 46.

An important advantage of this notebook computer unit invention is that it can be operational when it is in the closed configuration. Thus, while carrying the unit in one's hand or under one's arm, the user can perform voice, data and/or video communications. The notebook unit can be used in an open configuration on a desktop, airline tray or wide variety of other computing environments. The unit can be configured for wire based or wireless communication operations. The unit can be used for general purpose computing, network computing, pen input computing, PCS/Cellular, data/video conferencing, on-line network computing and data collaboration applications. The notebook unit can be used as

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a personal organizer or personal information manager, such as a computer equivalent of the Franklin Planner™ or equivalent planners. A multiplicity of personal computing applications may be embodied on its computer. The unit may be capable of wire or wireless communications, linking it to multiple handsets and earsets. The notebook computer unit may have a plurality of electrical connectors along the edges or other convenient locations for connection to a plurality of external devices, including but not limited to: modems, network interface cards, hard disks, floppy disks, and bus extender enclosures.

Preferably the notebook assemblies should be made relatively thin and light weight that would be an advantage in mobile use. For example, the flat panel display assembly 2 should have a thickness of roughly 0.75 inch or less. The cover assembly may be comprised of the battery power source section 9, keyboard assembly 16, and external communications section 8 should have a thickness roughly 0.75 inch or less, so that the folded total thickness of the unit could be 1.5 inches or less. However, an overall thickness of one inch (i.e. 0.5 inch for each half), or less, may be preferred. A keyboard unit located in keyboard section 16 that may be Model KFNR available from Alps Electric Co. Ltd. This keyboard unit has a thickness of 10 mm, a 3 mm key travel, a 1 mm over travel and a minimum key pitch of 18 mm. Alps Electric also has introduced a 7.5 mm height keyboard assembly a full size keyboard, capable of high speed typing without operator tiring.

FIG. 5 shows another alternate computer notebook embodiment, consisting of a somewhat smaller size flat panel assembly 2, display screen 4, pen/stylus means 7 and a roughly transparent display panel cover 17. The flat display panel could be an LCD, FED, or other type of flat panel display. The panel cover 17 could be made of a hard rigid material or a durable soft polymer material that is roughly transparent to a range of electromagnetic radiation frequencies. This cover may be made optically transparent to let the ambient room light to impinge onto a plurality of photoelectric light sensors 41A, 41B and 41C, which may be placed onto the display panel assembly 2. The photovoltaic or photoelectric light sensors may convert ambient room light to electrical voltages. These sensors may provide power energy to power the unit. The sensors may also help change the unit's battery source. Thus, with the roughly transparent cover 4 closed over the display panel assembly, some light rays will be transmitted through the cover. Photons from the ambient light are converted to an electric voltage, via the sensors and energy conversion circuitry that is applied to the computer unit's power source. Even if the computer unit is turned off and cover closed, the sensor could still be charging its batteries. The roughly transparent cover 17 may be made flexible layers of polyester, polycarbonate or other suitable materials. An advantage of this embodiment is an improvement in maintaining power to the notebook unit for longer periods compared to prior art battery powered units. Information on the display screen may be viewable even with the cover 17 is closed over the flat panel display assembly 2. Viewing of the display screen with the cover closed is an improvement over the opaque covers of conventional notebook computer and PDAs.

FIG. 6(a) shows another embodiment of a thin light weight notebook computer or PDA unit. The cover panel 17 contain a keyboard 16A, which may be a membrane type keyboard. The flat panel display assembly 2, with its display screen 4, is attached to the cover panel 17 by an expandable hinge means 10. The hinge means, which may be elastic or pliable, should be capable of being rotated over angles A. The hinge means should be capable of rotating through roughly 360 degrees, so that the two halves may be folded back onto each other as shown in FIG. 6B. In the configu-

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ration of FIG. 6B, the notebook unit can be held in one's arm, and the display screen can be written onto by a stylus or pen. The unit could also be placed onto the table or desk for convenient viewing. The cover keyboard assembly 17 can be closed to a hold loose sheets of paper, brochures, etc. If this latter case, the size of the panel halves should be slightly larger than 8.5" by 11" to facilitate one carrying loose sheets. Expandable hinge means 10 is designed to expand to accommodate a relatively thick stack of documents. Hinges may be made of pressed pliable corrugated plastic sheets can accommodate 0.5 inch or more gaps.

Various battery power sources 9 may be used in the above embodiments, including smart-battery technology having rechargeable batteries. They may be made capable of monitoring themselves for electrical charge level. Batteries that are suitable for this smart battery technology include nickel-metal hydride (NiMH) and lithium-ion (Li-ion) types. NiMH batteries are more sensitive to overcharge than NiCd batteries. Care must be taken to avoid overcharging that causes heating, which is damaging to the NiMH cycle life and capacity. Li-ion batteries require tight battery management for safety purposes. NiMH batteries are available from Sanyo Energy USA. Several power management and smart-battery devices are available. Duracell has a smart rechargeable battery with intelligent power management circuits for charge level gauge means, as disclosed above. The gauge may constantly show the state of the total battery charge. Advantages of an intelligent battery management system include customer notification of charge state, longer mobile operation times, longer battery lifetimes and faster charge times. The rechargeable battery and power management circuit may collect and communicate the present and predicted battery data to the host notebook computer under software control.

Wireless communications adapters or modems disclosed in the above embodiments may consist of analog or digital transmitter and receivers, having control circuitry for cellular AMPS, PCS, CDPD, and RF links to wide area communication networks. The communication means disclosed herein may make use of long distance or short distance communications techniques, methods and equipment. Communication techniques may include several types of digital multiplexing and command access schemes such as TDMA, CDMA, GSM, or a combination thereof.

FIG. 7 shows a block diagram of the system elements and associated circuitry, hardware, firmware and software. A microprocessor 38 controls most of the system elements. A computer system I/O bus 60 is shown interfacing several system elements. Many types of microprocessors may be embodied, including 16, 32 or 64 bit processors. The microprocessor may be a complex instruction set computer (CISC) or a reduced instruction computer (RISC) computer types, or a combination of the two. CISC microprocessors that may be embodied, including the Pentium P5 manufactured by the Intel Corporation, the 68000 series microprocessors made by Motorola Corporation. Many types of RISC processors may be embodied, including the ARM series, the UltraSpac by Sun Micro Systems, the SH Series by Hitachi, PowerPC by Motorola and IBM and the MIPS R4000 series by several sources. The above manufactures' references and manuals are hereby incorporated by reference. Since electrical power dissipation is very important in portable systems, RISC microprocessor may have an advantage with smaller transistor counts, low voltages and fully static designs. RISC processors are available at an operating voltage of only 2.0 volts. RISC processors using 0.5 micron CMOS processes have resulted in die sizes for core functions of roughly 4 mm². RISC processors can deliver 300-400 Mips/W. Microprocessor 38 may support several types of I/O buses (typically 32 bit wide), such as VL or PCI type buses.

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Microprocessor and I/O busses are well known to those skilled in the art.

A Microsoft Corporation's Windows® operating system software may be embodied in the computer system. For these system::, the microprocessor CPU should be at 32 or 64 bit processors, capable of clock speeds in the 100MHz or more. The microcomputer system may also consist of one or more I/O port means 62. A PC Card interface 27 may be embodied for bus expansion, extended memory or other added circuitry having access to the main bus 60. A mass memory device 42 may be embodied in the system, which typically is a magnetic disk memory hard drive. Many devices may be connected to the computer system, including a smart card interface 46 and keyboard 16. A touch panel and pen input means 7 may be embodied in the system; which may be separate or integrated. Examples of such touch pen devices are available from Elo Touch Systems Inc. in Oak Ridge, Tenn., MicroTouch Systems Inc. in Methuen, Mass., and Carroll Touch Corp. in Round Rock, Tex. Pen and touch panel combinations means are available from Scriptel Corp. in Columbus, Ohio for the tablet, and Symbiosis Logic in Colorado Springs for an IC controller. Other pen and touch devices are available from Phillips Semiconductor, Sunnyvale Calif. Other more traditional cursor control devices 56 may be embodied, such as a mouse, trackball, touch pad, or force transducer. Preferably, most of these components should be sufficiently small as to fit into relatively thin display assembly 2.

The flat display panel device 2 is be interfaced to the system bus 60 through display controller circuitry 44. Preferably, the display controller should be capable of VGA or SVGA display formats. Integrated into the display controller may be a BitBlt engine (to accelerate graphics), RAMDAC memory, clock synthesizer and display frame buffer. A digital signal processing (DSP) co-processor 48 may be embodied. The DSP may accept data from many sources including a microphone 36 and video data source 43. The DSP or microprocessor may output signals to one or more audio speakers, as shown as 10A and 10B. Video data may be in either analog or digital form. Microphone 36, and speaker(s) may be embodied in the handset or earset of the previous figures. Video data may be pre-processed by a the DSP. Video sources may include output from video cameras. VCR, broadcast TV, satellite TV or cable TV.

External communication means 54 may be connected to the bus, which may be capable of fast two way data transfers. The communications means 54 should be capable of controlling communications to and from a plurality of wire and wireless communication systems. These include wire based telephone means 53 and wireless communication means 51. The system may include an antenna means 32 for transmitting and receiving electromagnetic radiated signals. External communication means may be connected to one or more information or communication service providers. These service providers may include telephone services (RBOCs, LEC), on-line computer networks, Internet service providers, cable MSOs and/or long distance telephone firms. They also may include cable TV companies, satellite TV service, and LAN/WAN communication network providers. The external I/O port means 62 may be connected to a Universal Serial Bus (USB) and/or an IEEE 1394 (Firewire®) type I/O bus.

FIG. 8 presents a typical flow diagram of computer programs executing in the system of the embodiments disclosed herein. After a power-on action 60, the system may enter a standby power on mode 62. A power management program 66 may then be execute followed by a self diagnostic routine 68 that tests the major hardware and firmware elements of the system. If the test fails, a failure report 66 may be generated and either displayed or stored. If the test

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passes, the operating system (OS) 70 may be loaded and executed. With the OS loaded successfully, the system waits for incoming data and/or voice calls 72. The system may automatically enter a default system mode, or the user can select one or more computer or communication modes 76. The user has the option of selecting several operating modes, which may include a conventional computing mode 78, a wireless data communications mode 80, and a wireless voice communications mode 82. A conventional computing mode includes typical PC computing or PDA computing. While in any of the above modes, base unit to external communications operations 79 may be controlled, which includes data/voice wire and wireless options. Control code 81 may control the bidirectional handset or earset to base unit communications operations. These operations may execute roughly simultaneously or on a time shared bases, as indicated by connection 83. Under program control, either the wireless handset or the earset may communicate data first between the base unit, then the base unit may relay the data to/from the external communications network. The above communications may involve two way or bidirectional communications, including many types of data (including text, voice, graphics, video and/or images).

Many types of computer application programs may be executed by the computer system. For example, one or more telephony programs 84, office/personal productivity programs 86, electronic mail or voice mail 88, and Internet/Web browsing programs 90 may be used. Other PDA, PC or workstation programs may also be executed. One or more programs (algorithms or routines) 96 may be used to control this multiple program or system modes; this may include program coordination, scheduling and execution. Programs to control the mobile communications relay functions 98 may be embodied. Users may have the option to exit the application programs 100. Typically, after the applications have been closed, the user may exit the operating system 102. After the system exits the OS, the system may still may be in a standby power mode 104, in which the system can answer and process incoming calls, plus service other requests for other processing tasks. Users may have the option of turning off (or removing) all power to the unit 106.

It should be further understood that, although a preferred embodiment of the invention has been illustrated and described herein. Changes and modifications can be made in the described arrangements without departing from the scope of the appended claims. Other embodiments, additions, and improvements will be obvious to those with an ordinary skill in the relevant art.

I claim:

1. A method for handset unit communication comprising the following steps in any order:

- a) transmitting first data via wireless communication to a local area communication base unit a relatively short distance away;
- b) receiving second data via wireless communication from the local area communication base unit a relatively short distance away;
- c) using said handset unit to communicate, selectively, the first and second data to and from the local area communication base unit and to communicate third and fourth data to and from an external wide area network, wherein the communication of the first, second, third and fourth data are not necessarily performed simultaneously, and wherein the transmit power level of the handset unit when transmitting to the local area communication base unit is lower than when transmitting to the external wide area network; and
- d) wherein the first and second data include data formatted for computer e-mail.

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2. The method for handset unit communication as recited in claim 1, wherein said handset unit is configured to a personal digital assistant (PDA) having PDA functions in addition to handset unit communication functions.

3. The method for handset unit communication as recited in claim 1, wherein said handset unit is a cellular telephone unit.

4. The method for handset unit communication recited in claim 1, wherein the handset communicates with multiple handset units or earset units.

5. The method for handset unit communication as recited in claim 1, wherein said handset unit is adapted to access the Internet.

6. The method for handset unit communication as recited in claim 1, wherein said handset unit is configured to function as a hands free speakerphone, wherein a user has an option to speak toward a microphone located on the handset unit, wherein the distance from the user's mouth is substantially larger than a conventional telephone handset.

7. A method for handset unit communication comprising the following steps in any order:

- a) directly communicating bi-directional wireless voice and computer data including wireless data networking communicating data selectively to and from a local area base unit and an external wide area network;
- b) transmitting a first wireless radio frequency (RF) signal comprising said data selectively to said local area base unit and to the external wide area network, wherein the data is not necessarily transmitted simultaneously to the local area base unit and to the external wide area network and wherein the first wireless RF signal transmit power level transmitted to the local area base unit is lower than the power level required to transmit the signal to the external wide area network;
- c) receiving a second wireless RF signal comprising said data from said local area base unit; and
- d) wherein said handset unit data includes data formatted for e-mail.

8. The method for handset unit communication as recited in claim 7, wherein said handset unit is configured to data networking functions communicating with one or more handset units forming a local area network.

9. The method for handset unit communication as recited in claim 7, wherein the handset unit is configured to communicate with said external wide area network, wherein the external wide area network is substantially the Internet.

10. The method for handset unit communication as recited in claim 7, wherein said handset unit communicates with an earset unit.

11. The method for handset unit communication as recited in claim 7, wherein said handset unit is a wireless cellular telephone unit.

12. The method for handset unit communication as recited in claim 7, wherein said handset unit is configured to send and receive e-mail via said external wide area network.

13. The method for handset unit communication as recited in claim 7, wherein said handset unit is configured to communicate voice and audio information.

14. The method for handset unit communication as recited in claim 1, wherein the wireless voice and computer data is relayed to the external wide area network by the local area base unit.

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(12) **United States Patent**
Ditzik

(10) **Patent No.:** **US 7,509,142 B2**
(45) **Date of Patent:** **Mar. 24, 2009**

(54) **NOTEBOOK COMPUTER WITH
REPLACEABLE BATTERY UNIT**

(76) **Inventor:** **Richard Joseph Ditzik**, 307 Surrey Dr.,
Bonita, CA (US) 91902

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8, 1999, which is a division of application No. 08/832,
923, filed on Apr. 4, 1997, now Pat. No. 5,983,073.

(51) **Int. Cl.**
H04M 1/00 (2006.01)

(52) **U.S. Cl.** 455/557; 455/556.1

(58) **Field of Classification Search** 455/556.1,
455/557, 572, 90.3; 345/168, 169, 901, 905;
364/708.1; 361/380, 391, 392, 393, 395,
361/680, 683, 394; 429/97

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,096,577 A * 6/1978 Ferber et al. 708/190
4,903,222 A 2/1990 Carter et al.
5,132,876 A * 7/1992 Ma 361/680
5,200,913 A 4/1993 Hawkins et al.

5,225,293 A 7/1993 Mitchell et al.
5,400,055 A * 3/1995 Ma et al. 345/168
5,594,617 A 1/1997 Foster et al.
5,596,482 A 1/1997 Horikoshi
5,677,827 A * 10/1997 Yoshioka et al. 361/683
5,716,730 A * 2/1998 Deguchi 429/97
2002/0030969 A1 * 3/2002 Foster et al. 361/683

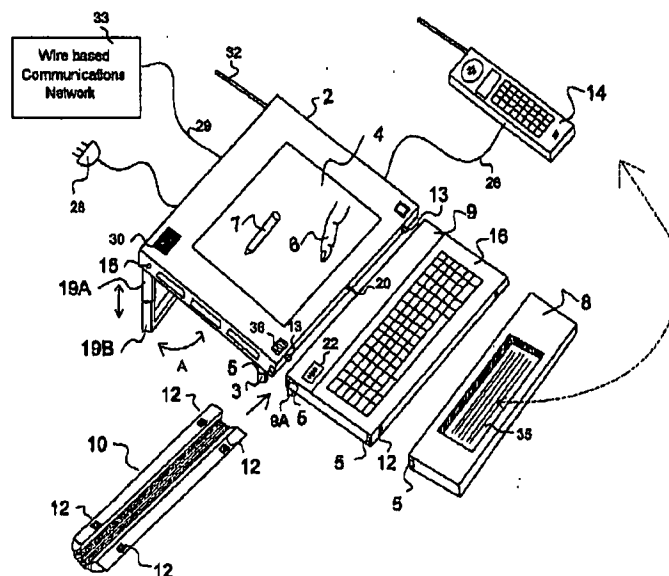
* cited by examiner

Primary Examiner—Sam Bhattacharya

(57) **ABSTRACT**

A small light weight modular microcomputer based computer and communications systems, designed for both portability and desktop uses. The systems make use of a relative large flat panel display device assembly (2), an expandable hinge device (10), battery power source (9), keyboard assembly (16), and wireless communications devices (32, 51). The systems are capable of bi-directional realtime communications of voice, audio, text, graphics and video data. Both wire-based or wireless communications methods and devices are implemented. Wireless communications devices may include one or more telephone-like handsets (14) and/or earset (34). The wireless communication devices may include one or more antennae (32). Systems can be configured in a portable arrangement similar to conventional personal computers, but can be quickly and easily disassembled and re-assembled for office desktop uses. Systems may consist of a base computer unit (100) comprising wireless communication devices may act as a relay station relaying voice and other data between the handset or earset and external wide area communications networks. The system may be capable of performing, personal digital assistant (PDA), cellular telephone, conventional notebook computer, desktop computer functions.

8 Claims, 9 Drawing Sheets



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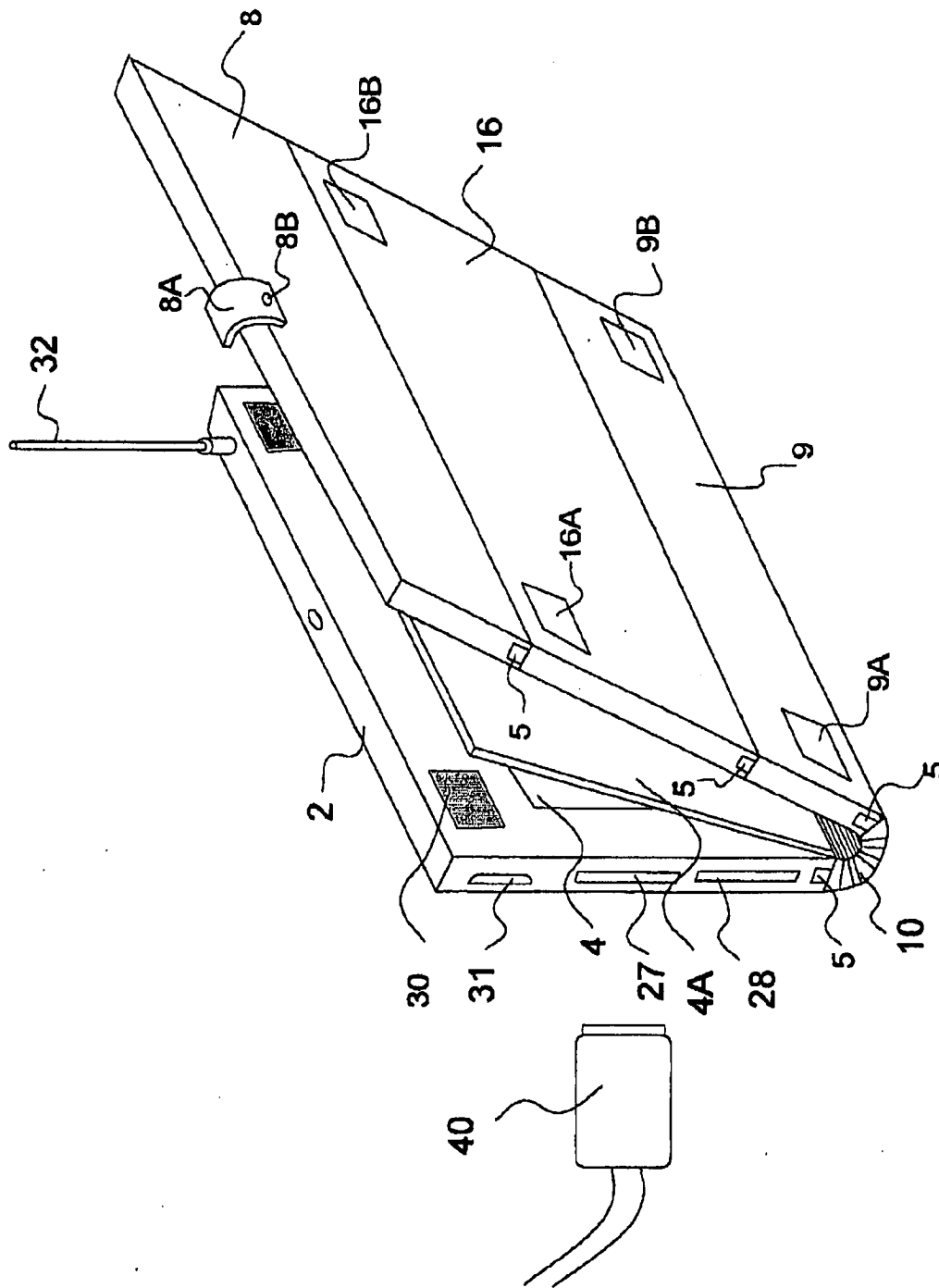
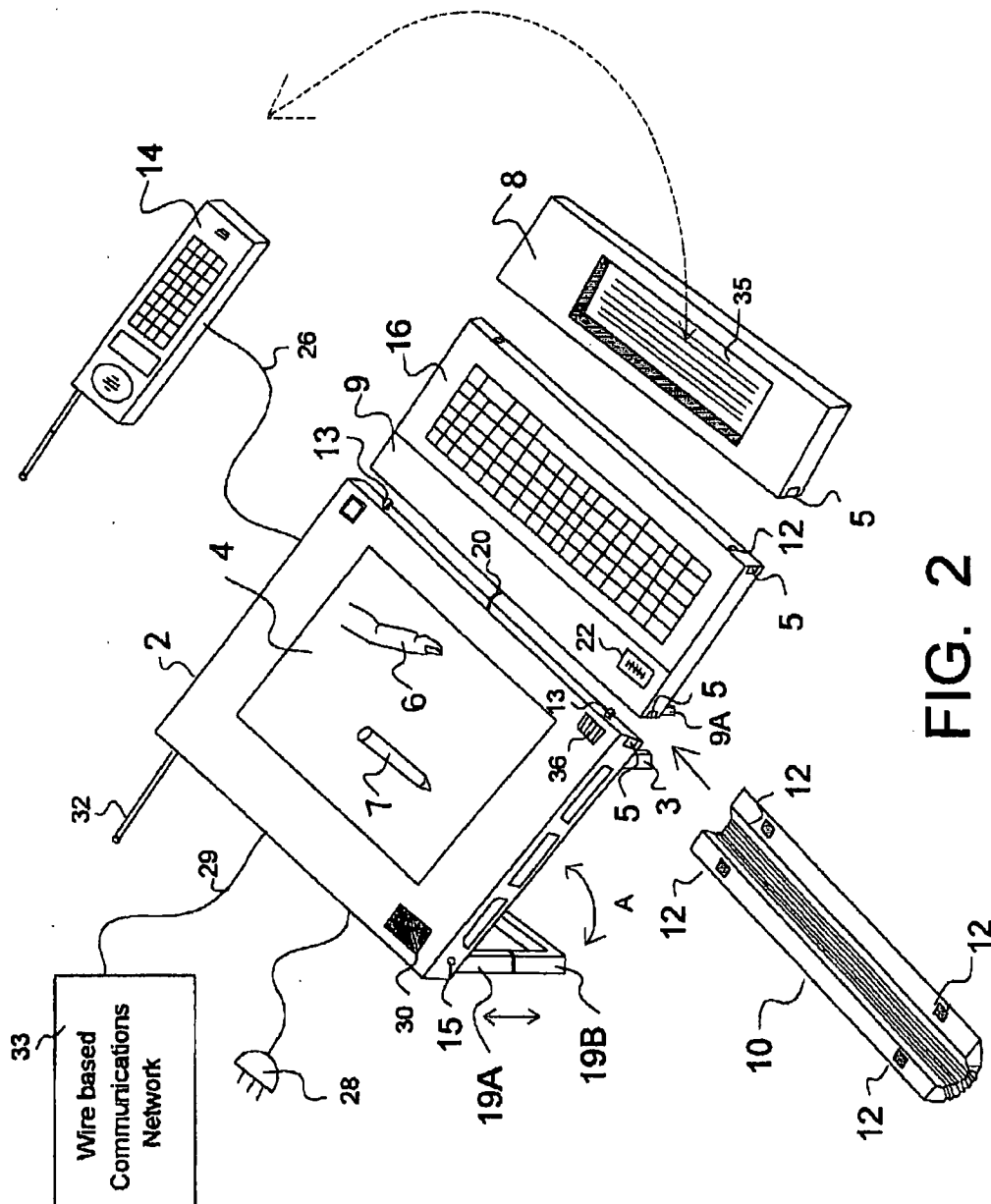


FIG. 1



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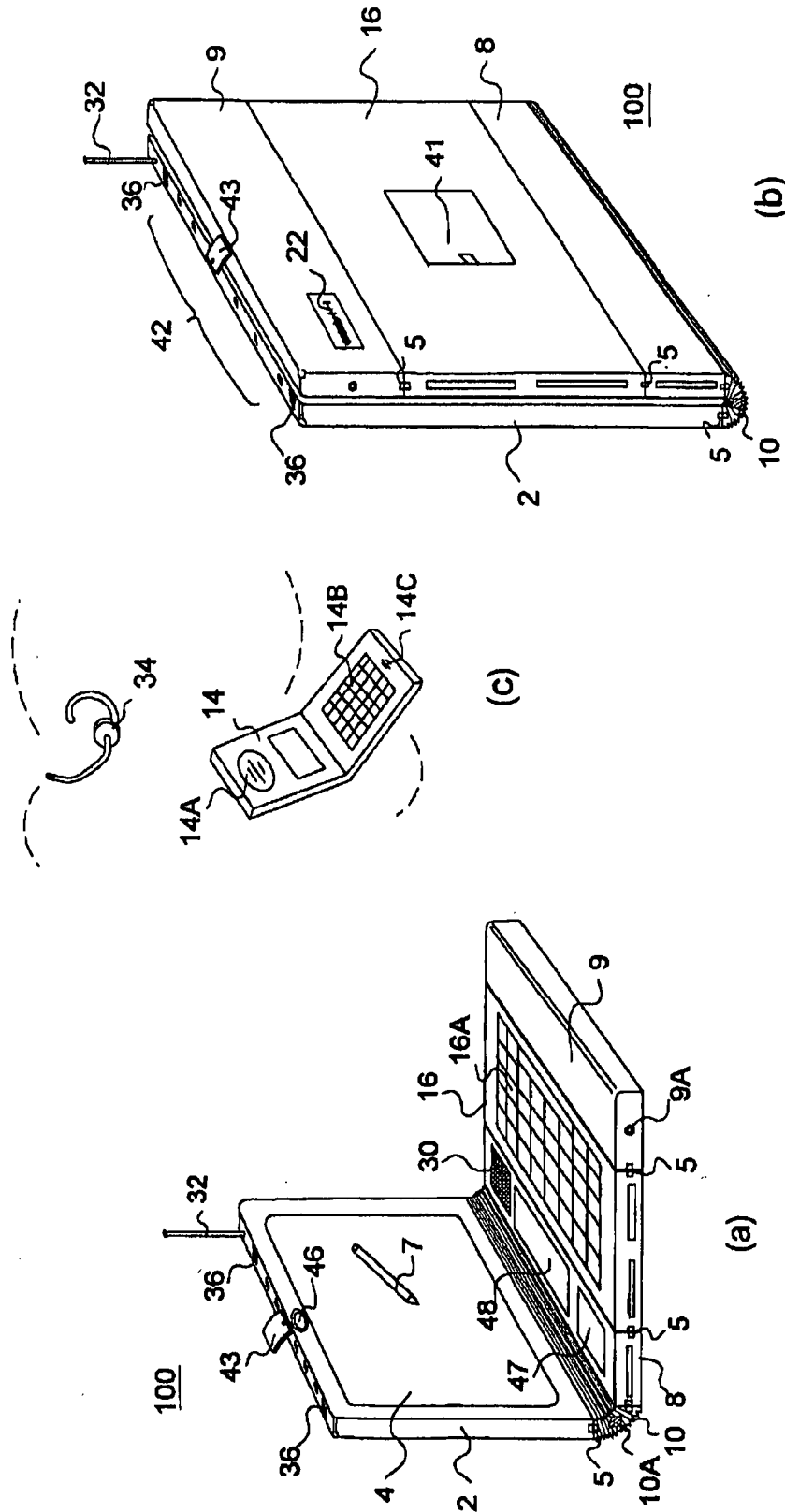


Fig. 3

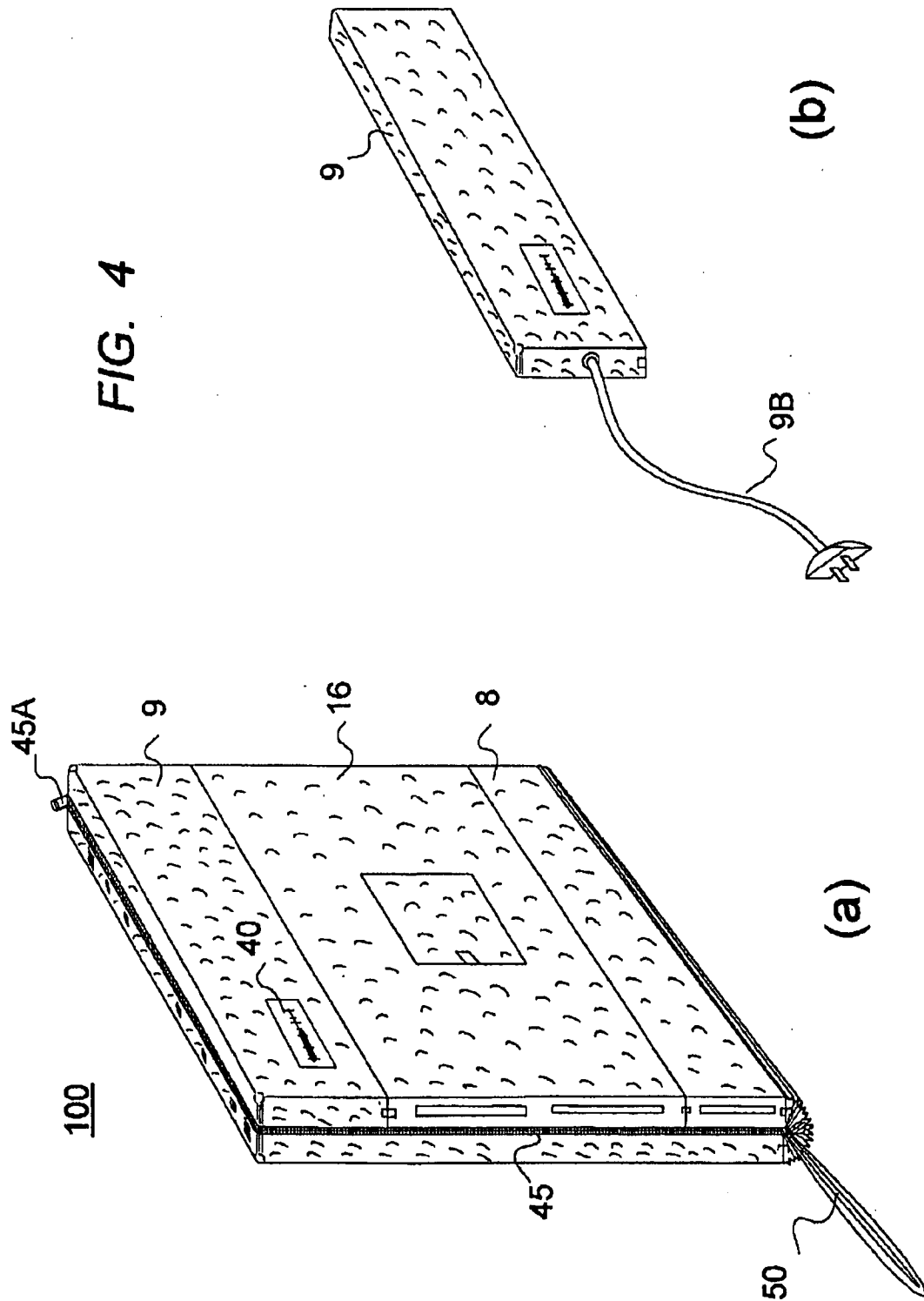
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FIG. 4



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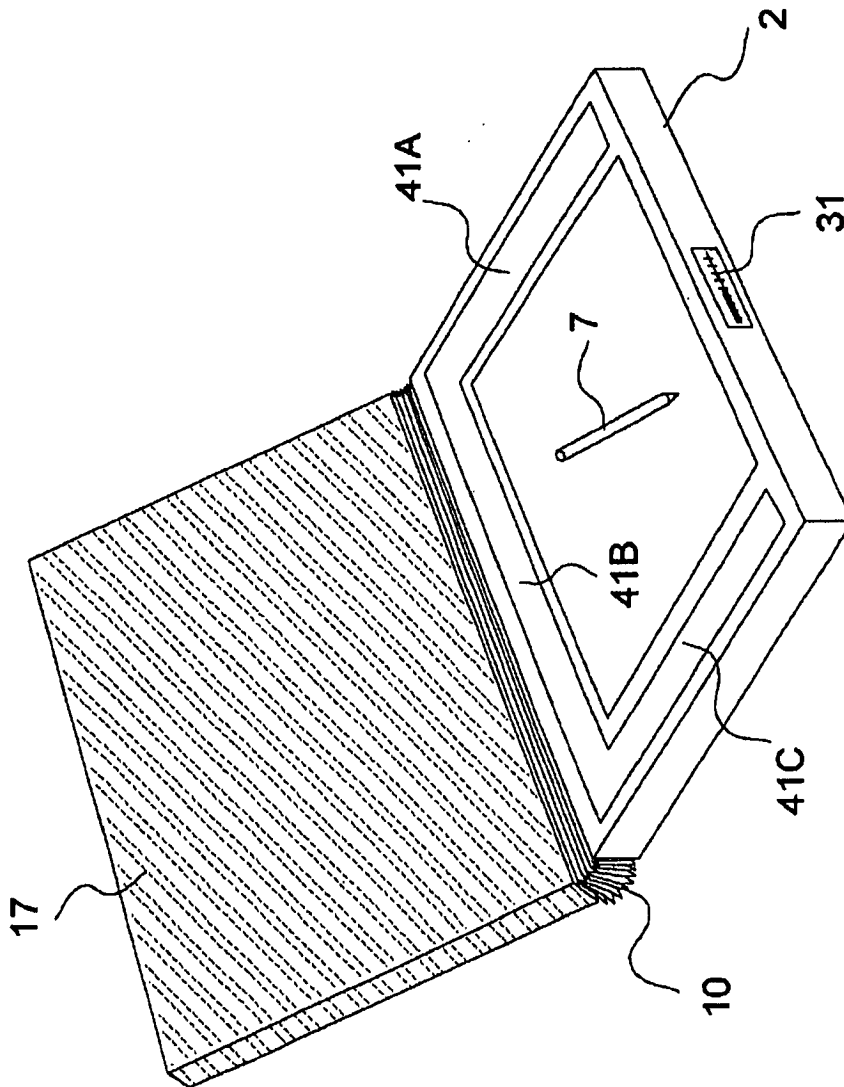


FIG. 5

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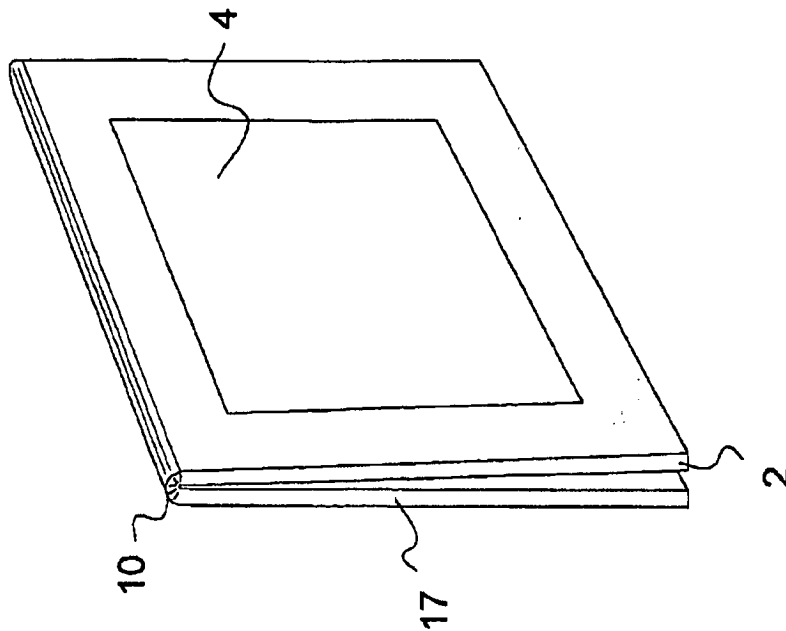


FIG. 6B

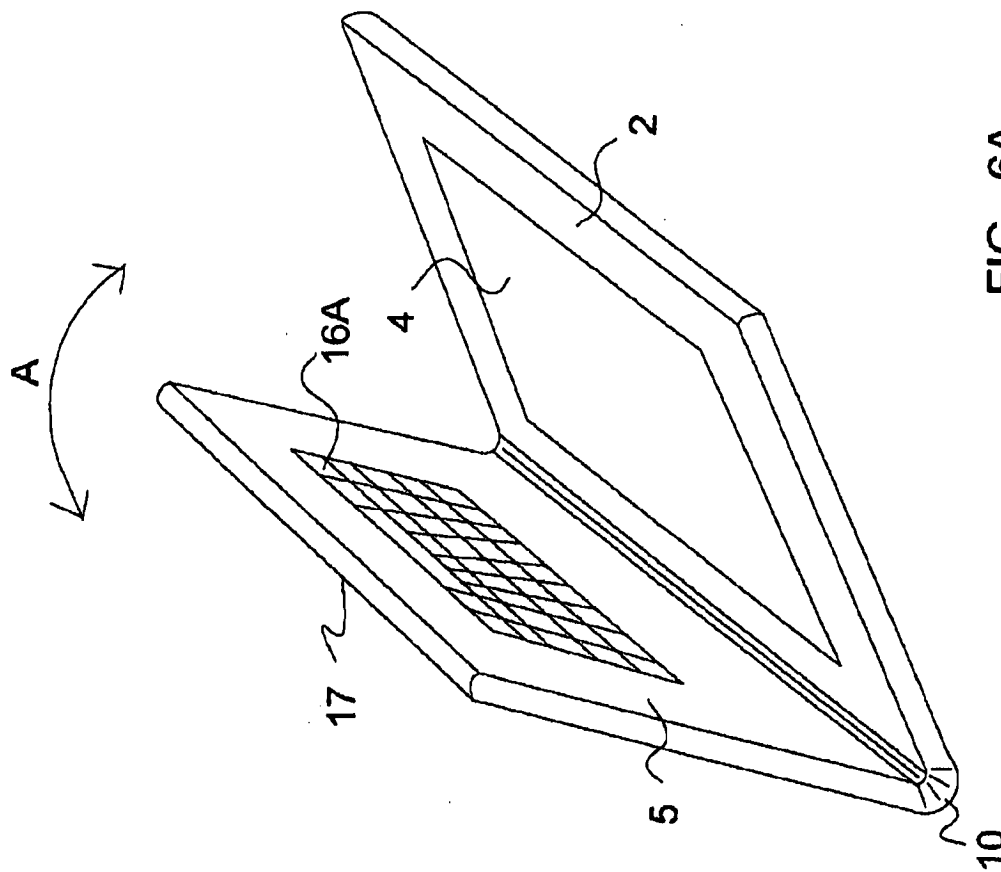


FIG. 6A

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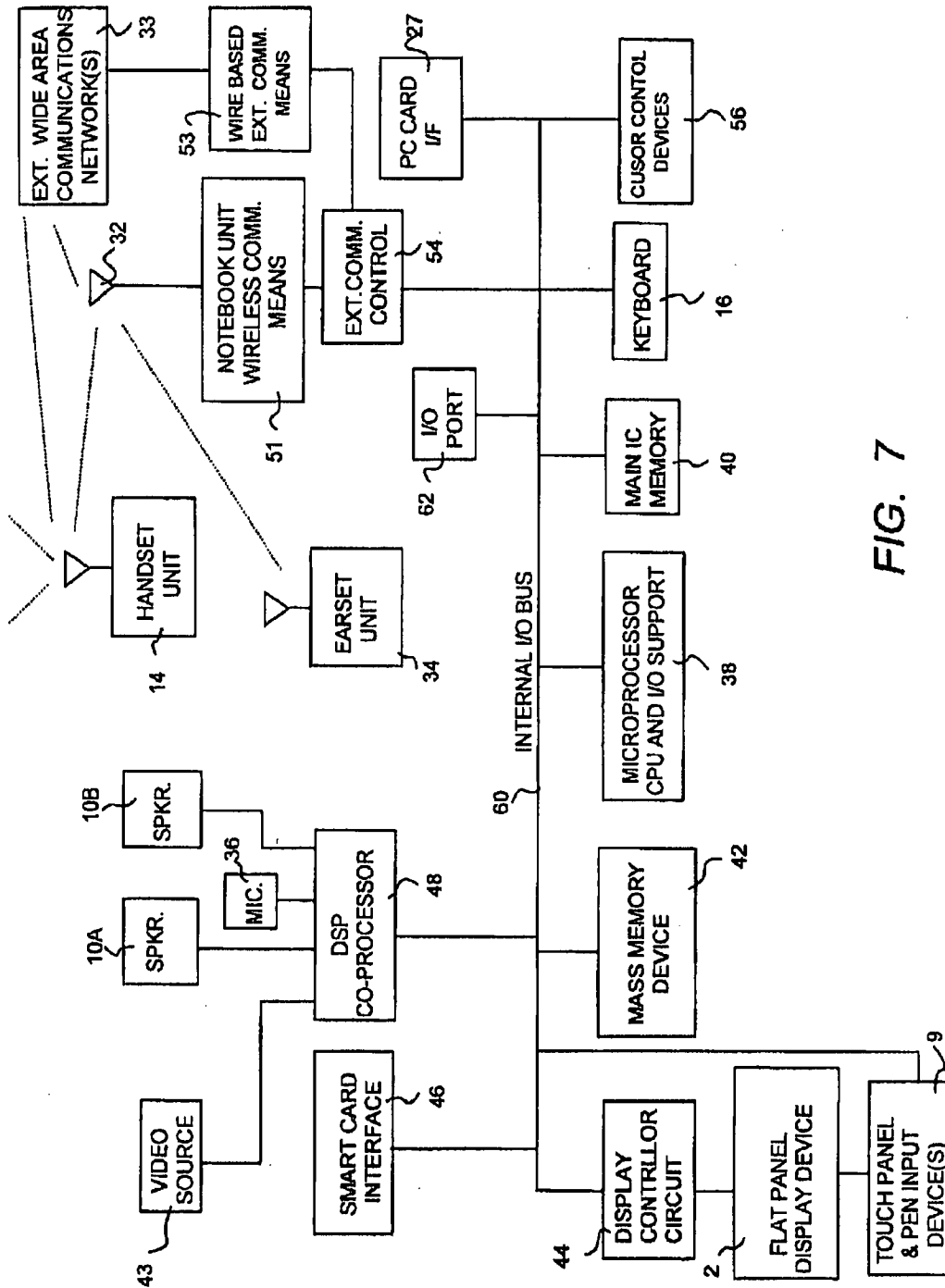


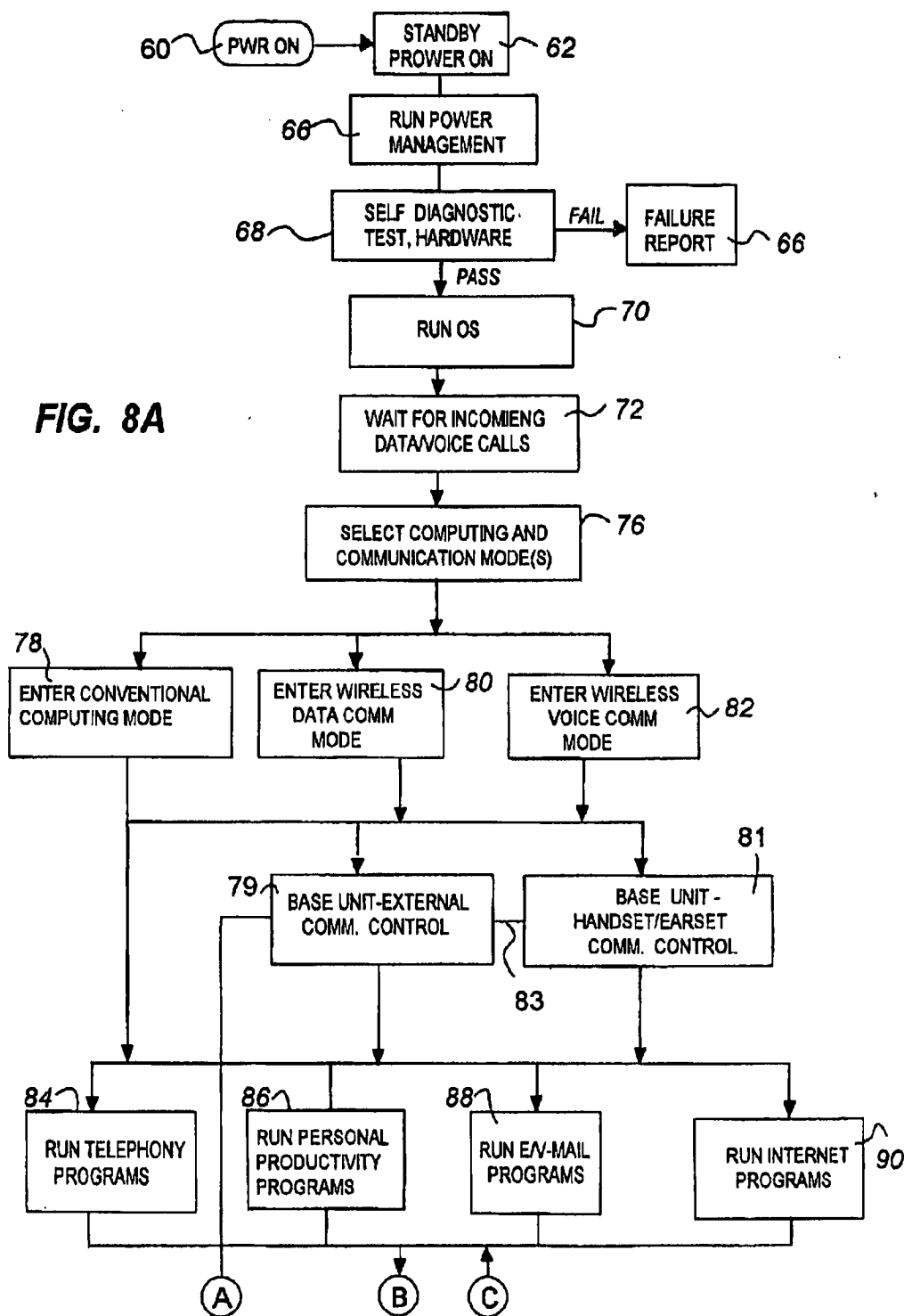
FIG. 7

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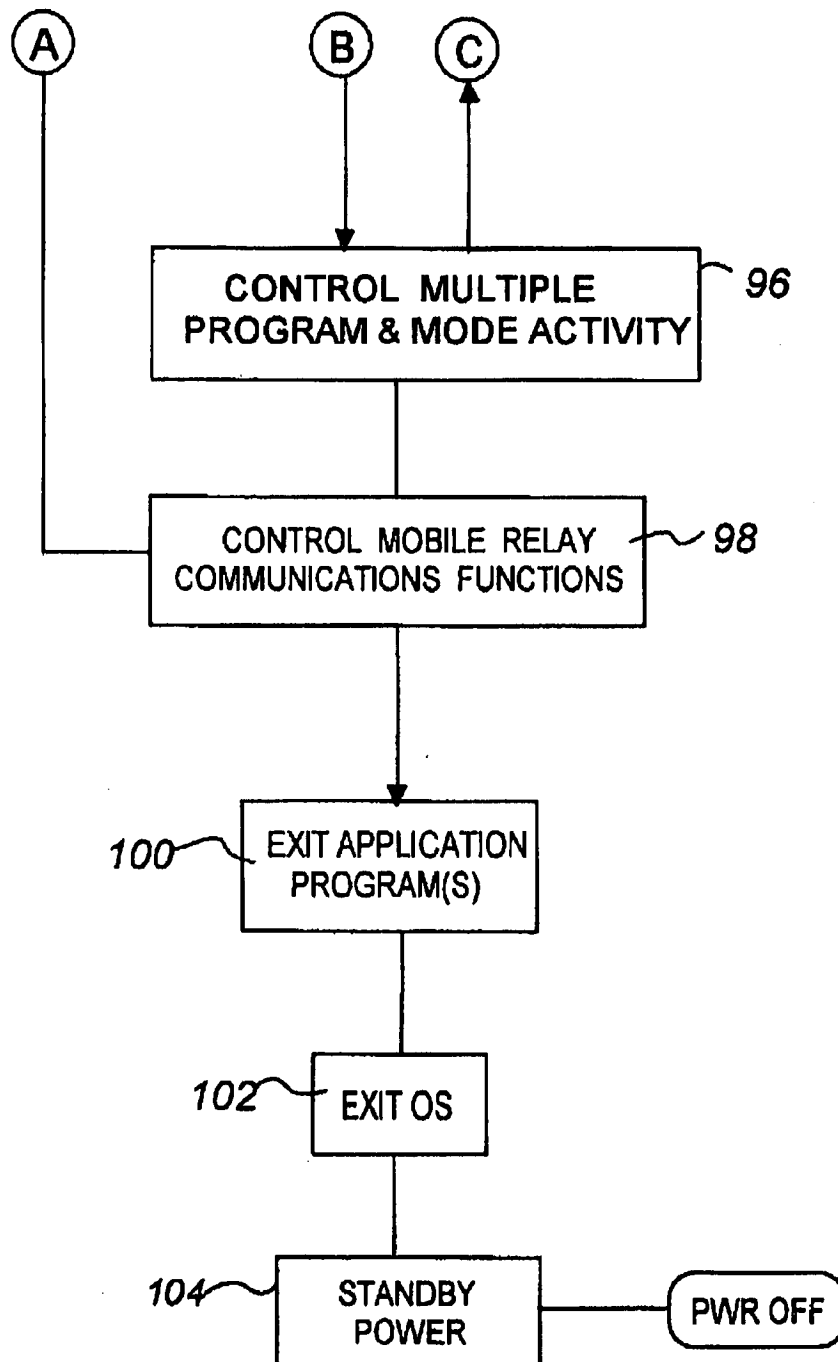


FIG. 8B

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**NOTEBOOK COMPUTER WITH
REPLACEABLE BATTERY UNIT****RELATED APPLICATION**

The present application is divisional application of U.S. patent application Ser. No. 09/391,966, filed Sep. 8, 1999 which was a divisional application of U.S. patent application Ser. No. 08/832,923 filed Apr. 4, 1997 that issued as U.S. Pat. No. 5,983,073. Each of the related applications is incorporated by reference in its entirety.

BACKGROUND OF THE INVENTION**1. Field of the Invention**

This invention relates to portable personal computer systems with external communication means, which can be used by an individual in both desktop and mobile environments. The computer system involves a relatively large color flat panel display, conventional microcomputer system, and a plurality of human interface means. In particular, it relates to a computer unit, having a light weight thin notebook-like computer structure that is capable of performing personal digital assistants (PDA) like functions and wireless external communications of voice, text, graphic and image data.

2. Description of Prior Art

There are several shortcomings with prior art notebook computers, PDAs and wireless telephone units. Notebook computers have a relatively large flat panel display device, a full alphanumeric keyboard and battery power. PDAs are small handheld units with a small LCD display, small key pad and touch pen. PDAs are designed to be placed in one's pocket or purse for maximum portability. A problem arises when customers desire large high resolution color display for both portable and desktop applications. To use a computer system for both portable and desktop uses, the customer must purchase multiple systems. The cost of color flat panels are still too expensive for most customers to by two display monitors, one display for desktop and one for the portable applications. Many customers require functionality of a desktop computer, notebook computer and PDA, but it is much too expensive to purchase multiple CPUs, displays, and keyboards.

U.S. Pat. No. 5,189,632 of Paajanen et al disclosed a hand held computer unit with an antenna and wireless RF communication capability, small flat panel display and a keyboard, in a partial clam shell type structure. However, they do not teach expandable hinge means, base station for handset relay functions, or cover latching function. U.S. Pat. No. 5,327,486 of Wolff et al teach a conventional laptop computer with antenna and RF communications to a radio network and local exchange telephone network. However, they fail to teach expandable hinge means, edge hinge means, handset means or base station relay functions. U.S. Pat. No. 5,459,458 of Richardson et al teach a virtual pager and data terminal system. However, they do not teach notebook like computers, base unit station or personal/PDA computing. U.S. Pat. No. 5,008,927 of Weiss et al teach a computer and telephone system with a display screen on a conventional telephone structure keyboard unit. However they fail to teach notebook like structure, wireless communication or handset relay functions. U.S. Pat. No. 5,196,993 of Herron et al teach a laptop computer with a removable flat panel display with built-in support feet for desktop support. However, they fail to teach expandable hinge means, exterior communications functions, cover latching functions or computer display assembly. U.S. Pat. No. 5,200,913 of Hawkins et al teach a laptop computer

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with flat panel display and pen input means. However, they fail to teach expandable hinge means, edge mounted hinge or latching functions.

Wireless hand held computer devices, such as cellular and Personal Communication System (PCS) telephones, have limited display capabilities. Prior art wireless computer units have display screens that are small (1.5-2.5" diameter), and they lack interactive capabilities to be successful for text, graphic and video applications. Some prior art notebook and laptop computers have integrated wireless communication means, but they are too large and bulky to be successful for in mobile uses. Prior art wireless devices do a poor job of providing voice, data and video communication functions. Typical wireless computer systems have display screens that are too small and have limited computing power. Prior art laptop and notebook computers are too heavy to carry for long periods. Inventions herein solve these problems by embodying a unique relatively thin notebook-like computer system that is capable of: being: (1) opened like a notebook, (2) quickly disassembled and re-assembled, (3) used for handset/earset communications relay operations and (4) used in a wide variety of computing, collaboration, communications and conferencing applications.

Inventions described herein are based on several Disclosure Documents submitted to the U.S. Patent and Trademark Office, including Document Nos. 353691, 363753, 368165, and 377365. Inventions herein solve several prior art shortcomings, resulting in new modular integrated computer systems. The inventions as described below can be quickly configured to desktop, notebook, wireless and/or PDA embodiments. Thus, the user will be able to purchase a single computer system and pay much less money than conventional systems.

SUMMARY OF THE INVENTION

An object of this invention is to provide a modular multiple function display-computer system, where one can use the same relatively high resolution color flat panel display in both a desktop and mobile environments.

Another object of this invention is to provide means to reduce the cost to the customer of owning several expensive computer systems, by combining in one system the capability of performing both office desktop and portable/mobile computing and communications applications. Thus the invention herein saves the user the expense of purchasing separate computer systems for desktop uses, notebook computer uses, PCS uses and PDA uses.

Still another object of this invention involves means to quickly configure a modular notebook or PDA-like computer system into a plurality of system configurations for personal computer and wide area communication operations.

Another object of this invention is to provide for a relatively thin and light weight computer unit to be carried under one's arm in a notebook-like fashion, yet have sufficient computing power to execute a wide range of conventional computer and communications applications.

Still another object of this invention is to provide for bi-directional communication of voice, audio, text, graphics, image and/or video data to wide area communications networks where one or more users may communicate with other users with appropriate apparatus. The communication may realtime or store forward type communications.

Another object of this invention involves hardware and program software to control cellular or PCS communications, combined with a light weight mobile notebook or PDA like unit. The unit or system would act as a computing platform

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and base communications relay station. The system or unit may then relay voice and data to/from a handset unit or earset unit, where the base unit relays the this voice and data information to/from a wide area communication network.

Still another object of this invention involves means for quick disconnection or disassembly and subsequent connection or assembly of key component of the system, such as battery power unit, communication adapters (modems) and/or wireless telephone units.

A still further object of this invention is to use the same display-computer system assembly, comprising of relatively large high resolution color flat display panel and a powerful CPU with large memory, etc., and combining them in a modular fashion with a thin keyboard, battery power source, modem, and wireless communications means.

Another objective of this invention is to provide means for integrated telephony functions on a portable computing platform, with powerful microprocessors running Windows operating systems for a wide range of computing and communication functions.

A still further objective of this invention is to provide for full Internet access on a wireless mobile platform, where the user can access the world wide web and execute most of the available Internet browser functions and plug-ins. The computer system would be capable of performing most of the Internet data access, download, upload and conferencing functions

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a perspective view of a portable computer with a notebook clamshell-like structure.

FIG. 2 shows a perspective view of a modular portable computer system in desktop configuration.

FIG. 3(a) shows a notebook like portable computer in an open state.

FIG. 3(b) shows the notebook like computer in a closed state.

FIG. 3(c) shows a handset telephone unit and earset unit.

FIG. 4(a) shows a notebook or portable computer with a protective covering material.

FIG. 4(b) shows an electrical power source unit.

FIG. 5 shows a PDA like unit with a roughly transparent cover half.

FIG. 6(a) shows a notebook or PDA in a partial open state.

FIG. 6(b) shows the notebook or PDA in a reversed open state.

FIG. 7 shows block diagram of the computer system and associated elements.

FIGS. 8(a) and 8(b) shows a flow diagram of the computer system programs and operations.

DETAILED DESCRIPTION

FIG. 1 shows a computer system, to be operated by a person or user, where the unit has a conventional notebook clamshell-like structure. The computer system as used herein can also be referred to as a portable computer system, computer-display unit or base unit, and shall also include the terms: personal computer, notebook computer, sub-notebook computer or Personal Digital Assistant (PDA). The computer system as disclosed herein typically comprises of a flat panel display assembly 2, which includes a display panel and screen 4 and other components described below. An expandable hinge means 10 connects the flat panel display assembly and cover assembly (8, 9 and 16). Expandable hinge means 10 may be embodied many ways including using flexible mate-

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rial that is corrugated, having its groves running parallel to the edge of the notebook structure. Cover assembly may consist of two or more sections, such as a first cover section 8, second cover section 9, and a keyboard section 16. One or more of the cover sections may be quickly disassembled from each other by the user. To avoid accidental disassembly, means may be embodied where the user must simultaneously press two push buttons 5, for example one on each side of the structure, in order to disconnect the sections. The portable computer system may also have an inside protective sheet member 4A attached to the inside the fold of the computer system. FIG. 1 shows a partially open notebook-like structure, but it may be closed all the way shut and secured, by a securing strap means 8A. This strap means may be secured to the other side of the display assembly 2 by Velcro like strips, for temporary securing and un-securing, with one's fingers. One purpose of this foldable embodiment is to provide the computer user with a handy portable notebook computer that: (1) when closed, one can easily carry, cradled in one hand under one's arm, and (2) easily opened for access to the computer indicators and controls.

The flat panel display assembly 2 may be a monochrome or color liquid crystal displays (LCD), such as those manufactured by Sharp Electronics, NEC Electronics, Toshiba Corporation or others. The display panels screen sizes may be 10 to 14 inches or more in diameter. The display pixel arrays may be 640 by 480 (VGA), 800 by 600 (SVGA), or 1024 by 768 (XGA). Color depth should be six bits, and the response time should be 45 to 50 milliseconds ($t_{on} + t_{off}$). Brightness of the screen should 70 Cd/m² and contrast ratio be at least 100:1, where 250:1 is preferred.

LCD panels from Sharp Electronics may be used in the embodiments. Applicable LCD Models include LQ11DS01, LQ12DS01, LQ12DX01 and LQ12X12. These panels have screen sizes of either 11.3 or 12.1 inches measure along their diagonal. Each panel is capable of a color depth of 6 bits/sub-pixel, a response time of 80 ms, brightness of 70-150 cd/m² and a contrast ratio of 100:1. LCD panels from NEC may also be used, such as NL10276BC24-04, NL8060BC31-02, NL8060BC31-01, and NL8060BC29-01. These panels are capable of 6 bit color depth, 50 ms response time, 70 cd/m² brightness and 150:1 contrast. Toshiba panels that may be embodied include: LTM11C016, LTM12C236, or LTM12C25S, which are capable of 50 ms response, 70 cd/m² brightness and 100:1 contrast. Manufacturers' references and manuals for each are hereby incorporated by reference.

Several I/O slots and/or connectors may be embodied at one or more edges of the flat panel display assembly 2. FIG. 1 shows access slots to a floppy disk 28, external communication means 27, printer connector 31. Other external connection means may be embodied. Several connector means may be embodied, including auxiliary video connector, COM ports, and/or mouse/game ports. PCMCIA PC card 40 may be included for adding fax/modem, network interface (wire or wireless) external communications and/or added memory. An integrated built-in transmitter receiver and a retractable antenna 32 may be embodied, for example to the flat panel display assembly 2. The antenna and associated RF transceiver may be used for wireless communications to/from an external communication network. Many of the well-known notebook computer or personal computer I/O devices may be embodied.

An important feature of this embodiment is the dimensions of the computer-display unit. It may be made conveniently larger than a 8.5x11 inch sheet of paper, so that one can place one or more sheets of paper (or other relatively thin flat objects) inside the closed clamshell like notebook structure in

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a folding or latching fashion. The user can safely carry papers from location to location without folding or wrinkling them. Thus the unit can act as a carrying device as well as a notebook computer. The outside surfaces and edges of notebook computer may be covered with leather, vinyl or other type of soft material, for easy of hand carrying and surface protection. Other parts may be embodied including foldable short legs 9A and 9B, keyboard resting pads 16A and 16B, built-in audio speaker(s) 30.

FIG. 2 shows the portable computer with several parts detached or disassembled. This embodiment may be used in desktop computer system environments. The flat panel display assembly 2 may be placed at an inclined angle, with foldable leg support means 19A and 19B. The leg support means may fold relatively flush to the backside of the assembly 2 (motion range A) when not in use, via a simple hinge 15. Vertical portions 19A and 19B may slide in and out, in a telescoping type arrangement, to allow wide range inclination angles. A pair of short legs 3 may be placed near the front of assembly 2 that may also fold relatively flush with the back of the assembly. Means may be included to place the screen at a vertical orientation. A pen or stylus input means may be associated with the display screen 4. The pen or stylus means may include finger input (touch panel) means, where one can write or point to area on the display screen. The expandable hinge means 10 may be removed from the assembly 2 and from the cover section 9 by a quick disconnect or disassembly means 5. Alternatively, the hinge means may be fixed to parts 2 and 9. The hinge means may be made of a relatively flexible material, such as leather and vinyl. It may be corrugated as shown in the figure so it can bend easily and expand, as required. The hinge may have a number of attachment slots 12 for the quick dis-attachment or disconnection from hook mechanisms 13. FIG. 2 shows the flexible hinge means 10 removed from the other assemblies.

Cover section 9 may contain a battery power unit containing one or more batteries and power circuit elements. The battery power unit may be embodied with several types of batteries, including Lithium-ion or NiCd batteries. The power unit may be a self contained battery package, having an easy to read charge indicator 22 that indicates the state of the battery's electrical charge. Because all batteries have a limited useful charge life, the package may be easily and quickly disconnected from the keyboard section 16 and replaced with another battery package. Spare battery packages and other spare parts could be carried in a separate traveling case (not shown). The keyboard section 16 may have a full size QWERTY keyboard with movable tactile keys. An electrical cable 20 may connect the keyboard to the computer-display assembly 2. Although short cable is shown, it may be a long cable or a flexible cable, so that the keyboard may be moved about if desired. Alternatively, a wireless electromagnetic link may be embodied such as infrared (IR) or RF links, which would replace electrical cables 20 and 26. The cover section 8 may contain a wireless handset 14, such as a cellular telephone transceiver. The handset may have retractable antenna, small speaker, keypad, built-in microphone and a battery source. This handset 14 may be capable of analog or digital cellular operation, including AMPS, TDMA, CDMA, PCS, CDPD, or equivalent types for communicating with wide area wireless communication networks. The wireless unit 14 can be easily removed from a cutout or recess area 35 in the cover section 8. The recess area is made slightly larger than the outside dimensions of the handset 14, so it can fit inside the recess with a relatively snug fit. It is important the handset be easily and quickly removed and replaced in the

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base unit. Alternatively, cover section 8 consist of the handset itself, so that a separate cover section with recess would not be required.

The portable computer system's flexible hinge and the cover sections should be made relatively thin so that when the two halves are folded (rotated) closed, it will not be too thick or heavy to carry with one hand. As shown in FIG. 1, legs 3, 5, 19A and 19B may be folded roughly flush with outside surfaces of the unit. The number cover sections are not limited to three. The cellular handset is shown in FIG. 2 may be connected to the computer system by an optional electrical cable 26. A RF transceiver in the wireless telephone would serve as the transceiver for the computer as well. This embodiment might be desirable to reduce the overall cost of the system. However, a wireless RF transceiver and modem may be located in the flat display panel assembly 2 for voice or data communications. An antenna may be embodied on the display assembly 2, with a retractable antenna 32. The display assembly may include the computer system located within the assembly housing. The advantage of this later embodiment is that the telephone 14 and computer system could be operated independently.

The portable computer system may also have means for connection to a non-battery power source, as shown in FIG. 2, via a standard power line cord and plug 28. The system may also have means for connection to an external wire based wide area communications network 33, via cable 29. The wire based wide area network may include one or more telephone networks, cable TV networks and/or computer LAN/WANs. Telephone networks may include POTS, ISDN, ATM or other equivalent types. Several computer interface connection means may be embodied, for example interface slots/connectors as shown (27, 31, and 38). These interfaces might include R/S 232, USB, IEEE 1394, PCMCIA, or other computer I/O (serial or parallel) connections. Useful connections may include a bus extender connection, so that the notebook computer can be interfaced to another more powerful computer. For portability reasons, it is desirable that the modem or digital terminal adapter be built into the computer system unit. Some means for software loading should be included such as a floppy disk or smart card. Internal mass memory of the computer system could include ROM, flash memory, or other memory means. Means for accepting PCMCIA cards, ROM cards or other types of memory card may be implemented. Preferably, the system may be embodied with a very small light weight and low power mini hard disk. One or more IR communications interfaces may also be implemented.

Other capabilities such as FAX send/receive, speech recognition, voice processing voice mail, telephony, and E-mail functions may be implemented in the computer system. A built-in microphone 36 and speaker 30 may be embodied to support speech input/output and multimedia functions. Preferably the display should be capable of full color with a wide viewing angle. If the display is back lit, the user should be allowed to switch the backlight "on", "off" and to a multiplicity of levels in between. The operating system of the notebook/PDA should be a GUI type such as Windows™ 3.1/95, Windows CE™, MagicCap or another suitable GUI based computer operating system. The system should can be designed to support wide range of communication connectivity and software compatibility.

FIGS. 3a and 3a show another embodiment of the invention having a base unit or notebook computer system 100, a handset unit 14 and a earset 34. This embodiment shows a relatively thin flat display panel assembly 2 having a display screen 4. The system may also include a pen and/or finger input means 7. The base unit has an expandable hinge means

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10 physically connecting the display assembly to the other half of the base computer unit. The other half can be comprised of several sub-assemblies including a battery power source section 9, keyboard assembly 16 and an electronics housing section 8. The keyboard assembly contains a keyboard unit 16A, which may contain a full-size QWERTY keyboard unit. The housing section 8 may include a wireless modem or communications adapter means. The expandable hinge means 10 should have an easy access locking and unlocking means 10A, which can temporarily lock the rotation of the two halves at the user's desired angle. Electronic housing section 8 may be attached edge wise to the keyboard assembly 16 by a quick attach and release connection means. As shown in the figures, several assemblies can be disassembled by pressing one or more finger access tabs 5. Likewise, a battery source section 9 may be edgewise connected to the opposite edge of the keyboard, via similar quick attach and release connection mechanism having finger push tabs 5. The tabs may be located on each side of the assemblies for quick and easy, but safe, user disassembly. The connection means may include means for secure physical attachment and connection of electrical wires, located inside the subassemblies. Although the sections may be rigid, the attachment mechanisms may be somewhat flexible, elastic or pliable, so that the combination of assemblies can bend slightly.

Battery power source unit 9 may consist of one or more batteries with voltage regulation, AC/DC operation, power management circuits and charging circuitry. In a preferred embodiment the unit should be capable of accepting electrical charge from an AC line. A important feature embodiment of the invention is means for quickly interchanging an electrical power depleted battery power unit 9 with a freshly charged battery unit. This may be accomplished by a combination of finger push tabs 5, latches and hook means for quick disconnection and re-attachment. In one intended scenario a user may carry several spare battery packages in a separate briefcase. When the attached battery package is depleted, the user can quickly changed out the battery sections. The user can then plug the depleted battery package into an AC line for a built-in charging operation.

It is preferable that each of the major assemblies and sub-assemblies be made relatively thin for easy carrying. The expandable hinge means should be made somewhat flexible, elastic or pliable so that the user may place relatively thin flat objects inside the folded space of the notebook-like unit. These thin objects may include sheets of paper, cards, brochures, or similar relatively thin flat items. Linkages between the sections may be made somewhat yielding, pliable, elastic and/or stretchable. Although the display device may be ridged, the other half of the notebook may be embodied with thin flexible enclosures and other structural components. Also, the flat panel display device and assembly 2, 4 may be made flexible. Thin and flexible keyboards are known to those in the art. The other parts may be adapted to have thin and slightly flexible mechanical features. The two halves can be closed by hand and secured by a flap and snap means 43 or equivalent means. As discussed above, the expandable hinge means 10 may be made flexible and expandable by incorporating a multiplicity of small folds or other equivalent means. If the user places thin objects between the halves of the base unit, one or more sides could bulge out slightly, improving the physical object carrying capability of the notebook computer. This object carrying capability is an important feature for mobile users who may be carrying the notebook almost everywhere they go. The user may securely place and latch paper sheets, letters, memos, or other flat objects inside the notebook clam shell structure. A base unit hinge locking and

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unlocking means 10A may also be embodied, so that the user can quickly and easily temporarily lock the two halves of the unit to a rotationally fixed state (and later un-lock them).

FIG. 3(a) also shows several other elements including a small CCD video camera 46, built into the display assembly for video conferencing and other uses. One or more built-in audio microphones 36 may be embodied in the base unit. Preferably one microphone should be located on the edge of the notebook, as shown, so that the user may be in voice communications with other while the unit is closed. One or more audio speakers 30 may be built into the base unit. One or more compartments 47 and 48 may be embodied at convenient locations to store attachments for use with the mobile computer system. A telescoping antenna 32 may be embodied into the base unit as shown, or it may be built-in the unit and not exposed. Although the base unit 100 can be a self-contained unit, it may work with other optional attachments, such as a wireless cellular-like handset 14 or earset 34 as shown in FIG. 3(c). The handset 14 may operate roughly equivalent to conventional cellular telephone handsets with a built in power source, providing voice and/or data communications to wide area communications networks. The earset 34 has a small low power RF transceiver, audio microphone, audio speaker and small battery source, which is capable of fitting into the user's ear. The wireless earset unit may be used for hands free applications. The user may then walk around while communicating with the handset or earset. If one is using the earset he/she may also use a pen input means 7 or keyboard 16 while in audio communications. For semi-private voice communications, some users may prefer using the handset 14, with hand set speaker 14A, handset key pad 14B and handset microphone pickup 14C.

If one is using the handset or earset, the base computer unit 100 may be placed some distance away from the user, typically in the same room or nearby room. The base computer unit may be designed for a higher transmitting power level. The base unit may be designed to allow the user to switch between a high or low level transmitting and receiving power levels. The earset 34 or handset 14 can be designed for a much lower RF transmit and receiver electrical power levels, because the base computer unit 100 can be place a relatively short distance away (typically from a few feet to about fifty feet). Thus, the base unit 100 may relay RF communications between the handset or earset and an external wide area communications network. The base unit could safely embody a more powerful RF transmitter resulting in a larger signal to noise ratio. This will result in improved wireless communication to and from wide area networks that may have antennas several miles away. A very important advantage of this invention is that the user has the option of having very low electrical power electromagnetic fields near his/her's head, thus improving the health and safety aspects for the user. Since less power is required for the handset 14, it can be thinner and smaller than a standard cellular handset. Thus the handset can be smaller and easier to place in the user's pocket. The earset can be made very small so that the users can leave it in his/her's ear for long periods of time and have one's hands free for other uses.

FIG. 3(b) shows the base unit computer-display unit 100 in a closed configuration, in which one may carry it under one's arm. Since the unit is typically battery powered and contains electronics for a wireless voice and PCS like operations, one could use it for voice/data communications while carrying it about (i.e., in transport). The user may speak towards one or more microphones 36 located along the top edge. The user will be able to hear the other person(s) talking, through audio speakers 30 located conveniently on the base unit. A small

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telephone keypad could be located behind a protective door 41, for convenient dialing of a telephone number. The door may be a simple sliding door device or mechanism. The antenna 32 may be a sliding telescoping type. A simple display indicator 22 may show the electrical charge state of the battery source. A plurality of switches and indicators 46 may be located along one edge of the base unit for easy viewing and access. Such switches and indicators may include: an On-Off switch, Mode Switch (for voice, data, and video modes, etc.), high/low power transmit switch, ring/alarm mode and/or speaker/mic mode (for earset, handset, etc.). For securing the two halves of the base unit, a flap 43 made of a simple expanding material, which may include a snap means at one end and may be secured with a pin and/or pivot means. The flap would then snap to secure the flat panel display assembly 2 and cover assembly (9, 16, 8). In FIG. 3(a), the flap 43 is shown rotated in the opposite orientation for clarity only. Other securing means may be embodied that are known to those in the art.

FIG. 4(a) shows the portable computer system or computer-display unit 100 covered with a thin soft protective material or film, such as leather or vinyl. This material will protect the unit when it is bumped and/or banged into hard objects while in the use in field or office environments. The protective material may have a texture or roughen surface (as indicated in the figure), which would also provide for a relatively high mechanical friction; so it will be easier to carry under one's arm. Holes or cutouts may be embodied in the protective cover for viewing and/or using the various indicators, switches and keypads. A zipper securing means 45 may be embodied with the notebook, as shown in FIG. 4(a). The zipper means may be attached to the leather or vinyl covers so that the unit can be zipped closed to secure and protect objects placed inside the notebook. A pull tab 45A of the zipper means is shown in the figure. This embodiment would be especially applicable in rugged or harsh environments. A strap 50 may be attached to the unit so that the user may temporarily store it on a hook for example. FIG. 4(b) shows an embodiment of the battery power source section 9. As in previous embodiments, it may be detached from the notebook computer-display unit. A spring loaded pull out power cord 9B may be embodied, so that the user can conveniently pull out the power cord to electrically charge the package. The power cord and plug may be easily retracted inside a cutout space on the side of the subassembly. Several adjunct attachments and/or accessories may be carried in small compartments in the notebook unit. In addition, accessories and attachments may be carried in a separate briefcase or like carrying case (not shown in the figures). Such accessories may include a line power supply and cord, extra battery power source section 9, spare earsets 34, spare handsets 14, external hard drive, external CD ROM drive, external mouse, spare styluses and/or spare video camera/lens 46.

An important advantage of this notebook computer unit invention is that it can be operational when it is in the closed configuration. Thus, while carrying the unit in one's hand or under one's arm, the user can perform voice, data and/or video communications. The notebook unit can be used in an open configuration on a desktop, airline tray or wide variety of other computing environments. The unit can be configured for wire based or wireless communication operations. The unit can be used for general purpose computing, network computing, pen input computing, PCS/Cellular, data/video conferencing, on-line network computing and data collaboration applications. The notebook unit can be used as a personal organizer or personal information manager, such as a computer equivalent of the Franklin Planner™ or equivalent

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planners. A multiplicity of personal computing applications may be embodied on its computer. The unit may be capable of wire or wireless communications, linking it to multiple handsets and earsets. The notebook computer unit may have a plurality of electrical connectors along the edges or other convenient locations for connection to a plurality of external devices, including but not limited to: modems, network interface cards, hard disks, floppy disks, and bus extender enclosures.

Preferably the notebook assemblies should be made relatively thin and light weight that would be an advantage in mobile use. For example, the flat panel display assembly 2 should have a thickness of roughly 0.75 inch or less. The cover assembly may be comprised of the battery power source section 9, keyboard assembly 16, and external communications section 8 should have a thickness roughly 0.75 inch or less; so that the folded total thickness of the unit could be 1.5 inches or less. However, an overall thickness of one inch (i.e. 0.5 inch for each half), or less, may be preferred. A keyboard unit located in keyboard section 16 that may be Model KFNR available from Alps Electric Co. Ltd. This keyboard unit has a thickness of 10 mm, a 3 mm key travel, a 1 mm over travel and a minimum key pitch of 18 mm. Alps Electric also has introduced a 7.5 mm height keyboard assembly a full size keyboard, capable of high speed typing without operator tiring.

FIG. 5 shows another alternate computer notebook embodiment, consisting of a somewhat smaller size flat panel assembly 2, display screen 4, pen/stylus means 7 and a roughly transparent display panel cover 17. The flat display panel could be an LCD, FED, or other type of flat panel display. The panel cover 17 could be made of a hard rigid material or a durable soft polymer material that is roughly transparent to a range of electromagnetic radiation frequencies. This cover may be made optically transparent to let the ambient room light to impinge onto a plurality of photoelectric light sensors 41A, 41B and 41C, which may be placed onto the display panel assembly 2. The photovoltaic or photoelectric light sensors may convert ambient room light to electrical voltages. These sensors may provide power energy to power the unit. The sensors may also help change the unit's battery source. Thus, with the roughly transparent cover 4 closed over the display panel assembly, some light rays will be transmitted through the cover. Photons from the ambient light are converted to an electric voltage, via the sensors and energy conversion circuitry that is applied to the computer unit's power source. Even if the computer unit is turned off and cover closed, the sensor could still be charging its batteries. The roughly transparent cover 17 may be made flexible layers of polyester, polycarbonate or other suitable materials. An advantage of this embodiment is an improvement in maintaining power to the notebook unit for longer periods compared to prior art battery powered units. Information on the display screen may be viewable even with the cover 17 is closed over the flat panel display assembly 2. Viewing of the display screen with the cover closed is an improvement over the opaque covers of conventional notebook computer and PDAs.

FIG. 6(a) shows another embodiment of a thin light weight notebook computer or PDA unit. The cover panel 17 contains a keyboard 16A, which may be a membrane type keyboard. The flat panel display assembly 2, with its display screen 4, is attached to the cover panel 17 by an expandable hinge means 10. The hinge means, which may be elastic or pliable, should be capable of being rotated over angles A. The hinge means should be capable of rotating through roughly 360 degrees, so that the two halves may be folded back onto each other as

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shown in FIG. 6(b). In the configuration of FIG. 6(b), the notebook unit can be held in one's arm, and the display screen can be written onto by a stylus or pen. The unit could also be placed onto the table or desk for convenient viewing. The cover keyboard assembly 17 can be closed to a hold loose sheets of paper, brochures, etc. In this latter case, the size of the panel halves should be slightly larger than 8.5" by 11" to facilitate one carrying loose sheets. Expandable hinge means 10 is designed to expand to accommodate a relatively thick stack of documents. Hinges may be made of pressed pliable corrugated plastic sheets can accommodate 0.5 inch or more gaps.

Various battery power sources 9 may be used in the above embodiments, including smart-battery technology having rechargeable batteries. They may be made capable of monitoring themselves for electrical charge level. Batteries that are suitable for this smart battery technology include nickel-metal hydride (NiMH) and lithium-ion (Li-ion) types. NiMH batteries are more sensitive to overcharge than NiCd batteries. Care must be taken to avoid overcharging that causes heating, which is damaging to the NiMH cycle life and capacity. Li-ion batteries require tight battery management for safety purposes. NiMH batteries are available from Sanyo Energy USA. Several power management and smart-battery devices are available. Duracell has a smart rechargeable battery with intelligent power management circuits for charge level gauge means, as disclosed above. The gauge may constantly show the state of the total battery charge. Advantages of an intelligent battery management system include customer notification of charge state, longer mobile operation times, longer battery lifetimes, and faster charge times. The rechargeable battery and power management circuit may collect and communicate the present and predicted battery data to the host notebook computer under software control.

Wireless communications adapters or modems disclosed in the above embodiments may consist of analog or digital transmitter and receivers, having control circuitry for cellular AMPS, PCS, CDPD, and RF links to wide area communication networks. The communication means disclosed herein may make use of long distance or short distance communications techniques, methods and equipment. Communication techniques may include several types of digital multiplexing and command access schemes such as TDMA, CDMA, GSM, or a combination thereof.

FIG. 7 shows a block diagram of the system elements and associated circuitry, hardware, firmware and software. A microprocessor 38 controls most of the system elements. A computer system I/O bus 60 is shown interfacing several system elements. Many types of microprocessors may be embodied, including 16, 32 or 64 bit processors. The microprocessor may be a complex instruction set computer (CISC) or a reduced instruction computer (RISC) computer types, or a combination of the two. CISC microprocessors that may be embodied, including the Pentium P5 manufactured by the Intel Corporation, the 68000 series microprocessors made by Motorola Corporation. Many types of RISC processors may be embodied, including the ARM series, the UltraSpac by Sun Micro Systems, the SH Series by Hitachi, PowerPC by Motorola and IBM and the MIPS R4000 series by several sources. The above manufactures' references and manuals are hereby incorporated by reference. Since electrical power dissipation is very important in portable systems, RISC microprocessor may have an advantage with smaller transistor counts, low voltages and fully static designs. RISC processors are available at an operating voltage of only 2.0 volts. RISC processors using 0.5 micron CMOS processes have resulted in die sizes for core functions of roughly 4 mm².

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RISC processors can deliver 300-400 Mips/W. Microprocessor 38 may support several types of I/O buses (typically 32 bit wide), such as VL or PCI type buses. Microprocessor and I/O buses are well known to those skilled in the art.

A Microsoft Corporation's Windows™ operating system software may be embodied in the computer system. For these systems, the microprocessor CPU should be at 32 or 64 bit processors, capable of clock speeds in the 100 MHz or more. The microcomputer system may also consist of one or more I/O port means 62. A PC Card interface 27 may be embodied for bus expansion, extended memory or other added circuitry having access to the main bus 60. A mass memory device 42 may be embodied in the system, which typically is a magnetic disk memory hard drive. Many devices may be connected to the computer system, including a smart card interface 46 and keyboard 16. A touch panel and pen input means 7 may be embodied in the system, which may be separate or integrated. Examples of such touch pen devices are available from Elo Touch Systems Inc. in Oak Ridge, Tn., MicroTouch Systems Inc. in Methuen, Mass., and Carroll Touch Corp. in Round Rock, Tex. Pen and touch panel combinations means are available from Scriptel Corp. in Columbus, Ohio for the tablet, and Symbiosis Logic in Colorado Springs for an IC controller. Other pen and touch devices are available from Phillips Semiconductor, Sunnyvale Calif. Other more traditional cursor control devices 56 may be embodied, such as a mouse, trackball, touch pad, or force transducer. Preferably, most of these components should be sufficiently small as to fit into relatively thin display assembly 2.

The flat display panel device 2 is interfaced to the system bus 60 through display controller circuitry 44. Preferably, the display controller should be capable of VGA or SVGA display formats. Integrated into the display controller may be a BitBlt engine (to accelerate graphics), RAMDAC memory, clock synthesizer and display frame buffer. A digital signal processing (DSP) coprocessor 48 may be embodied. The DSP may accept data from many sources including a microphone 36 and video data source 43. The DSP or microprocessor may output signals to one or more audio speakers, as shown as 10A and 10B. Video data may be in either analog or digital form. Microphone 36, and speaker(s) may be embodied in the handset or earset of the previous figures. Video data may be preprocessed by a the DSP. Video sources may include output from video cameras, VCR, broadcast TV, satellite TV or cable TV.

External communication means 54 may be connected to the bus, which may be capable of fast two way data transfers. The communications means 54 should be capable of controlling communications to and from a plurality of wire and wireless communication systems. These include wire based telephone means 53 and wireless communication means 51. The system may include an antenna means 32 for transmitting and receiving electromagnetic radiated signals. External communication means may be connected to one or more information or communication service providers. These service providers may include telephone services (RBOCs, LEC), on-line computer networks, Internet service providers, cable MSOs and/or long distance telephone firms. They also may include cable TV companies, satellite TV service, and LAN/WAN communication network providers. The external I/O port means 62 may be connected to a Universal Serial Bus (USB) and/or an IEEE 1394 (Firewire®) type I/O bus.

FIGS. 8(a) and 8(b) presents a typical flow diagram of computer programs executing in the system of the embodiments disclosed herein. After a power-on action 60, the system may enter a standby power on mode 62. A power management program 66 may then be executed followed by a self

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diagnostic routine 68 that tests the major hardware and firm-
ware elements of the system. If the test fails, a failure report
66 may be generated and either displayed or stored. If the test
passes, the operating system (OS) 70 may be loaded and
executed. With the OS loaded successfully, the system waits
for incoming data and/or voice calls 72. The system may
automatically enter a default system mode, or the user can
select one or more computer or communication modes 76.
The user has the option of selecting several operating modes,
which may include a conventional computing mode 78, a
wireless data communications mode 80, and a wireless voice
communications mode 82. A conventional computing mode
includes typical PC computing or PDA computing. While in
any of the above modes, base unit to external communications
operations 79 may be controlled, which includes data/voice
wire and wireless options. Control code 81 may control the
bi-directional handset or earset to base unit communications
operations. These operations may execute roughly simulta-
neously or on a time shared bases, as indicated by connection
83. Under program control, either the wireless handset or the
earset may communicate data first between the base unit, then
the base unit may relay the data to/from the external commu-
nications network. The above communications may involve
two way or bidirectional communications, including many
types of data (including text, voice, graphics, video and/or
images).

Many types of computer application programs may be
executed by the computer system. For example, one or more
telephony programs 84, office/personal productivity pro-
grams 86, electronic mail or voice mail 88, and Internet/Web
browsing programs 90 may be used. Other PDA, PC or work-
station programs may also be executed. One or more pro-
grams (algorithms or routines) 96 may be used to control this
multiple program or system modes; this may include program
coordination, scheduling and execution. Programs to control
the mobile communications relay functions 98 may be
embodied. Users may have the option to exit the application
programs 100. Typically, after the applications have been
closed, the user may exit the operating system 102. After the
system exits the OS, the system may still may be in a standby
power mode 104, in which the system can answer and process
incoming calls, plus service other requests for other process-
ing tasks. Users may have the option of turning off (or remov-
ing) all power to the unit 106.

It should be further understood that, although a preferred
embodiment of the invention has been illustrated and
described herein. Changes and modifications can be made in
the described arrangements without departing from the scope
of the appended claims. Other embodiments, additions, and
improvements will be obvious to those with an ordinary skill
in the relevant art.

I claim:

1. A notebook computer comprising:

- a) a base housing structure enclosing a keyboard, micro-
processor and other electronics, whereby the base hous-
ing structure forms a first leaf of the notebook computer;

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b) a display panel assembly comprising a flat panel display
and other electronics, whereby the display panel assem-
bly forms a second leaf structure of the notebook com-
puter, and wherein first and second leaves are physically
connected by a hinge;

c) a battery source section comprising a battery and elec-
trical connection, wherein the battery source section is
relatively rigid and thin comparable to the display panel
leaf, and securely connected to the base housing struc-
ture wherein the secure connection prevents the battery
source section from being rotated about any axis, and
wherein the battery source section is adapted to form a
substantial part of the exterior enclosing structure of the
notebook computer; and

d) said battery source section and base housing structure is
adapted to relatively quick physical and electronic con-
nection attach and release function actuated by a user via
a finger push button or tab component, wherein the bat-
tery source section is securely latched to the notebook
computer.

2. A notebook computer as recited in claim 1, wherein the
finger push button or tab component is located on the battery
source section.

3. A notebook computer as recited in claim 1, wherein the
finger push button or tab component is located on the base
housing structure.

4. A notebook computer as recited in claim 1, wherein the
finger push button or tab is located on the battery source
section, located near the opposite ends of the battery source
section.

5. A notebook computer as recited in claim 1, wherein two
finger push buttons or tabs are located on the base housing
structure.

6. A notebook computer as recited in claim 1, wherein the
battery source section is adapted to a relatively large long and
narrow shaped structure, wherein the length of the section
almost extends to the width of the notebook base housing
structure.

7. A notebook computer as recited in claim 1, wherein the
battery source section is adapted to be a re-chargeable battery
unit.

8. A computer display tablet unit comprising:

a) a base housing structure enclosing a display panel,
microprocessor and other support electronics;

b) a battery source section comprising a battery and elec-
trical connections, wherein the battery source section is
relatively rigid and thin, and securely connected to the
base housing structure wherein the secure connection
prevents the battery source section from being rotated
about any axis, and adapted to form a substantial part of
the exterior enclosing structure of the display tablet unit;
and

c) said battery source section and base housing structure is
adapted to quick physical and electronic connection
latching and un-latching via a finger push button or tab
component.

* * * * *

JS 44 (Rev. 12-07)

CIVIL COVER SHEET

The JS 44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I. (a) PLAINTIFFS

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(IN U.S. PLAINTIFF CASES ONLY)

NOTE: IN LAND CONDEMNATION CASES, USE THE LOCATION OF THE
LAND INVOLVED. BY DMX DEPUTY

Attorneys (If Known)

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NLS

II. BASIS OF JURISDICTION (Place an "X" in One Box Only)

- ☐ 1 U.S. Government Plaintiff
☐ 2 U.S. Government Defendant
☒ 3 Federal Question (U.S. Government Not a Party)
☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place an "X" in One Box for Plaintiff and One Box for Defendant)

- Citizen of This State ☒ PTF ☐ DEF
Citizen of Another State ☐ 2 ☐ 2 Incorporated and Principal Place of Business In Another State ☐ 5 ☒ 5
Citizen or Subject of a Foreign Country ☐ 3 ☐ 3 Foreign Nation ☐ 6 ☐ 6

IV. NATURE OF SUIT (Place an "X" in One Box Only)

CONTRACT	TORTS	FORFEITURE/PENALTY	BANKRUPTCY	OTHER STATUTES
<input type="checkbox"/> 110 Insurance <input type="checkbox"/> 120 Marine <input type="checkbox"/> 130 Miller Act <input type="checkbox"/> 140 Negotiable Instrument <input type="checkbox"/> 150 Recovery of Overpayment & Enforcement of Judgment <input type="checkbox"/> 151 Medicare Act <input type="checkbox"/> 152 Recovery of Defaulted Student Loans (Excl. Veterans) <input type="checkbox"/> 153 Recovery of Overpayment of Veteran's Benefits <input type="checkbox"/> 160 Stockholders' Suits <input type="checkbox"/> 190 Other Contract <input type="checkbox"/> 195 Contract Product Liability <input type="checkbox"/> 196 Franchise	PERSONAL INJURY <input type="checkbox"/> 310 Airplane <input type="checkbox"/> 315 Airplane Product Liability <input type="checkbox"/> 320 Assault, Libel & Slander <input type="checkbox"/> 330 Federal Employers' Liability <input type="checkbox"/> 340 Marine <input type="checkbox"/> 345 Marine Product Liability <input type="checkbox"/> 350 Motor Vehicle <input type="checkbox"/> 355 Motor Vehicle Product Liability <input type="checkbox"/> 360 Other Personal Injury PERSONAL INJURY <input type="checkbox"/> 362 Personal Injury - Med. Malpractice <input type="checkbox"/> 365 Personal Injury - Product Liability <input type="checkbox"/> 368 Asbestos Personal Injury Product Liability PERSONAL PROPERTY <input type="checkbox"/> 370 Other Fraud <input type="checkbox"/> 371 Truth in Lending <input type="checkbox"/> 380 Other Personal Property Damage <input type="checkbox"/> 385 Property Damage Product Liability	<input type="checkbox"/> 610 Agriculture <input type="checkbox"/> 620 Other Food & Drug <input type="checkbox"/> 625 Drug Related Seizure of Property 21 USC 881 <input type="checkbox"/> 630 Liquor Laws <input type="checkbox"/> 640 R.R. & Truck <input type="checkbox"/> 650 Airline Regs. <input type="checkbox"/> 660 Occupational Safety/Health <input type="checkbox"/> 690 Other	<input type="checkbox"/> 422 Appeal 28 USC 158 <input type="checkbox"/> 423 Withdrawal 28 USC 157 PROPERTY RIGHTS <input type="checkbox"/> 820 Copyrights <input checked="" type="checkbox"/> 830 Patent <input type="checkbox"/> 840 Trademark SOCIAL SECURITY <input type="checkbox"/> 861 HIA (1395ff) <input type="checkbox"/> 862 Black Lung (923) <input type="checkbox"/> 863 DIWC/DIWW (405(g)) <input type="checkbox"/> 864 SSID Title XVI <input type="checkbox"/> 865 RSI (405(g)) FEDERAL TAX SUITS <input type="checkbox"/> 870 Taxes (U.S. Plaintiff or Defendant) <input type="checkbox"/> 871 IRS—Third Party 26 USC 7609	<input type="checkbox"/> 400 State Reapportionment <input type="checkbox"/> 410 Antitrust <input type="checkbox"/> 430 Banks and Banking <input type="checkbox"/> 450 Commerce <input type="checkbox"/> 460 Deportation <input type="checkbox"/> 470 Racketeer Influenced and Corrupt Organizations <input type="checkbox"/> 480 Consumer Credit <input type="checkbox"/> 490 Cable/Sat TV <input type="checkbox"/> 810 Selective Service <input type="checkbox"/> 850 Securities/Commodities Exchange <input type="checkbox"/> 875 Customer Challenge 12 USC 3410 <input type="checkbox"/> 890 Other Statutory Actions <input type="checkbox"/> 891 Agricultural Acts <input type="checkbox"/> 892 Economic Stabilization Act <input type="checkbox"/> 893 Environmental Matters <input type="checkbox"/> 894 Energy Allocation Act <input type="checkbox"/> 895 Freedom of Information Act <input type="checkbox"/> 900 Appeal of Fee Determination Under Equal Access to Justice <input type="checkbox"/> 950 Constitutionality of State Statutes
REAL PROPERTY <input type="checkbox"/> 210 Land Condemnation <input type="checkbox"/> 220 Foreclosure <input type="checkbox"/> 230 Rent Lease & Ejectment <input type="checkbox"/> 240 Torts to Land <input type="checkbox"/> 245 Tort Product Liability <input type="checkbox"/> 290 All Other Real Property	CIVIL RIGHTS <input type="checkbox"/> 441 Voting <input type="checkbox"/> 442 Employment <input type="checkbox"/> 443 Housing/Accommodations <input type="checkbox"/> 444 Welfare <input type="checkbox"/> 445 Amer. w/Disabilities - Employment <input type="checkbox"/> 446 Amer. w/Disabilities - Other <input type="checkbox"/> 440 Other Civil Rights	PRISONER PETITIONS <input type="checkbox"/> 510 Motions to Vacate Sentence Habeas Corpus: <input type="checkbox"/> 530 General <input type="checkbox"/> 535 Death Penalty <input type="checkbox"/> 540 Mandamus & Other <input type="checkbox"/> 550 Civil Rights <input type="checkbox"/> 555 Prison Condition		

V. ORIGIN

- (Place an "X" in One Box Only)
☒ 1 Original Proceeding
☐ 2 Removed from State Court
☐ 3 Remanded from Appellate Court
☐ 4 Reinstated or Reopened
☐ 5 Transferred from another district (specify)
☐ 6 Multidistrict Litigation
☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION

Cite the U.S. Civil Statute under which you are filing (Do not cite jurisdictional statutes unless diversity):
28 U.S.C. 2201

Brief description of cause:

Declaratory judgment of ownership and to quiet title to seven United States patents

VII. REQUESTED IN COMPLAINT:

☐ CHECK IF THIS IS A CLASS ACTION UNDER F.R.C.P. 23
 DEMAND \$

CHECK YES only if demanded in complaint:

JURY DEMAND: ☒ Yes ☐ No

VIII. RELATED CASE(S) IF ANY

(See instructions):

JUDGE

DOCKET NUMBER

DATE

7-31-09

SIGNATURE OF ATTORNEY OF RECORD

FOR OFFICE USE ONLY

RECEIPT #

AMOUNT

APPLYING IFP

JUDGE

MAG. JUDGE

Court Name: USDC California Southern
Division: 3
Receipt Number: CAS003692
Cashier ID: sramirez
Transaction Date: 07/31/2009
Payer Name: AMERICAN MESSENGER SVCS

CIVIL FILING FEE
For: DITZIK V. PANASONIC CORP.
Case/Party: C-CAS-3-09-CV-001661-001
Amount: \$350.00

CHECK
Check/Money Order Num: 2381
Amt Tendered: \$350.00

Total Due: \$350.00
Total Tendered: \$350.00
Change Amt: \$0.00

There will be a fee of \$45.00
charged for any returned check.