(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
27 February 2003 (27.02.2003)

PCT

(10) International Publication Number
WO 03/017189 A1

(51) International Patent Classification[7]: G06K 13/00

(21) International Application Number: PCT/US02/25827

(22) International Filing Date: 15 August 2002 (15.08.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/929,925 15 August 2001 (15.08.2001) US

(71) Applicant: **EXADIGM, INC.** [US/US]; 2500 Redhill Avenue, Suite 100, Santa Ana, CA 92705 (US).

(72) Inventor: **ENGSTROM, Rolf, G.**; 12 Spring Buck, Irvine, CA 92614 (US).

(74) Agent: **SATERMO, Eric, K.**; P.O. Box 19099, Irvine, CA 92623-9099 (US).

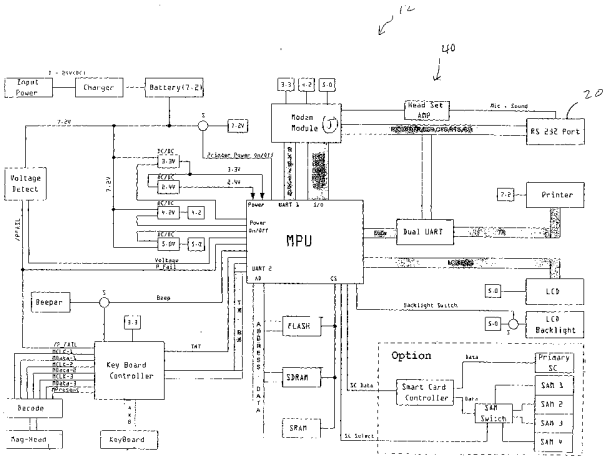
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: UNIVERSAL POINT-OF-SALE (POS) DEVICE WITH INTERCHANGEABLE COMMUNICATION MODULES



(57) Abstract: A point-of-sale (pas) device (10) includes a main body (12) and a communication module (14). The main body (12) includes a main circuit (40) for performing point-of-sale functions and an interface (16) having a port (20) in communication with the main circuit (40) and a physical connection apparatus (22). The communication module (14) includes a modem circuit (36) for operating in accordance with a modem protocol and an interface (18). The interface (18) of the communication module (14) has a port (24) in communication with the modem circuit (36) and for connecting to the port (20) of the interface (16) of the main body (12), and a physical connection apparatus (26) for releasably engaging with the physical connection apparatus (22) of the interface (16) of the main body (12). The interface (18) of the communication module (14) is configured to be complementary with the interface (16) of the main body (12) such that when the physical connection apparatus (22,26) are engaged, the ports (20, 24) are connected.

WO 03/017189 A1

UNIVERSAL POINT-OF-SALE (POS) DEVICE WITH INTERCHANGEABLE COMMUNICATION MODULES

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to devices that communicate data and, more particularly, to point-of-sale (POS) devices with a modem for communicating data.

Description of Related Technology

[0002] Point-of-sale (POS) devices have become ubiquitous in the retail industry. Nearly every retail establishment has a POS device or terminal at the cash register so that electronic transactions may take place. POS devices enable electronic transactions by swiping a credit or debit card, reading account information stored on the magnetic strip of the card, communicating with a remote host system or automated clearing house, and receiving verification that funds are available for the amount of the purchase. Conventional POS terminals may include any number of additional devices, such as a keypad, a printer unit, a signature capture unit, a fingerprint unit, and so on.

[0003] As mentioned, POS terminals need to communicate with a remote system during an electronic transaction. The communication may take place on a telephone line or wirelessly. In either case, there are any number of communication protocols in use today that may be employed for this purpose. For example, there are a number of modem protocols based on technologies such as CDPD, Motient, Mobitex, GSM, and CDMA. Alternatively, infrared, Bluetooth, and other radio frequency (RF) protocols are used to communicate data. Still other communication technologies included GPS, Ethernet LAN, IEEE 802.11b, and IEEE 802.11 DSSS WLAN.

[0004] This wide variety of communication protocols leads to one of the drawbacks in the art of POS devices, namely, dedicated POS devices need to be manufactured for each of the communication protocols in use. At the manufacturing end, this entails large installations and dedicated assembly lines for each protocol-dependent POS device. In addition, correspondingly large warehousing facilities need to be maintained for adequate inventory.

[0005] In view of the foregoing, there is a need in the art for a universal POS device that enables communication in any desired protocol while reducing the manufacturing costs and complexity.

SUMMARY OF THE INVENTION

[0006] The present invention provides a universal point-of-sale (POS) device that has a single main body that is configured so that a plurality of interchangeable communication modules are attachable thereto and detachable therefrom. Each of the communication modules is configured to communicate data in accordance with a respect protocol. Accordingly, all retail establishments purchase the same main body, and then select one of the communication modules to configure the main body to communicate in accordance with a desired protocol. Accordingly, from a manufacturing standpoint, the POS device of the present invention is highly favorable in that only a single universal main POS body needs to be fabricated in conjunction with a plurality of the less complicated and less expensive communication modules.

[0007] According to one aspect of the invention, a point-of-sale (POS) device includes a main body and a communication module. The main body includes a main circuit for performing point-of-sale functions and an interface having a port in communication with the main circuit and a physical connection apparatus. The communication module includes a modem circuit for operating in accordance with a modem protocol and an interface. The interface of the communication module has a port in communication with the modem circuit and for connecting to the port of the interface of the main body, and a physical connection apparatus for releasably engaging with the physical connection apparatus of the interface of the main body. The interface of the communication module is configured to be complementary with the interface of the main body such that when the physical connection apparatus are engaged, the ports are connected.

[0008] As mentioned, one of the advantages of the invention is that a plurality of communication modules may be manufactured, each with a modem circuit operating in accordance with a respective modem protocol, with each communication module being compatible with a single universal main body.

[0009] According to a preferred embodiment, the physical connection apparatus of the main body includes a pair of slots, and the physical connection apparatus of the communication module includes a pair of rails configured to slidingly engage with the rails. Alternatively, the physical engagement apparatus of the main body may include one or more sockets, and the physical interface apparatus of the communication module may include a respective number of pins configured to releasably engage with the sockets when the rails are engaged with the slots. Accordingly, the physical interface apparatus is configured to align the ports, for example, RS-232 ports, for effective communication with engaged.

[0010] Additional aspects, features, and advantages of the present invention will become apparent to those skilled in the art from a consideration of the following detailed description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0011] FIG. **1** is a perspective view of an exemplary universal point-of-sale (POS) device configured in accordance with the present invention, which POS device is configured so that a communication module with a particular modem protocol is detachable and connectable thereto;

[0012] FIG. **2** is a fragmentary perspective view of a universal POS device with an interchangeable communication module, particularly illustrating a physical interface of a main body of the POS device and that of a communication module;

[0013] FIG. **3** is a fragmentary perspective view of a universal POS device with a plurality of interchangeable communication modules;

[0014] FIG. **4** is a block diagram of an exemplary communication module configured in accordance with the present invention;

[0015] FIG. **5** is a block diagram of an exemplary universal POS device in accordance with the present invention;

[0016] FIG. **6** is a fragmentary perspective view of a universal POS device with an interchangeable communication module, particularly illustrating an alternative embodiment of a physical interface of a main body and that of a communication module; and

[0017] FIG. **7** is a perspective view of the communication module of FIG. **6**.

DETAILED DESCRIPTION OF THE INVENTION

[0018] Referring more particularly to the drawings, an exemplary embodiment of a universal point-of-sale (POS) device in accordance with the principles of the present invention is illustrated in FIG. **1** and indicated with reference numeral **10**. Exemplary POS device **10** generally includes a main body **12** and a communication module **14**. With additional reference to FIG. **2**, the main body **12** and the communication module **14** each have a physical interface **16** and **18**, respectively, which are complementarily configured so that the communication module **14** is releasably attachable to the main body **12**.

[0019] More specifically, in accordance with a preferred embodiment of the present invention, the main body **12** of the universal POS device **10** is configured so that a plurality of interchangeable communication modules **14a**, **14b**, ..., **14*n*** are attachable to and detachable from the main body **12** as shown in FIG. **3**. Accordingly, the physical interface **18** of each module **14** is configured substantially identically to be complementary with interface **16** of the main body **12**, while the modem circuitry thereof is unique to each module **14**, which is discussed in more detail below.

[0020] In accordance with a preferred embodiment as shown in FIG. **2**, the physical interface **16** of exemplary main body **12** may include a port **20** and physical connection apparatus such as slots **22**, and the physical interface **18** of each communication module **14** may include a port **24** and complementary physical connection apparatus such as rails **26**. The slots **22** and the rails **26** may be longitudinally configured so that the rails **26** slidingly engage with the slots **22**. The physical engagement apparatus of interface **16** may also include one or more sockets **28**and **18** may include one or more sockets **28**, and the physical interface apparatus of interfaces **18** may include a respective number of pins **30**. The sockets **28** and the pins **30** are preferably configured to releasably retain the communication module **14** on the main body **12** when the rails **26** are fully engaged or received within the slots **22**. The port **20** and the ports **24** may be configured as any type of known data port, such as RS-232 ports or TTL ports.

[0021] In accordance with the present invention, a single universal main body **14** is compatible with a plurality of communication modules **14a–14*n*** each configured in accordance with a respective modem protocol. More specifically, as shown in FIG. **4**, each communication module **14** includes a modem board **32** with an interface **34** connected to the port **24** and a modem circuit **36** connected to the interface **34**. The modem circuit **36** is configured to operate in accordance with a particular modem protocol, for example, CDPD, Motient, Mobitex, GSM, GPRS, CDMA, and 1xRTT, which protocols are known in the art. More specifically, with additional reference to FIG. **3**, the modem circuit **36** of each of the modules **14** is configured in accordance with a respective modem protocol so that the POS device **10** may be user configured to operate in accordance with a desired modem protocol.

[0022] In this regard, to configure the POS device **10** to communicate data in accordance with a desired protocol, one of the communication modules **14** is selected and connected to the main body **12**. If it is preferable to change the communication protocol, then the module **14** may be disconnected from the main body **12**, with another module **14** being selected and then

connected to the main body **12**. Accordingly, depending upon the type of installation, a user may customize the POS device **10** to operate in accordance with a desired modem protocol.

[0023] In addition, each communication module **14a–14*n*** includes a housing **38**. Preferably, the housing **38** of each module **14** is configured to accommodate a single one of the protocol-specific modem boards **32**. Also, to maintain uniformity between the communication modules **14**, it may be preferable to configure the housing **38** of each communication module **14a–14*n*** identically.

[0024] Referencing FIG. **5**, a block diagram of circuitry **40** for the main body **12** of the universal POS device **10** of the invention is illustrated. As shown, the main circuitry **40** includes the single port **20** for connecting with the port **24** of each communication module **14**. In the preferred embodiment shown in the drawings, the main circuitry **40** is configured to carry out functions necessary for performing point-of-sale transactions, as known in the art.

[0025] The present invention has been heretofore described in reference to a preferred embodiment of a POS device. However, the principles of the invention are applicable to any device with a removable communication module. For example, referencing FIG. **4**, the main body **12** and circuitry **40** may be configured as any type of communication device, with module **14** configured as a communication module that is removable from the main body **12**. For example, exemplary module **14** may be configured to communicate date in accordance with any known communication technology, such as Ethernet protocol, cellular, radio frequency such as Blue Tooth, and so on. In other words, exemplary module **14** may be configured as a communication module in which the modem circuitry **36** is configured to transmit and receive data in accordance with any type of technology. Accordingly, while a preferred embodiment of the invention encompasses modem technology for the module **14**, the universal communication device **10** may be configured as any type of communication device with a removable communication module **14**.

[0026] Those skilled in the art will understand that the preceding exemplary embodiments of the present invention provide the foundation for numerous alternatives and modifications thereto. For example, with reference to FIGS. **6** and **7**, the physical connection apparatus of the module **14** may include a screw **42** and the physical connection apparatus of the main body **12** may include a corresponding hole **44**. Accordingly, to connect the module **14** to the body **12**, the pins **30** may be coupled with the sockets **28**, thereby aligning the connectors of the ports **20** and **24**, with the screw **42** then being engaged with the hole **44**. These other modifications are also

within the scope of the present invention such that the present invention is not limited to that precisely as shown and described in the present invention.

CLAIMS

What is claimed is:

1. A point-of-sale (POS) device with a removable communication module, the POS device comprising:

a main body including a main circuit for performing point-of-sale functions and an interface having a port in communication with the main circuit and a physical connection apparatus; and

a communication module including a modem circuit for operating in accordance with a modem protocol and an interface having:

a port in communication with the modem circuit and for connecting to the port of the interface of the main body; and

a physical connection apparatus for releasably engaging with the physical connection apparatus of the interface of the main body;

the interface of the communication module configured to be complementary with the interface of the main body such that when the physical connection apparatus are engaged, the ports are connected.

2. A POS device as claimed in claim **1** wherein the physical connection apparatus of the main body includes a pair of slots, and the physical connection apparatus of the communication module includes a pair of rails configured to slidingly engage with the rails.

3. A POS device as claimed in claim **2** wherein the physical engagement apparatus of the main body includes at least one socket, and the physical interface apparatus of the communication module includes a respective number of pins configured to releasably engage with the sockets when the rails are engaged with the slots.

4. A POS device as claimed in claim **1** wherein each of the ports is a RS-232 port.

5. A POS device as claimed in claim **1** wherein the modem circuitry is configured to operate in accordance with a modem protocol selected from a group consisting of CDPD, Motient, Mobitex, GSM, GPRS, CDMA, and 1xRTT.

6. A POS device as claimed in claim **1** further comprising a plurality of the communication modules;

the modem circuit of each of the communication modules being configured to operate in accordance with a respective modem protocol; and

each of the communication modules being releasably connectable to the main body.

7. A POS device as claimed in claim **6** wherein the interfaces of the communication modules are configured substantially identically.

8. A POS device as claimed in claim **6** wherein each of the communication modules includes a housing;

the housings being configured substantially identically.

9. A communication device with a removable communication module, the device comprising:

a main body including a main circuit and an interface having a port in communication with the main circuit and a physical connection apparatus; and

a communication module including a communication circuit configured to transmit and receive data and an interface having:

a port connected to the communication circuit and for releasably connecting to the port of the interface of the main body; and

a physical connection apparatus for releasably engaging with the physical connection apparatus of the interface of the main body;

the interface of the communication module configured to be complementary with the interface of the main body such that when the physical connection apparatus are engaged, the ports are connected.

10. A method for configuring a point-of-sale (POS) device to transmit data in accordance with a modem protocol, the method comprising:

a) providing a POS main body including a main circuit for performing point-of-sale functions and an interface having a port in communication with the main circuit and a physical connection apparatus; and

b) providing a communication module including a modem circuit for operating in accordance with a modem protocol and an interface having:

a port in communication with the modem circuit and for connecting to the port of the interface of the main body; and

a physical connection apparatus for releasably engaging with the physical connection apparatus of the interface of the main body;

c) connecting the communication module to the main body by engaging the physical connection apparatus together so that the ports are connected to enable data communication therebetween.

11. A method as claimed in claim **10** further comprising:

d) disconnecting the communication module from the main body by disengaging the physical connection apparatus.

12. A method as claimed in claim **11** further comprising:

repeating steps (c) and (d).

13. A method as claimed in claim **10**:

wherein step (b) comprises providing a plurality of communication modules with the modem circuit of each being configured to operate in accordance with a respective modem protocol;

further comprising selecting one of the communication modules; and

wherein step (c) comprises connecting the selected communication module to the main body.

14. A method as claimed in claim **13** further comprising:

d) disconnecting the selected communication module from the main body;

e) selecting another one of the communication modules; and

f) connecting the selected communication module.

15. A method as claimed in claim **14** further comprising:

repeating steps (d) to (f).

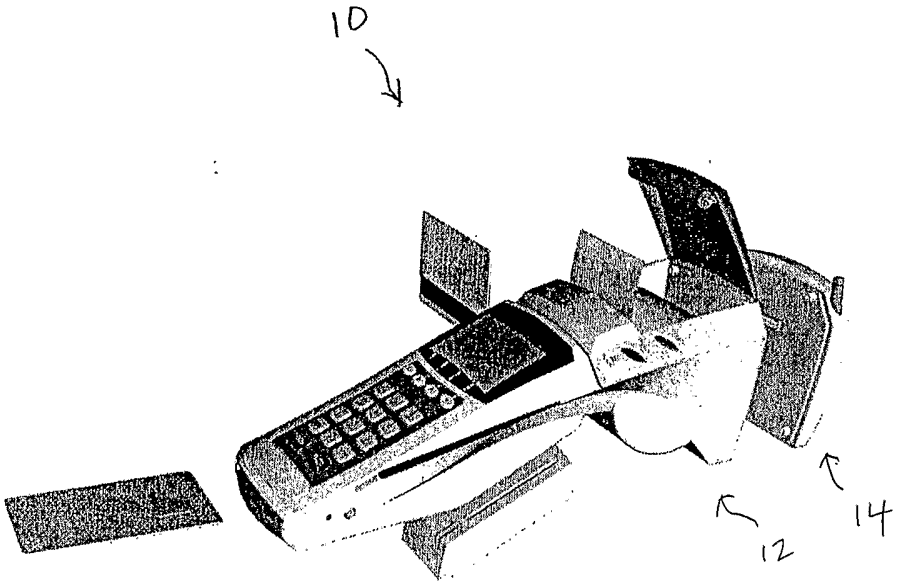


FIG. 1

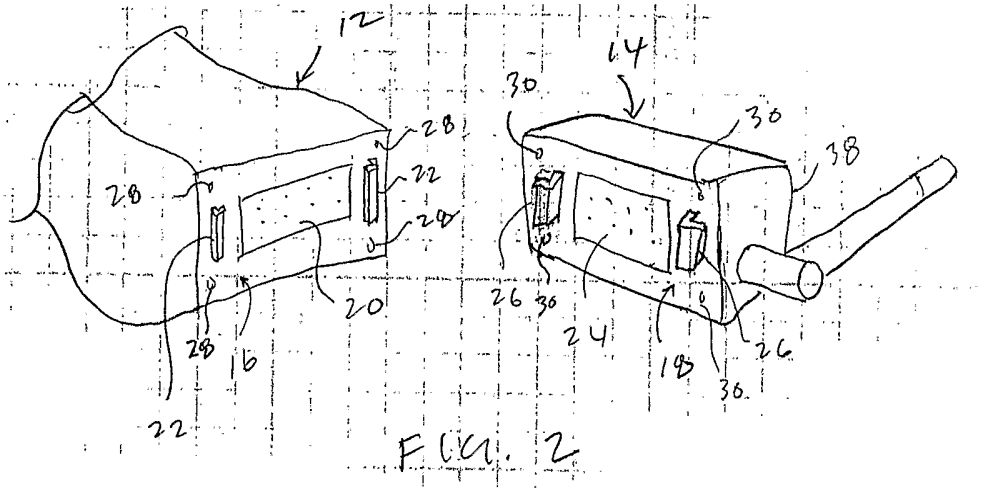

12
14
30
28
22
24
20
26
16
18
38

FIG. 2

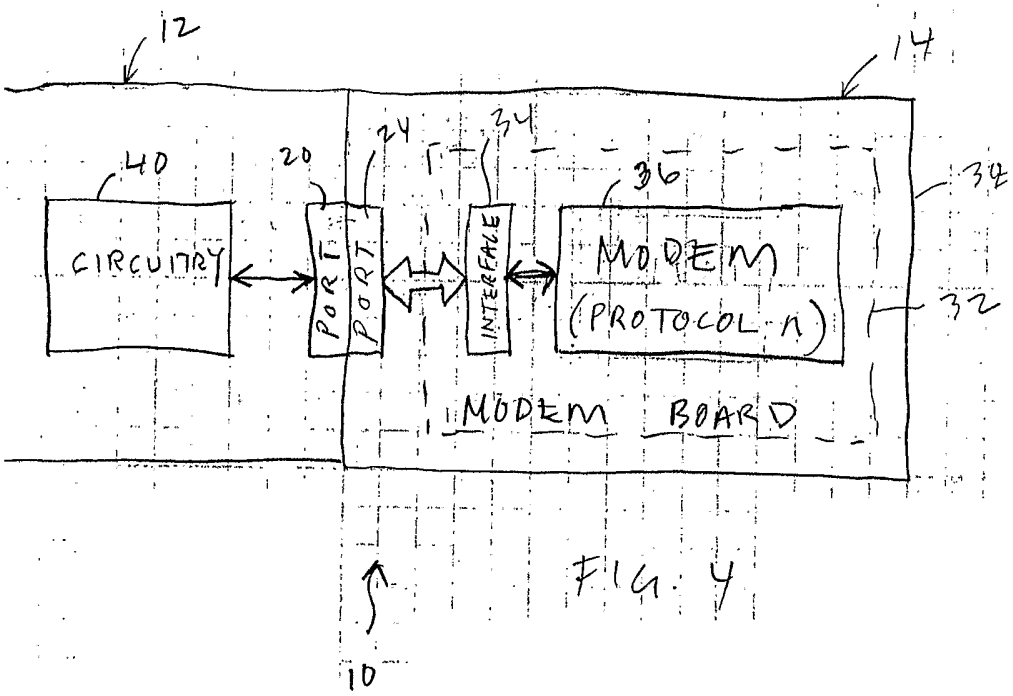

12
14
40
20
24
34
36
38
CIRCUITRY
PORT
PORT
INTERFACE
MODEM
(PROTOCOL n)
32
MODEM BOARD
10

FIG. 4

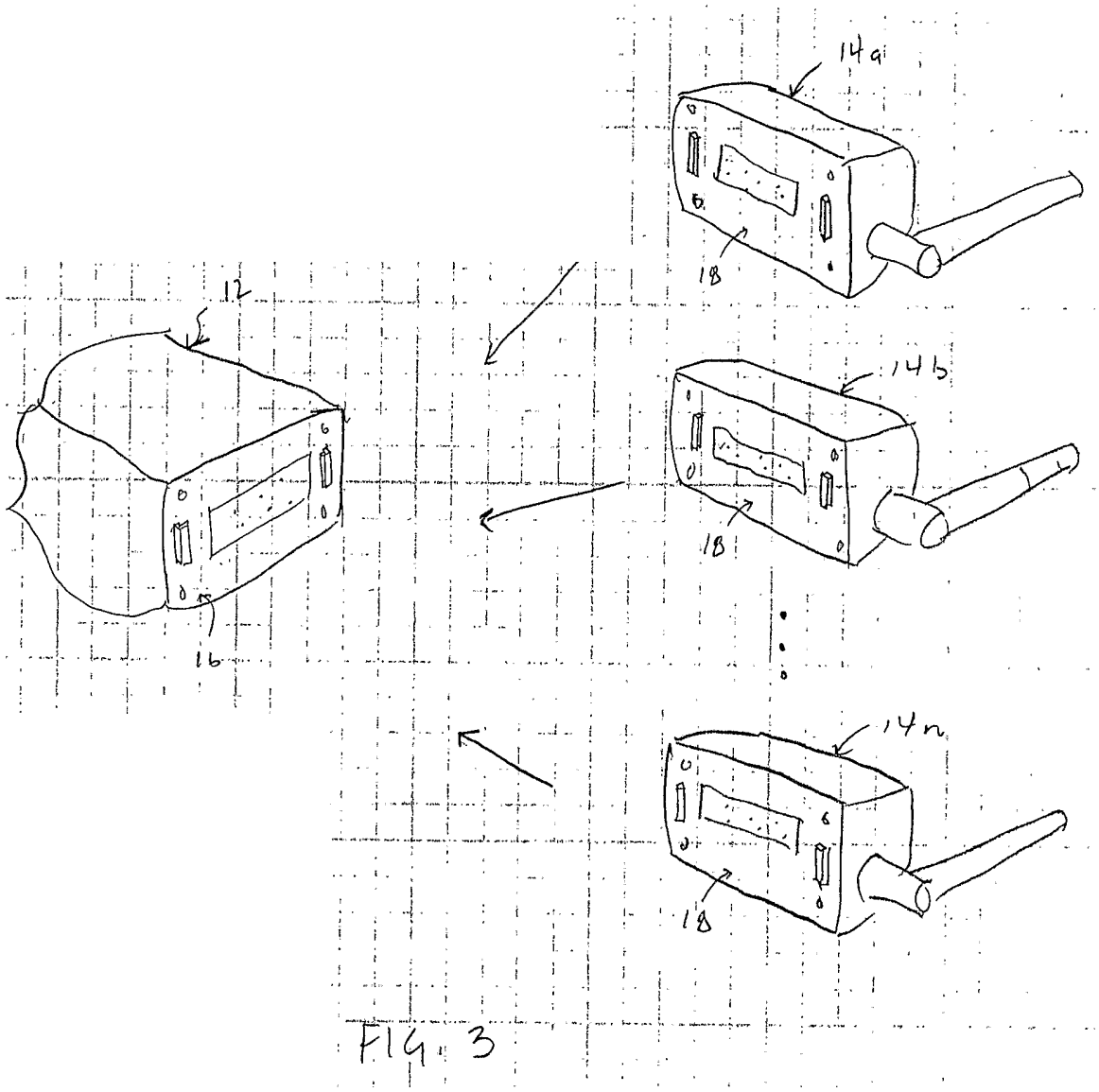


FIG. 3

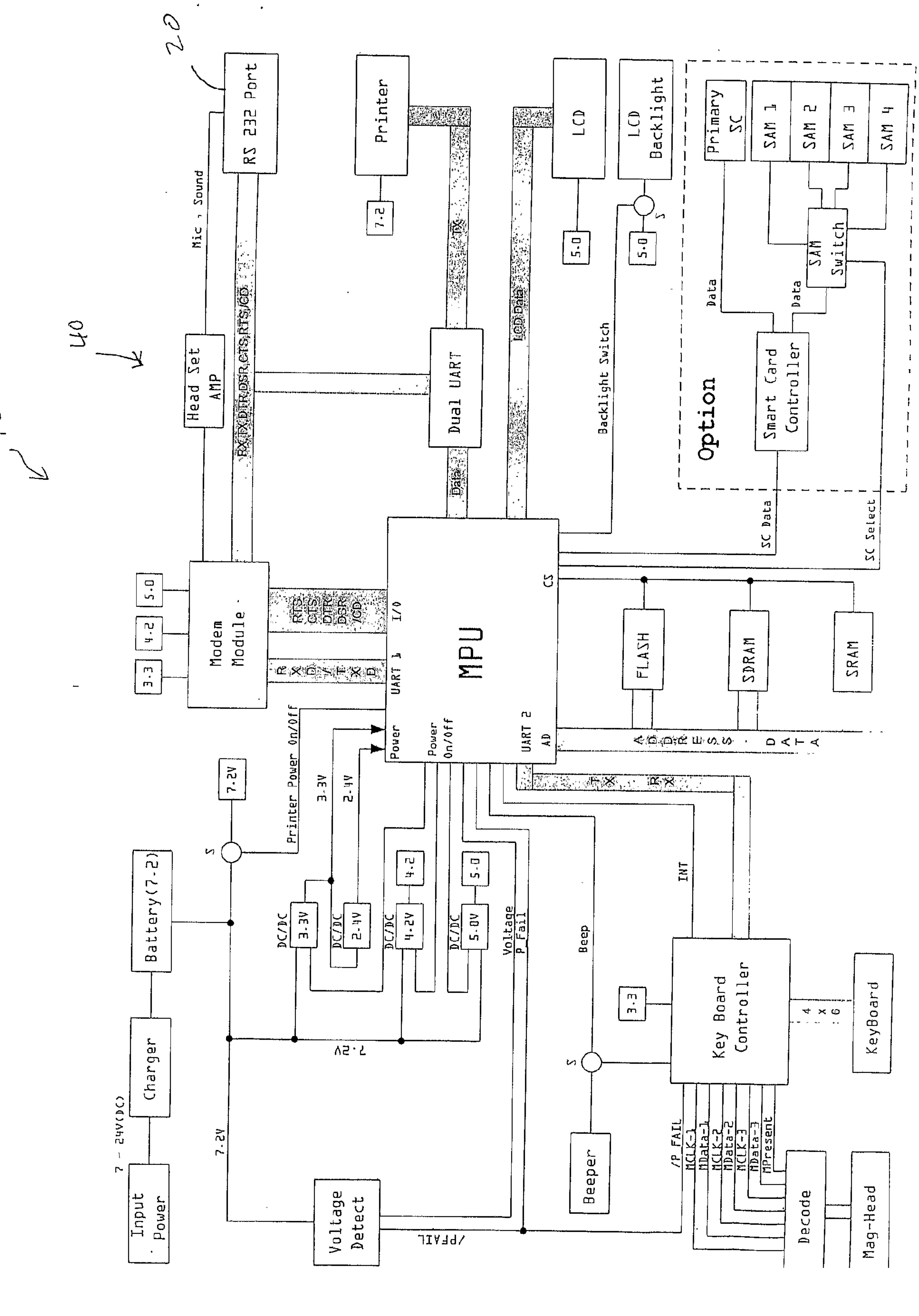

RS 232 Port
Printer
LCD
LCD Backlight
Primary SC
SAM 1
SAM 2
SAM 3
SAM 4
SAM Switch
Data
Smart Card Controller
Option
Mic , Sound
Head Set AMP
RX,TX,DTR,DSR,CTS,RTS,CD
Dual UART
TX
LCD Data
Backlight Switch
SC Data
SC Select
Modem Module
MPU
I/O
UART 1
UART 2
AD
CS
Power
Power On/Off
FLASH
SDRAM
SRAM
ADDRESS
DATA
Printer Power On/Off
Battery(7.2)
Charger
Input Power
7 - 24V(DC)
DC/DC
3.3V
2.4V
4.2V
5.0V
7.2V
Voltage
P_Fail
Voltage Detect
/PFAIL
Beep
Beeper
INT
Key Board Controller
KeyBoard
4 x 6
/P_FAIL
MCLK-1
MData-1
MCLK-2
MData-2
MCLK-3
MData-3
MPresent
Decode
Mag-Head
12
20
40

FIG. 5

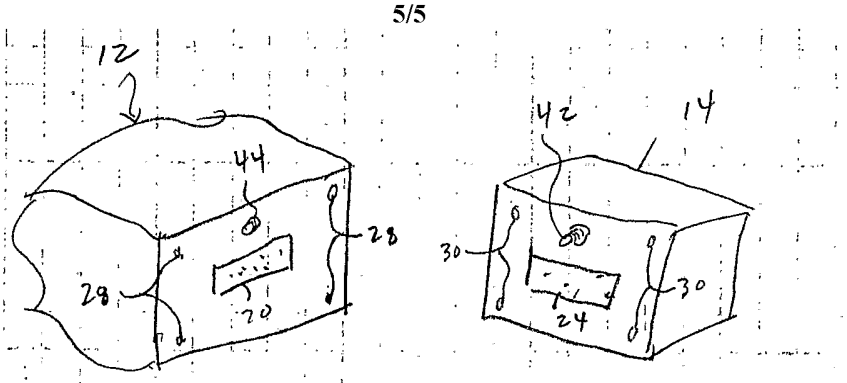


Fig. 6

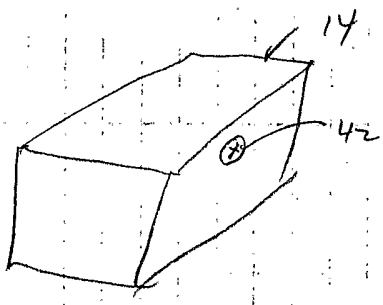


Fig. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US02/25827

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :G06K 13/00

US CL :710/2,4,5,8,12,20,240; 235/462.47

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 710/2,4,5,8,12,20,240; 235/462.47

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,065,679 A (Levie et al.) 23 May 2000, Abstract, figures 7,13 and 17, column 1, line25-column 3, line 20, column 66, lines 29-67.	1-15
A/P	US 6,356,794 A (Perin, Jr. et al.) 12 March 2002, entire document	1-15

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

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

Date of the actual completion of the international search 15 OCTOBER 2002	Date of mailing of the international search report 21 NOV 2002
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer Jeffrey A. Gaffin Telephone No. (703) 308-3301

Form PCT/ISA/210 (second sheet) (July 1998)★